Flagellated Protozoa of the Termite Zootermopsis

Family: Hypermastigidae
Order: Polymastigina
Class: Insecta
Phylum: Zooflagellate
Kingdom: Protista

Conditions for Customer Ownership (per USDA permits)

We hold permits allowing us to transport these organisms. To access permit conditions, click here.

Never purchase living specimens without having a disposition strategy in place.

- Termites contain the protozoa specimens. Termites are considered a plant pest by the United States Department of Agriculture. In order to continue to protect our environment; you must house your termites in escape proof containers. With Termites it is a good idea to "double container" them. This can be accomplished by placing a small container (such as sandwich size disposable container) inside a larger one (such as a casserole size disposable container.)
- Termites are restricted in Canada.
- Customers in certain states may be required to obtain an end-user permit from state agricultural agencies before we can ship termites to them. Please contact us for current information. At the time of printing this CD, Maryland, Arizona, Louisiana and Hawaii require end-user permits. For customers in other states, the USDA considers these termites to be a plant pest. As a condition for transporting these organisms, we are required to notify the end user of the following information: ***For no reason shall any of these plant pests be released into the environment.*** These organisms may not be indigenous to your area and, if released, they could adversely affect your local environment.

Primary Hazard Considerations

- Always wash your hands thoroughly after you handle termites, their food, or anything they have touched. As in defending their colony in the wild, soldier termites can use their large mandible to pinch your skin and can possibly break the skin! Forceps may be used when handling, although is not necessary. If a termite latches on, just pull it gently, making sure not to crush the it. The termite protozoa do not pose any hazards to humans..

Availability

- Termites are available year round, since the termites are collected. Since termites in nature burrow deep into the ground during winter (January-February) and dry months (August - October), there may be possible shortages. They are found on the west coast of the United States. Termites always contain the target protozoa since they cannot survive without them.

How Will Animals Arrive and Immediate Requirements

- Termites will arrive in a 4 ounce plastic jar with moist paper towel. If your termites should arrive with a piece of wood, and you don't see them, carefully break open and examine wood; they like to hide. Upon arrival you should place your termites into a new home. Termites can live in the shipping container about 3-5 days.
- When termites have deceased, they are lifeless at room temperature and can sometimes be mushy when moved or touched with forceps or your hand.
- In cold weather, the termites may appear lifeless; however, once they are brought back to room temperature they should become active.

Captive Care

- Since the protozoa live in the termite, captive care refers to the termite.

Habitat:

- Any escape-proof container with holes for oxygen exchange. (We use plastic shoe box sized containers. Our culture containers are 12 x 8 inches and hold approximately 500 termites.) Line the container with soil or Vermiculite. Provide pieces of damp, soft, rotting wood for the termites to live in. These can be picked up in wooded areas (paper towel can be placed in the culture if wood cannot be collected). To ensure your wood is free of invasive creatures, freeze it overnight, and let it thaw before offering it to your termites. A damp, paper towel (preferably un-printed) can be laid across the top of the wood to provide extra food and moisture.
- Termites require relatively high humidity at ordinary room temperature, but can survive in a wide range of temperatures, although ideally temperatures should not exceed 20 °C. To increase the humidity, moisten the culture and the wood, using a spray bottle.

Care:

- Food: Termites will eat the wood that they are living in. Replenish wood supply 87-W 6281 when it appears the termites need more.
- Water: Mist the paper towel daily with fresh water (de-chlorinate with water conditioner such as Stress Coat 21 W 2338). Keep the habitat damp, but not soaking wet. Avoid standing water.
- Care: Habitat does not need to be cleaned, but if wood develops mold or fungus, remove immediately.

Information

- Termites from the genus *Zootermopsis* are native to the West Coast of the United States and are the host organisms for many protozoa such as *Trichonympha, Trichomonas, Streblomastix, Hexamastix,* and *Tricercomitus*. The majority of these protozoa have a mutual relationship with the termite where each organism benefits from the relationship. In this particular relationship, the protozoa digest wood cellulose in order for the termites to absorb the nutrients.

Procedure

1. To examine the host for the presence of flagellates, place an adult termite on a clean microscope slide and separate the tip of the abdomen from the rest of the body with dissecting needles.
2. Gently tear the gut open and wash the contents of the gut free with one or two drops of insect saline (0.6% NaCl in distilled water). Discard gut.
3. Cover the gut contents with a cover slip and place the slide on a microscope to observe the various flagellates found in the termite's gut.

Trichonympha

- *Trichonympha* is a large hypermastigote ranging in size from 150-315µm in length and 55-145µm in width. The body is divided into three regions: a rostrum bearing long flagella, a middle region with flagella lengthening towards the posterior end, and a soft, sticky posterior that contains fragments of wood and is the site of ingestion.
- The protozoa in this genus are extremely vigorous. This organism moves forward by bending its rostrum from side to side or by twisting back on itself. The flagella emerge from the body pointing posteriorly, so that flagella undulations passing from the base to the tip push the animal along.

Trichonmomas termopsidis

- This protozoa is a polymastigote and is generally found in abundance in the termite. It ranges in size from 10-180µm long and averages about 40µm wide. The rhythmic movements of the flagella can be observed under high magnification. It is xylophagus and its cytoplasm contains pieces of wood. This flagellate, as well as *Trichonympha*, cannot survive without cellulose.

Strebolmastix strix

- The only species of the genus, this organism is generally confined to the anterior portion of the hind-gut and is especially abundant near the gut wall. It is able to attach itself to the gut wall by a hold-fast organ. This polymastigote is slim and spindle-shaped in its contracted state. In this state, it ranges from 15-30µm long, but it may extend into a long, whip-like from over 300µm in some instances. *S. strix* does not digest cellulose.

Tricercomitus termopsidis

- This polymastigote is only 4 x 2 to 12 x 3 µm in size, so the chance of observing it is very remote, although it is generally abundant in newly molted hosts. The cytoplasm may contain wood.

Hexamastix

- This protozoan moves more rapidly and jerkily without making much progress, in contrast to *Tricercomitus*, which can cover some distance in spasmodic stages. This polymastigote is small (5 x 5 to 12 x 7 µm) making observation at high power difficult.

Disposition

- We do not recommend releasing any laboratory organism into the wild, and especially not termites that are considered to be pests and/or are not native to the environment.
- Adoption is the preferred disposition for any living animal.
- If the insects must be euthanized at the end of study, follow one of these procedures:
  - Put them into a container or bag and freeze for 48 hours.
  - Place the organism in 70% isopropyl alcohol for 24 hours
  - Autoclave the organism @ 121°C for 15 min
- A deceased specimen should be disposed of as soon as possible. Consult your school's recommended procedures for disposal. In general, dead insects should be handled as little as possible or with gloves, wrapped in an opaque plastic bag that is sealed (tied tightly) before being placed in a general garbage container away from students.
- Please dispose of excess living protozoa material in a manner to prevent spread into the environment. Consult with your schools to identify their preferred methods of disposal.
- You can safely use one of the following methods:
  - Treat culture with a 10% bleach solution for 24 hours (1 part bleach to 9 parts culture medium or water culture medium removed). Then rinse bleach solution down the drain with water until you can no longer smell bleach. Rinse remaining materials and containers with water and dispose of them in a general garbage container.
  - Carefully wrap specimens and their containers in a biohazard bag (without containing anything sharp that might puncture the bag) and tie closed (a twist tie works well). Autoclave the bag for 30 minutes at 121 degrees C and at a pressure of 15 lbs. per square inch. Dispose of autoclaved bag as your school recommends.

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