

Field Notes
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September 9, 2023

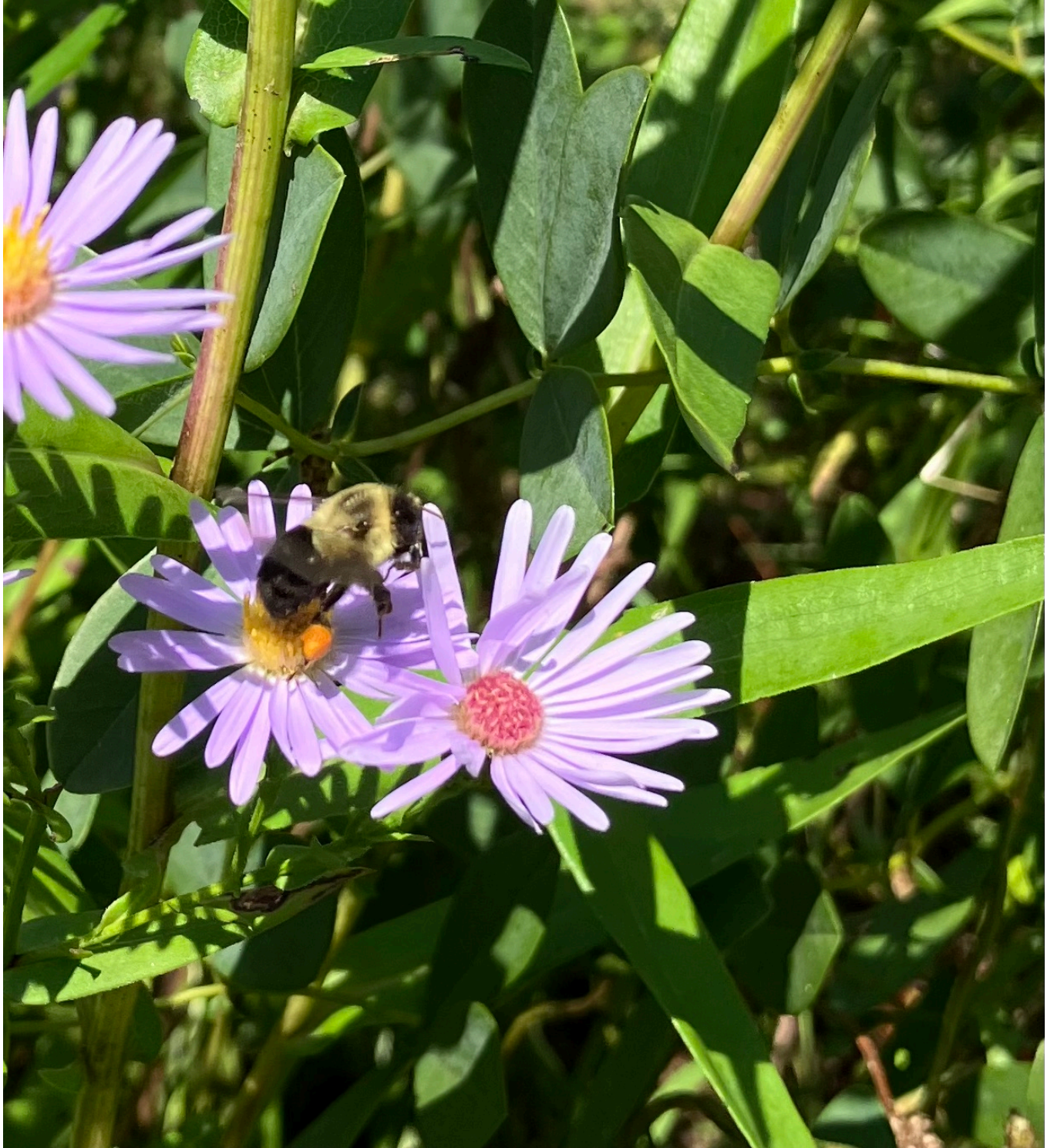
There is so much flower power in our fields and gardens and pond-sides this week! Feast on these beauties, dear pollies!



White-lined sphinx moth on leadwort (*Ceratostigma plumbaginoides*), September 1, our gardens



Honey bee on portulaca (*Portulaca grandiflora*), September 3, our gardens



Bumble bee collecting pollen on smooth aster (*Aster laevis*), September 3, Monarch Way Station

GARDENS

The feast, of course, is in the pollen and nectar; the flower colors are neon lights advertising the establishments with the most nutritious offerings. What I've noticed over several years of watching pollies on garden flowers is that a flower that looks beautiful and fresh to me is not necessarily the one

that the insects are drawn to. In fact, they sometimes seem more interested in blossoms that look a little passé to me. For instance, check out this lovely lace-cap hydrangea flower head:



No bees on this lace-cap hydrangea 'Twist and Shout'

The flower head above looks fresh and perfect; the sterile florets are fully open, and some of the small fertile flowers are also open. No bees seem interested.



Bees duking it out on this lace-cap hydrangea 'Twist and Shout'

Right next to it is a frowzy-looking flower head, past its prime as far as I'm concerned, but the bees are terrifically interested – you can hear them buzzing, trying to get at the nectar.

