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Adaptive innovation of green plants by horizontal gene transfer

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Abstract: Horizontal gene transfer (HGT) refers to the movement of genetic material between distinct species by means other than sexual reproduction. HGT has contributed tremendously to the genome plasticity and adaptive evolution of prokaryotes and certain unicellular eukaryotes. The evolution of green plants from chlorophyte algae to angiosperms and from water to land represents a process of adaptation to diverse environments, which has been facilitated by acquisition of genetic material from other organisms. In this article, we review the occurrence of HGT in major lineages of green plants, including chlorophyte and charophyte green algae, bryophytes, lycophytes, ferns, and seed plants. In addition, we discuss the significance of horizontally acquired genes in the adaptive innovations of green plants and their potential applications to crop breeding and improvement.

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