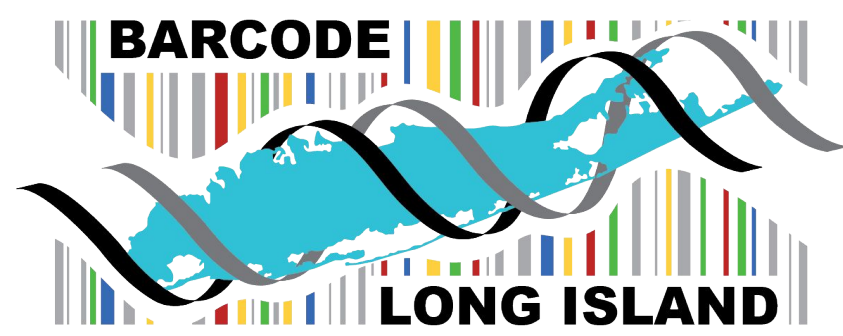


# DNA Barcodes of the Analysis of Plantae in Herbal teas and



## their Melatonin Comprisement

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### Abstract

Melatonin is a chemical that benefits many people daily. Melatonin can treat insomnia and circadian rhythm sleep disorders. These disorders are caused by desynchronization between internal sleep-wake rhythms and the light-darkness cycle. Melatonin also helps the body maintain homeostasis, in order for it to function properly. Plants like Lavender and Chamomile are known for secondary metabolites including the production of melatonin and are used in a variety of herbal teas. These two secondary metabolites were used as controls against two Long Island native plants: Purple Cone-Flower and the common Sunflower. Native species typically grow with less intervention, while Non-native plants may need artificial soil, and pesticides due to the foreign environment. Native plants would also increase the biodiversity on Long Island as well. All in all, the use of native plants for melatonin teas would provide a better environment for Long Island.

### Introduction

- Melatonin is a well known sleep hormone has been shown to help patients with insomnia
- Medical plants like lavender and chamomile have become a front runner of many herbal teas or essential oils
- This high demand has had numerous negative impacts, more specifically in the ecosystem: "the global market for Tea is very large and estimated at USD 15.4 billion in 2013, in terms of production value... Herbal Teas are growing exponentially (>15% CAGR)," (PR News Wire).
- Overharvesting is one of the largest concerns along with the impacts of over producing these medicinal plants on biodiversity. The over cultivation of charmolie led to an increasing need for biodiversity, " A strong need is felt to screen the different chemotypes of chamomile growing at different phytogeographical locations," (Khanam et al, 3
- the potential to use long island plants in herbal melatonin teas is extremely promising: "typically grow with less intervention, because they are suited to the amount of rainfall, the type of soil, and the climate they are grown in. Non-native plants may need artificial climate control, chemical soil preparation and/or additional water due to the foreign environment they're being grown in," (Yeager, *The Earth Island Journal*)
- It was decided that the use of the common sunflower and cornflowers would have the greatest potential to produce melatonin for long island native plants. Sunflower would be used due to its relation to the charmollie plants both belonging to the *Asteraceae* family while the cornflower also belongs to the *Asteraceae* family

### Materials & Methods

**Hypothesis:** If plants containing melatonin will be found in the native plants we will be testing. We believe there will be melatonin in the purple cone flower and sunflower plants.

