NYFA Newsletter

New York Flora Association - New York State Museum Associates

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Skirting Schunnemunk –

by Richard Mitchell, N.Y. State Museum

Please forgive the high degree enthusiasm that prompted me to devote the lead article to the same old mountain for two issues in a row. But, trust me, this is mostly not about Schunnemunk, but some fascinating botanical areas we visited in the immediate vicinity – alkaline sites such as Round Hill and Moodna Creek.

Round Hill - Perhaps the oddest but most productive of our days of exploration was the one spent on Round Hill. Located on the west side of Schunnemunk, this hill is marked by gently ascending slopes that face abrupty on a steep knob of conglomerate rock, apparently high in alkaline pebbles and sand. First visited by David Werrier weeks before, the slope offered little of interest until the ascent increased sharply at the base of the knob; then, we noticed quite a bit of a white boneset in the open-canopy woods – nearly all *Eupatorium sessilifolium*.

The chalky-looking talus was weathering to a fine, grayish-brown soil on which just a few plants of serpentary, *Aristolochia serpentaria* (a State Endangered species) lurked. Other indicators of the alkaline aspect of the slope were hop hornbeam (*Ostrya virginica*), hackberry (*Celtis occidentalis* and sweet pignut (*Carya ovalis*) occurring in some abundance. Wild coffee (*Triosteum aurantiacum*) and starry campion (*Silene stellata*) added to our interest. *Lespedeza violacea*, with its gray-blue to, pinkish leaf discolorations formed small stands here and there, and the odd looking Agrimony turned out to be *Agrimonia. rostellata*. All of this is quite unusual in the Hudson Highlands, so we were having a great time.

Surprises (like prickly pears) didn't stop coming as we descended from the hilltop and began a slippery and circuitous journey around the steepest cliffs below the summit, some of which were sheer, with 60-70 degree slopes between them.

***Arabis drummondii* A. Gray** DRUMMOND'S ROCK-CRESS
A New York endangered species now known from Orange County near Schunnemunk Mountain

It was in one of these spots that I encountered the largest population of *Polygonum tenue* I've ever seen, consisting of hundreds of very slender, erect plants in an almost pure stand on pale gravel.

I heard a call from behind me and climbed back up to a spot where Spider Barbour, Dave Werrier and Jack Focht were having a lively discussion about an *Arabis* and how many rows of seeds the erect pods bore. It was way past fresh and green,

but apparently *A. drummondii*, an unlikely find for the area, since it is a State Endangered species (G5 S1S2) whose nearest known occurrences are in northern Dutchess and Saratoga Counties, 50 to 150 miles away.

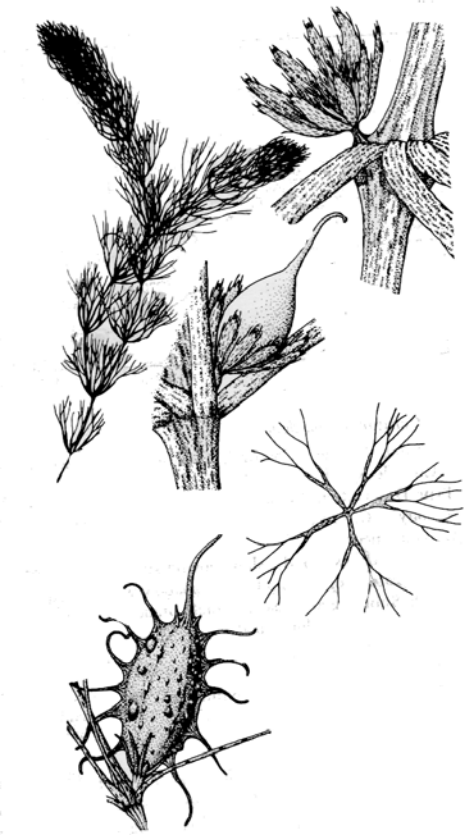
After finding a few plants of *Lechea tenuifolia* (State Threatened) in a dry clearing, we descended into a rocky, riparian, lowland forest with a number of old stream terraces. These were interspersed with shaly outcrops and small scaly cliffs that sported rue anemone (*Thalictrum thalictroides*) and columbine (*Aquilegia canadensis*) as well as maidenhair spleenwort (*Asplenium trichomanes*).

