Ants in Your Garden

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Table of Contents

Introduction.....2
Identifying ant species.....2
Behind the ants.....4
Experiments with ants.....5
Ant farm.....10
Conclusion.....11
BIBLIOGRAPHY.....12

Introduction

"*Ants, Like Humans, succeed because they talk so well.*"
(Bert Hölldobler and Edward O. Wilson authors of Journey To The Ants)

Ants (Formicidae) are often overlooked in the wild and frequently regarded as pests when they invade homes and gardens. This perception is understandable, considering that over 8,000 species of ants have been classified, with an estimated 9,000 more yet to be identified. Ants are present on every continent except Antarctica [1]. Despite this, they are capable of remarkable feats that can rival or even surpass human abilities. For example, ants can lift objects several times their own body weight [2], which, from a human perspective, would be like carrying a sofa on your shoulders. Some species, such as the Argentine ant (*Linepithema humile*), can organize colonies with millions of individuals [3] and others, like the Saharan Silver ant (*Cataglyphis bombycina*), can survive temperatures as high as 70°C [4]. Myrmecology, the study of ants, is a highly active field of entomology, constantly unveiling fascinating new insights.

Figure 1: Argentine (source Animal Bio) and Weaver ant (source Animal Bio) respectively

In this paper, I will guide you on how to identify, catch, and rear these incredible creatures, all from the comfort of your own garden.

Identifying ant species

Our journey begins by exploring the species of ants commonly found in the United Kingdom, with a focus on those you are most likely to encounter in your garden. The types of ants you'll find can vary depending on your location. In England, the most common species include the Black Garden Ant (*Lasius niger*), Yellow Meadow Ant (*Lasius flavus*), and the Red Ant (*Myrmica rubra*) [5]. Each of these ant species has distinct features that make them easy to identify. To begin with, if you find a mound of dirt in your garden that appears to be made of various materials or pellets of dirt, it is likely an ant nest. Once you've found one, it may be crawling with ants or just have a few ants around it. You can identify the species further by observing their color. For example, a Black Garden Ant (*Lasius niger*) differs significantly in color from a Yellow Meadow Ant (*Lasius flavus*). Size can also be a helpful factor in identifying the species. However, the most accurate way to identify an ant is to carefully pick it up near the mound for closer examination, sometimes using a microscope. Ant body parts, such as the abdomen, antennae, and mandibles, vary between species due to differences in diet, environment, and lifestyle. For instance, *Myrmica rubra* can be identified by the smooth, curved surface of its petiole, which transitions from the upper gaster to its hind edge.

Figure 2: A black garden ant worker (Lasius niger).

For those looking to dive deeper into ant identification, the book by Richard Jones [6] serves as an excellent reference.

