

Antheridiogen determines sex in ferns via a spatiotemporally split gibberellin synthesis pathway

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Some ferns possess the ability to control their sex ratio in their colony with the aid of antheridiogen. Antheridiogens are antheridium (male organ)-inducing compounds with structural similarity to gibberellin. We determined that ferns have evolved an antheridiogen-mediated communication system to produce males by modifying the gibberellin biosynthetic pathway, which is split between two individuals of different developmental stages in the colony.

Antheridiogen acts as a bridge between them because it is more readily taken up by prothalli than bioactive gibberellin, which may be due to its hydrophobic properties. The pathway initiates in early-maturing prothalli (gametophytes) within a colony, which produce antheridiogens and secrete them into the environment. After the secreted antheridiogen is absorbed by neighboring late-maturing prothalli, it is modified into bioactive gibberellin to trigger male organ formation.