

**HOW I WROTE THE FLORA OF THE NORTHEAST:
A MANUAL OF THE VASCULAR FLORA OF NEW ENGLAND
AND ADJACENT NEW YORK**

DENNIS W. MAGEE
762 Townsend Road
Groton, Massachusetts 01450

I was born and raised in rural Massachusetts and spent many hours throughout my youth as a hunter, trapper, and fisherman. It was only fitting that I would develop an intense interest and knowledge of natural history. In those early years I acquired a particular fondness for wild plants and for the places where they grow. Early in my career as an environmental consultant I spent many hours identifying wetlands and delineating their boundaries. This led to the writing of my first book “Freshwater Wetlands: A Guide to Common Indicator Plants of the Northeast” (1981). Over time my floristic interests expanded, leading me into the interior as well as the coastlines of New England, where I became intimately acquainted with the floras of a wide variety of habitats throughout this region as well as the Midwest and the mid-Atlantic states. Early in my professional life, the possibility of writing a regional flora seemed unlikely. Four of them already existed, and they effectively treated the vascular flora of greater New England, so the likelihood of me producing something novel seemed low.

It wasn't until I met Mr. Harry Ahles in the early 1970's as a grad student at the University of Massachusetts, Amherst, and studied under his tutelage that I began to realize the value and need to produce a modern flora for the region, one that would incorporate the latest taxonomic and nomenclatural standards into a descriptive text and blend these with easy to use keys, illustrations, and county-level distribution maps. This combination of objectives offered compelling justification for writing a new regional flora for greater New England, since none that had been written provided such features in combination.

The Influence of Harry Ahles

Mr. Ahles, or Harry as I knew him, was an exceptionally talented field botanist. As Dr. Arthur Cronquist once described him “He was simply one of the best plantsmen I've ever met”. And, indeed, he was. Harry had a profound memory and an exceptionally keen eye for depicting subtle morphological details useful for separating closely related plant species. He had no college training and started work in his late teens as a groundsman at the New York Botanical Garden. Over the decades he studied and came to know the floras of eastern North America from the Carolinas to the Florida Keys and northward from Illinois to eastern Canada. He had worked with Dr. Jones to produce the flora of Illinois and with Drs. Radford and Bell to produce the Flora of the Carolinas. He came to the UMass Amherst Botany Department in the late 1960's. When I once asked him how many species he thought he knew on sight, he estimated over 7,000.

Harry had many colleagues and acquaintances but few friends. During the 11 years I mentored and worked with him, we became close friends. I helped him build his log cabin on Horse Mountain in Hatfield, Massachusetts. I stayed at his cabin on weekends and, after breakfast at a local diner, would spend the day with him collecting plants for the UMass Amherst Herbarium. What I learned most from Harry was not so much field identification skills but more how to think about classification and how to construct useful keys. Notwithstanding his eye for subtle details, Harry was not a splitter, quite the opposite. In fact, he disdained taxonomists with the mindset of naming new species using criteria that don't stand up.

Although the interior of his cabin looked messy and chaotic, he always knew where everything was and had a very well-organized mindset. Field botany was his whole life, and he

usually worked 90 to 100 hours a week. In his youth he had a close relationship with a young woman that went sour and ever since then he swore off serious relationships with women and threw himself into his work. He could be very opinionated and stubborn as a mule, and I never dared to argue with him for fear of losing the friendship. But a more loyal friend one could not have; when I was newly married and building my house, he offered to lend me every dollar he had on no more than my word to repay him. Each year he had a tradition of baking Christmas cookies — several dozen batches of 50 or so each that he gave out randomly. He passed away in March, 1981, at the age of 57, from complications arising from surgery to remove a tumor from his lung. His untimely passing was a great personal loss to me as well as to the botanical community.

How I Proceeded

My opportunity to actually write the Flora came following Harry's passing. As a faculty member in the UMass Amherst Botany Department, he taught courses in field botany in addition to his role as herbarium curator. As part of his curatorial duties he established and maintained a large file of distribution records for the 3,800 or so species of plants in New England and adjacent New York. He also wrote keys for his use in teaching. As a faculty member he was also under some pressure to publish, and he represented his work on the keys as part of a flora for New England that he was working on. He told me on several occasions that he intended to publish a book strictly of keys. I often wondered whether he would have ever completed it because I observed him involved with his herbarium duties for 80 to 90 hours a week. During the last several years of his life he wasn't, to my knowledge, actively working on completing the keys.