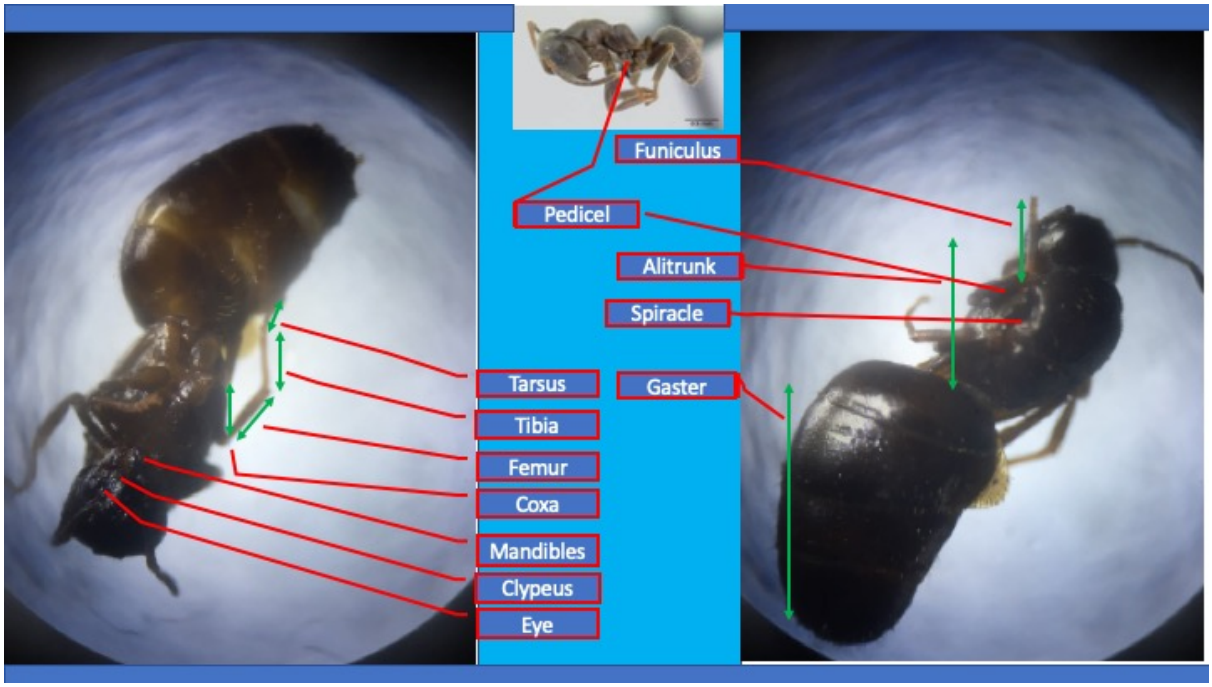

Figure 3: Image showing how to identify parts of an ant (Lasius niger queen).

Figure 4: Marking out a nest using sticks.

Now that you have identified the ant you should mark its nest so you can remember. There are two ways you can do this. Either by delimiting a square section around the nest by wood sticks or with stones (see Figure 4). A less invasive solution consists in obtaining the satellite image of your garden using Google Earth. Then using an image editor or Microsoft Power Point, you can overlap a grid splitting the area of the garden into equal squares that you can then assign with an identifying number. Then you can easily identify which square the nest was and mark it down (see figure 5).

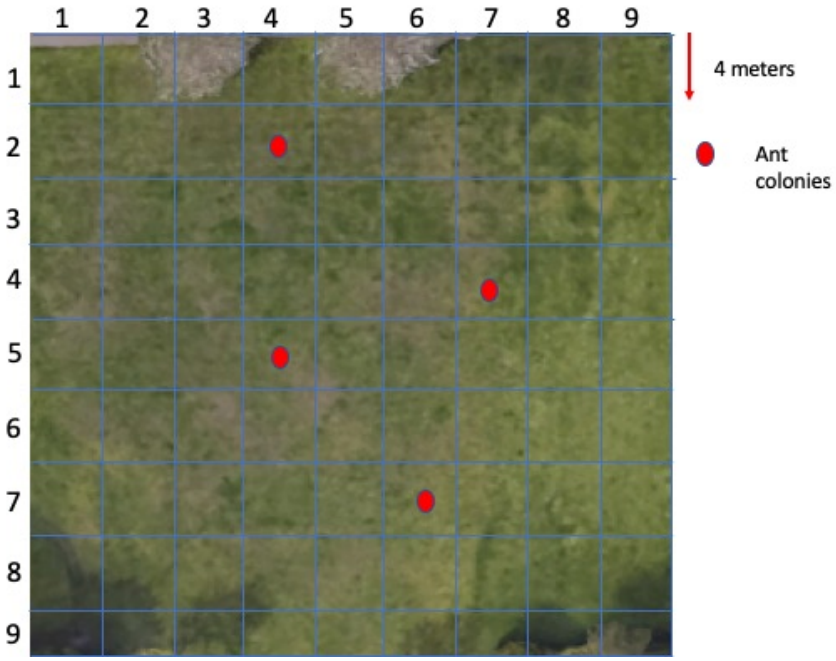

Figure 5: Using a grid on a map of a local park to mark down location of ant colonies

Here is a list of information of the common species I found in my garden.

Type of ant	Worker size	Male ant size	Queen size	Polygynous	Photo
Lasius niger	3.4-5mm	3.5-4.7mm	8-9mm	No	
Myrmica rubra	4-6mm	4-5mm	5-7.5mm	Yes	
Lasius flavus	2-4mm	3-4mm	7-9mm	No	

Source: NATURESPOT

Now it is time to study this anatomy of these little creatures.

