

# Sanction mechanism identified between ants and host plants

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In nature, many forms of plant-animal mutualism exist in which each partner benefits from the presence of the other. Although mutualistic interactions offer advantages for both partners, they are nonetheless a source of conflict.

CNRS researchers from Toulouse III University - Paul Sabatier and the IRD have recently observed an original sanction interaction between a plant and an ant. In French Guiana, the *Hirtella physophora* plant is capable of retaliating against the "guest [ants](#)" that prevent it from flowering. These results illustrate the importance of sanction mechanisms, which prevent a mutualistic partner from becoming a parasite.

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In the forests of French Guiana, *Allomerus decemarticulatus* ants and the undergrowth plant *Hirtella physophora* are closely associated. The ants live in the leaf pockets of the plant, where they protect it from plant-eating insects. This "win-win" arrangement is an example of mutualism, since each partner benefits from the presence of the other. But even good relationships can turn sour. The ants sometimes cheat and destroy more than two-thirds of the [flower buds](#) of their host plant in order to influence the growth-reproduction balance.

Experiments reproducing the destruction of buds by ants have shown that plants whose buds have been destroyed grow more quickly than

others. This explains the ants' behavior - by preventing the plants from producing flowers, the ants force them to channel their energy into leaf production, which means more leaf pockets. But the plant has a [defense mechanism](#). If too many buds are destroyed, the leaf pockets it produces are particularly small, so that the ants are unable to use many of them. The [host plants](#) are therefore able to sanction their guests when they become too virulent.

This study, carried out by CNRS researchers of Toulouse III University - Paul Sabatier and the IRD show empirically, and for the first time that in the relationship between a plant and an insect, sanction mechanisms can be used to maintain mutualism and prevent the relationship from becoming unilateral exploitation.

**More information:** Malé PJG, Ferdy JB, Leroy C, Roux O, Lauth J, Avilez A, Dejean A, Quilichini A & Orivel J. 2013. Retaliation in response to castration promotes a low level of virulence in an ant-plant mutualism. *Evolutionary Biology*.

Provided by CNRS

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