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# Tips on Culturing Wood Ticks

Elaine M. Thrune

# TIPS ON CULTURING WOOD TICKS

by

Elaine M. Thrune

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## Introduction

Raising the wood tick *Dermacentor variabilis* (Say) through a complete life cycle is practical and pertinent to studies of invertebrates and parasites at both the high school and college levels. The culturing may be done as a teacher demonstration or as an individual project provided certain safeguards are used to keep the ticks under control.

The life cycle consists of four stages: egg, larva or seed tick, nymph, and adult. Seed ticks and nymphs require a blood meal in order to molt; adult females require a blood meal before they lay eggs. The life cycle can be completed in three months in a warm, moist environment.

## Procedure

Early summer is an ideal time to find engorged adult female ticks feeding on long-haired dogs. Carefully remove a tick from the animal and place it in a vial for safe keeping. A fully engorged tick is easily removed.

To prepare the culture, place the tick on several pieces of wet paper toweling in the bottom of a petri dish. Replace the cover. Store at 24 to 30°C (75 to 85°F). Check daily to be sure the paper remains moist. If necessary, add several drops of water.

About a week after the blood meal, the tick begins laying eggs.

This continues for several days (Fig. 1). At this time it is wise to modify the culture because the seed ticks can easily escape from the closed petri dish. To prevent them from escaping, place the petri dish in a large pan containing one-fourth inch of water. Avoid flooding the petri dish. Apply petroleum jelly generously to the inner sides of the pan and cover loosely to retard evaporation. Check daily. Maintain a moist environment in the petri dish and a sufficient water level in the pan.

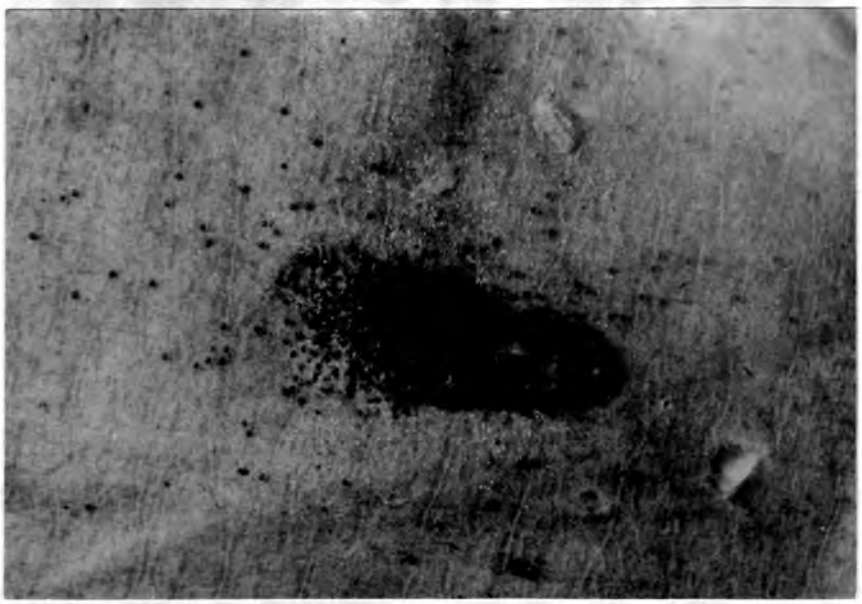

Figure 1. Petri dish culture showing female tick and eggs beginning to hatch.

The larvae hatch in three weeks (Fig. 2), and they can be immediately introduced onto a mammalian host. A laboratory rat is a suitable host because the ticks will readily feed upon it, it is large enough to feed many ticks without difficulty, and it has

relatively short fur. To transfer the ticks, gently sweep the culture dish with a fine camel-hair brush to pick them up, then brush against the fur on the rat's back to dislodge them. Transfer more ticks than you intend to use because some will be scratched off before feeding and some will crawl out and drown.

Figure 2. Recently hatched larval ticks. Note three pairs of legs.

