

Delimiting spruce budworm species using morphometric and DNA variation (Lepidoptera: Tortricidae)

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Until the advent of modern molecular biology, taxonomists relied primarily on morphological characteristics to identify and distinguish species. But the status of some closely related species is ambiguous, making them difficult to definitively delimit using morphological characteristics or DNA variation. Here, we sampled three species of the spruce budworm species complex *Choristoneura fumiferana*, *C. biennis*, and *C. occidentalis*, from Western Canada, to understand how differences in their wing pattern morphology (i.e. colour) are associated with variation that exists in single nucleotide polymorphisms across their genomes. DNA variation alone allows clear identification of two main groups, *C. fumiferana* and a second group that shows partial separation between two subgroups, *C. biennis* and *C. occidentalis*. However, morphological characteristics indicate significant intermingling among all three groups. Our results suggest more extensive mixing of the genes responsible for wing patterns in the spruce budworm species than the rest of the genome. The similarity in morphologies among the three species lead to uncertainty in evaluating previously recognize species boundaries and may be explained by introgression, convergence or retained ancestral polymorphisms.