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FERTILE MIND

Counting the ways science and plants intersect

By JAN WIESE-FALES
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Bike riding on the Katy Trail allows the interesting perspective of a great variety of plants whizzing by on both sides - a bird's-eye view that changes with the seasons. As the flora zooms by, it often strikes me that every exquisite shape exists in nature, and nature does some pretty fantastic things with geometry.

From the perfectly round white blooms of the buttonbush to the square stems of horsemint and the many plants with heart-shaped leaves, nature's configurations inform the human aesthetic.

In 250 BCE, Archimedes looked at nature and saw geometry. A drop of water forms ripples in the shape of a circle, and the well-known mathematician is probably most recognized for his calculation of pi, or the ratio of a circle's circumference to its diameter. He also studied spheres - the planets - and used mathematics to measure nature's spirals, such as those that occur in the growth of a pinecone's scales.

Leonardo of Pisa, or as he was nicknamed, Fibonacci, was a number theorist in the 12th and 13th centuries who is best known for a calculating a logarithmic or equiangular spiral that grows exponentially like the scales on a pineapple. It is estimated that 90 percent of all plants reflect Fibonacci numbers, a sequence that grows proportionately with each number being the sum of the two numbers that precede it. I'm no mathematician, but basically it is 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, etc. You get the picture, if not the exact formula.

This sequence of numbers is expressed in plants in a couple ways, one of which is in the numbers of flowers' petals. A few plants' flowers have one or two petals, such as the calla lily and euphorbia, respectively. Lilies, iris and trillium are examples of flowers that have three petals, and hundreds of species have blooms with five petals, including columbine, vinca and pinks.

Delphiniums bloodroot and coreopsis bloom with eight petals, and though eight-petaled blooms are

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not as common as some others, flowers with four, six, or seven petals are as scarce as hen's teeth.

The daisy family is a Fibonacci sequence poster child, commonly featuring blooms with 13, 21, 34, 55 and 89 petals. Starry-eyed young lovers would do well to pluck the 13 petals from a black-eyed Susan in a wistful test of loves-me-loves-me-not rather than the common field daisy, which offers the even number 34 petals, with it's obvious disappointing result.

The Fibonacci sequence is additionally reflected in seed heads, as in the 13 ridged points on poppies' cool little seed pod caps. The seeds of a large sunflower occur in spirals of 89 and 55, and the small florets at the center of a daisy blossom also reflect the Fibonacci spiral, with 21 counterclockwise and 34 clockwise spirals.

When Mark Changizi looks at nature's comely shapes, he doesn't see numbers, he sees letters. A study published last year by the California Institute of Technology researcher in The American Naturalist journal claims that all the letters in alphabets are based on shapes commonly occurring in nature. "Evolution has shaped our visual system to be good at seeing the structures we commonly encounter in nature, and culture has apparently selected our writing systems and visual signs to have these same shapes," Changizi explained. He has developed a periodic table of letter topologies.

Norwegian-born photographer and artist Kjell Sandved spent 24 years photographing letters and numbers in nature. He agrees our brains are trained to recognize particular patterns, but rather than seeing nature's shapes in letters and numbers, he has spent his time seeking their literal representations at the hands of Mother Nature.

In 1975, he published a famous poster of the alphabet and numbers represented in the intricate and beautiful powdery scales of moth and butterfly wings. More recently he produced The Nature Alphabet of alpha and numeric characters that occurred naturally in photos taken of animals, plants, rocks and trees.

A line from a poem by Theodore Roethke that appears on many of Sandved's posters reflects the considerable awe I feel when faced with the wonders of the natural world: "All finite things reveal infinitude." Math and science aside, I am in total agreement with Sandved when he says of his encounters with nature, "The more I learn, the more I see that I'm totally ignorant."

And, in my case, that ignorance is pure bliss.

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