

INBIPS: THE INTERNATIONAL NETWORK FOR THE BARCODING OF INVASIVE AND PEST SPECIES

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WHAT IS INBIPS?

The International Network for the Barcoding of Invasive and Pest Species (INBIPS, www.barcoding.si.edu/INBIPS.htm) is an informal international network of researchers, research institutes and government agencies concerned with the recognition of invasive and pest species. INBIPS's goal is to provide information about applying DNA barcoding to invasive and pest species identification and to facilitate new barcoding activities in this area.

DNA BARCODING

DNA barcoding is a technique that uses short DNA sequences from standardized regions of the genome as a species identifier. A ~ 650 base-pair region of a mitochondrial gene (COI) has been shown to be an effective barcode region for many animals, (Hebert et al. 2003a,b; Hebert et al. 2004a,b; Hogg and Hebert 2004; Armstrong and Ball 2005; Ball et al. 2005; Barrett and Hebert 2005).

HOW CAN DNA BARCODING BE USED FOR INVASIVE AND PEST SPECIES PROBLEMS?

DNA barcoding can play an important role in the identification of invasive and pest species that may otherwise be difficult or impossible to achieve. When new and unfamiliar invaders are initially detected, the search for expertise may be time-consuming and 'off-shore'. In the case of invertebrates, invaders are frequently discovered as eggs or larvae. These commonly lack distinguishing morphological characters, for which taxonomic keys are generally unavailable.

DNA barcoding of invasive and pest species can provide a valuable diagnostic method for biosecurity and quarantine, where rapid and accurate species identification is critical but may not be possible by current means. For example, rearing immature life stages through to the adults that can be readily identified is often unsuccessful, and at best it is far too slow. However, their genetic makeup remains constant throughout their life cycle. Even so, development of molecular tools customised for all but the most obvious high risk species has been considered impractical. In addition, corroboration of species identifications required for policy or management decisions can be complicated if different molecular tools are employed by different laboratories. DNA barcoding, however, offers rapid and accurate species identifications, and is based on standardized methods that can be easily developed from existing datasets.

The DNA barcoding method can be easily integrated into existing systems for the identification of alien species ranging from forestry and agricultural pests to human disease vectors (e.g., mosquitoes carrying

West Nile virus), to those that may be intercepted at a country's borders or in shipments held in quarantine, or as hitchhikers on ship's hulls or in ballast water. Combined with other tools, such as LUCID keys, taxonomic literature, on-line databases of biological and geographical species information (e.g., host plant, phenology, species range) it can contribute towards a highly effective and holistic means of identification. DNA barcode data may also provide the basis for development of new technologies, such as DNA micro- and macro-arrays for identification of species in mixed samples such as ballast water.

DNA BARCODING AND TAXONOMY

DNA barcoding can also contribute to the categorization of many invasive and pest groups by identifying genetically distinct individuals or populations, flagging potentially new species (Hebert et al. 2004b) and unveiling cryptic species complexes (Hebert et al. 2004a). For invasive and pest species, understanding the taxonomy and associating other biological information is critical to preventing their establishment and could play a role in predicting the invasiveness of species.

THE ROLE OF INBIPS

INBIPS can make DNA barcoding more accessible as a global, standardised tool for invasive and pest species identification, addressing the needs of both the developed and developing nations.

- ◆ catalyst for the formation of new barcoding projects on invasive and pest species,
- ◆ 'noticeboard' for increasing the taxonomic breadth of invasive and pest species barcodes and minimising redundancy of effort,
- ◆ source of information on DNA barcoding and its use in addressing invasive and pest species problems,
- ◆ forum for interactions among invasive alien species (IAS) initiatives that are interested in exploring the use of DNA barcoding, and
- ◆ clearinghouse of information on organizations, initiatives, and species lists concerned with invasive and pest species.

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