It was surprising to us, at the time, to find an extensive population of an uncommon agrimony, (*Agrimonia parviflora*) scattered on a lowland forest floor. Back when we thought this species was rarer, I had only seen the plant in open, often grassy, places. In the last few weeks of the 2002 season, we have found it in several similar moist, shaded habitats, including true swampforests.

Moodna Creek – The Moodna drainage system roughly marks the northwestern boundary of what we are calling the Hudson Highlands in our study. Near the spot where the creek empties into the Hudson River Estuary, wild senna (*Senna hebecarpa*) grows along the sandy shore, Miles upstream, past Vail's Gate, its muddy, boulder- and cobble-strewn banks are somewhat alkaline.

Unusual for the region are the spectacular, dense stands of lizard's-tail (*Saururus cernuus*), with their drooping inflorescences and lush, emerald foliage, lining the shores where large silver maples (*Acer saccharinum*) overhang the banks. Silver maple may not seem exciting to those of us who live in close proximity to the Hudson River, but it drops out in the uplands and was so rare in Sterling Forest that I found no natives there - only a couple of trees that had escaped from cultivation along the shores of Greenwood Lake.

We found some species many miles up Moodna Creek that are rare outside the estuary; one example is water pimpernel (*Samolus valerandi*); the rarest was the State Endangered *yerba de tago* (*Eclipta prostrata*), a sprawling composite of disturbed, mucky shores that ranges northward into New York from the tropics. A plant that was formerly thought to be quite rare in New York is the hornwort (coontail) *Ceratophyllum echinatum*. Since we have been showing people how to recognize this submerged aquatic in vegetative condition (it rarely fruits), quite a bit of it has been showing up, and it was recently removed from Threatened status and put on the N.Y. Natural Heritage watch-list on our recommendation. Last month, we found it growing in stagnant backwaters along Moodna Creek near a bed of water-stargrass (*Zosterella dubia*).



***Ceratophyllum echinatum* A. Gray HORNWORT**
Once thought to be quite rare in New York, this close relative of the common coontail (*C. demersum*) rarely fruits, but it can be recognized vegetatively by its slender leaves, which become filamentous toward the tips, with marginal teeth absent or hair-like and rudimentary (from Mitchell & Beal, 1979)

An amazing year of climbing Schunnemunk and exploring adjacent areas has so far yielded a plant list of over 1,000 species. This is particularly rich when compared with our first season at Sterling Forest, which yielded about 800. I am especially grateful to the team: Jack Focht, who has been out with us faithfully, usually once a week through every field season since 1993; Spider Barbour, who coordinated our explorations this summer, and who has been instrumental in so many rare plant finds;

and David Werrier, who went out of his way to travel from Ithaca, bringing admirable expertise, finding a number of rarities and putting in far more hours than we were able to pay for. It has been a real joy working with this group, and I hope we can continue the tradition next summer.

Blue-weed (*Echium vulgare* L.)

by Knowlton Foote, Ph.D.

This weedy wildflower has two well-known names. The older one, "Viper's Bugloss," is pronounced "bu-gloss" and not "bug-loss" (Rickett, l966). The viper part of the name has two suggested origins. It may refer to the red-spotted green stem that resembles a European species of viper (Wood 1863), or it may refer to the shape of the seeds and their resemblance to a snake's head (Shosteck, l974). A common, up-to-date name is "blue-weed," the name which will be used in this discussion. It is also called "blue-devil."

Terms that have been used to describe the flower are: "showy, very ornamental, very conspicuous, strikingly blue," and "brilliant blue." The plant was a favorite of Carolus Linnaeus, the great l8th century plant taxonomist (Faust, l986). Blue-weed is a very attractive and common wildflower found as a naturalized introduced species pretty much throughout New York State (Mitchell and Tucker l997). Its beauty is diluted somewhat by the copious, bristly small leaves and omnipresent bristles on the stems, which give the plant a scruffy appearance, especially as it begins to age.

