When genetic markers contradict historical hypotheses: an unexpected Cypriot origin for the invasive seed chalcid Megastigmus schimitscheki.

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MEDINSECT3, Hammamet, Tunisia, 8-12 May 2012

When genetic markers contradict historical hypotheses: Cyprus is unexpectedly the most likely source of the invasive seed chalcid *Megastigmus schimitscheki*

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The insect genus *Megastigmus* (Hymenoptera: Torymidae) is a group of micro-hymenoptera that mostly develop in seeds of various plants. The females directly lay eggs in the host plant, and each larva develops within a single seed until adulthood, affecting the host reproduction. Infested seeds are very difficult to detect. Due to seed trade and the increase of international seed exchanges (eventually carrying hidden *Megastigmus* larvae), several species of *Megastigmus* have been introduced accidentally in different parts of the world in the last few years. Among them, the cedar seed chalcid, *Megastigmus schimitscheki,* was recently detected in *Cedrus* plantations in Southeastern France. This species is native from Asia Minor where it develops on *Cedrus libani* in Turkey, Syria and Lebanon, and on *C. brevifolia* in Cyprus. Historical data suggest that *M. schimitscheki* could have been accidentally introduced from Turkey when seeds were imported for reforestation purposes. Because both historical and observational data may provide incomplete, sparse or misleading information on invasive populations history, the goal of our work was to study the patterns of genetic diversity of the invasive wasp in its native range, and to identify the potential source of the introduction in France.

We combined mitochondrial sequences and nuclear microsatellites to characterize several populations from both the native and the invasive ranges. The results obtained with the different markers were consistent. They showed a strong geographical genetic structure in the Near East, with four differentiated groups corresponding to Lebanon, Eastern Turkey, Western Turkey and Cyprus, respectively. Some gene flow moreover exists between Cyprus and Eastern Turkey. Concerning the introduction scenario, an approximate Bayesian computation analysis unambiguously identified Cyprus as the single source of the invasion in France. We could also show that the number of founders was extremely low (average estimate = 9). Factors that may have permitted a successful invasion in spite of a very severe founder effect and a host shift from *Cedrus brevifolia* to *C. atlantica* are discussed.