November – A Magical Month

I have always found November to be a magical month. There is an ever-evolving symphony of fall color mingled with the season finale of flowers and the intriguing yet subtle beauty of seeds! Milkweed, botanically known as *Asclepias* has elevated the shape and movement of seeds to a most magical artform with the parachute-like structures (as seen at right for *Asclepias syriaca*) gracefully floating about the garden. The plant also serves as a lifeline for the Monarch Butterfly.

Asclepias has roughly 200 species found in North and South America along with parts of Africa. Originally, it was in its own family of Asclepiadaceae but was shifted to the Dogbane Family or Apocynaceae. The genus name was officially penned in 1753 by the Swedish botanist Carl Linnaeus (1707-1778), honoring Asclepius, the Greek god of healing and medicine. His snake wrapped staff remains the symbol of modern medicine to this day! The inspiration for honoring the deity is somewhat clouded, although one possibility comes from the Swedish botanist Caspir Bauhin (1560-1624). Although Bauhin focused heavily on the study of human anatomy, he is best known for his work in botany and the concept of classifying plants by genus and species, a concept Linnaeus later adopted. In 1623 Bauhin published a book on herbals entitled *Pinax Theatri botanici* (Illustrated Exposition of Plants), describing over 5,600 plants. Within this treatise he mentions an ancient herbal named Asclepius used by the Roman naturalist Pliny the Elder (23/24-79 AD) and the Greek pharmacologist Pedanius Dioscorides (40-90). The herb was said to be effective against poisoning. He also mentions the plant had been recently discovered across the Atlantic in the region known as Virginia. Recognizing that Milkweed was used as an herbal by Native Americans and was possibly the plant mentioned by Bauhin, Linnaeus purportedly adopted the name for the newly found North American species while ignoring the plant(s) touted under this name by the ancient Greeks and Romans.

Asclepias benefits more than simply humans, since many insects are also reliant on the genus including the afore mentioned Monarch Butterfly. In fact, interest in planting *Asclepias* has grown rapidly over the past 20 years when it became apparent the dwindling population of Monarch Butterflies was directly tied to dwindling populations of specific Milkweed species. Oddly, this relationship developed because the sap and tissues of Milkweeds are poisonous to eat due to the presence of toxic steroids called cardenolides. These compounds are naturally occurring cardiac

glycosides that impact the heart and evolved within the plant to prevent predation. Much to the plant's consternation I'm sure, Monarch butterflies underwent several genetic mutations providing immunity to these steroids. The concentrated presence of the steroids within the caterpillar and later the butterfly gives them a bitter taste, rendering them unpalatable to birds. The bright orange color of the adults and bright yellow, black and white markings of the caterpillar (as seen above) evolved as a visual clue to birds that these insects were not a tasty snack – a phenomenon called aposematic coloration! Unfortunately, these genetic mutations took the caterpillar's nutritional intake one step further and restricted its diet to only Milkweed. Specifically, Monarch caterpillars can only survive on 27 of the 115 North America *Asclepias* species. Attempting to eat another plant would result in death. The old adage of 'Best Laid Plans' is proving true again as the massive amount of agricultural spraying combined with urban sprawl has reduced the natural habitat for *Asclepias*, resulting in declining Monarch populations.

Fortunately, the plants add wonderful beauty to the garden and the educated gardener can help resolve the Monarch's plight by planting Milkweed! Depending upon the garden's style and growing conditions, there are several readily available species from which the gardener can select. Perhaps the most well-known selection is *Asclepias tuberosa*, simply known as Milkweed. Despite its common name, it does not display the milky white sap that fostered the common name for the genus! Named by Linnaeus in 1753, the plant is native from Quebec west to South Dakota and South to Florida and Southern California. As the species name suggests, it grows from a tuber and is a clump forming perennial. Growing to 12-30" tall, plants prefer a sun-drenched location that is typical of the genus in general. This species also prefers average to dry soils. The slender lanceolate foliage grows to 3" long and is arranged alternately along the hairy stems. The ⅜" diameter flowers are orange or more rarely yellow and appear on umbels ranging from 2-5" in diameter. By definition, an umbel is a flower cluster in which the floral stems or peduncles are all of approximately equal length and originate from the same point (as pictured at left). With upwards of 20 flowers per umbel, the flowers provide an effective impact from June through September (as seen in the closing image at Chanticleer in late June). Plants self-sow generously and are short-lived, relying on the seedlings to maintain and perpetuate populations. Plants are hardy in zones 3-9.

