INVISIBLE UV-ABSORBING FLAVONOIDS ARE PERVASIVE IN FLOWERING PLANTS

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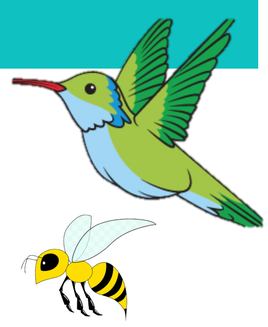
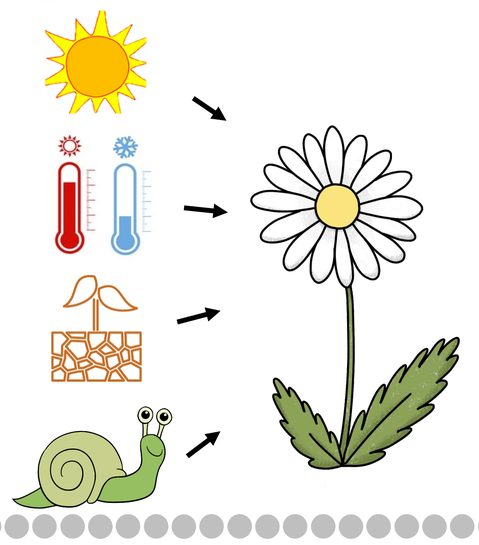
1 Flower color and pigments

- Flower color is crucial for pollinator attraction, however abiotic selection agents may drive flower color evolution as well and cause serious negative effects on plant fitness[1].

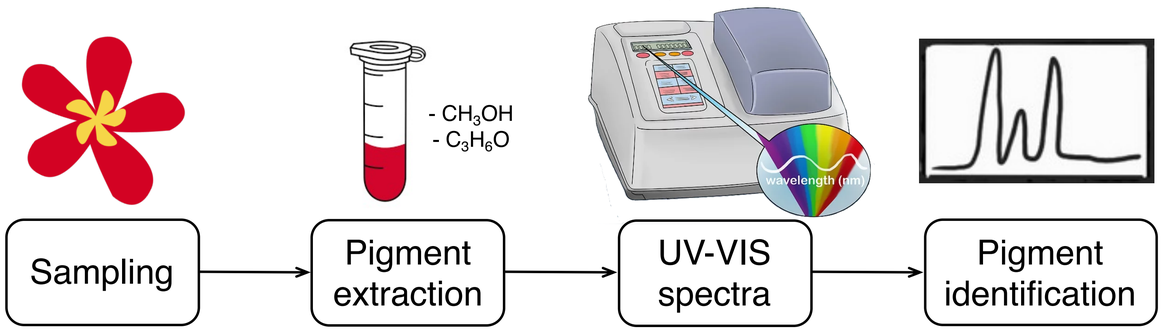


- The most important groups of floral pigments are: anthocyanins, carotenoids, betalains, chlorophylls, aurones-chalcones, and UV-absorbing flavonoids.
- UV-absorbing flavonoids, the only group that are invisible for humans, are crucial in pollinator attraction[2]. Given their known protective role in vegetative organs[3], they may have a dual role protecting flowers against all sorts of stresses.