Behind the Ants

Ant colonies consist of different types of ants, each specialized for specific tasks. Typically, colonies are organized into queens, males, and workers. However, in some species, such as leafcutter ants, there are additional worker subtypes: **minim**, **minor**, **media**, and **major**. These subtypes cooperate to build leaf nests and harvest leaves, which they use to cultivate fungus as a

food source [6]. This complex system is led by a queen (or multiple queens in polygynous species) that emits pheromones to regulate ant behavior. Polygynous colonies, where multiple reproductive queens coexist, often display greater resilience and adaptability, as the queens collectively produce a larger workforce. The exact composition and mechanisms of these pheromones are still under investigation. For further insights, a detailed explanation can be found in a study published by the E.D. Morgan [7]. Since ants have poor vision, they rely heavily on their sense of smell to navigate their environment. They use pheromone trails to mark paths leading to nearby food sources.

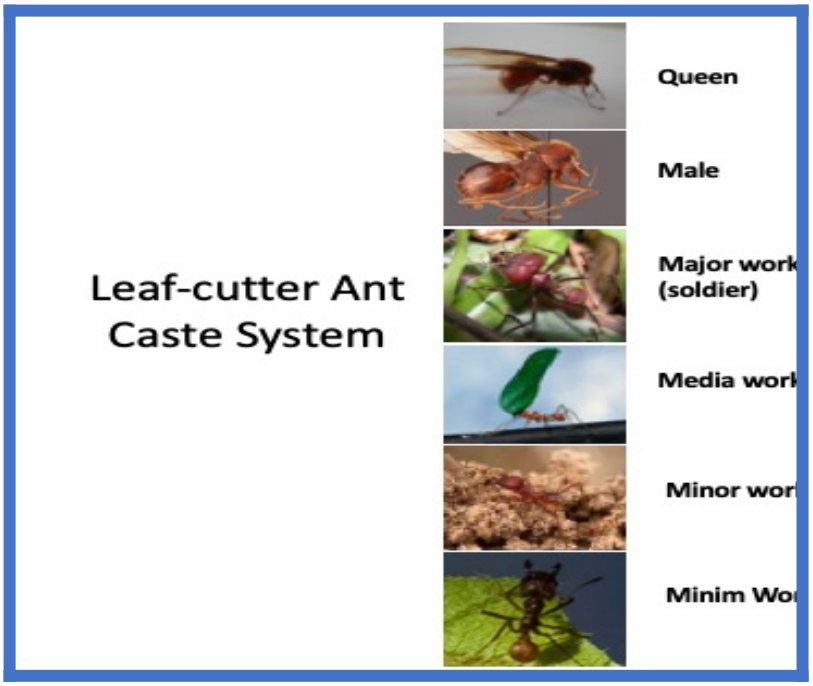

Figure 6: A diagram showing leaf-cutter ant caste system

Most ants establish permanent colonies. However, some groups, such as army ants, are nomadic and forage continuously from place to place without settling in one location. These groups can grow to include hundreds of thousands of individuals [8]. A typical ant nest expands from the initial chamber created by the queen to encompass sometimes hundreds of interconnected chambers linked by long tunnels. The central chambers of an ant colony are known as the royal chambers, where the queen resides. These chambers are usually located at the center of the colony. The queen is assisted by nurse ants, which care for her brood. Specialized chambers, called **brood chambers**, are dedicated to housing the eggs and developing larvae produced by the queen. Food collected by worker ants for the colony's survival during winter is stored in **storage chambers**. Additionally, nests include **waste management areas**, known as **middens**, where discarded material is deposited [9]. The complex structure and organization of ant nests have fascinated scientists for generations. Despite significant research efforts, how ants effectively coordinate their societies remains a topic of active investigation and debate.

Experiments with ants

Rearing ants

The best way to study the life of ants in a colony is rearing one yourself. This might sound difficult, but all it needs is time and patience. Since you have found a nest, you are already halfway there.

Figure 7: a large Lasius niger mound

Every ant nest contains one or multiple queens. These can be easily identified by their bloated Gasters and swollen *Alitrunk*. They lay the eggs that hatch into either male, queens, or worker (and soldier in some species). However, collecting a queen from an existing nest will doom the colony, as it will not survive after the queen is removed. A better option is to wait for the annual nuptial flight of ants where newborn queens and male ants will leave the colony flying around for a short period in the air to have the chance to mate. After mating has collected all the sperm that she need for the rest of her life. Then, she will get rid of her wings and start to dig a hole which would later become the nest of her colony. Here in England most species perform their nuptial flight between July and August [10] but this time range can change depending by nest location, ant species and climate conditions.

However, the event is so significant that it won't go unnoticed if you keep an eye out for it. When it happens, look for a queen crawling on the ground with a bloated gaster. Such a queen is likely fertilized (unfertilized queens will only produce male ants, which cannot sustain a colony as their role is limited to reproduction). To increase your chances of success, consider collecting multiple queen ants.

