USACHPPM
Readiness thru Health

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Just the Facts...

Human Bot Fly Myiasis

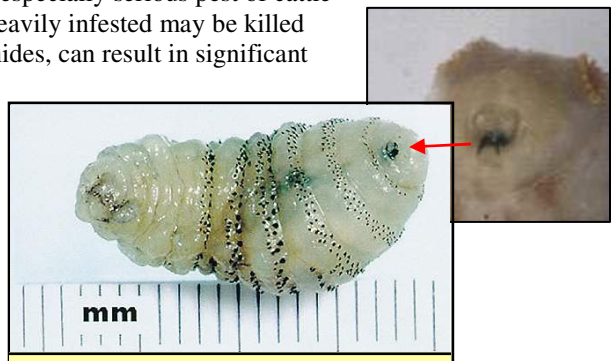
Q. *What is human bot fly myiasis?*
A. Myiasis is the condition caused when human or animal tissue is invaded by fly larvae (maggots). The human bot fly (*Dermatobia hominis*) is the fly species that most often infests humans with its larvae, although it also parasitizes a wide range of wild and domestic animals, including cattle, sheep, goats, pigs, dogs, cats, rabbits, monkeys, buffalo, and even some birds. *D. hominis* sometimes goes by other names, including the torsalo and American warble fly. It measures approximately ½-inch in length.

Human bot fly, *Dermatobia hominis*, adult female, pinned specimen
Photo: J. Eibl, U.S. Department of Agriculture

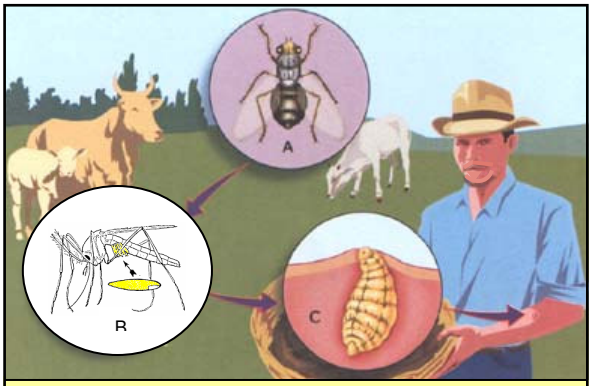
Q. *Where is* D. hominis *found?*
A. *D. hominis* is only found in the Americas. It is distributed from southern Mexico down throughout Central America and parts of South America to northern Chile and Argentina. *D. hominis* is especially common in Mexico and Belize. In the United States, human bot fly myiasis is most often seen in travelers returning from rural parts of endemic countries.

Q. *Is myiasis serious?*
A. Although myiasis due to the *D. hominis* is rarely fatal or even seriously detrimental to the health of an animal or human, the larva, which remains in the skin for up to 10 weeks, produces a painful nodule, boil or "warble." In rare instances they can occur in body cavities such as the eyes, ears, or nose. *D. hominis* is an especially serious pest of cattle in parts of Brazil and Central America, where young animals that are heavily infested may be killed and where the loss of meat and milk production, as well as damage to hides, can result in significant economic losses.

Q. *How is myiasis spread by* D. hominis*?*
A. The female bot fly captures a blood-feeding fly (commonly a mosquito) in mid air where she proceeds to glue 10-50 eggs to the underside of the captive insect's abdomen. When the mosquito subsequently feeds on a warm-blooded animal (host), body heat from that host causes the eggs to hatch, generally within 5 minutes, into a tiny larva known as the first instar. The larva enters the host's skin either through the bite wound, other abrasion, or hair follicle. The larva may occasionally penetrate directly through intact skin.



Third instar human bot fly larva, *Dermatobia hominis*. Mouth hooks are located on the anterior end (to right, enlargement shown in offset photo). The posterior end contains the respiratory spiracles (to left).
Photo: Capt R. Goodman, USAF



Life cycle, human bot fly larva, *Dermatobia hominis*: A. Adult female bot fly; lays eggs on a mosquito. B. Mosquito carries bot fly eggs, transferring them to the skin of a mammal (including humans) when the mosquito takes a blood meal. C. The eggs hatch and the larvae burrow into the skin where they then develop, getting larger with each successive larval stage (instar).
Drawing: Instituto Ciencia Hoje

Q. *What happens once the larval* D. hominis *enters the skin?*
A. Using its mouth hooks, as well as the rings of tiny spines encircling its body segments, the larva burrows down into the subcutaneous layer of skin, positioning itself "head down." It maintains its posterior respiratory spiracles at an opening at the surface at the skin surface so that it can breathe. The larva remains in one spot feeding on the host's tissue and developing (molting) from its tiny first larval instar stage through two successively larger instar stages. After spending a total of 6-10 weeks feeding and growing within the skin, the third instar larva, which measures approximately 1-inch in length, drops from its host, burrows into the ground, pupates, and after 4-11 weeks, emerges as an adult bot fly. The adult only lives a few days and does not feed. Mating and laying eggs on another transport host completes the fly's life cycle, and it dies.

