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BIODIVERSITY OF WOODLICE IN CENTRAL PARK

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Abstract

Woodlice were collected from seven different areas in Central Park to determine the relationship between human activity and species diversity. About 30 woodlice samples were collected and their DNA was extracted and sequenced in order to determine their species identification. We hypothesized that woodlice samples extracted from areas with less human disturbance would exhibit more biodiversity than the samples taken from areas with more human disturbance due to woodlice exerting more energy when disturbed. Our results did not support our hypothesis because the biodiversity in both areas was fairly similar.

Introduction

- Central Park is an urban park in New York City containing vast amounts of biodiversity.
- Woodlice are among the 223 invertebrate species that thrive in the 842.2 acres of land in Central Park (Sain-Baird, 2017).
 - Woodlice are commonly found in:
 - Gardens
 - Under piles of leaves, rocks, downed trees
 - Soil with neutral or alkaline pH, good crumb structure, high organic matter content, where soil bacteria and other micro-decomposers flourish (Wollney, 2016)
- We investigated the effects of human disturbance on woodlice species in Central Park through the analysis of the DNA sequences of collected samples classified using DNA barcoding.
- We hypothesized that woodlice samples extracted in areas with less human disturbance would exhibit more biodiversity than the samples taken from areas with more human disturbance due to woodlice exerting more energy when disturbed.
 - Our results did not support our hypothesis because the biodiversity in both areas was fairly similar.

Results

Latin Name	Common Name	Invasive/Native	Number of Species
<i>Philoscia muscorum</i>	Striped woodlouse	Invasive	11
<i>Hyloniscus riparius</i>	Woodlouse	Invasive	6

Table 1. Species Identification of Collected Woodlice. This table contains the scientific and common names of species collected in Central Park as identified by BLAST analysis of the DNA barcode of woodlouse samples, as well as the number of each species collected.

