

## The evolution of cold tolerance in *Drosophila*: From phylogenetics to gene expression

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Temperature is one of the major environmental factors affecting geographical distribution of ectotherm species, such as, *Drosophilids*. Therefore, the different capacity of species to tolerate extreme temperatures will influence their distribution across distinct climatic regions. In this study our main goal is to address the evolution of climate adaptation in *Drosophila* and explore the putative role of *Frost* on the basis of adaptation to different climate conditions. For this purpose we have first estimated separately the phylogenies of 218 and 122 species of the *Drosophila* and *Sophophora* subgenera, respectively. Ancestral reconstruction of climatic distribution indicates that the ancestral species of these two subgenera had a tropical distribution and adaptation to temperate climates has occurred several times independently. We have then performed chill coma recovery experiments and gene expression assays of *Frost* for six species, representative of the major groups of *Drosophila*, from different climatic distributions, with fully sequenced and annotated genomes. For tropical and cosmopolitan species with tropical origin, chill coma recovery times increase linearly with cold exposure times, whereas for temperate and cosmopolitan species with temperate origin, recovery times are independent of exposure times. Lower fold changes in *Frost* expression after two hours of recovery after cold shock are always associated with temperate species. The ability to largely increase *Frost* levels after cold shock should be a feature of the tropical ancestral of *Drosophila* genus and these levels should be reduced after the transitions to temperate climates.

### Biography

Jorge Vieira has completed his Ph.D in 1997 from the University of Porto. He is the head of the Molecular Evolution group at IBMC (Porto, Portugal). He has published 59 articles in reputed journals in the field of Molecular Evolution and bioinformatics (<http://evolution.ibmc.up.pt/>). Recently, he has dedicated a considerable effort to the development of easy to use informatics solutions for the regular molecular biologist.

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