Shortly after Mr. Ahles' death, I petitioned the Botany Department for permission to take the information he had assembled and write a flora for New England and the adjacent New York counties; I also needed permission from his sister, Marjorie Armstrong. There were others also interested in gaining access to Harry's files, including staff at Harvard University, who were interested mainly in his distribution data. Based on my long association with Harry, during which I spent much time with him in the field, the Botany Department and Harry's sister selected me to undertake the work. The challenge would be how to carve out a significant amount of time for this new endeavor in a schedule that was already full with a career in environmental consulting and a family. The task turned out to be several orders of magnitude more difficult and time-consuming than I'd imagined.

But I was strongly committed to the project, to see it through to completion regardless of the time it would take. I realized that circumstances afforded me a unique opportunity to make a significant, long-term contribution to field botany by writing a new regional flora. I was particularly interested in writing good keys. In the past, whenever I was on a serious mission to inventory plants I needed to bring along a half dozen or so field guides and manuals. Some resources had good keys for some groups of plants and others for other genera and species; principal authors often used various specialists to treat certain groups and so the treatments throughout such a manual were often uneven, some good and some not so good. I wanted to write a manual having treatments for all the plants in our region that would be useable for much of the year and that would be user-friendly. Also, Harry had done a lot of work on keys and distributions and I wanted to make best use of what he had produced, which would otherwise be lost to science.

To produce a finished flora from the partially completed keys and the distribution data turned out to be an enormous effort that required 20-25 hours per week over a period of 17 years. To honor my other commitments, I arose week days at 2:45 AM and put in 3 ½-4 hours each day before work. I also worked many weekends at the UMass Herbarium, and also put in a lot of time over holidays and vacations. I thought that a complete regional flora required excellent keys, family and genus descriptions, species accounts, diagnostic illustrations, and county-level range maps. I greatly admired the "Flora of the Carolinas" that Harry had co-authored and wanted to use the same format

and design for this work. I have always thought that photographs are useless in showing important diagnostic features while adding greatly to the production cost of a book, and so I've never used any. A major advantage in writing a flora is being in control of its content and design. I decided to call the book "Flora of the Northeast: A Manual of the Vascular Flora of New England and Adjacent New York."

I am describing my work on the Flora because I've come to regard it as a major portion of my life's work and also because I'm not aware of anyone who has given a full account of such an undertaking. I also thought it might be helpful to give others at least one man's perspective on how one goes about preparing a major regional flora. I can honestly say that I spared nothing as to level of effort, thoroughness, and what personal finances I could afford to produce the best possible flora for our region. In hindsight, I would not have done anything any differently.

Plant Distributions

The first task in writing a flora is to compile a list of all species having records of occurrence in the region to be covered by the flora. Fortunately, this information mostly resided in the 12-ring binder set of notebooks that Harry kept in the UMass Herbarium. All the data were at the county level for our Flora region. Just prior to his death, he had taken a one and one half year leave of absence from the Department to visit all the major herbaria in New England and eastern New York to update his file. He would work 80 to 90 hours a week taking off only one day but accomplished his goal. After Harry's death I did an extensive literature review to capture any records subsequent to his work. Harry's information was also used by the Massachusetts Natural Heritage Program in preparing an updated checklist for part of our area (published in 1999). They visited major herbaria to document collections made since 1981, and in comparing their more recent work with Harry's distribution data, a high level of congruence was found. As an added measure I obtained the list of plant names for our region from Dr. John Kartesz from the Biota of North America Program and added any data that were missing to my file.

After this process I felt I had a solid basis for the plant species I needed to include in the Flora, which came to around 3,600 species. For every species with more than three occurrences in the region covered by the Flora, I prepared a range map. For those with fewer occurrences I noted the data in the species account. To do this I mass produced maps showing state and county boundaries for New England and adjacent New York, and then placed a dot in each county having an occurrence record from my file. In all I prepared over 2,400 county-level distribution maps for the Flora. Owing to time constraints I wasn't able to make another circuit to revisit all the herbaria.

