

An electronic lab book to facilitate high-throughput DNA barcoding

Application

The high-throughput analytical protocols employed at the CCDB require an effective system to track the analytical history of each batch of samples being processed, while reducing technician time and minimizing human error. Besides the traditional functions of a molecular lab book, the system should facilitate easy data interchange with BOLD, sequencer and liquid handling stations and be compatible with the standard 96 well format.

Method Overview

The electronic lab book used by the CCDB is built on the Microsoft® Excel 2003 spreadsheet platform with built-in formulas and macros. It is a versatile tool which combines the simplicity and convenience of an electronic spreadsheet with the complex requirements of the lab analytical procedures. The lab book is designed to trace the entire analytical history of one 96-well plate from lysis and DNA extraction to sequence upload and submission of sequencer trace files to BOLD. Built-in data conversion tools allow easy transfer of data from plate and box records and output files of Biomek® liquid handling stations and retrieval of BOLD Process ID's. The lab book consists of several modules that facilitate managing the information for all routine stages of the analytical process: tissue lysis, DNA extraction, PCR reactions and cycle-sequencing. These modules can be activated or skipped, depending on a particular workflow. A graphical interface allows manual scoring of PCR results based on E-gel® images for each PCR reaction (see figure). Information tracking for up to six PCR reactions is supported, with individual and overall PCR success automatically calculated. For each plate a maximum of four sequencing reactions can be performed targeting COI and up to three additional genes. Based on the results of PCR and sequencing, plates with DNA and/or PCR products can be submitted for robotic or manual hit-picking. First introduced in 2003, the electronic lab book concept received continuous modifications to match the advancements of laboratory protocols and improve user interface. The current version (4.5.0 beta) is the standard tool used by the CCDB analytical staff for routine DNA barcoding, as well as research and development. With minimal modifications the lab book can be employed in other DNA barcoding facilities with similar high throughput analytical protocols and equipment.

At a glance

- » Tracking of all analytical stages for a 96-well plate with samples
- » Supports standard COI-targeting protocols and up to 3 additional genes
- » Supports up to 6 PCR reactions and scoring PCR results with E-gel® images
- » Facilitates complex screening of PCR results
- » Conversion tools facilitate retrieval of data from BOLD, Matrix TrakMate box records and robotic output files
- » Data output for ABI 3730 sequencer and BOLD trace file submission
- » Support for robotic/manual hit-picking of DNA extracts and PCR products

