

Glass fiber DNA extraction: A new inexpensive method for high throughput DNA isolation

Application

DNA extraction is the first step in the DNA barcoding analytical chain. Although commercial silica-based kits provide high quality DNA for barcode analysis, they are expensive. The Canadian Centre for DNA Barcoding (CCDB) therefore directed its efforts toward the development of an automation-friendly and inexpensive method yielding high-quality DNA extracts. The resulting methodology can be adopted by any facility engaged in either manual or automated high-throughput DNA barcoding.

Method Overview

This method is silica-based¹, and involves binding DNA to a glass fiber membrane in the presence of chaotropic salts. PALL² glass fiber plates^{a,b} have shown the best performance and compatibility with automation. The protocol requires only a small amount of tissue (2-4 mm of insect leg, 1-3 mm³ of ethanol preserved tissue). In fact, even smaller samples (e.g. some zooplankton) have been successfully extracted. Procedures for all animal species are similar, barring the use of a different lysis buffer for arthropods. However, plates with a more sensitive membrane^b (also available from PALL) should be used for small samples with low DNA quantity (e.g. zooplankton or insect legs).

CCDB has now successfully employed both manual and robotic versions of this DNA extraction protocol on more than 10,000 vertebrate and invertebrate specimens (>1000 species). At the time of publication, this method costs \$0.50 CDN versus over \$2.00 CDN for commercial kits. Detailed instructions on buffer assembly, consumables, and robotic protocols are available online^{3,4}.

More Information:

1. Ivanova NV, deWaard JR, Hebert PDN (2006). An inexpensive, automation-friendly protocol for recovering high-quality DNA. *Molecular Ecology Notes*, Published article online, doi: 10.1111/j.1471-8286.2006.01428.x.
2. PALL Corporation (www.pall.com)
3. Ivanova NV, deWaard JR, Hebert PDN (2006). Glass fiber plate DNA extraction protocol: manual protocol employing centrifugation protocol. Published online at <http://www.dnabarcoding.ca/>
4. Ivanova NV, deWaard JR, Hebert PDN (2006). Glass fiber plate DNA extraction protocol: automated method employing Biomek NX Liquid Handling Station. Published online at <http://www.dnabarcoding.ca/>

At a glance

- » Silica-based method uses glass fiber membranes and chaotropic salts
- » Requires only a small amount of tissue
- » Tested on more than 10,000 samples (>1,000 species)
- » Adapted for both manual and automated systems
- » 75% cheaper than commercial kits



Materials:

- a. PALL AcroPrep 96 1 ml filter plate with 1.0 µm glass fiber media (PALL 5051)
- b. PALL AcroPrep 96 1 ml filter plate with 3.0 µm glass fiber media over 0.2 µm bio-inert membrane (PALL 5053)