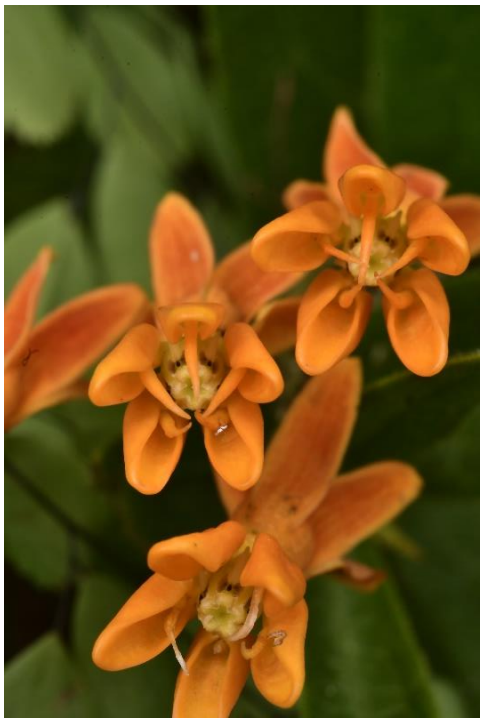
If the soil conditions are moister, consider *Asclepias incarnata* or Swamp Milkweed. It is native to every state except Mississippi and those states of the West Coast bordering the Pacific. In Canada it is also found from Quebeque west to Manitoba. This plant was once again named by Linnaeus in 1753, with the species epithet derived from the Latin *Carn* or *Carnis* meaning meat or flesh and *Ātus* meaning like or possessing a feature, describing how the flowers have a fleshy pink color (as seen below right). Also hardy in zones 3-9 and a clump former, it grows much

taller than its cousin, easily reaching 3-4' tall. The foliage is also lanceolate, reaching upwards of 1" wide by 4-6" long and arranged oppositely along the mostly hairless stems. The individual flowers are a bit smaller, measuring around ¼" in diameter but, with each inflorescence consisting of several umbels, the floral impact is more dramatic! Belying its common name, it readily grows in soils of average moisture although soils should not dry out during the spring flush.

Another readily available species is *Asclepias syriaca* or Common Milkweed. It too has large umbels of pink flowers but unlike the previous two species, it has a deep and broad spreading rhizomatous root system. Its tendency for stems to magically appear far from where it was initially planted makes it an ideal candidate for more wild or natural locations than a structured garden. Also named by Linnaeus in 1753, the species name means 'of Syria' based on the mistaken belief of the plant's origin. Native from the regions of New Brunswick and Quebec west to Saskatchewan and south to Texas and Georgia, it is also found in Oregon! Once again hardy in zones 3-9, it typically grows to 3-4' tall and has much coarser foliage than the previous two species, measuring 6-8" long by 2-3½" wide (as seen on the left). There is certainly no denying its importance to the world of insects. With over 450 insects known to dine on this plant, it serves as the mega diner for those 'little things that run the world' as the entomologist E. O. Wilson once wrote! The individual flowers are once again somewhat smaller, measuring ¼" in diameter, but with upwards of 100 flowers per umbel, the show remains spectacular. When all the flowers of an umbel are in bloom, the overall weight of the flowers results in the umbel drooping and even if it becomes somewhat hidden by the foliage, the overall impact is still effective.

In addition to displaying beautiful flowers and assisting in the life cycle of the Monarch Butterfly, all these species bring curious horn-like seed pods and the motion of floating seeds to the November Garden. The curious part of these seed pods is the sheer number of seeds held in the pods – all produced from such seemingly small flowers. The answer to the abundant seed set lies in the colorful and magically complex flowers that certainly deserve a closer look!

Unlike most flowers, the petals do not serve as the primary lure for attracting pollinators. They reflex downward, appearing much like a skirt for the flower and remain mostly out of view from the visiting pollinators. Also unique to *Asclepias* is how the male anthers and the pollen



receptive female stigma, along with their supporting structures (the filament and style respectively) have become fused into a central structure called a gynostegium. This structure has a relatively small, flat top that is white or light yellow in color (as seen on the right). Surrounding the gynostegium and both serving as the lure for pollinators and giving the flower its overall shape is the corona. The corona or 'crown' takes the form of five cup-like vessels and develops from the stamens (collectively the anthers and supportive filaments). These five cup-like vessels are called Hoods and their function is to hold copious amounts of nectar to lure in pollinators. Adding to the complexity of the corona are five tapered structures called Horns with each Horn emerging from the cup of a Hood. The Horns curve into the center of the flower, with the pointed tip of each terminating at or near the center of the gynostegium (again, seen at right). Collectively, all five of the horns create a dome-like structure floating over all or part of the gynostegium, depending upon the species. The function of these mysterious looking Horns is to create unstable footing for the pollinator.

