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Abstract-Isopods' Behavior Under a Magnetic Field.

The aim of this project was to see whether a magnetic field would affect the isopods' normal behaviors. The data is useful for proving ways to fight pest insects, like mosquitoes. I expected the isopods living with a magnetic field would have a different behavior than those that didn't have a magnetic field. In similar experiments done, magnetic fields made the arthropods tested on lethargic (What-When-How, 2019). They displayed unusual behavior. To set up the experiment I had a control container, and a container with several neodymium magnets. During the experiment, I observed that the isopods with the magnetic field were 25% to 50% less energetic while eating and roaming around their enclosure. This information is great because it supports my hypothesis. It also supports the idea that artificial magnetic fields are a potential repellent for arthropods, and more importantly, insects.

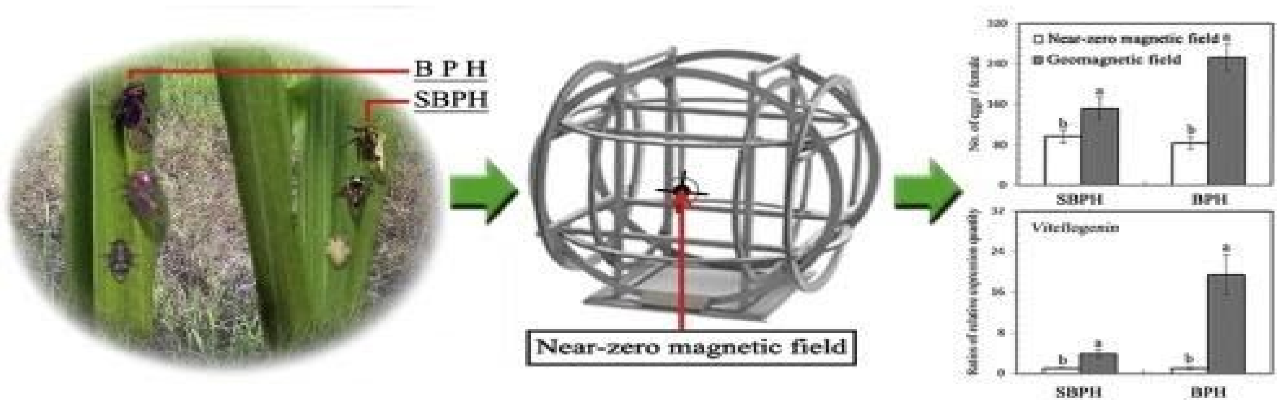
Background

Magnetic fields may be a possible solution for repelling pests. Social insects are the most widely experimented on, with other arthropods like isopods (wood lice) and cockroaches also coming into the field of research. The purpose of this review is to look at research already done on relations between magnetic fields and insects, and to draw a conclusion if the effects are positive or negative to the animals tested on.

Changes seen in isopods happened only when exposed to a static magnetic field. The alterations seen in isopods in the static magnetic field positively affected lifespan, growth, and behavior common in isopods. Lifespan increased greatly compared to the control group of woodlice. The pleopods (rear legs), which are modified in isopods, as well as the brood pouch (marsupium), showed increased growth when exposed to the static magnetic field. The behavior also changed, which included less curling of the isopods exoskeleton (volvation) (Mustapha, March 2019, Volume 38, Pages 98-102). There are little sourceable resources, so science doesn't know how this experiment would work during widespread testing. The agreement is that the static magnetic field affects the physical and behavioral states of isopods exposed in a positive way. However, isopods are more positively affected during artificial field testing than social insects.

