

## Presentation

### Title

TRACKING ORIGINS OF INVASIVE LEAF-MINING MOTHS USING HERBARIA AND MINIBARCODES

### Authors

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### Abstract

Determining the origin of alien invasive species is crucial to developing invasive species management strategies. However, the origin of many alien species remains uncertain because of the lack of historical data. For instance, the moth *Cameraria ohridella* (Gracillariidae) was described in 1986, as a genus new to Europe and had managed to invade almost all Europe since 1989. Its larvae are leaf miners on the white flowering horse-chestnut (*Aesculus hippocastanum*), causing significant damage to their summer foliage. The fact that the appearance of *C. ohridella* in much of Western Europe has been so recent and dramatic, without earlier detection by entomologists, has made its origin a subject of debate. Originally thought to be a relict species in the Balkans, a more recent hypothesis is that the moth is an example of a sudden host plant shift to horse-chestnut, probably from maple or sycamore (*Acer* spp.), maybe combined with long distance translocation. Examination of horse-chestnut samples in seven historic herbarium collections revealed that almost half of 71 sheets had leaf mines with larvae/pupae inside. This material came from natural populations in Albania and Greece and dated from 1981 back to 1879. We extracted DNA from 54 archival larvae and used five COI minibarcode primer pairs developed specifically for *C. ohridella*. We successfully amplified DNA minibarcode fragments from 10 larvae extracted from herbarium specimens from 1936 to 1981. These archival sequences confirm an identity and a Balkan origin of *C. ohridella* and set its history back over a century. The herbaria reveal three previously unknown mitochondrial haplotypes. We also detected local outbreaks back to 1961 and dynamic frequency changes, which may be associated with road development. This case history demonstrates that herbaria are greatly underutilised in studies of insect-plant interactions, herbivore biodiversity and invasive species origins.

250 words maximum