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## Constructing designer duckweed holobionts for comprehensive analyses of plant-microbe interactions

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Holobiont refers to a holistic view of the organism as a combination of an eukaryote and its associated microbiome, which is a dynamic assortment of microbes inhabiting various niches that the host presents. The bacterial microbiome of water lentils (aka duckweeds) has been characterized over the past decade and may enhance or inhibit the growth of these aquatic plants. Most of these studies involved presenting isolates of duckweed-associated bacteria (DABs) to gnotobiotic duckweeds and observing their effects on the plant's behavior after days or weeks. However, the mechanism of how DABs can modulate duckweed growth in different context is still lacking due to the complexity of the interacting partners as well as with the changing environmental context during the assays. Leveraging the clonal propagation lifestyle of duckweeds, we have constructed duckweed holobionts (DHBs) using characterized DABs and their combinations that stably colonize gnotobiotic *Lemna minor* 5576, a duckweed strain with a well characterized genome. These associations may be stably propagated for months or years under laboratory conditions, showing that assembled DABs could be transferred between generations of fronds. Preliminary studies show that these designer DHBs can provide a convenient platform to study how stable colonization by individual DABs and their mini-communities can modify the host's physiological properties, such as their relative growth rate and levels of vitamin B12, as well as the response of plant-microbe association to environmental factors. The DHB approach can thus help generate deep datasets on plant-microbe interactions while producing value-added strains as candidates for practical applications.

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### References

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