Once collected, the ants need an appropriate environment to begin nesting. One option is a **terrarium**. If you choose this setup, ensure it is furnished with sterile sand and natural materials similar to those in the queen's original environment. Maintain proper humidity and temperature levels. Be cautious, though: without decomposers like springtails, fungus can quickly develop, which may harm the ants.

Another option is an **ant farm setup**, which consists of a narrow vertical container filled with loose material where the queen can burrow, enclosed by two transparent sides. This setup allows the queen to create a nest naturally while letting you observe her activities. However, it can be difficult to access for cleaning and maintenance if not designed carefully.

The final option is an **ant tube setup**, which is easy to construct, clean, and maintain. It is highly effective for raising ant colonies. Both the **ant farm setup** and **ant tube setup** are shown below in Figure 8.

Figure 8: Procedure to build an Ant Farm

An alternative solution is to use a test tube as a nursery environment for each queen. This method is the standard procedure for maintaining ant farms in laboratories. Based on my experience, it is by far the most effective method for rearing a starting ant colony and is also very easy to set up.

Figure 9 illustrates the steps to set up an ant tube. You will need a test tube large enough to accommodate your queen. I recommend a test tube with an opening of 2 cm in diameter and a length of 13 cm (Step 1 in Figure 9). Begin by filling approximately two-quarters of the tube with tap water (Step 2 in Figure 9). Insert a piece of cotton to create a water reservoir, which will provide a long-term drinking supply for the ants through capillary action (Step 3 in Figure 9).

The remaining space in the tube serves as a living area for the queen and her brood. Finally, seal the entrance of the test tube with another piece of cotton. This cotton plug ensures proper ventilation while keeping the ants secure (Step 6 in Figure 9).

