Host-parasitoid relationship as a driver of horizontal transfer ?

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Résumé

Traditionally, evolution has been represented by trees, portraying the vertical transmission of genetic
material from parents to offspring ; but the transmission of genetic material can also take place

across inter-species barriers. With the generalization of comparative genomics to non-model species,

this phenomenon known as horizontal transfer, which predominantly occurs in procaryotes, is

increasingly documented in multicellular eukaryotes such as metazoans. Horizontal transfer now

appears to be a common phenomenon, phylogenetically widespread and responsible for a significant

part of the evolution of these organisms.

However, the molecular and ecological mechanisms underlying these horizontal transfers, and their

adaptive implications, are still largely unknown. It is now necessary to quantify these events on large

taxonomic scales, and to identify their explanatory factors.

The numerous cases of horizontal transfer recorded between host organisms and their parasites

suggest that ecological connectivity could affect the frequency of this phenomenon - but to what

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extent? To address this question, we have chosen to focus on a particular but widespread ecological

relationship amongst insects: the host-parasitoid relationship.

Our project benefits from a combination of extensive ecological and genomic data, obtained from

decades of fieldwork: we analyzed the complete genomes of 228 insect species, comprised of

Hymenoptera and Diptera parasitoids and their Lepidoptera hosts, which constitute an exhaustive

network of ecological interactions within a well-known phylogenetic framework. Through clustering

and phylogenetic approaches, we were able to extensively document horizontal transfer events

between insect host species and their parasitoids, and to assess the contribution of the relationship
between hosts and their parasitoids on horizontal transfer events.

Mots-Clés: Evolutionary ecology, host parasite interaction, genomics