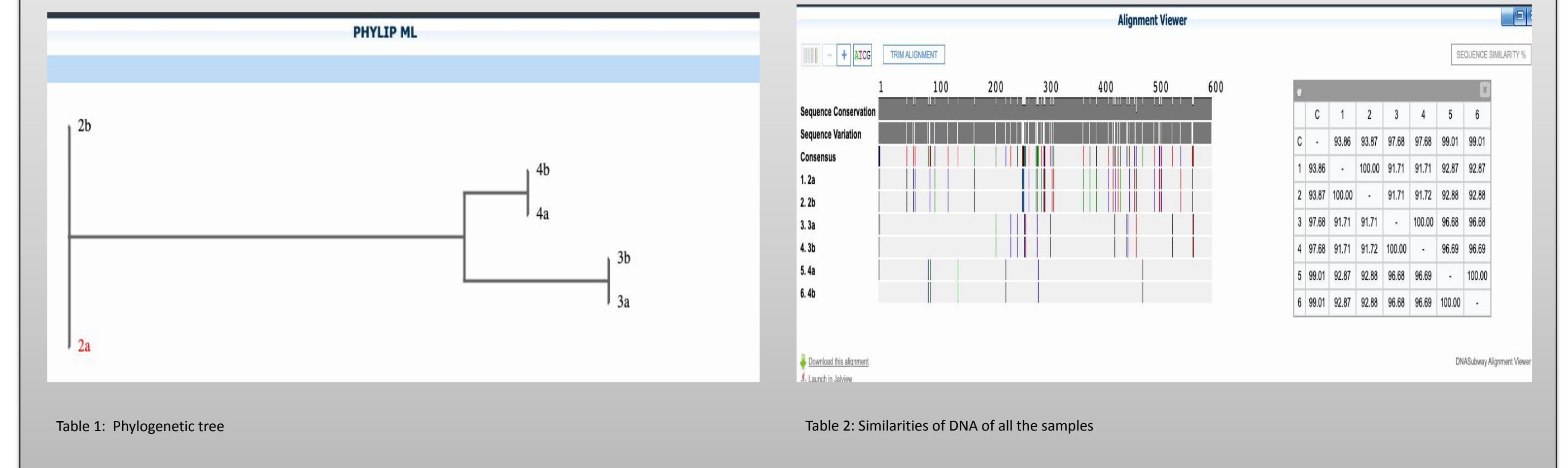
During our experiment we used plants such as the purple coneflower and sunflowers, as our main plants. We also had the use of Chamomile in a herbal tea to use for analysis. We collected our sample approximately a week before doing our first analysis of the species. We collected our materials through the purchase of the teas and purchase of the plants. In the methods that were used we first isolated the DNA by using rapid DNA isolation. This required the use of a lysis solution to uncover the actual DNA. Then the use of a paper disc was needed to hold the DNA and later put in a wash buffer to prepare for incubation. After the DNA goes through these processes we later amplify the DNA before it is sent to PCR testing to analyze the DNA and give a good source of results.



| Name                                    | Label |
|---|-------|
| Chamomile Tea prepared by Student A     | 1A    |
| Chamomile Tea prepared by Student C     | 1B    |
| Lavender Tea prepared by Student B      | 2A    |
| Lavender Tea prepared by Student A      | 2B    |
| Sunflower prepared by Student B         | 3A    |
| Sunflower prepared by Student C         | 3B    |
| Purple Coneflower prepared by Student B | 4A    |
| Purple Coneflower prepared by Student A | 4B    |

Sample Table Identification

### Tables & Figures



### Results

For samples 1A and 1B it was shown to be classified as *Glycyrrhiza Glabra* ( Liquorice), samples 2A and 2B was classified as *Lavandula Stoechas* ( French Lavender,) 3A and 3B was proven to be the *Helianthus Annuus* (The common Sunflower), and 4A and 4B was proven to be *Symphotrichum Eatonii* (Eaton's Aster). While comparing the DNA it was evident that samples 1A and 1B could not be used as a control since Liquorice is not an established producer of the secondary metabolite for melatonin. It is evident that sample 4A and 4B seem to have more similar DNA than 3A and 3B. Thus, Eaton's Aster, seems to have the highest chance of having the secondary metabolite of melatonin with further testing.

### Discussion

Although the hypothesis was not proven correct the results still had significant findings. The outcome of using Eaton's Aster, another Long Island native plant as a secondary metabolite is extremely promising. None of the samples were successfully identified as the purple coneflower or charmolie most likely due to cross contamination in the teas and an error while germinating the long island plants. This study would require the further testing of analysing the melatonin output of these plants, along with having samples that identify as Chamomile and purple coneflower in the experiment as well.

### References

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3. Faso, B. "Agriculture and the Environment. Volume I: Introduction and Commodities." *Global Environmental Management Support (GEMS)*,

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