Cold Spring Harbor Laboratory
DNA Learning Center

Barcode Long Island
Proposal Writing
Campaigns

Jeffry Petracca, MSc

BARCODE LONG ISLAND

Research Proposals - Campaigns

- **For campaigns:**
  - Use the Campaign form found on DNA Barcoding 101.
  - Fill out the required fields
    - Grammar
    - Full sentences

    (See video "BLI Developing Project Titles and Scientific Writing")
    - All proposals should mention DNA Barcoding
    - Citations and references *(See video "BLI Citations")*
    - Fill out student and mentor biography info
    - More than a few sentences per section please…

Research Proposals - Campaigns

- **Remember:**
  - Your proposal represents ***you***
  - You are trying to request funds from a scientific organization

*Proofread, **do not** plagiarize, and make sure that your proposal is logical, precise and well-supported.*

Research Proposals – Our Motivation

Perhaps more than anything else, writing a good proposal is one of the greatest skills to walk away with from BLI

We will take your proposals ***seriously*** and evaluate them as we feel a scientific funding agency would

Our comments are intended to set you and your project up for success in BLI and when you write proposals in the future

Research Proposals – Our Motivation

- Poor/careless writing
- Plagiarism/chatGPT are fairly obvious and will be **automatically rejected**.
- Project has flawed scientific basis
- Follow guidelines on DNA Barcoding 101

Research Proposals – Your Motivation

- Communicate your goals/intent
  - Who, what, when, where, how, why
- Writing well is better than using “big, science-y” words
- Get me (as the reviewer) excited about your project

Navigating the Campaign Form…

Barcode Long Island Campaign Proposal Form

Please fill in all information below to participate in a *Barcode Long Island* campaign. Any team participating in a campaign must submit their own proposal form.

Campaign teams are strongly encouraged to collect **20 samples** of visibly different organisms. Collection across different locations is ideal. *Biographies for all team members, including the mentor, as well as collection location permits or written permissions, must be submitted* ***with this form.***

Team Name:

Project Title:

Team Members:

School:

Campaign (please select one):

- ☐ Ants
- ☐ Mosquitoes
- ☐ Beetles
- ☐ Aquatic (freshwater) macroinvertebrates (ex: insect larvae)
- ☐ Lichens

(See video "BLI Developing Project Titles and Scientific Writing")

Next order of business is the collection location

Collection Location(s) – please **describe collection location(s) in detail** (habitat type, etc.) and provide coordinates:

Latitude:
Longitude:

- Each location that you collect from should be listed and described so that the reader knows where you plan to execute your study.

- Did you secure permissions before collecting from a park or residence? Now is the time to mention that!

Collection Location

- Include relevant information…
  - Habitat type, types of groundcover, level of human activity, etc. – whatever you feel is relevant to your study.
  - Avoid vague descriptions:
    - The fact that your collection location has “many trees and rocks” is ***not*** relevant.
    - The fact that your collection location is a “typical deciduous forest” ***might be*** relevant.

The main parts of the proposal…

1) Abstract

2) Project Hypothesis/Specific Plan

3) Describing Collection Methods

Abstract (1000 character limit):

Describe your project hypothesis and/or specific plan for collecting diverse or difficult to obtain specimens:

Describe the collection methods for your samples (in detail):

Science Writing

- Precise
- Get to the point
- Elevated vocabulary only when necessary
- Inclusion (don’t leave your readers in the dust)
- Good flow and organization
- Use an appropriate “voice”
- ***No quotations*** – everything should be in your words and a legitimate use of quotations in science writing is rare.

The Abstract

- The gist of a scientific study.
  - A little background
  - The problem
  - How you planned to solve the problem
  - What you found
  - What your results mean
- Note: typically, you don’t see citations in an abstract, but your campaign proposal ***should still have references***.

Recipe for an Abstract

- The most important background information (1-2 sentences)
- Research question and/or hypothesis (1 sentence)
- Objectives (1-2 sentences)
- The most essential materials and methods (1-2 sentences)
- Description of results (2-3 sentences) *when project is completed*
- Interpretation of results (2-3 sentences) *when project is completed*
- A final concluding statement of the most important findings (1 sentence).

Example abstract:

An outbreak of the virulent "*Plantdestroyis*" virus killed many native plants at the DNA Learning Center (DNALC). To determine if this outbreak led to the destabilization of the DNALC ecosystem, we studied the biodiversity of ant species, which can be used as potential indicators of ecosystem health. 100 ants were collected from the same ten locations throughout the DNALC grounds over a period of five years. Species abundance was documented and species diversity was determined through DNA barcoding, a process that can potentially identify a species using sequence information from a specific region of the DNA. The results indicate a progressive decrease in ant richness and biodiversity, suggesting a decrease in overall ecosystem health. These results indicate that a quick response is needed to remove diseased plants and prevent re-infection, to restore biodiversity and ecosystem health at the DNALC.

Pause the video

Resume when you're finished reading!

Project Hypothesis/Specific Plan

- This section is like a mini-introduction.
- ***Mention DNA Barcoding!!!***
- Start with relevant background, end with your hypothesis/specific plan
- **Hypothesis** – a potential explanation for an observation

E.g., “It is likely that the creek near the old industrial site will have lower aquatic invertebrate diversity than other areas on Long Island due to suspected heavy metal contamination.”