Background

Blue-weed is known botanically as *Echium vulgare* L., a name first given to it in Sweden by Linnaeus (l753). "Echium" was a plant name used by Dioscorides and comes from the root "echis" meaning viper (Fernald l950). *Echium* is a genus of Old World herbs with about 30 species of annuals, biennials, and perennials with a distribution center in Mediterranean Europe (Pusateri and Blackwell, 1979). *Echium* is a member of the Boraginaceae or "Borage" family. Other genera of this family growing wild in the Northeast are heliotrope (*Heliotropium*), comfrey (*Symphytum*), forget-me-not (*Myosotis*), and bluebell (*Mertensia*).

Description

Like a number of other plants that have come to this continent from overseas, blue-weed exists in the eastern United States as a polymorphic species, *i.e.*one with wide range of variation between individuals and populations (Pusateri and Blackwell, l979). Its polymorphic nature may be traced back to multiple introductions into North America from Europe, followed by hybridization among the variants. Some botanists have dubbed it, appropriately, the "*Echium vulgare* complex."

The plants have been described as biennial by Gleason and Cronquist (l99l) but may sometimes persist longer. A plant may grow as a single stem, but it will most often have 5-12 ascending stems usually 1.5-2.5 ft tall. The stem leaves are linear-oblong to oblanceolate, while basal leaves are broader and 2-4 inches long. The stems and leaves are covered with stiff, pointed bristles that may serve to discourage pollen-robbing ants. At peak flowering time, an inflorescence often bears 10-15

open flowers. The flower is blue suffused with hot pink, but plants with pure pink (forma *roseum*) or white (forma *albiflorum*) flowers also exist (Fernald, l950). The corolla is irregularly bell-shaped, 0.5-0.75 inches long with five small, unequal lobes and a constricted throat that allows only narrow access to the lower part of the floral tube, which is usually filled with nectar.

The flowers are usually hermaphroditic, bearing five stamens (four long and one short) and one pistil. Charles Darwin, in l888, reported plants with only female flowers along with the normal bisexual ones. Klinkhamer *et al.* (l994) reported male sterility in Holland, with flowers that produce infertile pollen amounting to about 7%.

In New York, blue-weed begins to bloom the first week of June, peaking in July to early August. Some plants continue to bloom well into the fall, and can produce a second flush of growth and flowering with late summer rains. This species, normally considered a biennial, is sometimes perennial, with individual plants that may live 3-6 years. Surprisingly, blue-weed has a well-formed taproot. For a well-established plant, with about six stems, the stout root will be about one inch in crown diameter and 12 to 15 inches long (similar in vigor to chicory, *Cichorium intybus*). Chromosome counts for blue-weed have been reported at two ploidy levels: 2n= 16 and 2n= 32 (Gleason & Cronquist, l991, Mulligan, 1957).

Habitat

Blue-weed is generally shade intolerant and grows in open areas: roadsides, fields, quarries, and overgrazed pastures. It is often found on or near soils overlying limestone and dolomite bedrock (Muenscher, 1951). I have also seen it growing profusely on granite in southern Ontario, where the well-developed taproots penetrate well into the cracks of the rock. Blue-weed is one of the first species to invade a disturbed, newly opened site such as a plowed or graded field. It is not a good competitor and may rapidly drop out (Eickwort, 1973). However, in some physically harsh sites such as quarries and gravel beds, blue-weed remains for longer periods of time as a naturalized wildflower, and can even survive some competition (Klemow and Raynal, 1985).

Arrival in North America

The time of arrival of this species in North America has recently been answered. Thomas Nuttall reported it common in Virginia in l8l8. John Torrey in his *A Flora of New York State* (1843) reported it in New York as rare. In his (1924) checklist, Homer House stated that it may have been introduced to this continent as early as l683. To answer this question satisfactorily, a complete search of early American and European herbaria was needed to actually locate specimens of the species. William Pusateri and Will Blackwell (Miami University of Ohio) examined more than 2,500 herbarium specimens from nine herbaria and concluded that blue-weed became naturalized in eastern United States in the early to mid-1800s, not in the late 1600s.

Range

Blue-weed now ranges widely throughout eastern North America with the exception of the extreme Southeast (Florida, Louisiana, and Mississippi). Its greatest concentration is found in the Appalachian and Ozark Mountains which are both limestone-rich areas (Pusateri and Blackwell, 1979). There have also been reports of its occurrence further west, as in Iowa, Kansas, Colorado, and Oklahoma. Its northern limit is about 49 degrees North in Canada (Rousseau, l968).

