Human Bot Fly, Torsalo (Central America), Moyocuil (Mexico), Berne (Brasil), Mucha (Colombia, Mirunta (Peru), and Ura (Argentina, Paraguay, and Uruguay), *Dermatobia hominis* (Linnaeus, Jr.) (Insecta: Diptera: Oestridae)[1]

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Introduction

The human bot fly, *Dermatobia hominis* (Linnaeus Jr. 1781), is a large, densely haired fly that looks like a bumblebee (Kahn 1999). The human bot fly is native to Central and South America. The fly is not known to transmit disease-causing pathogens, but the larvae of *Dermatobia hominis* will infest the skin of mammals and live out the larval stage in the subcutaneous layer, causing painful pustules that secrete fluids. The infestation of any fly larvae inside the body is known as myiasis.

Cases of human *Dermatobia hominis* myiasis reported from non-indigenous people are diagnosed when travelers bring the parasite back with them from Central and South America. Haruki et al. (2005) reported 33 cases of *Dermatobia hominis* in Japan from 1974–2005 as a result of overseas travel to Central and South America. One third of the reported cases occurred during the last six years of the study. Six different studies have documented seven reported cases of *Dermatobia hominis* myiasis in the United States since 1999 (Lawson et al. 2005; Liebert et al. 2004; Maier et al. 2004; Marty et al. 2005; Millikan 1999; Sampson et al. 2002). All the patients with confirmed *Dermatobia hominis* myiasis had recently been to Central or South America.

Distribution

Dermatobia hominis is indigenous from Mexico in the north to Paraguay and northeast Argentina in the south.

Description

Adult

The adult bot fly is 12 to 18 mm long with a wide array of colors (Kahn 1999; Sampson et al. 2001). The face is yellow with a metallic blue abdomen and orange legs and each body segment is covered with hairs which give the fly a bumblebee appearance (Khan 1999).

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Figure 1. The geographical distribution of the human bot fly, *Dermatobia hominis* (Linnaeus f.).
Credits: C. Roxanne Connelly, UF/IFAS

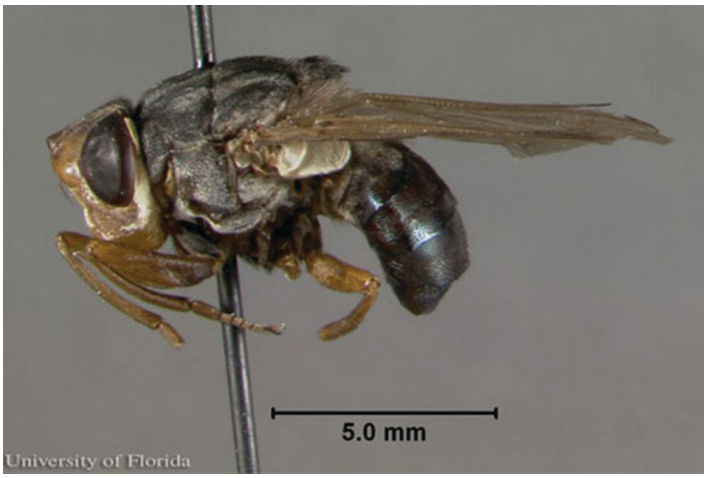

Figure 2. Lateral view of an adult human bot fly, *Dermatobia hominis* (Linnaeus Jr.).
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Egg

The egg of the bot fly is creamy colored and oval in shape, and is attached to different species of blood-feeding insects captured by the female bot fly. The eggs, usually attached to the ventral side of the body, hatch when the insect carrying the eggs begins to blood feed on a warm-blooded host.

Larva

The larva, or white maggot, goes through three instars once in the mammalian host. Each instar develops a distinctive shape. The first instar is worm-like with a bulbous end. The second instar larva has a bottle-neck shape. The third instar is cylinder shaped. Each instar possesses backward projecting spines that encircle the thorax.

Pupa

The puparium may exhibit the prominent anterior spiracles of the third instar larva.

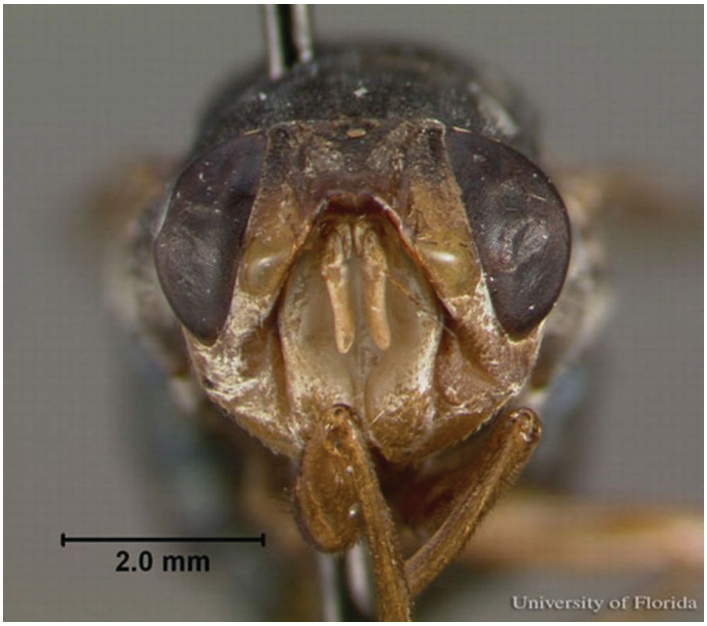

Figure 3. Frontal view of an adult human bot fly, *Dermatobia hominis* (Linnaeus Jr.).
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Figure 4. Dorsal view of an adult human bot fly, *Dermatobia hominis* (Linnaeus Jr.).
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Life Cycle