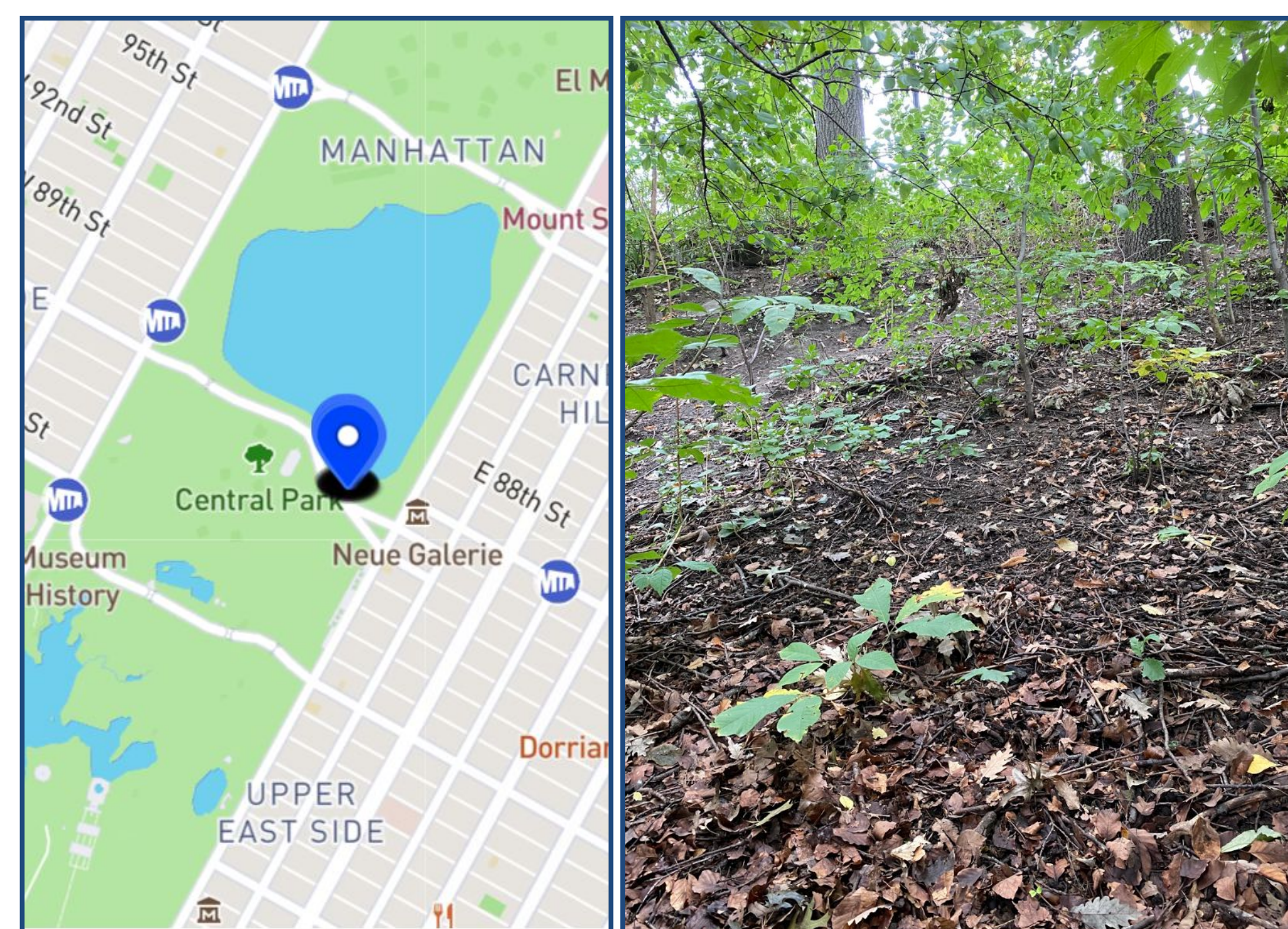


Figure 1. Sample Locations in Central Park. On the left is a map of Central Park indicating the locations of each of the collected samples. The location pins represent the samples taken from under the canopy, by the fence, under a rock, under a bush, and near sunny leaves. All samples were collected near the Bridle Path. The picture shows one of our sample locations with deciduous trees and piles of leaves.

Materials and Methods

- 30 samples were collected from different areas of the Bridle Path in Central Park.
- DNA was isolated using chelex and amplified using PCR with invertebrate COI primers.
- Gel electrophoresis to confirm PCR amplification
 - 30 samples were sequenced
 - 17 were successfully identified
- Sequencing by Azenta
- Sequence analysis through BLAST

	More Human Disturbance	Less Human Disturbance
Species	<i>Philoscia muscorum</i> (3) <i>Hyloniscus riparius</i> (2)	<i>Philoscia muscorum</i> (8) <i>Hyloniscus riparius</i> (4)
Simpson's Biodiversity (1/D)	1.9	1.8

Table 2. Simpson's Biodiversity in Areas with Varying Amounts of Human Disturbance. Woodlouse species were found in Central Park and identified by sequencing. Two different species were found and they were repeated throughout the five different locations in the park. The five locations included under the canopy, by the fence, under a rock, under a bush, and near sunny leaves. Five samples were collected by the fence, which was the location with the most human disturbance. Under the canopy, under a rock, under a bush, and near sunny leaves were the places with the least human disturbance, where 12 samples were collected. Simpson's Biodiversity (1/D) was calculated to compare biodiversity at areas with more or less human disturbance.

