

Concerted evolution of female and male pheromones in corn borers *Ostrinia* spp. (Lepidoptera: Crambidae)

Christer Löfstedt and Jean-Marc Lassance
Department of Ecology, Lund University
SE-223 62 Lund, Sweden

E-mail: christer.lofstedt@ekol.lu.se

The European corn borer (ECB) *Ostrinia nubilalis* and its close relative the Asian corn borer (ACB) *O. furnacalis* provide unique opportunities for studies of assortative mating and related mechanisms potentially involved in speciation among phytophagous insects. The ECB and ACB both thrive on a large number of host plants, but from an agricultural point of view, maize is the most important host. The so-called E and Z pheromone strains of the ECB use a blend (*E*)-11- and (*Z*)-11-tetradecenyl acetate as female-produced pheromone components but in opposite ratios, 99:1 and 3:97 respectively. The ACB uses E12- and Z12-14:OAc as pheromone components. In spite of apparent similarity in pheromone composition, the pheromone components in the two species are biosynthesized along distinctly different pathways.

Males of many moth species also possess pheromones that are released during courtship. The evolution of these courtship pheromones has been suggested to constitute an adaptive response in species in which the probability of mating mistakes is high. Female mate discrimination via the chemical cues emitted by males would act as a second reproductive barrier. Furthermore, male pheromones have been considered as a relevant trait to assess mate quality. We report the role of odours released during courtship by males of *O. nubilalis*. In choice experiments, females show mating preference for older males based on male pheromone composition. Although in most moths the pheromone system provides species specificity and show little variation within species, we find the composition of the male pheromone to vary in an age-dependent manner. Moreover, whereas a vast majority of male pheromones identified so far are derived from plant compounds, male pheromone components of *O. nubilalis* appear to be biosynthesized *de novo* by an enzymatic machinery similar to that found in female pheromone glands. Male pheromone components from *O. nubilalis* are compared to pheromone component candidates identified from *O. furnacalis*. Our results suggest that the evolution of specific male and female pheromones in corn borers is an intricate case of adaptive sex-specific transcription/translation of essential pheromone production genes. We discuss how this mechanism may facilitate the evolution of new pheromones and contribute to speciation.