

Meadow Notes – First Week of September, 2021
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Up and Away

The fourth and final generation of Monarchs is out and about in the world now. You can tell them by the vivid freshness of their colors and by their behavior. They're not circling each other in mid-air, looking for the perfect mate. And the females aren't circling the milkweed patch, landing on this leaf and that one, tasting them with their feet, depositing eggs on the undersides of the tastiest ones. They're visiting non-milkweed flowers with lots of nectar, and staying until they've drunk their fill.

I visited two Monarch Way Stations on Mount Desert Island in Maine last week – the one at Thuya Gardens in Northeast Harbor and the Charlotte Rhoades Butterfly Garden in Southwest Harbor – and saw several Generation 4 individuals just emerging from their chrysalises.



Generation 4 female Monarch, just eclosed from her chrysalis, Thuya Garden, August 27

This generation emerges in a state of diapause: although they are morphologically adult, their reproductive hormonal signals are on mute until next spring. Their single-minded quest is for nectar, nectar, and more nectar as they journey through power lines, rail trails, fields, and gardens, fattening up for their journey south. They need to

stay ahead of the first frost, flying by day, roosting in trees by night, catching thermals and soaring to save energy when they can. It's possible that some of the Monarchs we're seeing in Andover today are ones that eclosed in Maine last week. Some of them will make it to Mexico, and some of those will live to mate next spring.

How many? To keep a population of any species stable, every pair of adults needs to be replaced by two mature offspring in each generation. In insect populations, of course, most larvae don't survive long enough to become mature offspring. Even the cardenolide-protected Monarch juveniles have their predators: some parasitoid wasp larvae seem to be immune to the effects of the cardenolides, and consume the caterpillars even as they grow. Anurag Agrawal, a well-known Monarch researcher, estimates that only 10 percent of any female butterfly's eggs make it to adulthood.¹

If every female Generation 4 Monarch laid, say, 100 eggs on milkweed plants in the Southeast last spring, let's say 10 survived to pupate and eclose into adults.² Half of those 10 were female; so now there were five Gen1 females for every original female of Gen 4. If these five females were all successful in their flights north and managed to find mates and reproduce, given the same actuarial statistics, there would be 25 females in Gen 2. If their offspring were equally successful, there would now be 125 females for each original Gen4 female. If all went well with them (i.e., 10% of their eggs resulted in butterflies), Generation 4, which is now out and about now, would represent (perhaps) 625 female butterflies for each of the original Generation 4 females – 1250 butterflies for each pair, even allowing for 90% mortality among the caterpillars.

No wonder we see so many Monarchs in our gardens at the end of August and in early September!



Monarchs on Zinnias in my home garden, September 6

¹ Anurag Agrawal, *Monarchs and Milkweed*, Princeton University Press, 2017.

² Agrawal posits that each Monarch female may lay as many as 300 eggs (p. 218), but points out that females do not lay all of their eggs, so I choose 100 as a conservative (and easy) number to work with.

Every day, more Gen4 butterflies are moving through our town from points north. On a sunny day, they're apt to be out and about between 10 a.m. and around 4 p.m. They are like flying flowers, coming to alight and feed on the nectar of tall-stalked flowers in sunny spots.



Monarch on Joe-Pye-Weed (*Eupatorium maculatum*) in Thuya Garden, August 26

Not all are going to make it to Mexico – and not all need to in order to replace the previous Gen4's. Monarch populations tend to go through boom and bust cycles in their population numbers, with huge increases in some years and huge declines in others. Favorable weather and the availability of way stations (suitable habitat) are the two great variables in their life journeys. A higher-than-average survival rate is needed – at least at some point in the procession of generations in some years -- to keep the population from crashing. What to do? Cultivate habitat in our own back yards and open spaces.

Our Way Station got off to a great start this year. We built it, the Monarchs came. Next year, I'm hoping that the existing Milkweed Café will be bigger and better, and that we can build up the population of nectar plants for late summer, to provide more support for the Gen4 Monarchs. This is what we can do as a town to help keep the majestic aerial dancers coming back.

If you'd like to see more Monarchs in your yard next summer, I'd recommend planting a patch of maybe a dozen Zinnias in a sunny spot – these seem to be a very reliable draw for Monarchs (and other butterflies) in my gardens, every year. The Monarchs like flowers that are at least a couple of feet off the ground, so go for a tall variety, like 'State Fair.' They're annuals, easy to grow, and as far as I can see, deer aren't interested in them. Other tall late-summer flowers that Monarchs like: Butterfly Bush (*Buddleia*), Mexican Sunflower (*Tithonia*), Floss Flower (*Ageratum*), Joe-Pye-Weed (*Eupatorium*).



Monarch on *Ageratum* 'Blue Horizon' in my home gardens, September 6

Let's all keep our eyes out for the royal procession as it moves through Andover in the next few weeks. The Monarchs should be well south of us by the end of the first week of October.