

Colchicum

Autumn Crocus, Meadow Saffron

NOT to be confused with saffron!



Colchicum x byzantinum is a hybrid between *C. autumnale* x *C. cilicicum*.

Colchicum, Autumn Crocus, or Meadow Saffron is a genus of delightful perennial flowering plants. There are about one hundred species, most from northern Africa, southern Europe, the Middle East through Western Asia to the borders of Central Asia.

Colchicum, despite the common name *Autumn Crocus*, isn't even closely related to *Crocus sativa* (the source of saffron). *Colchicum* species belong in the Colchicaceae family, having three styles and six stamens, whereas *Crocus* belong in the much larger *Iris* family (Iridaceae), having only three stamens and a single style. Moreover, *Colchicum* is extremely toxic, so it's important not to confuse the two genera.



Colchicum species in Europe, Africa and east Asia



Plants like *Colchicum* that spend some of the year underground to avoid extreme environmental conditions, are termed *geophytes*. But *Colchicum* is a little bit different. After spending the summer underground, instead of producing leaves and a stem and *then* flowers, like most self-respecting flowering bulbs, the flowers of *Colchicum* are produced directly from the corm in *autumn*. The *ovary* of the flower remains *underground* and the styles are extremely long as they extend from the underground corm to the open flower. The petal-like tepals (sepals and petals combined) form a long, narrow tube commonly 35 cm (or more) long! The flower tubes emerge from the corm creamy-white but once exposed to sunlight, change to light purple.

Medicine

Colchicine is an alkaloid. Alkaloids are a vast family of naturally occurring, bitter, toxic compounds produced by plants to deter herbivores. In modern times, they are the origin of a vast array of pharmaceutical and recreational drugs such as psilocybin, cocaine, caffeine and nicotine, not to mention atropine, ephedrine, and on it goes. Use of extracts derived from *Colchicum autumnale* for joint pain was recorded in an Egyptian manuscript, the *Ebers Papyrus*, in 1,500 BCE. Its use as a treatment for gout was recorded in the 6th century. The active ingredient, colchicine, was isolated in the early 1800s and continues to be used in medicine today. In addition to relieving inflammation in gout, it's also used for other inflammatory conditions, including Behçet's syndrome and familial Mediterranean fever. So how does it work? It's not fully understood, but seemingly, it affects neutrophils, a type of white blood cell (leucocytes) that act as the first line of defence of the immune system.

Plant Breeding

Colchicine is extensively used in plant breeding, as it has the capacity to induce multiple sets of chromosomes by disrupting the spindle that *separates parental chromosomes* when a cell divides to make daughter cells. Plant breeders therefore use colchicine to double chromosome numbers (per cell), inducing *polyploidy* and enabling development of new plant cultivars. This would be lethal for higher animals, but in plants it can result in larger, more robust, and faster growing plants than their parents. For example, it opens a path for breeding of sterile *triploid* (3n) plants by crossing a colchicine-induced *tetraploid* (4n) plant with a *diploid* (2n) parent. These *triploids* produce *seedless* fruit, such as watermelons and bananas.



Biogeography

There are about 250 species in the Colchicaceae, from temperate to tropical areas of Africa, Europe, Asia, Australia and North America. Curiously, it is not present in South America. *Colchicum* has an interesting connection to Australia. Although the genus, *Colchicum* is not present in Australia, there are many other genera of Colchicaceae that do occur here, including *Burchardia umbellata*, common in sandstone woodlands of the Sydney region, and *Wurmbea dioica*, which is widespread across much of Australia. The largely Southern Hemisphere distribution of the family Colchicaceae is strong evidence of a Gondwanan connection, although *Colchicum* tells us that the family is also well represented in the Northern Hemisphere.



Burchardia umbellata – an Australian relative of *Colchicum*



World distribution of Colchicaceae

- Dasgeb B, Kornreich D, McGuinn K, Okon L, Brownell I, Sackett DL. (2018). *Colchicine*: an ancient drug with novel applications. *British Journal of Dermatology*: 178(2): 350-356. doi: 10.1111/bjd.15896.
- Jung L, Winter S, Eckstein L, Kriechbaum M et al. (2011). Biological Flora of Central Europe: *Colchicum autumnale* L. *Perspectives in Plant Ecology Evolution and Systematics*. 13. 227-244. 10.1016/j.ppees.2011.04.001.
- Royal Botanic Gardens Kew, Plants of the World Online:
<https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:24150-1>
- Thornton C, Mason JC. (2012). Drugs for Inflammation and Joint Disease. *In: Clinical Pharmacology* (Eleventh Edition). Chapter 16: 240-259.
- Vinnersten A, Manning J. (2007). A New Classification of Colchicaceae. *Taxon*, 56(1), 171–178.
<http://www.jstor.org/stable/25065748>
- Wikipedia: <https://en.wikipedia.org/wiki/Colchicum>
- Wikipedia: <https://en.wikipedia.org/wiki/Colchicaceae>
- Wikipedia: <https://en.wikipedia.org/wiki/Colchicine>

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