Ants-nature’s secret power

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I. Name of program and producer

Documentary Title: Ants: Nature’s Secret Power Producer: Walter Kohler Co-Production of ADI MAYER FILM and ORF

II. Viewed on

http://topdocumentaryfilms. com/ants-natures-secret-power/

III. Notes Ants are powerful predators:

- Ants may live in colonies of up to 100 thousand and like a human city they need constant supply of food.
- They kill large insects and carry them back to base.
- In one year a single colony consumes over 10 million insects.
- They consume more meat than lions, tigers, and wolves combined.

Strong survival instincts:

- Life of individual ant is not important but the survival of the colony is critical.
- As a colony, ants protect themselves effectively even against large predators like bears.
- They first protect their larvae and pupae, the future of the colony.
- They squirt acid on any predator that attacks their colony.
- Shows bear being driven off from ant colony and attacking bees nest.

Bees drive off bear but their exposed nest is taken over by the ants. The bee meat is given to the ant larvae. Adult ants have different diet. Symbiotic

relationships: Ants and aphids have symbiotic relationship. Aphids provide honey dew to ants and ants protect the aphids.

- Mealy bugs provide ants with honey dew. In return, ants carry the mealy bugs to food sources or plants that have plenty of sap.
- Ants also have mutually beneficial relationship with carnivorous plants in Indonesia. Small ants live on carnivorous plants in Indonesia and eat insects trapped by the plant.

The ants protect the plant from herbivores. Characteristics:

- Ants can support 100 times their own weight, consume vast amounts of food, and run huge distances. They cooperate and become like a superpower
- Ants have a liquid that allows them to grip smooth surfaces. E. g. weaver ants need the strong grip to construct their colonies.
- Evolution of Australian bulldog ants – they evolved from wasps more than 100 million years ago. They have retained the sting of their wasp ancestors.

Sociology

- No ant species lives in isolation. Only 3% of animal species have evolved to live in societies. Ant and Homo sapiens are among these 3%.
- Larger ants defend the colony and forage for food. Smaller ants stay in the nest to tend the garden and the brood. Ant societies have division of labor, communication between individuals, and an ability to solve complex problems

- Colony may have only one queen, or there may be many queens depending on the species
- Only the queen lays fertile eggs. Examples:
- Grass cutter ants – most complex. They live in huge underground cities. They are so efficient in foraging that they compete with the cattle in the Argentinean pampas. Cutters cut grass leaves into appropriate sizes, transport ants carry cut grass to the colony. They transport nearly ? ton grass a year over 300 meters using relay transporters. When attacked, first priority is to protect the larvae and pupae, the future of the colony.
- Rattan ants – when attacked, they shield larvae/pupae from the sun and others move them to the shade. Then scout ants look for new site for colony, spreading broken line of scent or chemical trail that the rest of the ants can follow. Once site is selected by ‘ chemical democracy, the rest follow the scent to new nest site. No leader giving orders – simply division of labor. Winged reproductive ants want to instinctively fly but other ants keep them anchored.

She controls the sex of her offspring – fertilized eggs become female; unfertilized eggs become male. Males have short life, but sperm is preserved in queen’s sperm pocket for 10-20 years.

Communication:

- When foraging, ants leave a pheromone trail so that they know where they’ve been, •Chemical communication is one of the most important keys of ants’ success.

- Queen also uses chemical scent to advertise her fertility. Leaf cutter males and females – females or virgin queens are bigger because they carry fat they will need if they reproduce and found their own colony.
- They mate while in flight and males die after this. Females land, shed wings, and start their colony. New queen fertilizes eggs with stored sperm and works alone, living off her reserve of fat until her first workers are born or emerge.

Lab experiment

- To determine how leaf cutter ants let other know about food source.
- Besides chemical signal, ants produce high frequency sound from abdomen that alerts other ants.
- Ants sing only when food is of high quality and alert other worker ants more that a meter away to come and help transport the food.
- Fire in the pampas destroy ants’ chemical trail.
- Ants become disoriented for a while but slowly rebuild chemical trail.

Lab experiment

- To see how scent commands ants.
- Scent directs ants to action and strength of command depends on quantity of chemical.
- Ant lays broken trail to food.
- When if finds food, it drinks as much as it can so it can carry it back to its nest mates.
- It lays solid line of scent that it and others can follow back to food source. At the nest, others feed from its ‘ social stomach’.
- Ants’ world is tied up with scent as opposed to human’s being visual.

Keeping healthy:

- Wood ants use tree resin to kill fungi and bacteria and keep healthy. Grass cutter ants live manufacture antibiotic to treat the grass.
- Correct temperature and humidity is important. Ants form chimney in the nest to control these – air conditioning system (cold blooded). The fungus garden produces CO2 that exits the nest through the chimneys. Other chimneys allow fresh air to enter the fungus garden. Special chambers for waste also create temperature differences in the nest that create current allowing CO2 to flow out and fresh air to flow in. Investigating an ant city-state
- 10 tons of cement pumped into nest in three days. Excavation after a month shows megalopolis – city-state of 50 sq meters and 8 meters into the earth. Equivalent to building the Great Wall of China.
- Some ant colonies are as small as an acorn.