Floral Biology

Blue-weed flowering has been well-studied, beginning with the published observations of two German botanists, Hermann Muller (l873) and Paul Knuth (l909). The flower is pink while in the bud and upon opening, then turning pink to mostly blue the first day. Color change may be due to a shift in acidity from acid pH to basic pH in the liquid contained in the vacuoles of cells of the epidermis of the petals (Crockett, l977). The filaments of the stamens are dark pink and stand out boldly against the mature, blue petals. The anthers are covered with bluish pollen. Upon blooming, four out of five stamens become exserted 1/4 to 3/8 inch beyond the corolla. At this time the short stamen is from 1/10 inch longer to slightly shorter than the corolla. The two short, white stylar lobes of the pistil remain nearly parallel, thus keeping the stigmatic surface from being exposed.

The flowers are protandrous. Pollen is released and becomes highly accessible during the first two hours of blooming, at a time when the style is still developing and the bloom is pink. The pollen is fine-grained, abundant, light-to-dark blue and sticky. A grain weighs some 66 micrograms (Strickler, 1979) and is only 10 to 14 microns in diameter, ranking it among the smallest pollens in the plant kingdom (McLean and Ivimey-Cook, 1956). Four hours after the flower opens, the style

begins to grow rapidly; its two globose branches spread and reach the level of the longer anthers. The stigmatic lobes now become rough, sticky and receptive to pollen. The stigma, as observed by George Eickwort of Cornell University (l973), appears to be most receptive during the 4-hour period when the style reaches and then surpasses the mostly empty anthers. Nectar is more abundant at this stage and tends to attract more pollinators than in the following female phase (Klinkhammer, *et al*., l994). The nectar may be giving off an insect attracting odor, and pollen has recently been shown to give off odors in some species (Dobson *et al.,* 1996). The corolla withers to a dark blue and eventually browns and falls off, as the next flower of the inflorescence opens. Flowers of blue-weed have been observed to last one and a half days in New York (Eickwort, 1973) and up to four days in England (Corbet, 1978b).

Pollinators

Because of the attractive blue/pink flower, sticky pollen, nectar, and its accessibility to a range of sizes of insects, blue-weed receives a large number of visits. In Europe, Muller observed 67 insect species visiting the flower for one reason or another (nectar, pollen , plant tissue). In Rensselaerville, New York, Eickwort observed a large variety of insects, including syrphid flies, butterflies, skippers, and a day-flying moth. Bees were more abundant, and 23 species representing some 12 genera were collected.

The honeybee (*Apis mellifera*) was the most common visitor, but it almost exclusively took nectar, not pollen. The second most abundant insect type was the bumblebee group, comprising: *Bombus terricola, ternarius, griseicollis*, and *perplexus* (both queens and workers) and the small carpenter bees*, Ceratina calcarata* and /or *C. dupla*.

Next in abundance were the sweat bees (Halictinae): *Augochlorella striata*, *Lasioglossum coriaceum, Evylaeus foxii, Dialictus cressonii, imitatus,*and *D. pilosus.*

Robert Dirig of the Bailey Hortorium, Cornell University, has observed the following butterflies nectaring in the Northeast at blue-weed: *Epargyreus clarus* (Silver Spotted Skipper), *Nastra l'herminier* (Swarthy Skipper), *Ancyloxypha numitor*(Least Skipper), *Thymelicus lineola* (European Skipper), *Polites themistocles* (Tawny Edge Skipper), and *Papilio troilus* (Spicebush Swallowtail).

The floral morphology of blue-weed is adapted well for pollen transfer, as observed by biologist Hermann Muller in 1883. Insects seeking nectar can not reach it without getting dusted ventrally with pollen (from a young flower) or leaving some pollen on the stigma of an older flower. The four stamens serve as convenient landing places for smaller insects as well (Strickler, 1979). As they land on the stamens, the sticky pollen coats them. The smallest bees can actually fly directly into the flower and come into contact with the 5th or shortest stamen. Thus, a great majority of the insects that come to seek nectar use the stamens as landing places and effect pollination.