Keys and Descriptions

I feel that the most important part of any flora is its keys, and I spent an inordinate amount of time on these. I shared Harry's views of wanting keys that were accurate yet user friendly and useful for as much of the year as possible. And so, I used vegetative structures as much as practicable in addition to flowering and fruiting structures. For woody plants I included a key to genera in winter condition and descriptions of twig, bud, and other features useful for winter identification that I placed in the genus accounts. Overall, I spent around 12 of the 17 years required to complete the work on the keys and descriptions.

In writing the keys I always prepared the species keys of a genus first and then a key to the genera in the family. Harry had completed keys for many of the genera, had partly completed others, and for some genera had no keys. And so, I used the information he had completed as a data source, and also consulted other floras and monographs. I used these sources to compile a list of plant characteristics that had been found to be useful in distinguishing one species from another. I then constructed a matrix of characteristics and species and filled in the matrix cells with information from the literature on each species; such information included measurements and similar empirical data. I

then went to the UMass Herbarium and pulled out a folder of usually one to two dozen sheets for each species. I then examined each sheet, took my own measurements and other observations, and added these to the matrix cells. Over the course of this research I examined tens of thousands of herbarium sheets.

Over the many years that botanists have been studying the temperate flora, all the important diagnostic features that distinguish a species from others had pretty much been discovered. What was different among the various floras was the hierarchy used by various writers to arrange the data and design the keys. By the time I had gone through the literature and plant specimens for all the species in a genus and had completed my matrices, I had a clear idea on how to design a key that I felt accomplished my objectives. In writing the keys to the genera I pretty much used the same process. Throughout the 12 or so years I worked on the keys, I was spending a lot of time in the field inventorying vegetation as part of my work as an environmental consultant. Throughout this time, I and my staff of three botanists at Normandeau Associates, Environmental Consultants (Bedford N.H.) field-tested the keys I had completed up to that time, and I modified my keys whenever needed. Since Harry and I came to view field botany and keys pretty much the same, the keys I ended up constructing were often similar to his. Wherever the data supported his conclusions, I tried to make use of them in my keys to preserve his understanding and make it part of the Flora. In constructing the keys, I made every effort to use everything of value from Harry's manuscript. I have placed a copy of his original manuscript in the archives of the University of Massachusetts Amherst Library for posterity.

By the time I had finished the keys for around 3,600 species and 1,000 genera, I felt I was well on my way toward accomplishing my objective of creating a single manual with uniformly good treatment of all the groups. The final major task in this part of the project was to prepare the general keys section for the beginning of the Flora. In anticipation of this task I prepared a master matrix for genera with more than one to few species; I ended up with around two-thirds of the genera in this matrix (over 600 genera). The matrix had around four dozen characteristics of potential value in distinguishing each genus from the others. Because the information was voluminous and the cells were small, I developed a system of codes and abbreviations that I used to populate the matrix. The matrix proved indispensable in writing the general keys. Harry had also completed a draft of this general key, much of which I was able to use. Because this matrix contained a lot of good empirical data of potential value to others, on the strong recommendation of Dr. George Wilder of the Naples Botanical Garden (Florida) I ended up including it, along with all the codes in the appendix to the Flora. In last analysis, the keys and descriptions that ultimately comprised the Flora are my own creations based on analysis and synthesis of information gleaned from the herbarium material, the literature, and Harry's partial manuscript.

In his 15 or so years as curator of the UMass Herbarium, Harry spent the majority of his time building up the specimen collection. He also collected specimens for exchange with other institutions and maintained a large exchange program with herbaria throughout the USA and the world. And so, for the Flora region there was abundant material for me to examine to prepare the keys and descriptions. If a species was rare in the Northeast it was generally well represented in specimen folders from other areas of the USA or abroad. I am fortunate to have had access to such a large, well supplied herbarium throughout my preparation of the Flora. The Botany Department and Herbarium staff afforded me unlimited access; I had my own key to the science building and the herbarium. I would go to the herbarium when I needed to, take home dozens of folders of specimens at a time and return them when I had finished a group. I typically spent around 10 hours each visit. The herbarium was always well organized and well maintained by Dr. Karen Searcy, the Herbarium Curator who took over after Harry. Without this level of cooperation and encouragement, I could never have undertaken the project.

