

# Among -and within- genus variability of the UV-absorption capacity in saxicolous mosses

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## Objectives

Mountain ecosystems, especially at high altitudes, might be particularly exposed to the effects of ultraviolet radiation. In particular, rock outcrops are very important for bryophytes because of the reduced competition from vascular plants, providing a diversity of microhabitats with variable ecological condition. Limited work has been done with bryophyte species from rocky habitats that are known to be desiccation tolerant species and apparently well adapted to ambient levels of UV radiation. Our aim was to study the among- and within-genus variability of UV protection in three genera with a high number of sun-exposed saxicolous species (*Andreaea*, *Grimmia* and *Racomitrium*), considering the differences due to the genera, species and environmental variables.

## Material and methods

Dried samples of the studied species (5 *Andreaea* taxa, 10 *Grimmia* taxa and 8 *Racomitrium* taxa) were collected from four mountain areas in northern and central Portugal. UV absorption capacity was determined by both spectrophotometry and HPLC, differentiating in both cases methanol-soluble and methanol-insoluble cell wall-bound UV-absorbing compounds (respectively, SUVAC and WUVAC). The effects of the genus, species within genus and qualitative environmental variables on the physiological variables were tested using the non-parametric Kruskal-Wallis test. Correlations between the physiological and quantitative macro- and micro-scale environmental variables were calculated using Spearman correlation coefficients.

## Results

The bulk amount of methanol-soluble UV-absorbing compounds (SUVAC) varied between 4.6 and 36.9. The bulk amount of methanol-insoluble UV-absorbing compounds (WUVAC) varied between 15.1 and 100.5. The values of SUVAC, WUVAC, TUVAC (total UV-absorbing compounds) and WUVAC/SUVAC were significantly affected by the genera ( $p < 0.001$ ) and environmental variables (e.g. substrate, chain of mountains;  $p < 0.001$ ). Significant differences between species within *Andreaea*, *Grimmia* and *Racomitrium* genera for each physiological variable were also found ( $p < 0.001$ ). The physiological variables SUVAC and *p*-coumaric acid were positively and significantly correlated with altitude and biologically effective UV-B ( $p < 0.01$ ).

## Conclusions

Our study clearly shows that *Grimmia*, *Andreaea* and also *Racomitrium* genera accumulate UV-absorbing compounds, with different values between genera and species within genus and that are significantly affected by both micro and macro-scale variables. This study also confirms there is an increase of UVAC levels with altitude and that the levels of the cell wall-bound UVAC were higher than those of the soluble fraction.