



Accompanies Episode 11 of the 13-part video series

— *Plant Prospectors* —

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In this episode...

Taking to the air in their flyer, the microscopic explorers discover that lawns and flower gardens are home to a variety of insect pollinators and voracious predators. Honeybees, butterflies, ladybird beetles, aphids and soldier beetles illustrate the role insects play in the ongoing health of the backyard ecosystem. And when a larger animal dies, such as a mouse or squirrel, scavenger insects swoop in to harvest the carcass. This process accelerates decomposition, releasing nutrients back into the ecosystem.



Backyard Ecology: Garden The Log of Captain Jonathan Adler

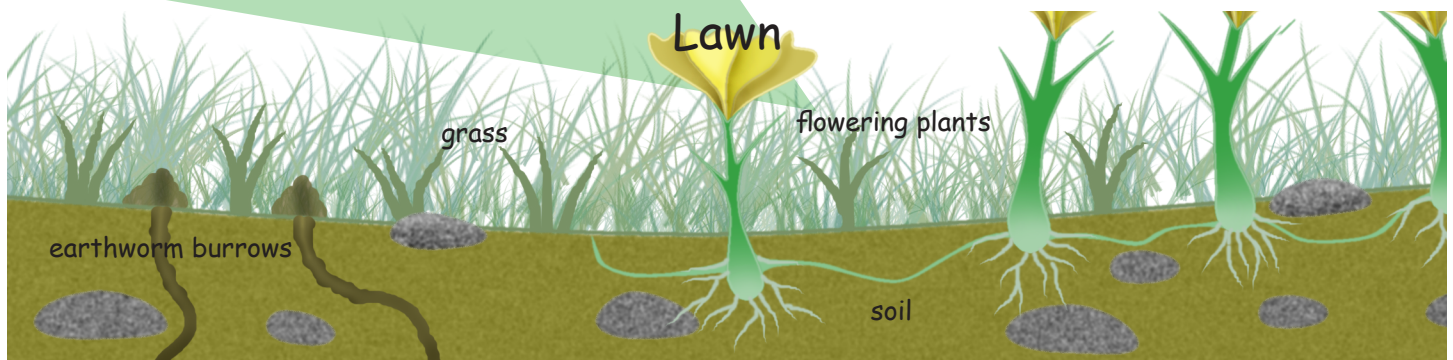
Day 17: 07:30 hours... To speed up our journey over-land, Tara and I have assembled her flyer. We have parked the rover safely in the grass at the edge of an expansive lawn and garden. We suspect that this area will be excellent for observing how insects and plants work together.

Our first encounter is with a beautiful large 4-winged insect. The **butterfly** uses a long tube-like snout to reach deep into a flower's inner parts, extracting irresistible sweet nectar. We wonder why a plant would produce sweet nectar?

Moments later we spy a faster moving flower-feeder... a furry fellow that picks up yellowish pollen grains as it burrows into the flower for nectar - a **honeybee**. Why would a plant want to attract these insects?

Pollen is the answer! By luring them with sweet nectar, the flower uses both the honeybee and the butterfly for the same purpose. Flower pollen sticks to the insects. When they fly away to another flower, the pollen is transferred, and seeds begin developing. This is the process of pollination.

The flowers that grow into fruits, nuts, and berries, are all pollinated by insects.



Flyer

Aerial auxiliary to MS Cyclops

Vehicle Dimensions

LENGTH	.65 mm
WINGSPAN	.75 mm

Vehicle Mission

Maximum speed	1 meter per minute
Mission duration	2 days

The *Flyer* is an ornithopter, a machine that maintains flight by emulating the wing-beat patterns of flight-capable animals such as insects, bats, and birds.