Is Self-pollination (Autogamy) Possible?

Mulligan and Findlay (l970) placed pollination bags over 10 blue-weed plants to exclude insects and pollen. Pollen was collected when adjacent open-pollinated plants growing nearby produced seeds. Both the unbagged and bagged blue-weed plants produced viable seeds indicating that this species had the ability to self-fertilize itself (self-compatible). Apomixis (asexual production of new plant embryos) is suspected, since the sticky pollen wouldn't be expected to move from stamen to stigma within a given flower without assistance from a pollinator.

Pollen Sources

Since each bloom is protandrous, autogamy (self pollination) within a flower does not occur, due to temporal separation of the two reproductive phases. Thus, a bloom can not be pollinated by its own pollen, but each plant has many blooms from which to receive pollen.

Klemow and Raynal (l985) reported as many as 342 flowers per plant in central New York. When a pollinator visits a blue-weed plant in full bloom, it forages many flowers in a short period of time. Bumblebees may visit from one to 50 blooms on a single blue-weed plant before moving on to another (Rademaker *et al* l997). Thus, considerable pollination of flowers by pollen taken from other blooms on the same plant might occur. Self-pollination between flowers of the same plant is termed geitonogamy. Pollinators may carry pollen to other plants in the same area with the same genetic makeup or to different genets. The benefits of cross pollination are lost, but it does insure that some seeds are produced.

A Mason Bee Visits Blue-weed

Visits by one bee, *Hoplitis anthocopoides*, to blue-weed have been described in detail by

Eickwork (l973) and Strictler (l979). This bee is called a "mason" bee and is a recent immigrant from Europe. Nearly all of our common native solitary bees nest in concealed places: soil, stems, or various pre-existing cavities. Mason bees, by contrast, build exposed nests of soil and pebbles on the surface of rocks, and this mason bee species relies exclusively on blue-weed for pollen in the New York State area. When the female mason bee lands on a flower to collect pollen (for brood development), she grasps the filaments of two to four of the long stamens with her front and middle legs, positioning the anthers under her abdomen, where her pollen collecting hairs are located. At this point, her body lies outside the corolla tube with her head facing in. She rapidly contracts and expands her abdomen over the anthers for several seconds, often using her hind legs to place pollen between her pollen-collecting hairs. Next she moves forward rapidly across the shorter anther, then backs out of the corolla to take flight (Strickler, l979).

Observed pollen-collecting visits or combined pollen-nectar collecting visits lasted only two to seven seconds. When visiting a solitary flower for nectar, the female landed deeper in the corolla tube and grasped the stamens with her hind legs. Her middle legs either grasped the stamens or were spread wide to brace her against the inner wall of the corolla tube. The forelegs and head were extended forward, and the bee moved rapidly into the corolla (with her tongue extended) to drink nectar. A visit to a flower solely to collect nectar lasted only one to two seconds. This mason bee is remarkably efficient in its foraging behavior.

Nectar

Several studies have been carried out on the nectar of blue-weed (Corbet, l978a,b; Percival, l961; Southwick *et al.,* l981). The nectar contains mostly sucrose, with smaller amounts of glucose and fructose. The amount and composition of nectar depends upon several factors: 1) rates of secretion and reabsorption by the nectaries, 2) the effect of weather (wind, temperature and relative humidity), and 3) insect visits after secretion has taken place. As a result, the available amount and composition of the nectar varies from hour to hour, day to day, and site to site.

Sarah Corbet (l978a,b) of the University of Cambridge, studied blue-weed nectar in England. Nectar was initially secreted at a concentration of 20 to 35% sugar in the morning. However, on a sunny day in July, the concentration increased up to 60% by 3 PM and then decreased to 20-35% in the evening. On a cloudy day with relative humidity at 70% or higher, and evaporation reduced, the sugar concentration stabilized at 25-35% through the day.

In terms of total sugar per flower per 24 hours, blue-weed falls well below common milkweed (*Asclepias syriaca*) and butter-and-eggs (*Linaria vulgaris*), as observed by Southwick *et al.* (1981). The total sugar values were 1.4 mg. for common milkweed, 2.1 mg for butter-and-eggs, and only 0.6 mg for blue-weed. The number of calories an insect would obtain if all the nectar was swallowed in a visit revealed that blue-weed is not comparatively energy-rich: 2.8 calories/flower for common milkweed (five nectaries), 0.7 calories for butter-and-eggs but only 0.3 calories for blue-weed.