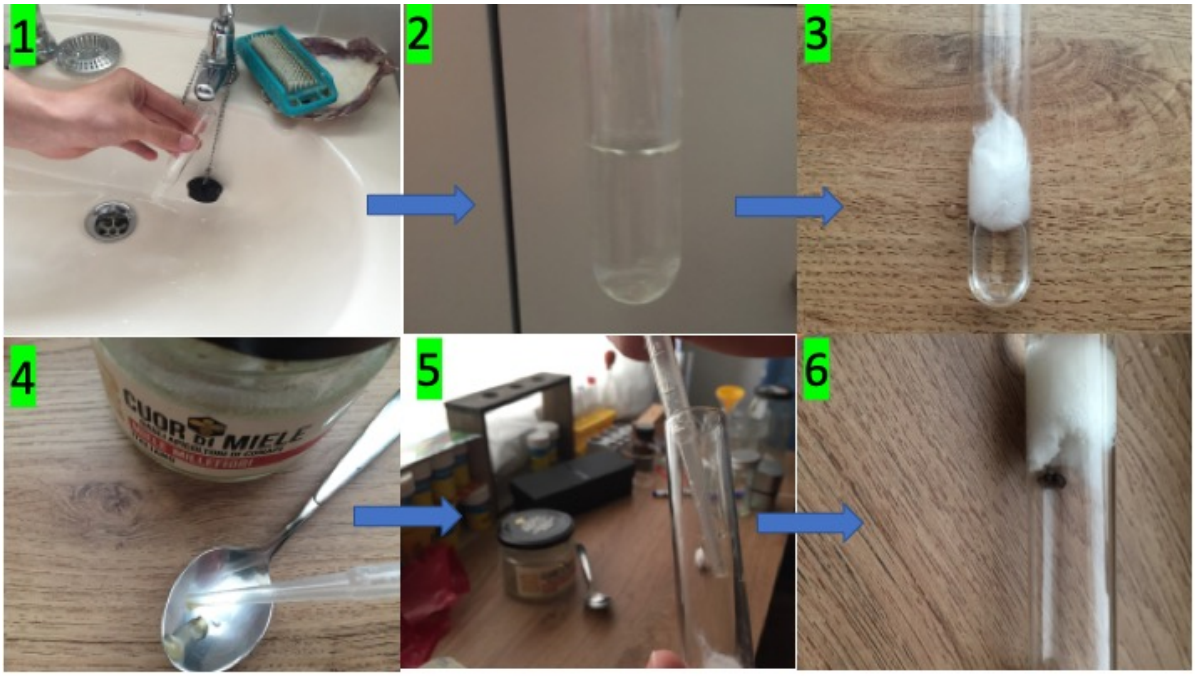

Figure 9: Procedure to setup an Ant tube

In each test tube put a single queen. Some ant species are polygeny (can have multiple queens in the same nest) other monogyny (only accepts one queen). However, from my experience it is always better to have multiple queens in a single tube. After you put the queen inside the tube keep it in a dark sheltered space far from noise. You want to keep the queen as comfortable as possible so it can start laying eggs in a couple of weeks. Depending on the species of ants and the temperature, if you are doing this at winter the queen might enter a state of hibernation to conserve her energy. However, if you keep the temperature at over 20 ºC it should be fine. Remember to regularly check the water supply. You can feed the queen ant occasionally with some drop of honey (step 4 and 5 on Figure 9) as a treat to provide her with extra energy. If you have setup the container correctly you will get a pile of eggs and later ants.

Figure 10: Myrmica rubra with brood in an Ant tube.

The first ants you will get are called *Nanitics*, slightly smaller than normal worker ants and will first help be rearing the rest of the eggs. But soon they will get out in search of food, and you need to be ready. If you are using the ant tube setup, I have created a 3D printable attachment
called the Ant Gateway. The information to its construction can be read in my Instructable [11] project as well as the script to print it. The script works on a software called OpenScad (https://openscad.org) which is free and can be downloaded from the Internet. This device serves as a gateway to transfer the ants in another test tube setup. Alternatively, it can be attached to the test tube to add a small foraging area. To use it you need to attach your ant tube to the porthole of the proper size as shown in the Figure 10. and now you can conformably add food and make observations. Furthermore, the smaller hole on the side of the gateway can be used to add a flexible plastic tube to connect the ants to other areas.

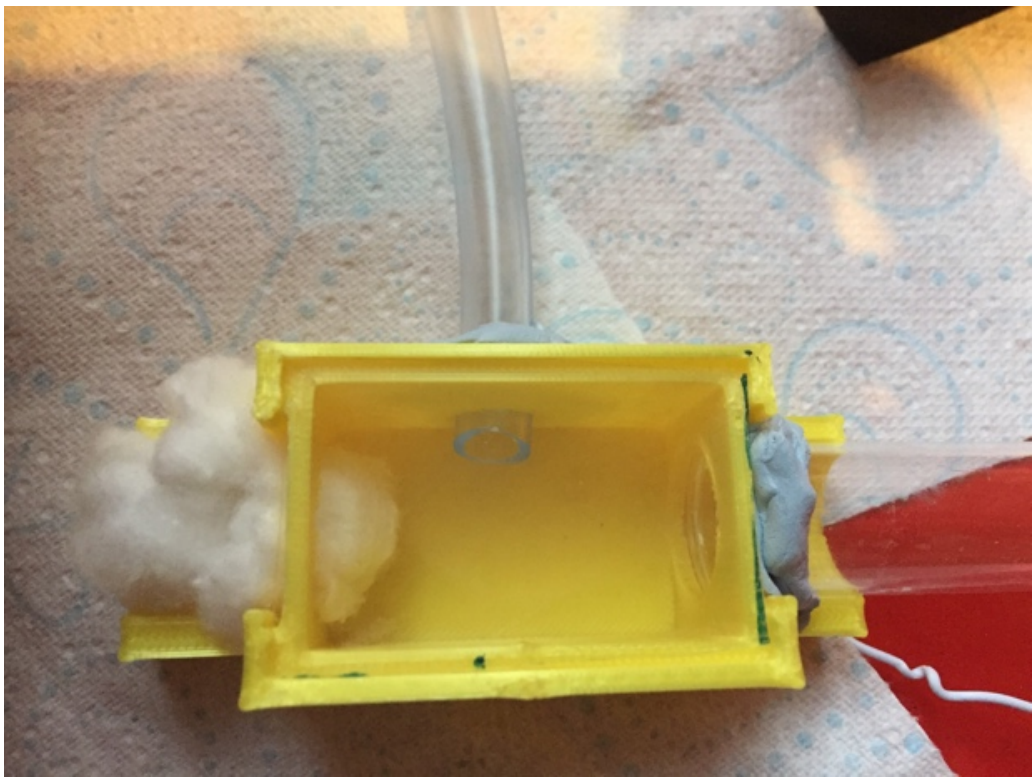

Figure 11: Ant Gateway setup with test tube and tubing connection

After your colony has grown you can expand your colony even further by building a larger ant farm.