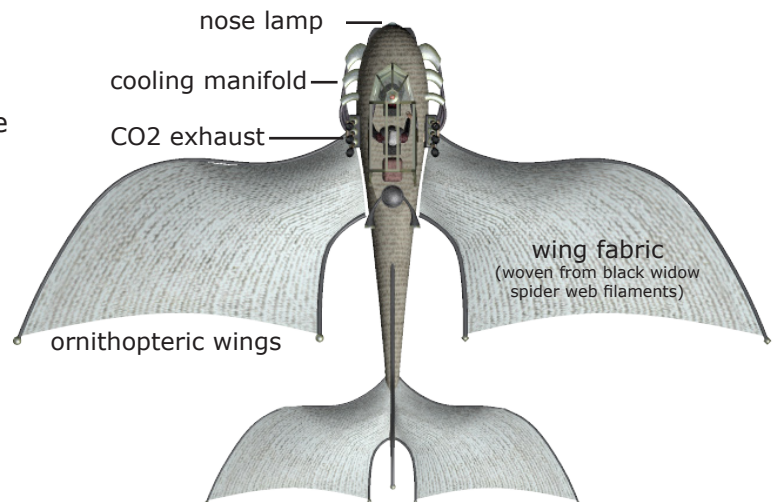
Launched from a base built in the molt of a dragonfly larva, a fleet of flyers patrol the pond surface and surrounding habitats, scouting probable exploration sites for the Micro Exploration Corps.

The flexible fabric of the Flyer's wings are made from a woven mesh of black widow spider web filaments. The fuselage is constructed from a basket-like weave of cellulose plant fibers.

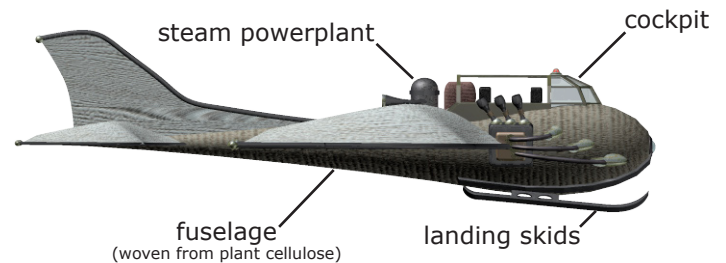
Power is generated from an onboard steam powerplant that uses alcohol as fuel. The alcohol is produced by decomposer bacteria and is carried in small tanks aboard the flyer.

Requiring a single pilot, the Flyer can carry a second microscopic passenger for aerial explorations and reconnaissance.

Top view



Right side view



Oblique view



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About the Organisms

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A yard is filled with biological surprises. There are often more kinds of living things to be found in gardens and backyards than you might expect. Some of the most interesting are the flowering plants and the insect pollinators, pests, and predators that live with them.

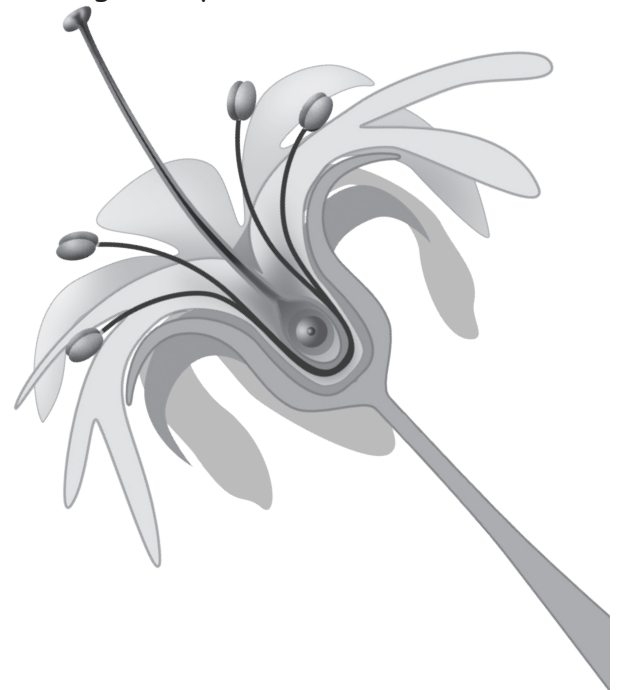


Flowering Plants

Flowers are a plant's way of announcing to a passing insect that a treat awaits if it will just land and start sniffing around. To get at that sweet nectar the insect must rub against the anthers, picking up pollen grains along the way. When the insect goes in for another flower's nectar the pollen grains rub off onto the sticky stigma.



The Log of Captain Jonathan Adler



12:30 hours... Plants and insects have a perfect symbiotic relationship! The two species help each other.

We believe that many insects have life cycles that coincide to the growing season of flowering plants. Spring!

The adult forms of insects such as the butterfly are busy during the same season that plants are producing flowers. And since flowers are a flowering plant's way of making seeds, it can be said that a flowering plant essentially tricks insects into helping it make more plants.