Q. ***How can I tell if I have been infested with D. hominis?***
A. The initial symptom of the presence of a bot fly infestation is a small nodule in the skin that continues to enlarge over the course of several weeks. Unlike the puncture wound caused by a mosquito, the infected nodule discharges blood or serum continually because the larva needs to keep the wound open in order to breath. The wound often itches, and sometimes intense shooting pain occurs when the larva shifts position or matures to another instar. As the larva grows, movement can often be seen below the surface of the wound, and the posterior tip of the larva may be visible at the wound opening.

Nodule caused by a single human bot fly larva, *Dermatobia hominis*, developing within the skin on the chest of a human male. Note the whitish posterior tip of the larva at the wound entrance.
Photo: Marty F and Whiteside K. NEJM 2005;352:e21

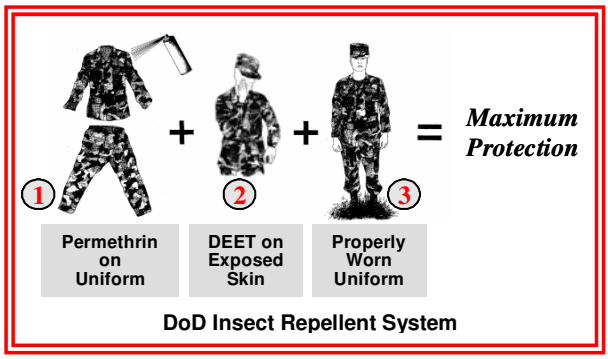
Q. ***Is there treatment for a bot fly infestation?***
A. Treatment entails removal of the larva, although some patients and their physicians prefer to allow the larva to develop and emerge naturally. If immediate removal is desired, it is useful to cut off the parasite's air supply by applying a thick layer of petroleum jelly, liquid paraffin, beeswax, or even pork fat (bacon) or chewing gum to the wound opening. The lack of oxygen will force the larva to begin to emerge in about a day, so that it can be pulled the remaining way out with forceps. More aggressive treatment includes injecting lidocaine beneath the skin to anesthetize the larvae during removal. Gentle pressure downward beside the nodule, and inward may expose the larva sufficiently that it can then be grasped with forceps and pulled the rest of the way. Soaking the area in hot water prior to extraction facilitates removal by making the nodule more pliant. Following removal, the wound should be cleaned and disinfected. Oral antibiotics, such as a cephalosporin or erythromycin, are generally not necessary unless secondary infection appears likely.

Q. Can human bot fly myiasis be prevented?
A. During deployments or travel to Mexico, and Central and South America, you can help prevent human bot fly myiasis by protecting your skin and mucosal cavities from contact by mosquitoes and other flies that may be carrying the eggs of *Dermatobia hominis*. Use the DoD Insect Repellent System:

- Cover as much of your skin as possible with clothing. This will act as a physical barrier against mosquitoes and other flies. Wear long pants tucked into boots or socks; long sleeves; socks; shirt tucked into pants; and buttoned shirt collar.

- Wear a hat. Consider a hat with flaps or a "drape" that hangs to cover the back and sides of your neck.

- Treat outer clothing with permethrin repellent. For military uniforms, order the impregnation (IDA) kit (NSN 6840-01-345-0237, effective through approximately 50 washes), or aerosol spray (NSN 6840-01-278-1336, effective through 5-6 washes). The aerosol spray can also be used on civilian field clothing. Permethrin aerosol spray is also available commercially.



DoD Insect Repellent System

- Apply DEET repellent to all exposed skin (standard military lotion, 33% DEET, NSN 6840-01-284-3982, one application lasts up to 12 hours). DEET is available commercially; choose a product that contains 20-50% DEET because DEET in higher concentrations is no more effective.

- Use a permethrin-treated bed net when sleeping or resting in areas where mosquitoes and flies are present.

- Practice good camp sanitation to prevent attracting flies.

- Eliminate mosquito breeding sites by preventing accumulation of water in discarded containers, tires, other debris, or natural structures, such as tree holes and ruts in the ground.

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