Project Hypothesis/Specific Plan

- ***Note***: for campaigns, your study may not have a clear hypothesis (especially for survey-type studies)

- ***Must demonstrate some degree of previous analysis…***

- Still, you should finish this section with some "hypothesis-esque" statement

e.g., "Based on an analyses of iNaturalist observations at Heckscher Park, we will focus our collection on finding more of Mordellid beetles to help resolve some taxonomic ambiguity."

Describing Collection Methods

- For Campaigns, this section should also be thorough!
- Consider this a mini-Methods section – *the more you include, the more we can help clarify your writing/understanding of the process.*
- Detail the following:
  - How/when you plan to collect
  - Be specific about how you collect
  - How will you store specimens? Photodocumentation and data recording in the Sample Database.
- Less on the molecular end, but if you do include it, be correct.

Describing Collection Methods

- Here's what we *don't* want:

"We plan to collect ants in the fall. We will go to the park, and look for ants. When we find them, we will crouch down, open the tube, place the ant in the tube, and then close the tube."

Describing Collection Methods

- Here's what we *don't* want:

"We plan to collect ants in the fall. We will go to the park, and look for ants. When we find them, we will crouch down, open the tube, place the ant in the tube, and then close the tube."

Shows me you have not thought about collection whatsoever.

Describing Collection Methods

- A *better* approach:

"We plan to visit the park at least three times through the fall to collect leaf litter from five sites. After collection, we will return to the lab and process the leaf litter samples in Berlese funnels. Specimens will be retained in >95% ethanol after letting the litter dry for 48 hours in the lab."

Describing Collection Methods

- A *better* approach:

"We plan to visit the park [illegible]hree times through the fall to collect leaf litter from fi[illegible] collection, we will return to the lab and process the [illegible]ples in Berlese funnels. Specimens will be retain[illegible]ethanol after letting the litter dry for 48 hours in the lab."

Shows me you have researched proper collection, have a clear plan (even if you don't have the details), and I am confident you will have success.

Collection Methods??

DNA Learning Center BARCODING 101

Home About Student Programs Citizen Science Laboratory Resources Sign in Sample Database

Barcoding US Ants

About the Program

Program Resources:

- Program Orientation
- Ant Sample Collection
- Sample Documentation
- Laboratory Resources
- Sample Processing & Bioinformatics

NIH National Institute of General Medical Sciences

SEPA SCIENCE EDUCATION PARTNERSHIP AWARD
Supported by the National Institutes of Health

This project was supported by the Office of the Director, National Institutes of Health under Award Number R25OD016511-01. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Barcoding US Ants

ANT SAMPLE COLLECTION

PROTOCOL

- Collection Guide (PDF): collection and documentation steps. Detailed instructions for different ant collection techniques are summarized.
- Metadata Worksheet (MS Word): use to document observations about site, ants, and ant nests during collection.

ANT COLLECTION

- Ant Collection Recommendations by Genus (PDF)
- Regional Species Hit Lists (PDF)
- Collecting Ants: Shawn Dash (PowerPoint)

ANT COLLECTION CLINICS

- Collection Clinic, July 20, 2020 Zoom recording:

DNA LEARNING CENTER — COLD SPRING HARBOR LABORATORY

Barcoding US Ants

Collection Guide

I. Collect and Document Specimens

The steps below lay out the Collection and Documentation steps of the US Ants Barcoding Project. Detailed instructions for different ant collection techniques are summarized for reference, but not all collection techniques are necessary for all teams. Gear your collection to your geographical area and the ants that you are trying to collect.

Ants belong to a single family, the Formicidae, within the hyper-diverse insect order, Hymenoptera, and they exemplify the importance of insects as ecological indicators with their astounding biodiversity. Ants dominate the ecology of an area with their substantial biomass. They can manipulate species composition, influence trophic interactions, and shape both the abiotic (e.g., through soil shifting) and biotic (e.g., plant-insect interactions) factors affecting an ecosystem. They fill numerous ecological niches taking on the role of predators, mutualists and symbiotic partners, parasites, decomposers and often acting as “keystone species.” Additionally, ants possess a quasi-stable taxonomic and systematic status, creating a situation where species identification is assessable and widely understood. The extant Formicidae contains 21 subfamilies, 411 genera, and more than 15,600 species worldwide. In North America, there are 9 subfamilies, 70 genera, and nearly 800 species.

Molecular??

- Not necessary for the campaign proposal (still need for the summary report/symposium), but here's the workflow:
  1) *Use the whole specimen or a leg…*
  2) *Extract DNA using silica, chelex, commercial kit, etc.*
  3) *PCR to amplify COI*
  4) *Gel Electrophoresis to check amplification*
  5) *Send amplicons to third party (Azenta) for cycle sequencing*
  6) *Use DNA Subway to trim sequences and prep barcode*
  7) *Compare DNA barcode to those in GenBank to make ID*
  8) *Additional analyses…?*

References and Citations

References are important in any scientific/professional writing

(See video "BLI Citations")

Finished proposals

- Go to your mentor for review first.
- When they are satisfied with your work, they submit to us
- We will review
  - *Great proposals will be accepted (comments will be emailed to mentor)*
  - *Others will be rejected with comments for you to address*

Once accepted, a project is automatically generated in the Sample Database for your team!

Questions?

New (as of BLI 2023):

Opportunity for once a month virtual office hour sessions with a BLI staff member!

Check with your mentor on dates and availability