Honeybees are particularly good pollinators. They travel far from their hives in search of the sweet nectar from which they make honey. This behavior sends them visiting and pollinating hundreds of flowers a day. This is why a honeybee is a gardener and fruit grower's best friend.

If the honeybee population were to suffer from pesticides or insect disease, it could hurt not only the busy bees themselves, but also the plants and people who rely on them.

About the Organisms

Predators in the Garden

Young, fast growing garden plant stems have soft tissues and are often targeted by insects as a food source. The new growth of a garden variety rose bush is a good place to find a thriving population of aphids.



Aphids are very efficient reproducers. Large females give birth to many babies. The young **nymphs** immediately stick their beaks into the host plant and begin sucking its juices. The plant is soon swarming with destructive little juice suckers. The aphids rob the plant of nutrients and create wounds that allow bacteria and viruses to enter. But these sap sucking insects have enemies that prevent them from killing the plant.



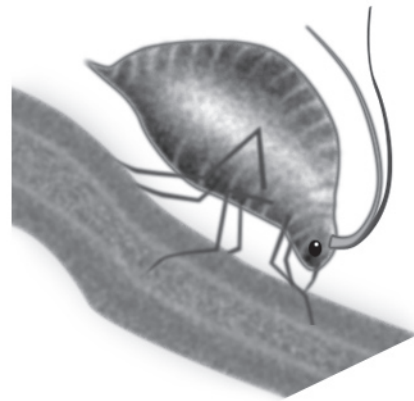
Aphids are the food of choice for predator insects, **soldier beetles** and **lady bird beetles** (ladybugs). The soldier beetle has a behavior that keeps it clean and tidy: using its front set of legs to keep its mouth clear of aphid parts and sticky sap.



The Log of Captain Jonathan Adler

14:30 hours... We soon discover that the beautiful world of the flower garden is also home to destructive pests!

Small insects called aphids make a home on plant stems. There are thousands of them! They use their beaks to suck out the sap and fluids, which is certainly not beneficial to the plant. We wonder what stops these pesky little juice-suckers from killing the plant?



With the sound of crunching and munching we are alerted that company is here! The pesky aphids are now the snack of choice. Two kinds of predator insects have arrived to feast on the pests, and they are hungry! The predators gobble the plant parasites as fast as they can munch.

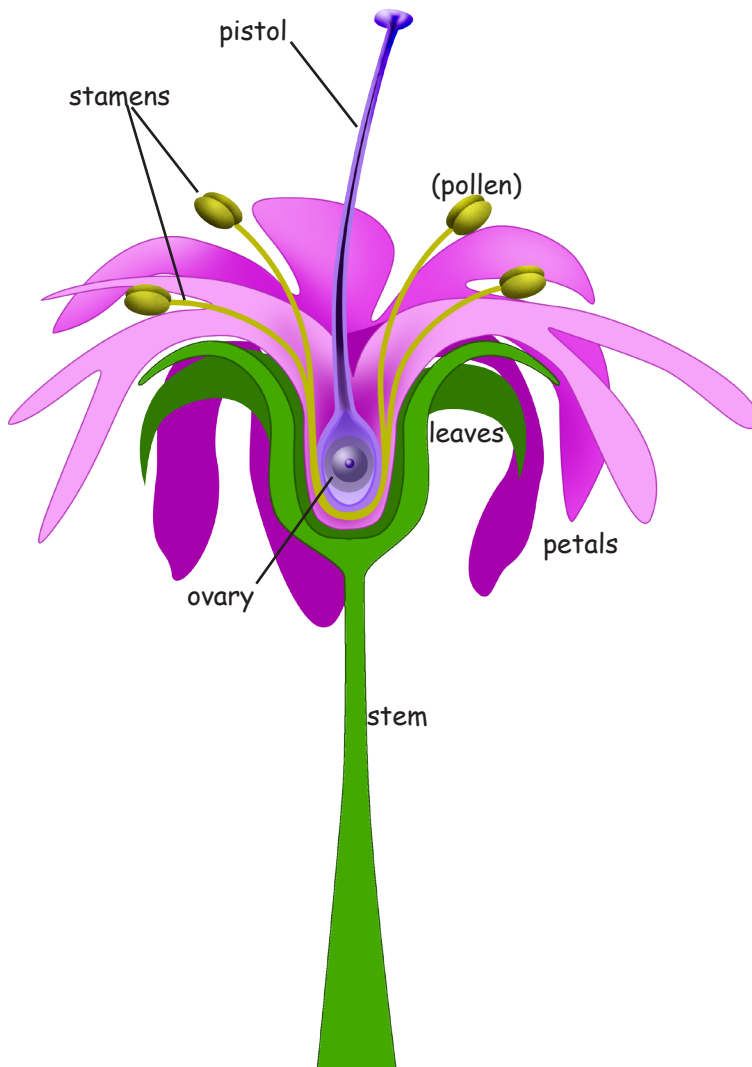
The larger of the predators, the soldier beetle, eats so quickly that sticky sap and chewed-up aphids collect on its mouth parts. But this is the neatest insect we have ever seen! It periodically wipes its mouth clean with its front set of legs.

