

Monitoring *Danaus plexippus* populations in Oswego County for the presence of *Ophryocystis elektroscirrha*

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Background

- Recent decline of global populations of *Danaus plexippus* (monarch butterflies) may be partly attributed to the protozoan parasite *Ophryocystis elektroscirrha* (O.E.).
- O.E. impacts pupal development, resulting in adults that can emerge with crumpled/deformed wings, impaired mating ability, and a decreased ability of flight endurance in migration (4).
- The parasite is transmitted to monarchs during their larval stage by consuming the dormant form of O.E., their spores.
- Spores are deposited in the environment by adult monarchs actively infected in juvenile life stages. Detection of spores carried by adult monarchs reflects the prevalence of infection in a population.

Methods

- **Collection:** Adults and larvae of *Danaus plexippus* were collected in Oswego County at SUNY Oswego campus and Rice Creek Field Station from late August to mid-October 2022. Collected larvae were reared to adulthood and sampled to make a combined total of 104 analyzed specimens.
- **Measurements and sample collection:** The adult butterflies were sampled using tape on the abdomen to collect a thin layer of scales. The mass (g), wing length (mm), sex, date, and locale were recorded for each specimen, as well as the condition of their abdomen and wings before they were released back into the wild.
- **Detection:** Each sample was assessed by microscopy using a magnification of 40x and 100x. Infection based on estimates of spore count was measured using a range of 0 (not infected) to 5 (heavily infected).
 - **Analysis:** The resulting data was used to analyze the prevalence of infection, to determine if infection showed a significant correlation to other specimen variables, and to compare with results from prior monitoring in Oswego County.

*Rearred caterpillars/pupae that died due to alternative causes (including tachinid flies and braconid wasps) were excluded from analyses.

** Evaluation of additional samples is still in progress.

Results

- Overall infection rate of O.E. was 62.5%
 - 64.6% of females infected
 - 60.1% of males infected
- Mean wing length of 53.0 mm
 - 52.7 mm for females
 - 53.4 mm for males
- Mean weight of 0.560 grams
 - 0.544 grams for females
 - 0.507 grams for males
- Female and male monarchs are equally likely to be infected with O.E.
- O.E. infection does not affect the weight, wing length, or abdomen size of female or male monarchs.

