

Museomics to the rescue: Unraveling the insect decline across the 20th century in Switzerland

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January 8, 2023

Abstract

The large-scale decline of insects in the past decades starts to be widely documented. However, the mechanisms, the kinetic and the causes of this decline, and in particular the role of anthropogenic activities, remain poorly understood. Indeed, studies documenting this decline are based on recent trends, since the 1970s, and rely on biomass estimations that do not fully reflect the state of populations. However, samples are available to undertake a large-scale study, both spatially (Switzerland) and temporally (throughout the 20th century). The museum collections contain insects collected throughout this period and form real time series. Thanks to recent developments in museomics, it is now possible to access the genetic information carried by these samples and thus to study their demographic evolution over time. Here we investigate population trends of ten widely distributed insects using museum specimens. To that aim, we selected specimens constituting populations sufficiently sampled in the past and we apply the HyRAD protocol, a cutting-edge museum genomics method. By using population genetic estimators, notably the genetic diversity, the inbreeding coefficient and the effective population size, it will thus be possible to finely assess the population dynamics and the mechanisms involved.