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Development of bioluminescence reporter systems using duckweed plants

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Duckweeds serve as ideal model plants for whole-plant imaging due to their simple two-dimensional structure and compact size. Using bioluminescent reporters, we have achieved long-term, continuous monitoring of gene expression dynamics at both the whole-plant and single-cell levels (*Sci Adv* 2016; *New Phytol* 2021; *Plant Physiol* 2023). These studies spatiotemporally revealed dynamics of circadian and diel gene expression in duckweed. While these bioluminescence techniques were originally developed for duckweeds, they have recently been applied to other species, such as *Arabidopsis* (*Sci Rep* 2025). In this presentation, we will highlight the unique bioluminescence behaviors specific to duckweeds (and aquatic plants) and introduce new applications of bioluminescent reporters for monitoring plant physiological processes. Finally, we will discuss the advantages and limitations of duckweeds as a model system.

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bioluminescent reporter, luciferases, gene expression

References

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