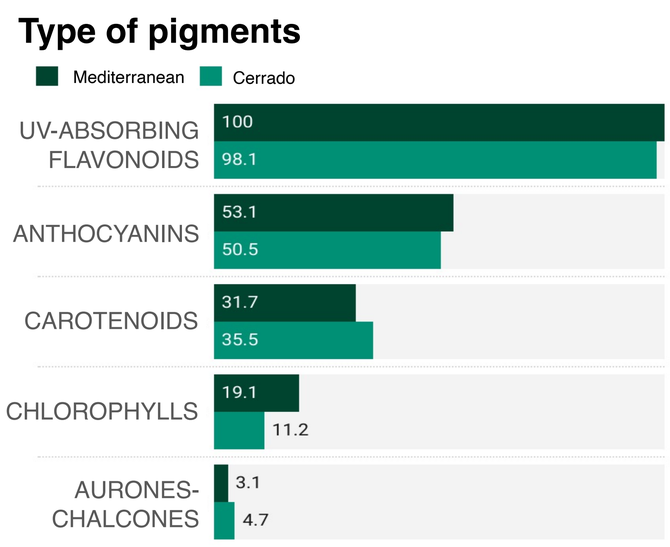
2 Sampling and pigment quantification

- We analyzed major floral pigments classes (i.e., chlorophylls, carotenoids, aurones-chalcones, UV-absorbing flavonoids and anthocyanins) for 489 species belonging to 89 angiosperm families from Mediterranean (South Spain) and Cerrado vegetations (Central Brazil).
- (1) We extracted floral pigments, (2) measured the UV-VIS absorption spectra (280-700 nm), and (3) identified mayor pigment classes by means of spectrophotometric analyses.

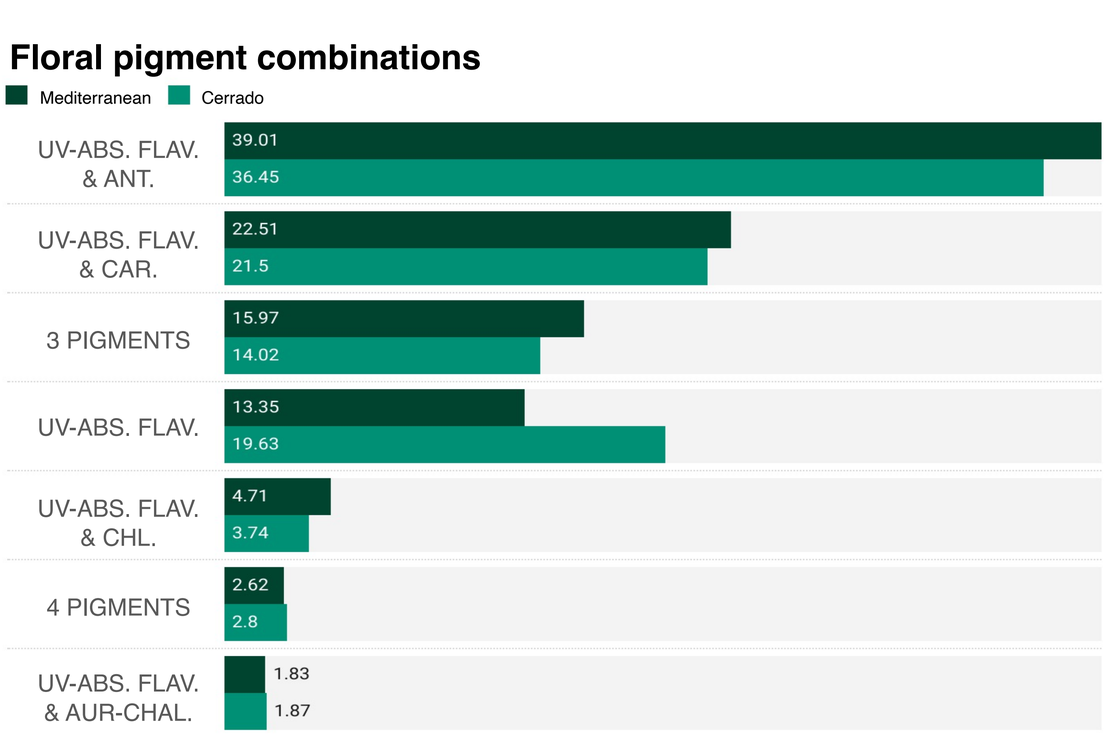


3 What we don't see is prevalent

- The frequency of the main groups of floral pigments in Mediterranean and Cerrado flora was similar.
- UV-absorbing flavonoids were ubiquitous in all flowers. They were present exclusively in white-flowered plant or coexisting with other floral pigments.