Here are two Japanese anemone blossoms side by side, looking similar to my eyes – but there are bees fighting over one and ignoring the other.



Bumble bees crowding into the center of a Japanese anemone

Bees tend not to like to be crowded – I’ve noticed that they usually practice social distancing of about 4” on most plants – but I’ve seen as many as five crowd into the same anemone flower, presumably because it is the one with the best advertising. The bees see things I can’t see no matter how closely I look, because their eyes have receptors for ultraviolet light.

Bee Vision vs. Human Vision



They see less than we do at the red end of the spectrum, but much more at and beyond the violet end, and apparently take many of their cues about food availability from UV markings on flower petals – which guide them to the nectaries.¹

These UV nectary advertisements tell the pollies exactly where to land when the sweets are being produced. This means, of course, that there is a tight link between nectar production and UV pigment production (anthocyanins have a sugar component).² A given flower might be “open” to our eyes for days, but open for nectar consumption for just a few hours of a single day. I think this must be at least a partial explanation for why the pollies move around the garden from planting to planting throughout the day.

FIELDS AND BYWAYS

Outside of the garden, out in the fields, along roadsides and pond edges, the pollinators I see most are feasting on asters (dry sun and shade), goldenrod (dry sun), jewelweed (damp shade), Joe-pye-weed (damp sun).



¹ Sharla Riddle, “How Bees See and Why It Matters,” Bee Culture, May 20, 2016.

<https://www.beeeculture.com/bees-see-matters/>

² Bianca Enaru et al, “Anthocyanins: Factors Affecting Their Stability and Degradation,” PMC 2021

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8750456/>



Clouded Sulphur butterfly on smooth aster, Monarch Way Station, September 3



Bumble bee collecting pollen on goldenrod, our field, September 8



Bumble bee inside a jewelweed blossom, September 3, Gay City



Bumble bee on Joe-pye-weed, September 3, Gay City

I have to say, I've seen huge numbers of bumble bees this season, both in gardens and in the wild, and am pleased to see that they're still collecting pollen – it means their colonies are still active, still producing young. There are many species of goldenrod and aster in our area, and they open sequentially, so there is always something on offer.

There are clouds of white wood asters in the dappled shade at the edges of the woods Some have yellow disc flowers, some have purple ones.



White wood asters (*Eurybia divaricata*), September 8

Q: What's the difference?

A: The yellow disc flowers have not yet been visited by pollinators. The purple ones have. Each one of the disc flowers is complete: it has petals, stamens, and pistils. The petals start out yellow . . .



A single disc-flower head of white wood aster, showing yellow corollas

... and once the flower has been pollinated, they actually change color: they go from yellow to purple within about 24 hours, thanks to anthocyanin development.³ The color change serves as a signal to the pollies that the flower is closed for business – but it must also benefit the plant in some way! I wonder if the anthocyanins also serve to support pollen tube growth and protect the developing seeds in asters, as they appear to do in apples.⁴

³ David Spector, “A Different Kind of Fall Color Change,” *Daily Hampshire Gazette*, September 17, 2021
<https://www.hitchcockcenter.org/earth-matters/a-different-kind-of-fall-color-change/>

⁴ Weifeng Cheng et al, “Competition Between Anthocyanin and Kaempferol Glycosides Biosynthesis Affects Pollen Tube Growth and Seed Set of *Malus*,” *Nature*, August 1, 2021
<https://www.nature.com/articles/s41438-021-00609-9>



Seeds from a single white wood aster disc, September 8 (not all of them, actually!)

I'm fascinated by the many uses of anthocyanins in flowers and trees –

- the red coloration in early tree leaves, which seems to protect the chlorophylls from UV radiation while the leaf tissues are still thin and developing;
- the red coloration of fall leaves, to protect the enzymes that facilitate transport of nutrients out of the dying leaves and into the wood – again, protection from UV radiation;
- the many shades of red, blue, and purple in fruits that attract seed-dispersing birds;
- the many shades of these colors that advertise the presence of maturing flowers;
- the UV-reflecting anthocyanins that I can't even see, but which indicate fine distinctions in nectar quantity and perhaps tastiness.

And now I'm learning that they are also involved in pollen color. The pollen of flowers that are open during the day (exposed to UV radiation) is very often yellow, whereas the pollen of evening- and night-blooming flowers is often white. Yup, the yellow color is due to anthocyanins, and it serves to attract attention from pollinators, but also to protect the genetic material from UV radiation, and thus mutation.⁵

I found a report of a new study suggesting that over the past 75 years, the UV pigments (flavonoids, mostly anthocyanins) in flowers have increased about 2% each year in response to rising temperatures and a thinning ozone layer. So the flowers are taking care of themselves, adapting rather rapidly to the changing climate! There's some question as to whether this increased UV coloration will affect the ability of pollinators to detect pollen and nectar at exactly the moment of perfect availability and ripeness.⁶ I have a hunch that they're adapting, too.

