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Effects of Moisture Levels on Armadillidium vulgare Biodiversity in Central Park Ellen Chan¹, Maya Gwin¹, and Noor Wilson¹, and Anne Kloimwieder¹ ¹Marymount School of New York

Abstract

Armadillidium vulgare, also known as roly polys, were collected from the ground of the eastern side of Central Park under dry and wet conditions to compare the biodiversity of roly polys based on the dampness of the environment. We extracted, amplified, and sequenced the DNA of 30 samples. We hypothesized that there would be more biodiversity within roly polys under wet conditions when compared to dry conditions because roly polys need moist environments to live, however, we found comparable biodiversity under both wet and dry conditions.

Introduction

- Roly polys, pillbugs, and woodlice are all common names for *Armadillidium vulgare*, an isopod (Classifying the Roly, n.d.).
- range from 8.5 to 18 mm in adulthood
- oval-shaped with a gray or brown-colored exoskeleton and seven pairs of legs
- generally live for two to five years (Featured Creatures, n.d.)
- Roly polys breathe with gills, so they live in moist conditions (Hetzler, n.d.).
- Originally from Europe, roly polys are also in North America (Featured Creatures, n.d.).
- In New York City, roly polys are found in areas with decomposing organic material they can eat, like Central Park (Taft, 2015).
 - Make the topsoil healthier (Hetzler, n.d.)
 - Slow down climate change by eating a fungus that causes the release of carbon dioxide (Cassidy, 2017)
- Central Park is around 840 acres, and includes many diverse habitats such as woodlands, ponds, lakes, and wildflower meadows, which are home to many organisms like birds, mammals, and insects (Central Park, n.d.).



Figure 1. Sample Collection Locations in Central Park. This map of Central Park indicates the locations where each of the samples were collected. The farthest east location pin represents the samples taken from the NW side of Bridge 24, on the Bridle Path, in dry leaves near trees, while the cluster of pins represents samples taken from the southeast side of the Bridle Path.



Figure 2. Sample Collection Environment. This photo shows an example of the environment of dry leaves and dirt where the samples were collected. The ruler is provided for scale.

Materials & Methods

- 30 samples were collected from the Central Park Bridle Path on separate days under wet and dry conditions.
- DNA from the samples was isolated and amplified using PCR.
- PCR products were analyzed using gel electrophoresis and 28 samples were sequenced.
- Species were identified using BLAST.

Result

Total Number of

Simpson's Biodiv

Table 2. Simpson's Biodiversity for Wet or Dry Conditions. Species of invertebrates were collected from the Bridle Path in Central Park and identified through sequencing. Six different species of invertebrates were identified and found in either dry or wet conditions. Simpson's Biodiversity (1/D) was used to calculate the biodiversity of roly polys.



Figure 3. Distribution of Species Found. This bar graph shows how many of each species were collected under dry conditions versus under wet conditions. Our data shows that *Epuraea* corticina and Hyloniscus riparius were only collected under wet conditions, while Cylindroiulus caeruleocinctus and Armadillidium nasatum were only collected under dry conditions. Meanwhile, the same numbers of *Philoscia muscorum* were collected under both dry and wet conditions.



the species.

| 1 | |
|---|--|
| | |

| | Wet Conditions | Dry Conditions |
|-----------|----------------|----------------|
| f Species | 4 | 4 |
| versity | 0.4 | 0.4 |

Figure 4. Neighborhood Joining Phylogenetic Tree. This phylogenetic tree displays the evolutionary relationships between the identified species. The species highlighted in red, coconut octopus, is the outgroup, and it has the least genetic commonalities with the rest of

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Discussion

• 30 samples of roly polys were collected from Central Park, New York under wet and dry conditions.

• We hypothesized that there would be more biodiversity found under wet conditions since roly polys need damp conditions to survive.

• Our hypothesis was not supported.

- Simpson's Biodiversity Index showed that the biodiversity was the same, 0.4, under both conditions (Table 2).
- Four species of roly polys were found on both days (Figure 2).
- A limitation of this study was that the sample size was too small. In the future, more samples should be collected. • Roly polys are mostly nocturnal organisms, if we had collected the samples at night, the
 - biodiversity of species might have been different (Roly-poly (Armadillidium), n.d.).

References

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