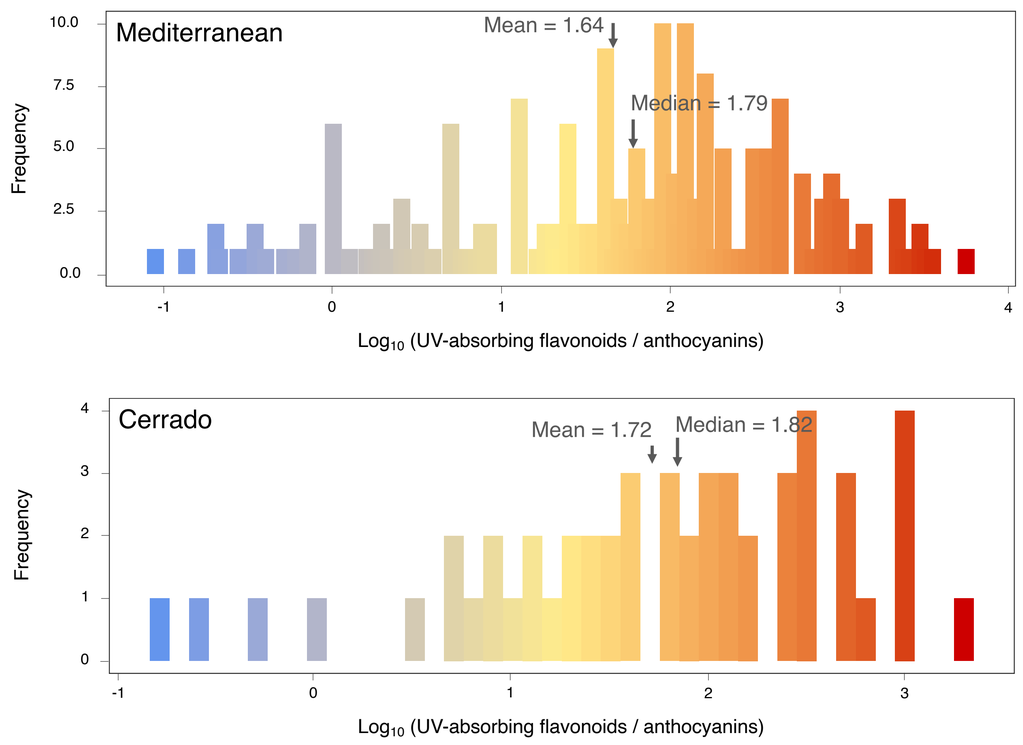


- Most flowers accumulated two pigments, and in all cases was due to the presence of UV-absorbing flavonoids coexisting with any of the other colored pigments.



4 Favored accumulation of UV-abs. flavonoids

- The quantification of anthocyanins and UV-absorbing flavonoids, synthesized at different points of the flavonoid metabolic route, showed considerable higher concentrations of the latter in flowers.



CONCLUSIONS:

- The widespread concurrence of UV-absorbing flavonoids, regardless of the presence of other pigments, may have adaptive advantages in flowers.
- The high concentration of UV-absorbing flavonoids in flowers of both vegetation types suggests important unsolved roles of these compounds in the evolution of angiosperms.

REFERENCES:

[1] Borghi, M., Perez de Souza, L., Yoshida, T. and Fernie, A.R., 2019. Flowers and climate change: a metabolic perspective. New Phytologist, 224, 1425-1441.

[2] Lee, D. 2007. Nature's palette: The science of plant color. Chicago, IL: University of Chicago Press.

[3] Agati, G., Brunetti, C., Di Ferdinando, M., Ferrini, F., Pollastri, S. and Tattini, M. 2013. Functional roles of flavonoids in photoprotection: New evidence, lessons from the past. Plant Physiology and Biochemistry, 72, 35-45.

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