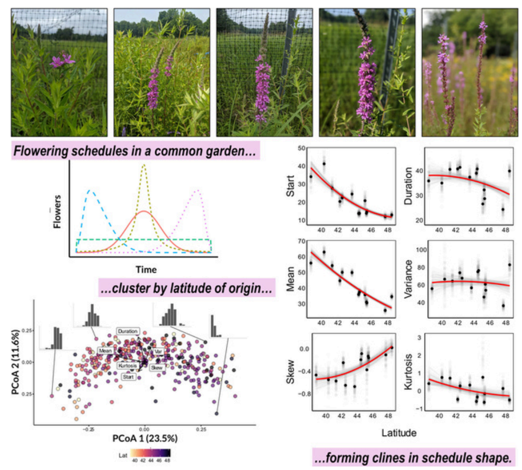
Highlighted Articles for March 2025

Rapid evolution of flowering schedule shape is associated with adaptation to shorter growing seasons in an invasive plant

The way that a plant produces flowers over time is determined by genetic and environmental causes, which is formally defined by a "flowering schedule." **Akbar et al. use a common garden approach here to show that flowering schedules have evolved in the North American invasive plant *Lythrum salicaria* (purple loosestrife) as it spread northward into Canada.** Previous studies showed that the evolution of earlier flowering time was crucial to the northward range expansion of *L. salicaria* as it experienced shorter growing seasons, resulting in locally adapted populations. Although previous studies only looked at the onset of flowering, the current study characterizes full flowering schedules using principal coordinates analysis and other metrics analogous to central moments of frequency distributions (i.e., mean, variance, skew, and kurtosis). **These shape changes can help us understand trade-offs associated with rapid evolution of local adaptation in *L. salicaria*, which may be relevant for other species experiencing novel and changing climates.**



Mia N. Akbar et al. 2025. Latitudinal clines in the phenology of floral display associated with adaptive evolution during a biological invasion. *American Journal of Botany* https://doi.org/10.1002/ajb2.70015

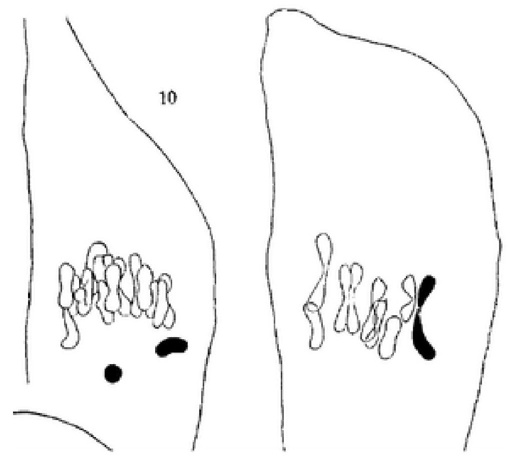
A plant "muscle": G-fibers help vines anchor onto their support

Gelatinous fibers ("G-fibers") are common in the stems of twining vines, but the timing of their development and their role in climbing remain unclear. **Onyenedum et al. tracked G-fiber development in an emergent model species, the common bean vine *(Phaseolus vulgaris)*, and found that these fibers do not drive the plant's characteristic circumnutation (i.e., oscillating movements).** Instead, G-fibers form only after the vine has coiled around a support structure. **This suggests that G-fibers play a key role in generating the squeezing force that twining vines use to securely attach to their host.**

Joyce G. Onyenedum et al. 2025. Gelatinous fibers develop asymmetrically to support bends and coils in common bean vines (*Phaseolus vulgaris*). *American Journal of Botany* https://doi.org/10.1002/ajb2.17014

Only two sexes, male and female, but oh, the diversity of sex chromosome systems

In XY sex-determination systems, the sperm cell determines offspring sex, and males are the heterogametic sex. In ZW sex-determination systems, the egg cell determines offspring sex, and females are the heterogametic sex. Knowledge of the frequency with which these systems occur in the Tree of Life is limited because most sex chromosomes cannot be distinguished from each other, or from the autosomes, using microscopy alone. **Based on genomic data, ZW systems are now known for 22% of flowering plants with studied sex chromosomes, and switches between ZW and XY systems have been documented in *Silene* (Caryophyllaceae) and *Salix* (Salicaceae).** Because there are currently no known correlates between either sex chromosome system and species traits or environmental conditions, it is not possible to predict which of the thousands of dioecious angiosperms may have which chromosomal system. Only a small fraction of XY and ZW chromosomes are heteromorphic, with *Fragaria elatior* being the most striking example (see figure). **In this *On the Nature of Things* essay, Susanne Renner suggests that there are now enough known cases of ZW chromosomes to justify addressing hypothetical predictions regarding ecological and genetic drivers of this system.**



Susanne S. Renner. 2025. Female heterogamety (ZW systems) in 22% of flowering plants with sex chromosomes: Theoretical expectations and correlates. *American Journal of Botany* https://doi.org/10.1002/ajb2.70006

[Figure shows two embryo sac mother cells of *Fragaria elatior,* a synonym of *F. moschata*, in prophase I of meiosis, showing the W and Z sex chromosomes separating from each other before the autosomes as is typical of heteromorphic sex chromosomes. It is not known, which is the W and which the Z chromosome (Figs. 10 and 11 from Kihara [1930]. His Fig. 24 shows a photo of the chromosome plate drawn in the figure shown here).]

Kihara, H., 1930. Karyologische Studien an *Fragaria* mit besonderer Berücksichtigung der Geschlechtschromosomen. *Cytologia* 1: 345-357.