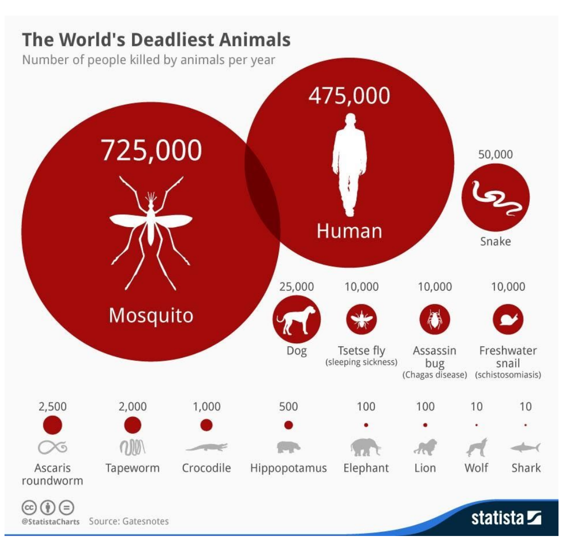
Although not widely used, there are some possibilities for reducing natural magnetic fields to slow the reproduction of pest insects. Experimentation at the University of Cordoba showed that when they decreased the magnetic field's power, the brooding of eggs decreased by

40% in species of pest moths that attack stored grain (Hussien, 2016, vol 4, pp. 39–48).



(Wan, September 2014, pg. 7-15)

In another test, pest planthoppers were exposed to near zero magnetic fields. This caused nymph development and female fertility to drop in both species tested on (Wan, September, 2014, pages 7-15). The likely reason for decreased reproduction in the NZMF is natural magnetic materials not being stimulated by earth's magnetic field. These tests mean that the power of magnetic fields affects the reproduction of some insects.



(World’s Deadliest Animals, May 5th, 2014, pg 1)

Methods

There are two main questions I will be asking during my research. The first question is whether physical behavior changes under a magnetic field. The second question is whether the isopods’ diet will change under the magnetic field. My hypothesis is that the control and experimental groups of isopods will show different behaviors when the experimental group is exposed. Different behavior means different eating habits, or how exactly they move around. My hypothesis is based on similar cases in other insects exposed to an artificial magnetic field when they are feeding or navigating. In these cases, insects are often confused and unable to complete their goals (What-When-How, 2019). This tells me that a similar thing should happen to isopods, another arthropod, during research.

For my research I will be conducting a simple experiment. My experiment has a procedure consisting of gathering materials necessary, setting up the experiment, noting activity of both groups, and analyzing the data collected. The materials I will need include: containers to house the isopods, substrate to fill the containers, 30 large isopods (fifteen in each group), food for the isopods, and neodymium magnets.