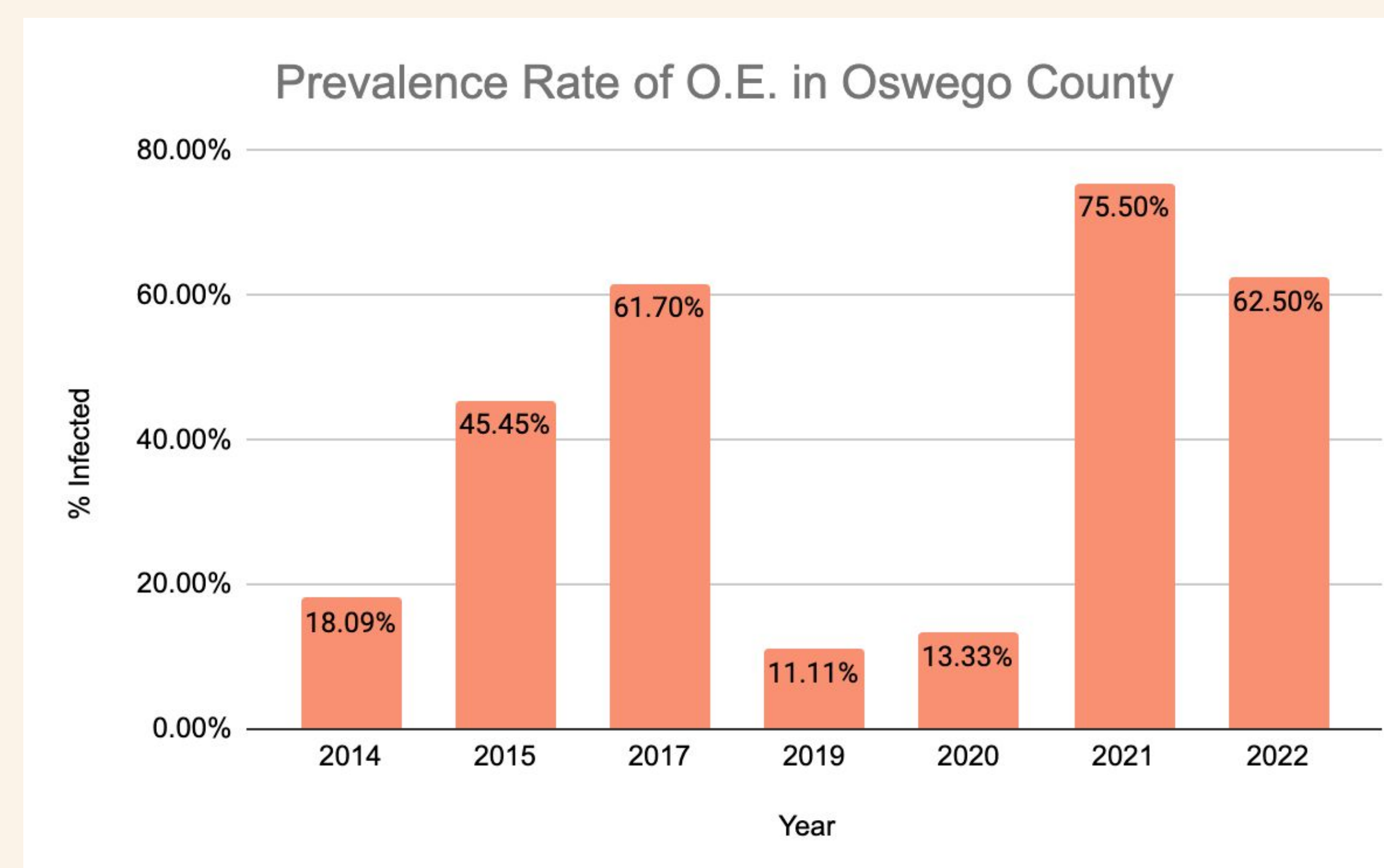
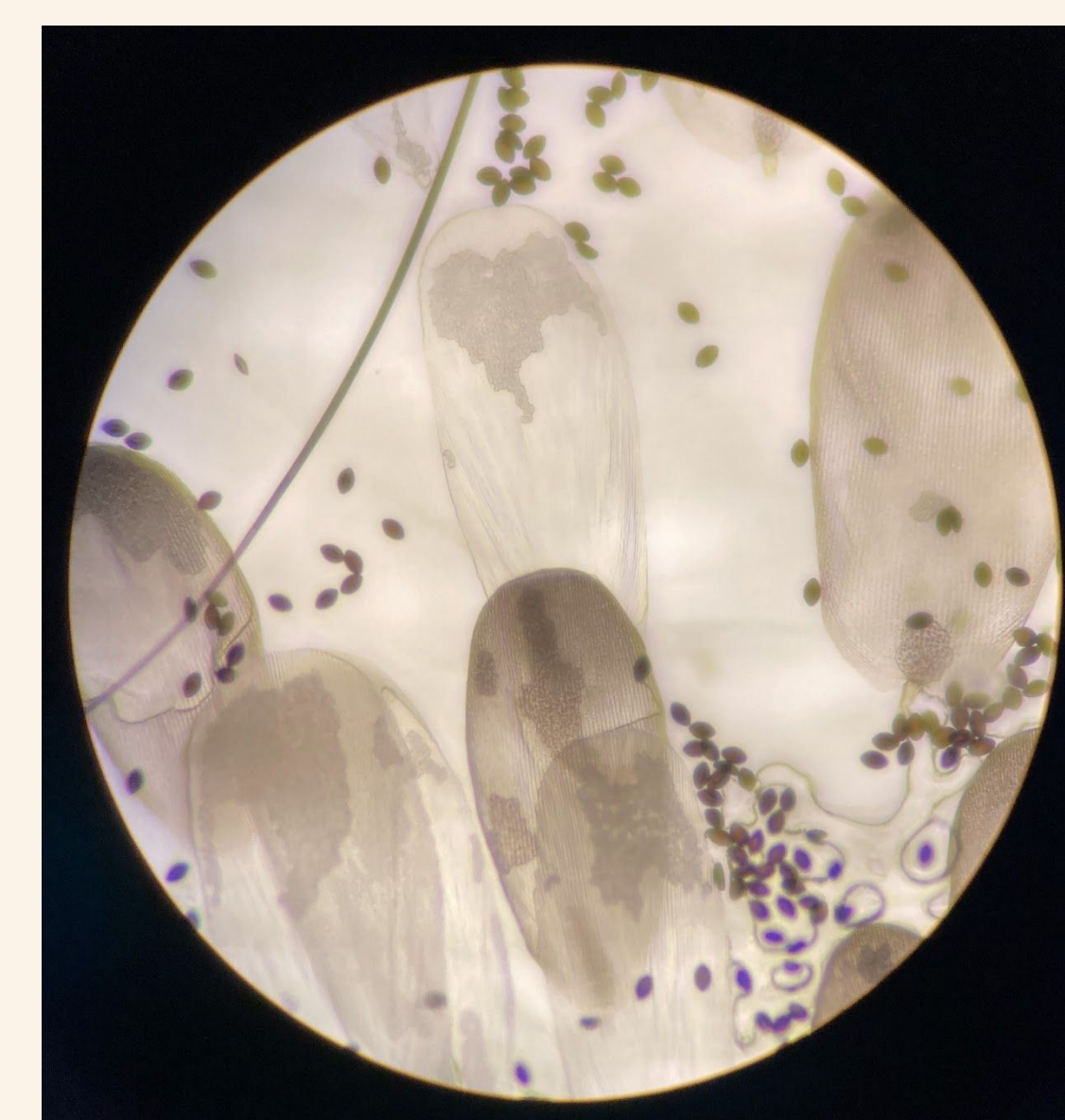


Figure 1: Percent of surveyed monarchs infected with O.E. in Oswego County from 2014-2022



Proper handling of a live butterfly after sampling and before being released



Ophryocystis elektroscirrha spores (smaller) between abdominal scales (larger) under 40x magnification



Danaus plexippus

Discussion

- Preliminary results show that the prevalence of O.E. infection in Oswego County has declined since 2021 but still indicates an increase in recent years.
- Higher O.E. rates are correlated with collection later in the season (2).
 - Monarch population decline is due to many factors in addition to O.E., as observed by alternate causes of death in reared larvae/pupae in our sampling (1).
- Changes in migration patterns among monarch populations demonstrate an increase in O.E.'s ability to spread and persist (3).
 - Continued monitoring of O.E. infection prevalence in monarch populations is necessary for understanding the parasite and its potential means of control.

References

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