Changing concentrations of nectar can have a significant effect on the types of insects visiting during the day. Different concentrations of nectar attract different insects. Honeybee (*Apis mellifera*) sucking rates decline sharply when the concentration of nectar exceeds 50 to 60%. Some species of bees and butterflies can dilute the nectar by a few percent by spitting saliva into the nectar from their labial glands. Both bees and butterflies prefer a concentration range of less than 50%. Short-tongued bees and flies, on the other hand, prefer nectar at high concentrations, and even feed on crystalline sugar. These insects spit on the crystals of sugar and lap up the solution (*i.e.* the solution was the solution).

It may be the willingness of some insects to spit and lap that enables them to use dry nectar abandoned by honeybees. It is partly because of the change in the nectar concentration during the day that blue-weed receives visits from such a variety of insects, ranging from short tongued flies to bumblebees - even the Ruby-throated Hummingbird (*Archilochus colubris*)

Seed Production

Each flower can potentially produce four seeds. The seeds are well protected by 4 brown sepals that are covered by numerous short (1/10 inch) sharp white bristles. The seeds are large for wildflowers (2.7 mg or l68,000 per pound) and $1/10^{th}$ inch long (Breemen l984). The seed potential for a plant is adequate, but not great for a plant that relies solely on seeds for reproduction, since vegetative reproduction does not occur in this biennial species (excluding apomixis). Klemow and Raynal (l985) observed blue-weed for five years in an abandoned

limestone quarry near Syracuse. The soil cover was 3 to 12 inches deep. The area was freely drained and experienced wide daily temperature variations. In a population the mean number of flowers per plant was 342. The number of filled seeds per flower was 1.08 of a possible four. The percentage of filled seeds that germinated was 92.4% to give an average of about 340 viable seeds per plant. The seeds, called nutlets, have no special mechanism but are dispersed in the immediate area around the parent plant. Blue-weed seeds, however, remain viable in the soil for a number of years (Salisbury, l961).

Germination

Blue-weed seeds germinate throughout the growing season, indicating that most do not go dormant (Breemen l984, Breemen & Leeuwen, l983). They germinate quickly under a wide variety of temperature and soil moisture conditions. The germination rates in darkness and light are similar, indicating that light is not required for germination. Indirect evidence indicates that seeds buried six inches or more can remain viable for many years and not germinate before being brought to the surface. Removal of buried landmines in Holland following World War II resulted in large areas colored blue from Blue-weed as the buried seeds brought to the surface then germinated.

Its seeds can germinate anytime during the growing season to produce a rosette that overwinters. If the site is adequate, the rosette will bolt the following season to produce flowering stems. After it flowers, the plant usually dies. A plant that produces seeds only once is called "monocarpic." Careful growth studies by Dudley Raynal and Kenneth Klemow (1985), on Blue-weed in a limestone quarry, have revealed a modified picture of the species. Blue-weed is not an obligate, but a facultative biennial; that is, the rosette stage can take more than a year to reach critical size for the energy-requiring bolting stage to occur.

In previous studies by Katherine Gross (1981, 1984), two of the most common indices used to predict the fate of a rosette after one season were rosette diameter (teasel, common burdock, mullein, evening primrose) and root diameter (Queen Anne's lace). Competing vegetation often reduced rosette growth and therefore delayed bolting in some plants for one to several years. In the quarry study by (*ibid.*), it was found that the size of blue-weed's root system was the best indicator of predicting when bolting occurred rather than rosette size or root crown diameter. In addition it was the harshness of the site, rather than the competing vegetation, that largely determined the root size, and thus when bolting would occur. Some plants lived up to four years and it was postulated that plants growing in a shaded site might require up to six years growth to produce the critical root volume necessary for flowering. This species, then, is more accurately described as a facultative biennial or a short-lived monocarpic perennial, rather than an obligate biennial.