MONARCH WAY STATION

There have been fewer Monarchs in the area this summer than last, but I've seen activity at the station. Here's a picture of a beautiful female Monarch that I took at the end of July (the only one I happened to catch with my camera):

⁵ John R. Flenley, "Why Is Pollen Yellow?," *Journal of Biogeography* 38: 809-816, 2011.
[https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1365-2699.2011.02480.x#:~:text=The%20yellow%20colour%20results%20from,atom%20rings%20\(one%20heterocyclic](https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1365-2699.2011.02480.x#:~:text=The%20yellow%20colour%20results%20from,atom%20rings%20(one%20heterocyclic)
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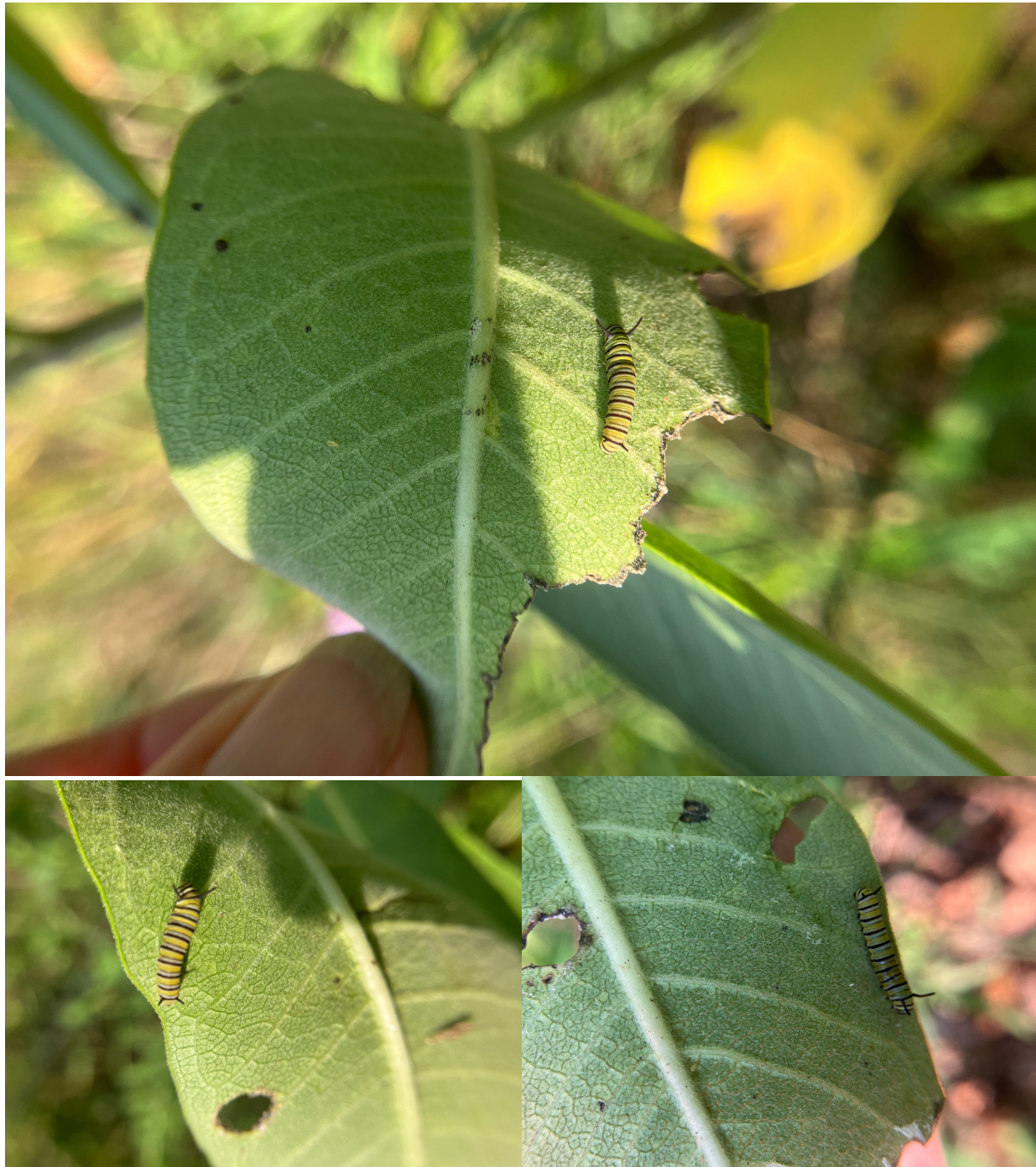
⁶ Rasha Aridi, "Flowers Are Changing Color in Response to Climate Change," *Smithsonian*, October 2, 2020/
<https://www.smithsonianmag.com/smart-news/flowers-are-changing-color-response-climate-change-180975964/>



Female Monarch on coneflower at Monarch Way Station, July 31

And here are some portraits I took of developing cats on young milkweed plants on September 8. As I noted earlier in the season, the females have shown more interest in laying eggs on tender leaves than on

the leathery leaves of the more mature plants.) They'll be ready to pupate in about a week, ready to fly in early October:



Monarch caterpillars at the Monarch Way Station, September 8, 2023

Until next time . . . enjoy the September light and shadows, and keep well.