During the years I worked on the keys I traveled a fair amount of the time to various project sites in the course of my work as an environmental consultant, mostly to do field studies. I was generally able to get my own room in a motel or a cabin. I would load the back of the field vehicle with herbarium folders and take them to my temporary accommodation of up to a week or two. This way I was able to maintain my schedule of arising at 2:45AM and putting in four hours or so per day on my work on the keys. All I needed was my dissecting needles and my 10 power hand lens. If I thought observations of fresh material were needed I brought as much from our field studies as needed back to my room. If my trips out of town involved air travel, I brought my notes, matrices, and literature sources with me and worked on the plane and mornings in my hotel room. Overall, I was never away from the project and lost little if any time due to travel for my profession.

After I had completed a key to a given genus I used my notes, matrices, and the literature to prepare a technical description for the genus while everything was fresh in my mind. I also prepared accounts for each of the species to include information generally found in a floristic treatment except the technical description. To do this would have added years to the work and considerable volume to a book that was already going to be very large. Instead, I added brief notes of the sort that a field botanist, wetland scientist, or naturalist would find useful and interesting. For synonymies I relied on the data provided in the Biota of North America Program. More original research would have involved extensive literature review to document my decision on the name I used for the plant. This would have added years to the project, and since John Kartesz had made it his primary work to maintain a list of updated names, I relied on the information he provided. After completing the descriptions and accounts for all the genera in a family, I prepared the family description.

Illustrations

I decided on the illustrations I would include in the Flora as I was writing the keys to species and genera. As I was working on a key I would identify the concepts and features that I thought needed clarification and note these. After I had accumulated a couple dozen or so I made a special trip to the herbarium to select specimen sheets that I thought best showed what I wanted to clarify. I then brought these to my illustrator, Abigail Rorer, and sat with her for hours at a time, going over my notes and each sheet. She then made her own notes and by the end of the session had a clear understanding of what she needed to produce. As soon as I got the finished product I appended the species name and prepared the text that I wanted to accompany each drawing. Throughout the process of working with Abigail, I was able to convey any specific features I thought should be highlighted in a particular drawing and she was able to do this with heavier lines, shading, and other graphics techniques. This is a distinct advantage over photographs, which often come out too dark or light and generally don't show clearly the important features. Photographs are useful in conveying overall appearance of a plant but generally fail to display necessary diagnostic details. Overall, nearly 1,000 original drawings were prepared by Abigail for the Flora, working steadily for four years, and all are of top quality.

Other Tasks

Although the vast majority of the time and effort put into this Flora was spent on the keys and descriptions, distributions, and illustrations, there are other parts to a floristic manual that need to be included. A couple of more years needed to be spent on the preface, acknowledgements, glossary, index, summary of taxa, and assorted other lesser tasks; for these lesser tasks I adopted conventions used by other authors that have become more or less standard, formatting my own information to the standard. One task that was not part of the preparation of the Flora that I much disliked was fund-raising. For many publishers, authors are expected to solicit funding for their project, and I had to take time out from my work on the manuscript to write letters, send samples of the work, make phone calls, and attend meetings. Fortunately, I didn't need to be involved in this process in earnest until the project was about three-quarters completed.

Funding and Production

Over and above the enormous amount of time required to write a flora, the monetary cost of producing a high-quality manual was way beyond what I had expected. I myself paid out around \$10,000 for the illustrations (1000 drawings at \$10/apiece), and this was a real bargain in view of their high quality. Abigail Rorer, an exceptionally talented illustrator, has since earned international acclaim, and costs to secure her work today would be prohibitive. The Ahles estate paid out about as much in word processing and assorted other costs. My company, Normandeau Associates, dedicated a secretary half time for two and one-half years to produce an electronic manuscript at a cost of around \$20,000. In addition, the University of Massachusetts Press, the publisher, required a subsidy in order for production to begin. Fund raising efforts had come to nothing and I was in despair as to whether the book would be published after all the effort and expense put forth. In desperation, I appealed to Normandeau's parent company at the time, Thermo Electron; I had met the President, George Hatsopoulos, a number of times, himself an author of several books on economics. He ended up granting me a contribution of \$8,500, which was sufficient to get things moving at the Press.