Since the anthers are partially responsible for creating the gynostegium, another mystery of this flower is the apparent lack of pollen. Of course, the answer lies within the central gynostegium! It contains 5 chambers called stigmatic chambers with each chamber containing the pollen receptive stigmatic surface, a nectary that fills the cup-like Hood with a sugary fluid and two pollen containing pollinia. Unlike most flowers that have individual grains of pollen, species of *Asclepias* encase the pollen within a waxy sac, allowing the insect to move many grains of pollen at once. This trait is also seen in Orchids. Each of the 5 chambers can be accessed by a slit in the side of the gynostegium called the stigmatic slit. At the top of this slit is a small black structure called the corpusculum which is connected to the 2 pollinia within the chamber by 2 arms, sensibly called the connective arms! All of these organs combined – the corpusculum, 2 pollinia and 2 connective arms – are called the pollinarium. The corpusculum (seen at the tip of the arrow in the image at left) and the stigmatic slit beneath can be seen in the image at left.

When a pollinator lands on a flower to partake of the nectar, the horns cause the insect to stumble about and invariably a leg may pass through a stigmatic slit. As the insect works to pull its leg from the slit, the leg becomes stuck in a narrow groove of the corpusculum. As a result, it not only pulls out its leg, but also the entire pollinarium. Of course, this requires a degree of effort and strength not every insect possesses. Older insects may not be able to remove their leg and will ultimately perish on the flower. Fortunately, most of the insects escape with the 2 pollinia in tow. Magically, roughly 1½-2 minutes after the insect removes the pollinarium from the moist atmosphere of the chamber, the connective arms proceed to turn 90 degrees from their original orientation as they dry. This allows for the two pollinia to properly align with and pass through the stigmatic slit of a subsequently visited flower and come in contact with the stigmatic surface, pollinating the flower. Ingenious! Once the pollinia are safely in the receiving chamber, the connective arms break off while the corpusculum often remains on the insect's leg for some length of time. Although ingenious, the process is certainly not failsafe. Sometimes the pollinarium dislodges in flight. Or, since the plants are self-incompatible, if it ends up in the chamber of another flower of the same plant, pollination will not occur. Or, the insects' leg may simply fail to enter the chamber!

Assuming pollination occurs, the ovaries develop into horn-like follicles or seed pods, measuring upwards of 3-5(6)" in length. The mature size of the pods is ultimately dependent upon the species, with the developing pods of *Asclepias tuberosa* pictured above in September. It is not uncommon to only see one or two pods developing from the numerous umbels and several hundred flowers present on a given plant. When they ripen in late October and November, they split open along a seam running the length of the follicle to reveal 200-400 plus brown seeds neatly arranged in rows. The large number of seeds are the result of the many grains of pollen contained in a pollinia! Attached to the seed is a feathery plume called a coma, which resembles the pappus attached to Dandelion seeds. Pictured at left are the coma tipped seeds of *Asclepias tuberosa*. Although the function of moving the seed about by wind is identical, they are different in origin. A coma develops from the seed, while the pappus develops from the sepals of the calyx. For *Asclepias*, each 1-2" long coma is attached to the narrower end of the ovoid shaped seed and is composed of cellulose. Although it appears solid, it is

actually a hollow tube, allowing it to magically float about in the air or on the surface of a stream as it travels to its new home. In fact, during WW2 the buoyant comas were gathered to fill life preservers for the military!

Asclepias plants combine well with shorter or more upright forms of ornamental grasses such as *Schizachyrium scoparium* (Little Bluestem) and various *Carex* species or with blue flowers as seen below at Chanticleer. For those species preferring drier conditions consider combining them with selections of *Rudbeckia* (Black-eyed Susans), *Penstemon* (Beardtongue) or *Campanula* (Bellflower). Swamp Milkweed looks great with moisture loving Iris, Iron Weed (*Vernonia*), Sedges including *Carex stricta* and even some of the shrubby Willows (Salix spp.). All three species are readily available at garden centers and for the deer wary gardener, the bitter taste from the cardenolides also provides good browse resistance.

For gardeners who enjoy the magical motion of those fluffy comas or butterflies flitting from flower to flower, these species of *Asclepias* are garden essentials. For children, the thrill comes from collecting and rubbing the incredibly smooth comas between your fingers or blowing the seeds from your palm. Yes, November is indeed a most magical month!

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