



Accompanies Episode 10 of the 13-part video series

— *The Great Termite Kingdom* —

Written by Eric R Russell & Bruce J Russell

In this episode...

The continuing exploration of the forest floor finds Jonathan and Tara emerging from their survey of the living humus beneath a rotting log. Small perforations in the rotting wood beg further investigation, so they steer the terra rover into the maze-like catacombs of a termite gallery. In this dark labyrinth they discover that a termite's gut is home to a teeming community of protozoans that do all the work of digesting wood for the host insect.



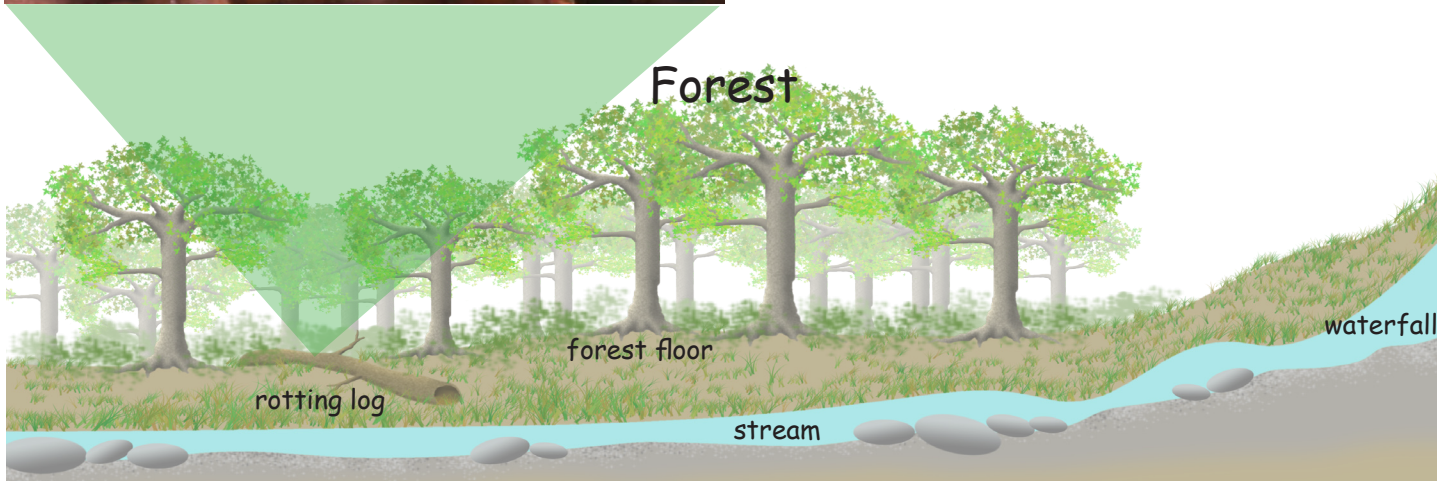
Forest Ecology: Rotting Log

The Log of Captain Jonathan Adler

Day 16: 11:30 hours... Our exploration of the forest floor continues. We have seen a great number of insects, round worms, mites, and assorted other scavengers, predators, and harvesters. All contribute to the breakdown of dead forest material, such as wood and leaves. The soil becomes enriched, and the trees and other living plants benefit. Decomposing and processing the dead cells of a leaf are one thing, but we wonder how does the forest floor ecosystem deal with something as enormous and solid as a fallen tree?

12:10 hours... It isn't long before we discover the answer! Climbing up from the humus we find ourselves beside a massive object - a fallen log! The wood is covered with holes, and keen-eyed Tara catches a glimpse of something moving inside.

Perhaps we have uncovered the secret of how a fallen log returns to the soil. With a triumphant shout, Tara declares: "Follow that bug!"



Terra Rover

Terrestrial auxiliary to MS Cyclops

Vehicle Dimensions

LENGTH	.35 mm
BEAM	.22 mm

Vehicle Mission

Maximum speed	3 cm per minute
Mission duration	10 days

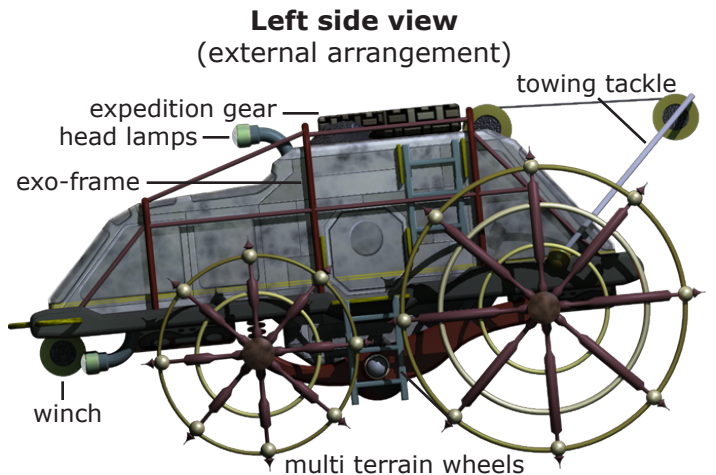
The *Terra Rover* is a durable vehicle designed for exploration of terrestrial surfaces with a minimum crew (2).