Summary

Blue-weed (*Echium vulgare*) thrives for a variety of reasons. It has been shown to be self-compatible as well as an out-crosser. Mulligan and Findley (l970) observed that of 23 weedy, biennial species studied in Canada, self-pollination occurred in 21 of them, underlining the fact that self pollination is a safety measure that insures some seed production for a plant when only a few plants are present at a site, or when pollinators are in short supply. Self-compatibility is also an obvious advantage for a plant that does not have a means of vegetative reproduction.

Blue-weed's floral structure is attractive to insects: the colorful bloom, both nectar and sticky pollen and many flowers per plant. Its seeds, even though they are produced in small numbers, have good longevity in the soil, and germination occurs throughout the season. The plant has an unusual ability to withstand drought, and occupy barren sites, with a well-developed tap root and reduced leaf area, which minimizes transpirational water loss. The life of a rosette can extend for over three years to increase the chances of bolting to produce flowers, so that seeds may be produced quickly.

Its seedlings have been shown to survive well among competing vegetation. Klemow and Raynal (l985) suggested that blue-weed evolved in permanently open, generally unproductive, sites, and therefore the species does well in barren habitats created by human activities. Growing on sterile, dry ground, a population may survive for many years, even decades, and and will not be forced out by subsequent stages of succession that often occur on more fertile sites.

Naturalist Neltje Blancha (1915), used two adjectives to describe this weedy wildflower: "pugnacious" and "persistent." Perhaps its greatest beauty, beyond striking flower color, is its unusual ability to survive harsh conditions. While not a wildly successful invader, except in local regions,

blue-weed has found a niche and become a well-established member of the flora – thick where most plants fear to tread. Not bad for an immigrant!

Editors Note: Here is information on dangers and uses of blue-weed from my upcoming compendium:
☹ Toxic if ingested; a cause of livestock poisoning on other continents, such as Australia, but with a less troublesome history in North America; in sheep, there seems to be a correlation between consumption of this plant and susceptibility to copper intoxication; although ungulates share some degree of tolerance for the plant, horses and cattle may exhibit nervous symptoms, lack of muscle coordination, constipation and other symptoms after grazing it; the plant hairs are also cited as a cause of irritant dermatitis in humans
❁ The the roots contain allantoin and a mild extract has been used in folk medicine as an expectorant, treatment for inflammations, headaches, nervous conditions and fevers; a dilute infusion from the crushed seeds has been added to hot wine for a sedative effect

Another Banner Year for Seabeach Amaranth
by Steve Young, N. Y. Natural Heritage Program

A new Long Island count of seabeach amaranth (*Amaranthus pumilus*), a federally-threatened plant, was carried out this summer by staff and volunteers of many organizations. This year was the first time since1993 that plants were found along the entire island from Water Mill, Southampton in the east to Breezy Point, Queens in the west.

On some beaches they were the dominant plants, even outnumbering the common sea rocket. The number of plants was estimated to be between 100,000 and 200,000 plants island-wide. Some sites had a large drop in numbers from the previous year while others had large gains, reflecting the fugitive nature of this plant. We hope that future research will switch from purely demographic work to more ecological work. Many questions remain about how and where this plant grows and how that information can be used for optimum management strategies. At the present time, as long as efforts to protect portions of the beaches from vehicle and foot traffic continue, we consider this plant to be on the road to full recovery on Long Island. However its recovery has yet to be tested by the effects of a powerful winter or tropical storm.

Note: Illustrations of *Echium* and *Arabis* from Holmgren, 1998; photo of *Amaranthus* provided by Steve Young.

NYFA Under New Management:

by Richard Mitchell, Editor

With an overwhelming landslide of two votes and three hanging chads, **Troy Weldy became our new Director**. Bob Ingalls will serve as Assistant Director, and Andy Nelson will be the Treasurer. We can look forward to some great years of progress and good communication with these folks in charge of the organization.

I will be retiring as NYFA Editor and as State Botanist in December, partly because of family obligations, and partly because I want to overwinter with the egrets in the southland, then come back to botanize in New York every summer. I'll say more about it in the next issue. I'll surely miss you all, but I'll definitely see you on field trips and at meetings. I'll also try to get an article published in NYFA Newsletter once in a while, as I finish my flora compendium and Hudson Highlands projects.