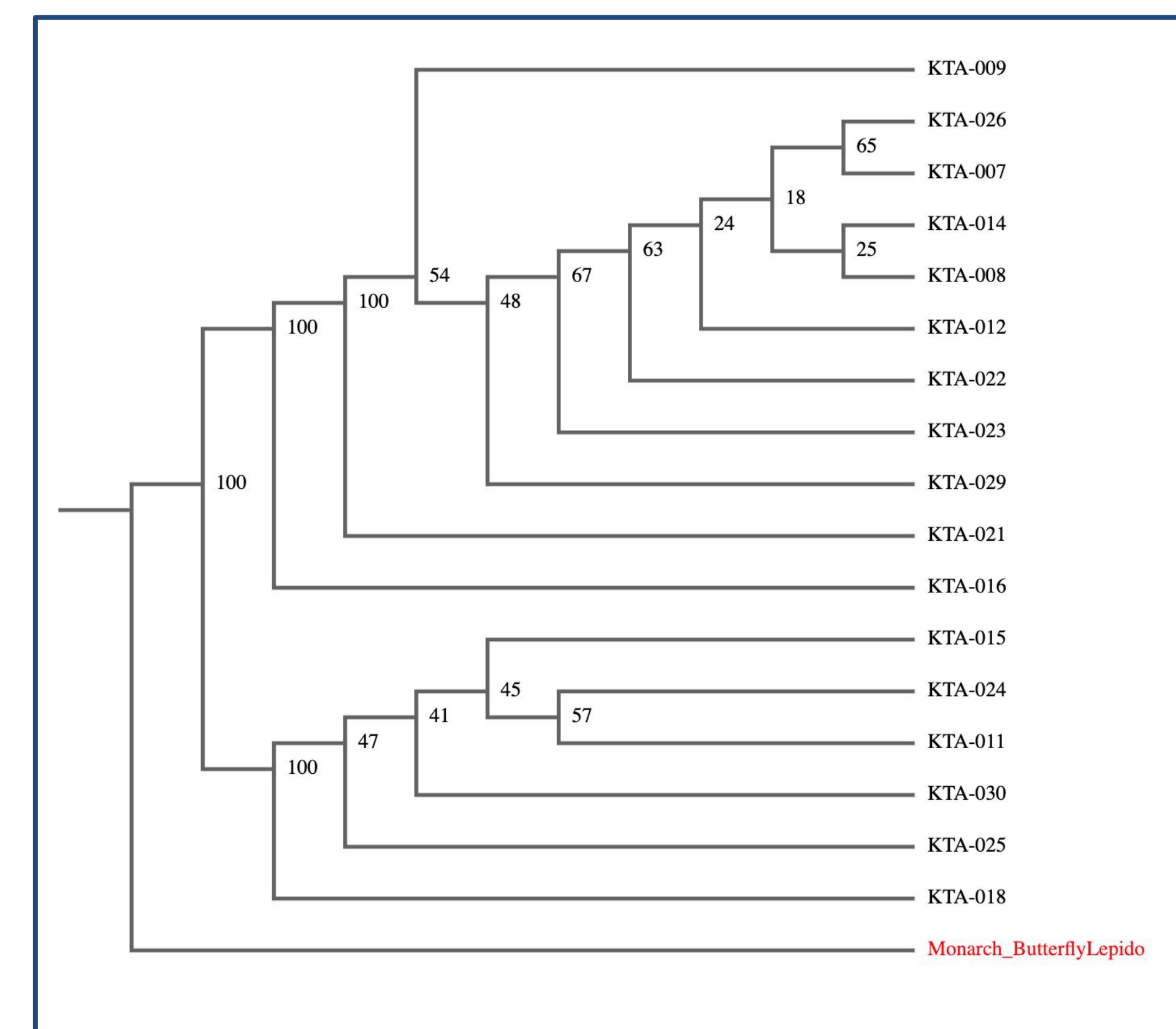


Figure 2. Neighborhood Joining Phylogenetic Tree. This figure shows the neighborhood joining phylogenetic tree, which displays the evolutionary relationships between the identified species. The species highlighted in red is the outgroup and has the least genetic commonalities with the rest of the species.

Discussion

- We hypothesized that woodlice samples extracted from areas with less human disturbance would exhibit more biodiversity than the samples taken from areas with more human disturbance due to woodlice exerting more energy when disturbed.
- Our hypothesis was not supported by Simpson's biodiversity index which was:
 - 1.9 for areas with more human disturbance and
 - 1.8 for areas with less human disturbance.
- We found fewer samples in the area with less human disturbance
 - 12 woodlice from areas with limited human disturbance
 - 5 woodlice from areas with more human disturbance.
- Only two woodlice species were identified:
 - 11 *Philoscia muscorum*
 - 6 *Hyloniscus riparius*.
- Increasing the number of samples would improve the reliability of the data of the effects of human disturbance on the samples of woodlice.
- In the future, it would be beneficial to collect samples from areas with measured human disturbance including
 - measured amounts of pollution, pesticides, and crowdedness.
- Improve biodiversity of woodlice by:
 - Reducing pesticide, herbicide, and fertilizer use
 - Reducing the clearing of leaves
 - Creating areas in Central Park with limited human disturbance.

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