The rover's multi terrain wheels allow the vehicle to climb near-vertical surfaces of soil, wood, and soft plant tissue.

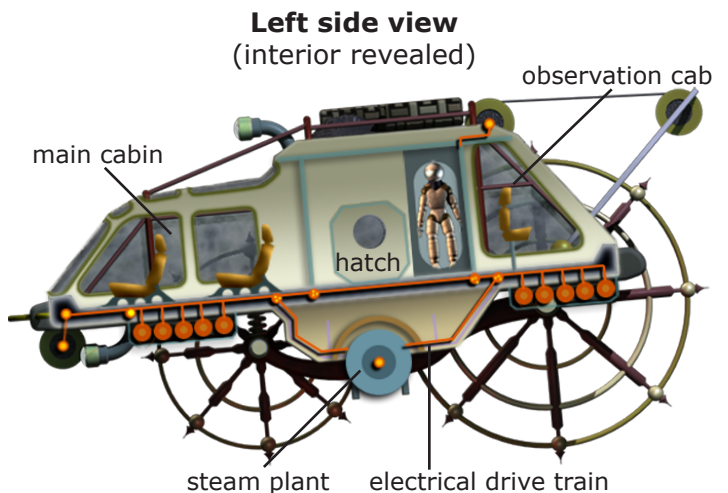
Power is generated from an onboard steam powerplant that uses alcohol as fuel. The alcohol is produced by decomposer bacteria aboard the *Cyclops* and carried in tanks on the rover.

The *Terra Rover* carries equipment for exploration, including tackle for towing and climbing, and diving suits for immersion in fluid environments.

Protecting the rover are armored hull plates made of chemically resistant reinforced glass, in the unlikely event the vehicle is swallowed by some monstrous inhabitant of the terrestrial microcosm.

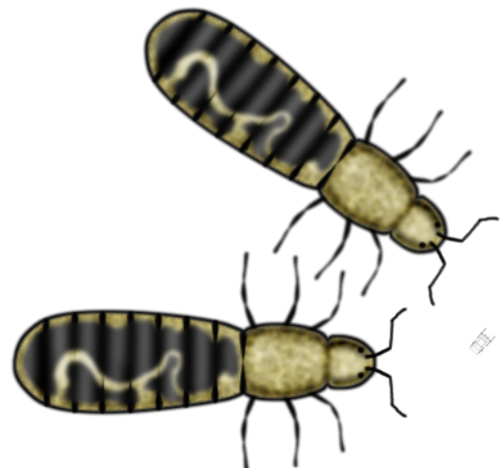


Micro Vehicle Terra Rover: 350 μ m



Contents of this guide...

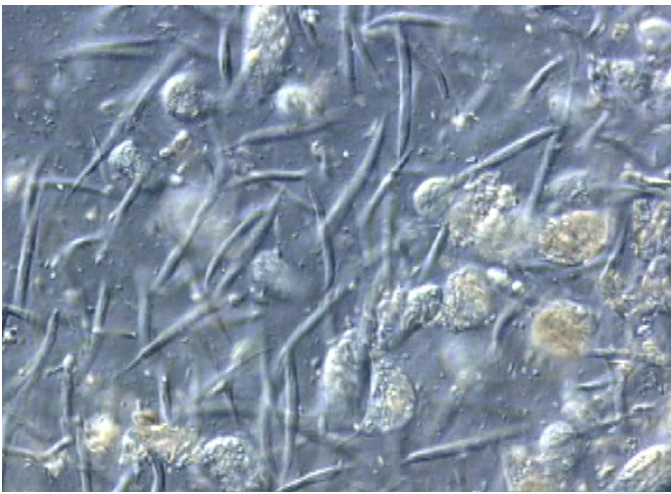
- The Terra Rover page 2
- About the Organisms page 3
- Key to Organisms page 4



