Introduction

   Ants are perhaps some of the most amazing creatures on the planet. The ant is a member of the phylum arthroppda,

and are in the order Hymenoptera.  This order also contains the other social insects such as bees and wasps.  Ants belong to their own family, Formicidae, and have some 350 genera with thousands of different species.  The ant consists of three body parts, the head, the thorax, and the abdomen.  The legs, which are jointed, are attached to the thorax.  These species span an overwhelming number of varieties, ranging from ants which are two inches long to smaller parasitic ants 1/25 of an inch long.  Ants can live in a wide range of climates and temperatures, from the deserts to the trunks of trees, to tunnels in the ground.  All of the worker ants in a colony are female, as well as the queens.  Queens and male ants are both winged, but the male dies soon after mating is completed, and the female sheds her wings once she has begun to lay eggs.  The female is usually noticeably larger than the male.

        Ants also have amazing abilities with strength.  Some species of ants can lift up to 50 times their own weight.  The most interesting thing about the ant, however, is the communities that ants form with one another.  Unlike any other animals known to human beings, ants use a true system of communism.  They depend on one another, and are unable to survive without the aid of one another.  Any ant left by itself will surely die, as no single individual is able to survive without the cooperation of the rest of the community.  Even when any ant is alone, it is working for the greater good of the rest of the colony.  Ants have specialized jobs, though they can change from day to day.  While one ant is out gathering food, another may be protecting the nest or gathering heat outside, so that it can go into the nest and warm it with its body heat.  However, when an ant returns to the nest with food, it will give food to the others in the nest.  There is no competition between the ants, but complete cooperation in order to allow the nest as a whole to survive.  In fact, two ants working together will accomplish more work than if the two ants were working separately.  Why this is the case is not known.  It may be either a chemical stimulation, or a mimicking of the other ants activities.  Perhaps it is even true, intentional cooperation.   Whether it is pure instinct that has developed over years of evolution, or some degree of actual intelligence, the ant society is the truest communism that has ever existed in the world.

        The complexity of the ant society leads one to think of how ants are able to actually communicate.  The ant has a very well developed sense of smell.  It is the odor of the ants in a colony that allow an ant to know whether or not a fellow ant is a friend or an enemy.  While ants go about their work, they come into direct contact with, and actually feel every other ant which they meet.  This allows the ants to smell one another and avoid allowing enemies to invade the nest.  Anything that acquire the smell of the nest may invade it unharmed.  Ants also have antennae that are attached to the head.  These are their primary sense organs, not only to the smell of objects, but are able to feel size and shape as well.  This ability of ants to communicate with one another is one of their most important abilities, as it is the amount of cooperation that allows ants to be successful.  Without this the community could not survive.  I was personally amazed while I worked with my ants.  When I first allowed the ants to exit the ant farm they had been in for a matter of weeks, only one ant found the opening.  It walked to the edge of the opening, peered out, turned around and then went back to the others.  Soon, a large amount of ants were collecting at the beginning of the exit tube, while one ant periodically went out, studied the outside world with its antennae, and turned around to seemingly "report" what it discovered to the other ants.  They truly act as an organized group, which seems so unbelievable for such a small insect.  It is as if the community as a whole is an organism, and the individuals are parts of that organism.  It is this characteristic that made me first become interested in the subject of ants, and decided to look further into the ways in which ants communicate and are able to work with one another, or sense one another as a friend and not an enemy.

        At first, my experimentation was to include a small group of ants.  I intended to allow one ant to find food, and then reunite it with other ants.  If the first ant was able to properly communicate with the other ants, then the others would also go to the food.  I would then be able to do further experimentation concerning the ants communication.  I could allow one ant to find the food, but restrict its ability to communicate with the other ants.  For example, the ant could feel the others without being able to see it.  If the ants still went to the food I could conclude that the ants relied heavily on touch for communication, but not sight (which would be logical, since many types of ants live underground).  However, I found that a small group of ants removed from the rest of the colony were very uninterested in any amount of food.  My first conclusion was that the ants were not hungry and did not need to collect food at that time, but when I allowed the entire community of ants to freely access the food, the colony began collecting the food in a matter of minutes.  I therefore concluded that the ants were totally helpless without the rest of the community.  If a single ant, or even as many as five or more, is removed from the colony it ceases to have any purpose.  It does not begin any actual collection of food unless the rest of the colony is there as well.  This first failure actually led to one discovery: ants require the rest of the nest in order to perform specific tasks.  They require the colony as a whole in order to live and operate.

        My next attempt was to work with the two separate colonies I had.  However, I was unable to use the two colonies as a basis for any experimentation, for the ants that made up these two separate communities were originally from the same colony.  Ants identify one another based on their odor, and though these colonies had been separated for several weeks, it appeared that the ants still identified one another as the same community, and not as enemies.

        The experimentation I decided to proceed with was to attempt to make the ants, who had been working together for weeks, to identify one another as enemies, or to lose the ability to identify each other as friends.  If this could be done by changing the odor of the ant or taking away the ants ability to sense odor, then it would confirm that the ants use odor as a way of identifying one another.

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