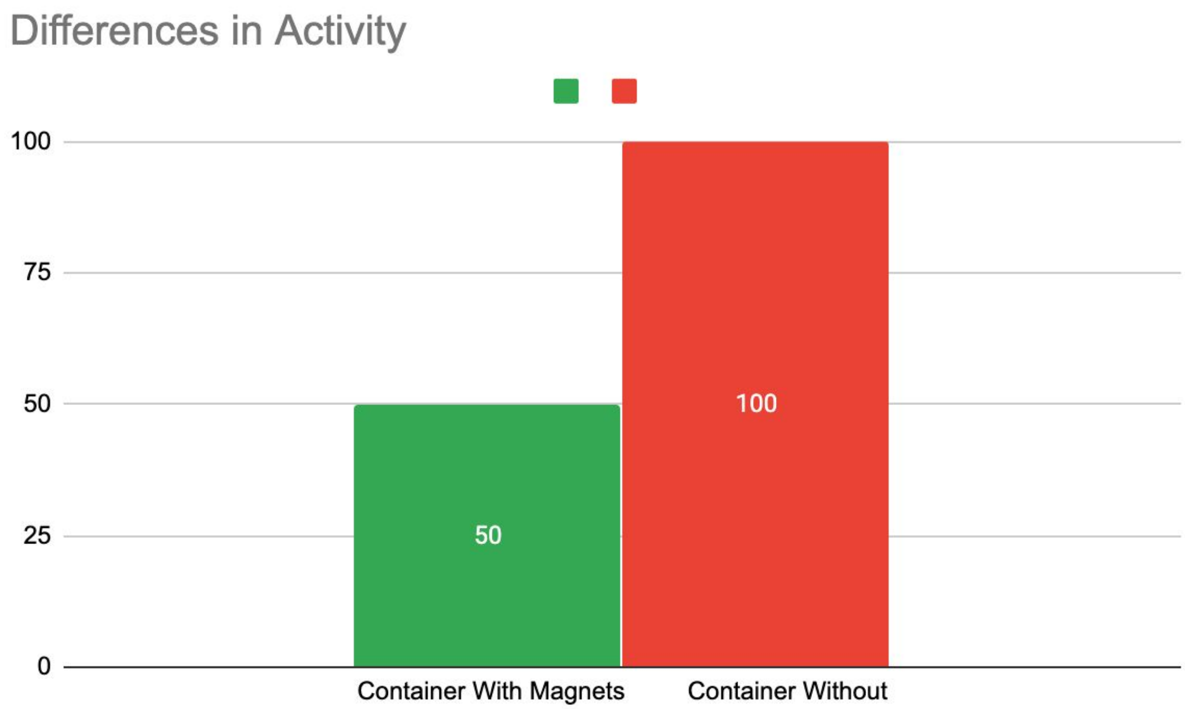
To set up the experiment, I will fill the containers up to one-quarter with substrate, place 15 isopods in each habitat, set up the magnetic field with neodymium magnets, and dampen the soil to the isopods' preference. To note the activity of both the control and experiment groups I will make a chart. This chart will note any differences in the behavior of both groups, and compare them to data from other experiments.

Another benefit of testing isopods instead of insects is isopods do not carry diseases or parasites and don’t bite. This decreases the risk of testing done on isopods to almost nothing. I am using neodymium magnets. These can pinch and cause blisters if handled wrongly. To analyze the data I collect throughout the experiment I will draw a conclusion based on the differences in behavior and graph the contrast.

Results

The results of my experiment helped to support my hypothesis, and correlated with other experiments that have been documented. First, I placed the neodymium magnets in one container, between the isopods’ food and their rock. This seemed like the best way to see how the magnets affected them.

Next, I collected the isopods and placed them in their respective containers. From there I began regularly adding moisture and food. I kept track of their behavior, looking for differences that I could document. I documented differences in activity, waste production, appetite, and energy. In 100% of these tests differences in behavior were crystal clear. The container with magnets was 50% less active overall, and produced 75% less waste. I counted how many isopods were not under the rock to decide this, and I counted how much waste each container had produced. The isopods in the container with magnets ate 25% less, which was visible from their food source. The isopods with magnets were also less energetic when I handled them.



The experiment went as planned and I was able to spot some obvious differences in the isopods' behaviors, supporting my hypothesis.

Conclusions

Overall, I was able to draw a couple of conclusions from the experiment on the isopods. The first conclusion I made was that the results supported my hypothesis. The second conclusion I made was that the results were similar to other experiments that were done with isopods and magnetic fields (What-When-How, 2019, Mustapha, March 2019, Volume 38, Pages 98-102).

When I formulated my hypothesis, I suspected that the isopods' behaviors would be different, based on cases in other experiments with insects and magnets. This was supported by my results, which showed 50% less activity in the container with magnets. If I was to extend this project, I would keep track of growth and reproduction as well as normal behavior. This would need extra time because the isopod's lifespan is 1-2 years, and egg hatching takes about three weeks. This would further show how the magnets affect the isopods normal behavior.

When I first considered this experiment, I was targeting pests like mosquitoes, hoping to find a way to repel them with a magnetic field. Other tests had been done, and I wanted to expand the data. The experiment showed that isopods were drowsy when under the magnetic field. This is great because now there is more data showing that magnets have a potential for repelling arthropods, and more importantly, insects.

Bibliography (MLA8)

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