Precautions must be taken to prevent the ticks from escaping during feeding. Select a cage that will house the rat comfortably and allow the engorged ticks to drop beyond the rat's reach (Fig. 3). Maintain a water moat in the larger container and coat the inner sides generously with petroleum jelly. The seed ticks (Fig. 4) complete their blood meal after two or three days at which time they drop from the rat and fall through the cage floor grid onto a pan

lined with paper toweling. They crawl under the toweling where they can easily be collected and transferred to a petri dish. These ticks are too large to escape from a petri dish. About a week later the nymphal ticks molt (Fig. 5) and are ready for a second blood meal.

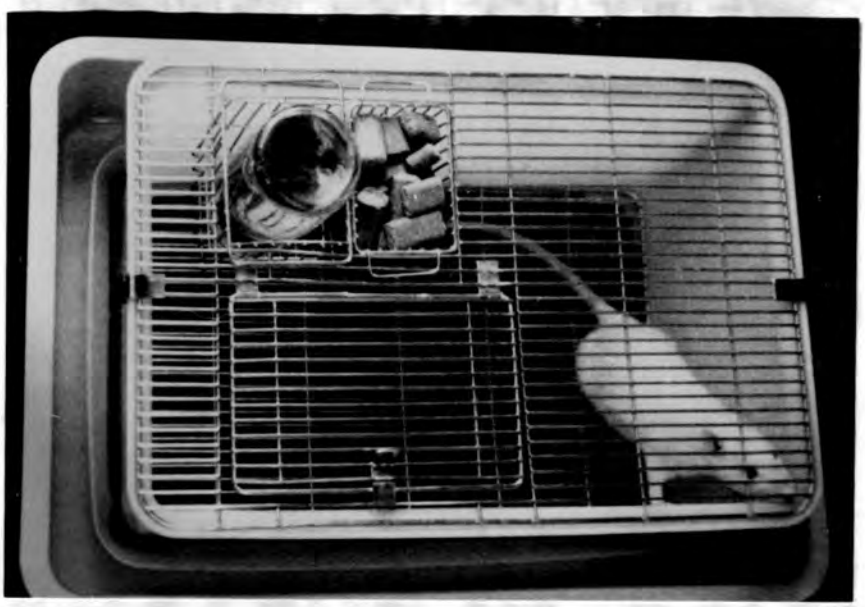

Figure 3. Rodent cage modified for feeding ticks.

The second feeding process is similar to the first. Transfer the nymphal ticks to the rat. Six days later as they begin to drop, put them in another petri dish. The second molt occurs after three and one-half weeks or more (Fig. 6). The ticks that emerge (Fig. 7) are adults capable of breeding. To continue the life cycle, place several males and females on a rat. Following copulation, the females engorge, drop from the rat, and lay eggs.