As we take to the air and make our way back to the rover, we look down to see scavenger insects picking at the carcass of a dead rodent - the beginning of another food chain. Just like the microworld of the pond, we now see that the backyard flower garden is a system of producers and consumers, of predators, prey and scavengers. Every organism plays a role in keeping the system alive and healthy.

Key to Organisms

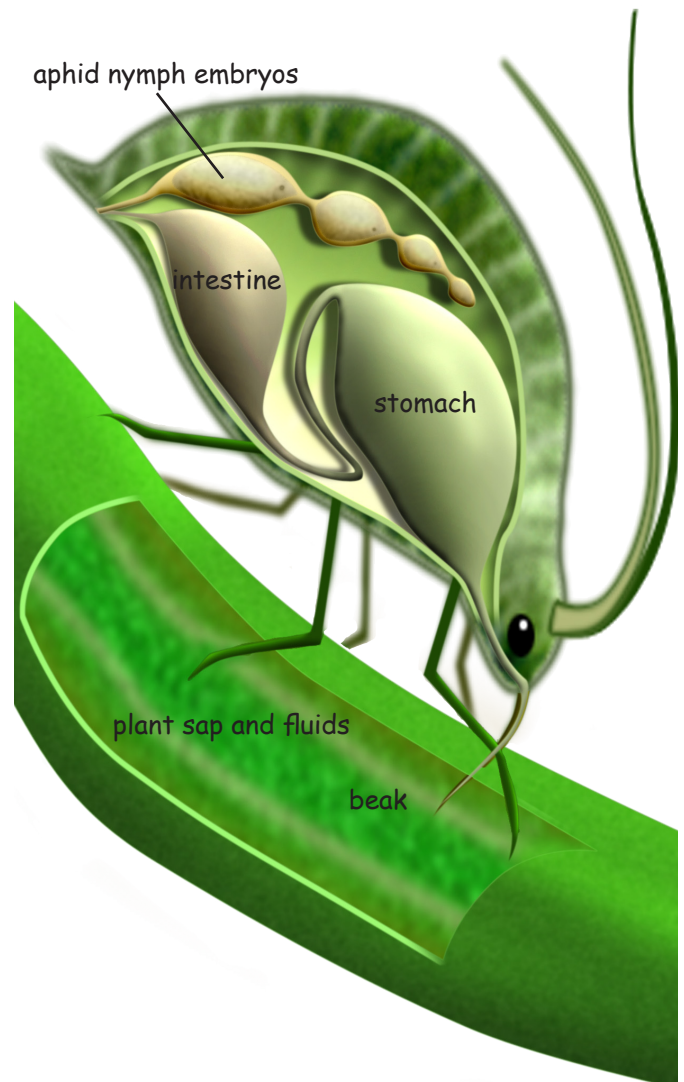
Flower

Flowers are a plant's way of making seeds. Some flowers are pollinated by wind and air, others by insects. When an insect dives into the middle of the flower seeking sweet-tasting nectar, pollen grains from the stamens stick to its body. When the insect moves on, the pollen is transferred to the pistil of a new flower. It travels down the pistil to the ovary where it develops into seeds.



Aphid

A female aphid can produce many baby aphids (nymphs) every day. They are clones of the mother aphid. New plant growth in the flower garden can be quickly overcome by a carpet of tiny aphid nymphs, which begin making their own babies. Luckily plant-friendly predators such as ladybugs find aphids to be delicious.





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