Ant farm

An ant farm is essentially a layer of dirt between two panes of glass which the ants can dig and create their intricate tunnels in. It is an expanded space for your colony and if they move in you can learn how colonies in the wild are structured. It is possible to buy different types of ant farms. However, you can also make one yourself quite easily. I am going to describe here the one that I build using easy to find cheap and off-the-shelf materials. In the following list I have reported all the material that you need.

- A picture frame set complete with a glass panel which can be easily found in arts and craft stores. I used a frame of 27 by 22 cm, but smaller frames are also suitable and easier to build.
- Hot glue gun and clear hot glue sticks.
- A clear plastic sheet about as large as your frame
- Sand. The one used for children playground or for Hamsters are both good options.
- A drill with a 12mm wide drill bit (the size for the tubing to be connected to).

One frame pack is enough to make two ant farms. There should be along with the pack a carboard or wooden backboard. Stick on one side the clear plastic sheet with some glue (step 1 on Figure 8) . This is to prevent mold forming when you spray the ant farm with water. Take this and screw the backboard onto the frame making sure the plastic sheet side is pointing inside the frame (step 2 on Figure 8). Put some hot glue all around the border to prevent sand from seeping out (step 3 on Figure 8). Now drill three holes on the top of the backboard (two for tubing connections and one for maintenance) (step 4 on Figure 8). You can block these off with a bit of cotton wool if needed. Now fill the frame with sand so it is just below the holes and still allows the glass cover to be placed on it

(step 5 on Figure 8). When you feel it is right (you can always change the sand level later using a funnel), place the glass pane on top and secure it with hot glue (step 6 on Figure 8). Connect your ant farm to the ant gateway and secure the outside of the tubing with Blu tac and your colony has a whole new area to expand to (step 8 on Figure 8). If you want your colony to expand their keep the ant farm dark and shine a light to where the ants currently are. This will encourage them to move.

Figure 12: A full Ant Tube, Ant Gateway, and Ant farm setup.

Conclusion

In this paper, we explored the diversity of ants, examined their anatomy, and discussed methods to identify and mark the locations of ant colonies. Additionally, I suggested ways to study ants in greater detail by raising colonies using various techniques. These include the **Ant Gateway**, **Ant Tube**, and **Ant Farm**, which I described and provided instructions for creating.

The world of ants is truly fascinating, and I hope this article has inspired you to view these creatures with greater curiosity. For those who wish to dive deeper into this topic, the books by **Jones** and **Hölldobler** are excellent starting points.

Figure 13: A successful starting colony of Lasius niger.

BIBLIOGRAPHY

1. “Ant,” in The New Encyclopaedia Britannica 15th edition, Encyclopaedia Britannica,Inc, p. 982.
2. W. Hiestand, “Correlation of Strength and Weight in Insects,” Annals of the Entomological society of America, 1928.
3. M. W.Moffett, “Supercolonies of billions in an invasive ant: what is a society?,” Behavioural Ecology. , vol. 23, no. 5, pp. 925-33., 20 April 2012.
4. J. Langston, “Saharan silver ants use hair to survive Earth's hottest temperatures,” 2015. [Online]. Available: https://www.washington.edu/news/2015/06/18/saharan-silver-ants-use-hair-to-survive-earths-hottest-temperatures/.
5. R. Jones, “The Ants of Britain And Ireland,” in Ants, Bloomsbury, 2022.
6. R. Jones, “Ants, British Wildlife Collection,” : second Edition ed., Bloomsbury, 2022.
7. E. Morgan, “Trail pheromones of ants,” Physiological entomology, vol. 34, no. 1, pp. 1-17, 2009.
8. T. C. Schneirla and G. Piel, “Army ant,” Scientific American, vol. 178, no. 6, pp. 16--23, 1948.

9. G. Yang, “A Review of Ant Nests and Their implications for Architecture,” MDPI, vol. 12, no. 12, 2022.
10. R. Jones, “Being an every day ant,” in Ants, Bloomsbury, 2024.
11. L. Roccatano, “Starting Your Ant Colony,” 2024. [Online]. Available: https://www.instructables.com/Starting-Your-Ant-Colony/.
12. B. Hölldobler and E. O. Wilson, Journey to the Ants, II ed., Belknap Harvard, 1994.

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