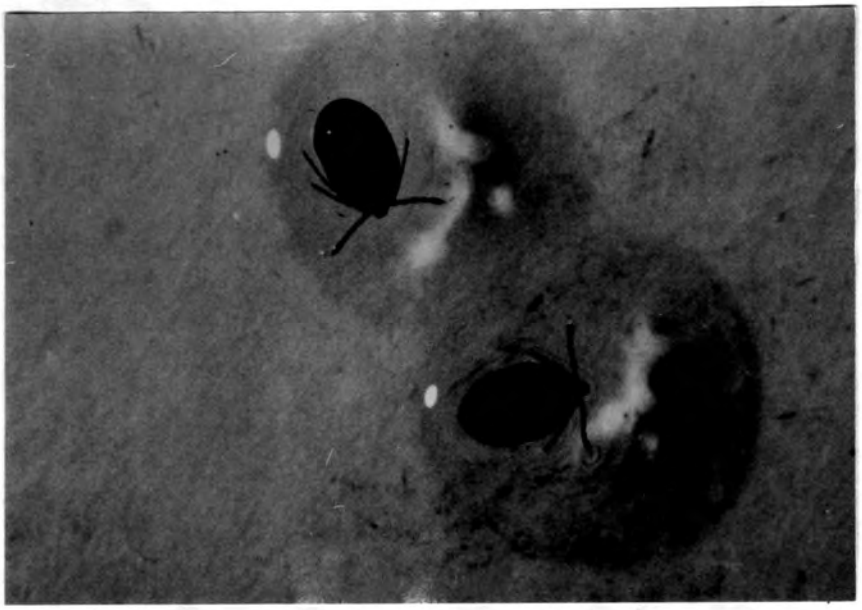

Figure 4. Engorged larval ticks.

Figure 5. Nymphal ticks just emerged from molt. Note four pairs of legs and empty casings.

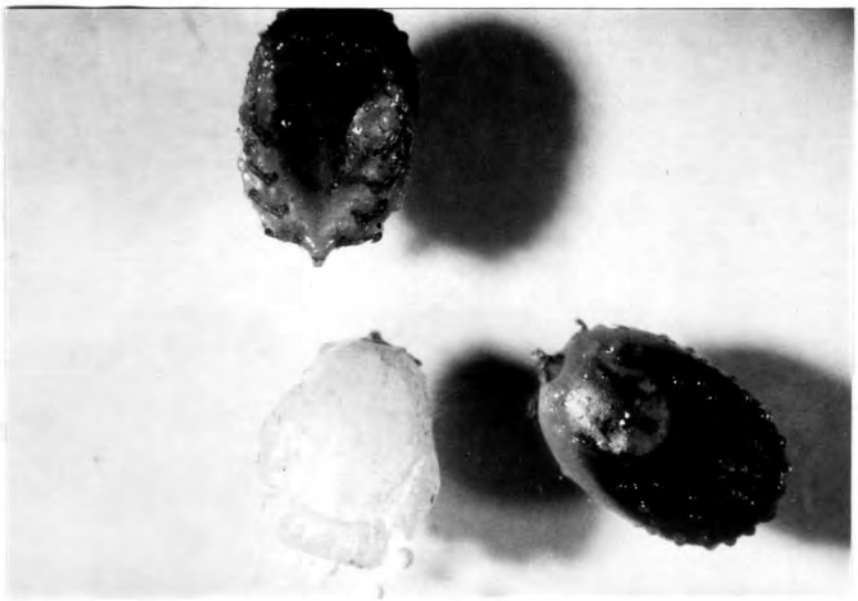

Figure 6. Engorged nymphal ticks during molt. Empty casing is from adult that just emerged.

Figure 7. Adult ticks, female (left) and male (right).

The entire life cycle of the American dog tick can be completed using this procedure. Other species may be cultured in this way providing the life cycles are similar and the ticks accept a laboratory animal to feed upon. The procedure and type of host must be altered for host-specific, one-host, and many-host species.

## Disposal

When the seed ticks first hatch, they are contained by the water and petroleum jelly. As they continue hatching, they become crowded and some ticks may escape despite the barriers. Before this happens, initiate subcultures of the ticks to be retained. Excess ticks may be pinned or mounted on slides for a collection. One method of killing is to immerse the culture in a tightly closed container of alcohol for at least one hour.

## Safety Precautions

Great care must be taken to insure that all ticks are kept under control at all times. A single female lays several thousand eggs and a great percentage of them hatch. Uncontrolled ticks will soon infect an animal room and can spread throughout an entire building or campus. The life cycle can take as little as three months or as long as two years. Eradication is extremely difficult.

Though the danger of spreading infection exists, the culture can be maintained safely. The host animal must be isolated from all other animals and killed at the end of the exercise. At no time should it be removed from the cage or returned to the animal facility.

Water and petroleum jelly barriers must be maintained and checked daily. All containers must be kept in an out-of-the-way place to prevent accidental release of ticks. Transfer must be undertaken with care. And finally, all ticks must be killed promptly when no longer needed.