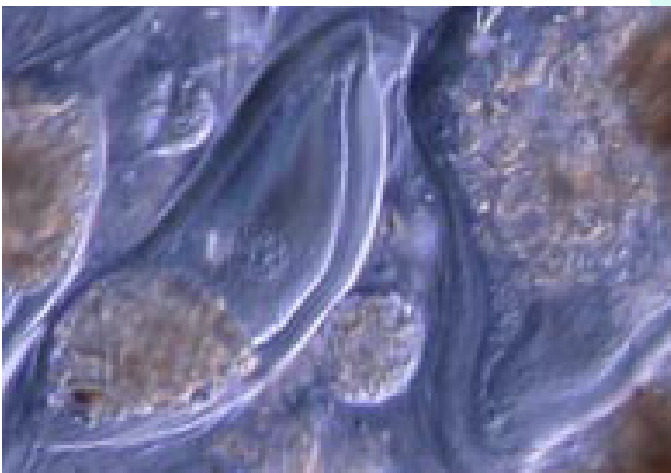
About the Organisms

Termites: In temperate zone forests **termites** invade fallen trees soon after **bacteria** and **fungi** have begun to soften the dead wood. Fallen logs are a special habitat where one can examine an interesting relationship between termites and the microscopic partners that live in the termite digestive system.

The large termites seen in this program do not attack houses unless they are made of old, partially decayed pine logs. They break down wood with the help of bacteria and protozoans that live in special stomachs located near the end of the termite's intestine.



If a termite is “cleansed” of its **symbiotic helpers** using antibiotics, it will continue to eat wood. Without helpers, the termite will soon die of an internal log jam.



The relationship between termite and its wood digesting microbes is a classic example of **mutualistic symbiosis** — each species requires the other in order to survive.



The Log of Captain Jonathan Adler

12:30 hours... We have entered the fallen log through one of the insect holes. What will we find in this lightless world?

We fire up the head lamps. Termites by the hundreds appear before us, populating a complex gallery of tunnels and chambers that riddle the interior of the log.

Two kinds of termites are visible - the workers, and the larger soldiers with long sharp mandibles. We assume that somewhere in this vast colony is a termite queen, responsible for laying eggs.

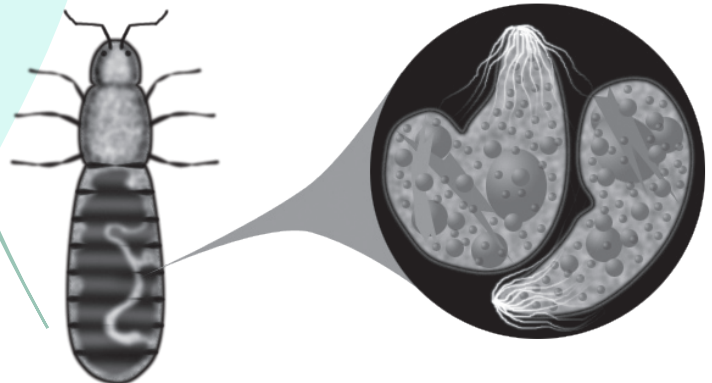
The workers are busy little insects, relentlessly munching away on the log. With magnification we can see the wood chips inside a termite's stomach - and swarming around those wood chips... something else.

Before I can stop her, Tara grabs a diving suit and sets out to discover what is living inside the termite's gut!

The termite's stomach and intestine, to our surprise, are full of various kinds of single-celled microorganisms!

The termite does not digest the wood after all. That is the job of its digestive helpers! The termite chews up bits of wood, swallows - but the process of digestion cannot begin without help from the hungry inhabitants of its innards! The relationship between the termite and its guests is called symbiosis.

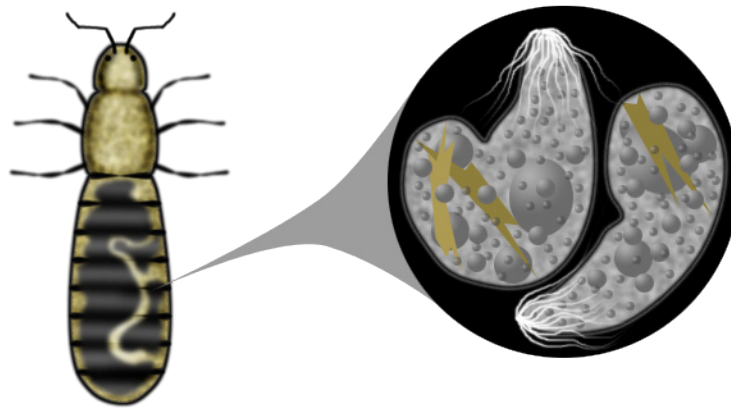
Without this symbiotic relationship, the termite would be unable to digest a single chip of wood and would starve.



Key to Organism

The Woodland Termite and Internal Helpers

The termite's digestive system is home to a variety of microbes that aid in breaking down wood chips. In this way, a colony of termites processes the dead wood of a rotting log, returning its nutrients back to the forest to the benefit of other organisms.





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