Lab demo:

- Weaver ant walks upside down on pane of glass, withstands hurricane force winds, and lift massive weight. Shows an ant upside down on glass surface and carrying 100 times its weight.

IV. Summary of Documentary

The documentary, Ants: Nature’s Secret Power, shows the world of ants through the eyes of world renowned authority, Bert Holldobler, who has studied these organisms for nearly 60 year.

The documentary includes video shot in the ants’ natural habitat worldwide, as well as laboratory scenes where scientists carry out experiments to learn

more about ants. The main theme of the documentary is that ants are social animals and the secret to their strength lies in the organization of their society and their ability to modify habitats, tap resources, and defend themselves. In short, specialization, cooperation, and communication ensure their survival and make them the most efficient predators on earth.

Ants may live in a colony of up to 100 thousand and, similar to a human city, the colony needs a constant supply of food. Ants are able to lift 100 times their weight so they kill large insects and carry them back to their nest. In one year a single colony consumes over 10 million insects, more than lions, tigers, and wolves combined. Members of an ant colony communicate through chemical scents or invisible lines of pheromone or chemical trails. The documentary shows how leaf cutter ants alert other ants from their colony about a food source.

Besides leaving a chemical trail that will guide other ants to the food source, leaf cutter ants also produce a high frequency sound from their abdomen that alerts other ants when they find food of high quality. This illustrates the concept that communication is an essential element of interactions between animals. The documentary also shows how ants become disoriented and lose their way when a fire in the pampas destroys these chemical trails. The transporter leaf cutter ants run around in circles with no scent to lead them in the right direction.

This is an example of how chemical pollutants can cause abnormal behavior. Ants have mutually beneficial relationships with other organisms and plants. The documentary shows that ants and aphids have such a relationship. The

aphids, which are fluid feeders, feed off plant sap and then excrete honey dew. Adult ants need a high source of energy and honey dew is full of sugar and vitamins needed by the ant. Depending on its size, an ant colony can consume about 100 kg of honey dew a year. In return, the ants protect the aphids. Another example of such as relationship is that of ants with mealy bugs.

Ants drink honey dew and in return carry the mealy bugs to plants that have abundant source of sap. The program likens this to how humans take their herds to new pastures and notes that only ants and humans keep domestic animals. Ants also have mutually beneficial relationship with carnivorous plants in Indonesia. Small ants live on these plants and eat insects trapped by the plant. In return, the small ants protect the plant from herbivores. These mutually beneficial relationships illustrate the concept that interspecific interactions are fundamental to community structure and mutualism benefits both partners.

Ants have various ways of protecting their colony from harmful bacteria and fungi. Grass cutter ants live on fungus that they grow themselves from grass compost. They manufacture antibiotic in their bodies and use this to treat the grass. Wood ants bring tree resin to their nest at the cost of being trapped in it because resin contains chemicals that kill fungi and bacteria. This illustrates the concept that social animals have evolved sophisticated behavioral defenses to counteract the effects of parasites and pathogens.

V. Essay: Ants: Nature’s Secret Power

The documentary shows that ants really are nature’s secret power. The makers claims that ants are nature’s most efficient predators and then go on to show this through very powerful video imagery of various ant colonies; a secret world that is sophisticated and extremely organized. Ants live in a world invisible to humans so we rarely think about them unless they are preying on our homes. It is easy to believe that they are the most efficient predators when you see their social organization and the effective way that they work together to ensure their survival in the film.

They cooperate and communicate in order to protect their colony as well as to ensure they and their young have an ample food supply. The documentary shares scenes in ants’ natural habitats throughout the world, as well as laboratory experiments that show scientific studies of their behavior. This includes measuring how far ants will travel in search of food, how they leave a chemical trail for others to follow, and how much weight an ant can lift while hanging on to a smooth surface. The documentary gives many facts and statistics about ants.

For example, it states that ants can lift 100 times their weight. The documentary then shows an ant actually lifting this weight while hanging upside down on a smooth, glass surface. Ants are social animals and they show many similar behaviors to humans such as the nurturing of their young, building safe structures to live in, protecting their colony from harmful fungi and bacteria, and communicating with each other to give directions on where to find food and to call an alarm. The documentary shows all these real-life scenarios and more.

The most fascinating scene was where a massive colony, a fifty sq meters wide and eight meters into the earth ant city, is exposed on film. Unfortunately, the filmmakers had to pour ten tons of cement into it in order to preserve the structure for the dig – effectively killing off the colony. The program is a useful learning tool for understanding community structures in nature and the mutually beneficial relationship that living things have with each other. Its appeal is not only for nature enthusiasts but for general audiences of any age