Timing was everything, and if it had taken me another year or so to bring the project to this point, a large part of the funding would not have been there. In the year following my secretary's half-time work on the manuscript, Normandeau issued a policy whereby department managers could no longer have their own secretaries. Also, about six months after my \$8,500 grant from Thermo, that company sold Normandeau and it became employee-owned. Given these circumstances, it is likely that the Flora would not have been published.

Overall, the book was in production for about two years, during which I spent much time meeting with Jack Harrison, the designer, and reviewing galley proofs. I wanted the illustrations to be placed throughout the keys to facilitate keying and the range maps to be as near the species accounts as possible. These requirements presented major problems with layout and typesetting, but Jack did a magnificent job. I also needed to work closely with Jack to be certain each illustration had the correct scale, notations, and arrows to features. These and other production tasks required my constant attention throughout the two years the Flora was being created; in the final stages especially, there were minutiae one could not anticipate. To minimize typographic errors, I conducted countless reviews and there are still a few errors. In addition to the salaries of the production, design, and marketing staff at the Press, actual printing and binding costs for the first printing of 2,500 copies ran around \$25,000. I estimate that the entire cost to produce the first print run was in excess of \$100,000, or around \$40 per book. This doesn't include any of my time, which averaged 20-25 hours per week for 17 years. Some months prior to its debut, the marketing staff at the Press launched an extensive advertising campaign to introduce the book to university book stores and other potential buyers.

Publication

I finally received the call in September 1999 that the book had been shipped from the warehouse to UMass Press, and so my wife and I took the day off and went out to the Press. As I thumbed through it the book looked perfect; text, drawings and maps were crisp and the paper and bindings were of top quality. Design and layout were more than I could have hoped for and gave the book outstanding visual appeal. This book was worth all that I and my predecessor, Harry Ahles, had put into it and I felt proud.

Shortly after its publication the Press marketed it at book shows and in special releases. The book was reviewed in about a dozen professional journals and newsletters, about 10 of which were very positive and the other two were neutral. There were no negative reviews. Within about five years the first printing of 2,500 copies was sold out. The book was being used as a text by several universities and as a reference book by botanists, consultants, and other professionals. I felt pleased

with the success of the Flora as reflected in the sales and good reception by the professional and scientific community. I also finally had a single book I could use in the field without needing to bring along a collection of others. I felt more confident using my own keys, which included the best of Harry's insights and the artist's talents than any other keys, and the range maps gave me an immediate sense of the distribution of each species.

A few years later (2007) I produced a second edition of the Flora, with a CD ROM containing a Random Access Key that I prepared from the appendix matrices in the first edition. The CD-ROM included numerous color photographs, because cost was not a consideration as it would have been if they were placed in the book. It took three years to complete the second edition.

Several months prior to his death, as if by premonition, Harry confided to me that he had a deep concern that his knowledge and work would soon pass with him "into the great beyond." And so, I am very pleased to have carried on the botanical legacy of Harry Ahles, a truly great man in the annals of field botany. He will be long remembered by those who knew his work in the field and herbarium as one of the finest field botanists of eastern North America of all time. To reach higher achievements in science, as in other fields, we stand on the shoulders of colleagues and mentors who went before us, blazing new trails and illuminating the way. In writing the Flora, I have followed in the footsteps of a great man, colleague, mentor, and friend.

ACKNOWLEDGEMENTS

The author expresses gratitude to the following individuals for their review of this manuscript prior to its publication and for offering valuable suggestions: Dr. John Kartesz, Director, Biota of North America Program, Chapel Hill, North Carolina; Dr. George Wilder, Herbarium Curator, Naples Botanical Garden, Naples, Florida; Dr. George Neuman, Master Horticulturist and Gardener, Bedford, New Hampshire.