Eggs

Female *Dermatobia hominis* adults deposit their mature eggs on a blood-feeding arthropod, usually a mosquito or a tick, that is captured by the bot fly in flight. This behavior is known as phoresy (Safdar et al. 2003). As the vector takes a blood meal, the bot fly eggs react to the change in temperature and hatch.

Larvae

The larvae enter the skin through the bite wound or hair follicles, where it then burrows into the skin. The larvae breathe through two posterior spiracles which lie flush with the skin of the host. A study by Pereira et al. (2001) showed that in rats, it took two days for the larvae to reach the subcutaneous tissue. After the seventh day of infestation, the larvae molt to the second instars, and then to third instar after eighteen days. After approximately thirty days, the third instar larvae, which can grow to be relatively large (Figure 7), crawl out of the host to pupate in the soil. In general, the life of the larvae inside the host is five to 12 weeks (Acha and Szyfres 1994). The larva feed on tissue exudates (Haruki et al. 2005; and Kahn 1999).

Figure 5. Left to right—1st, 2nd, early 3rd, and late 3rd instar larva of the human bot fly, *Dermatobia hominis* (Linnaeus Jr.).
Credits: Francisco M. Marty, M.D. and Kristen R. Whiteside, B.S., Brigham and Women's Hospital, Boston, MA

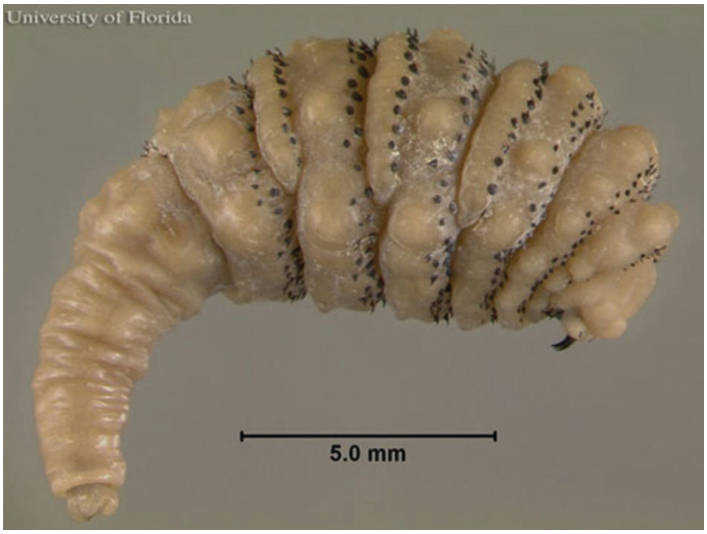

Figure 6. Third instar larva of the human bot fly, *Dermatobia hominis* (Linnaeus Jr.), lateral view.
Credits: Lyle J. Buss, UF/IFAS

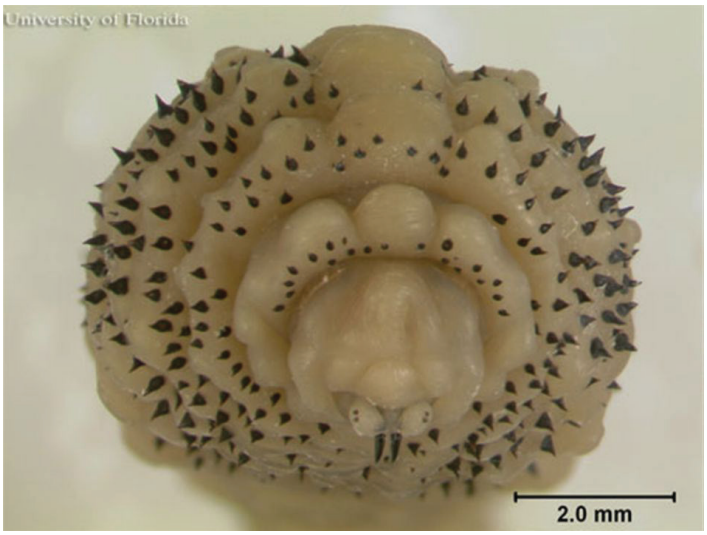

Figure 7. Third instar larva of the human bot fly, *Dermatobia hominis* (Linnaeus Jr.), frontal view.
Credits: Lyle J. Buss, UF/IFAS

Figure 8. Backward projecting spines on larva of the human bot fly, *Dermatobia hominis* (Linnaeus Jr.).
Credits: C. Roxanne Connelly, UF/IFAS

Pupae

Pupation takes place in the ground and the pupae do not feed. Adults will emerge after two to three weeks.

Figure 9. Pupa of the human bot fly, *Dermatobia hominis* (Linnaeus Jr.).
Credits: Marcelo de Campos Pereira, University of Sao Paulo

Figure 10. Posterior spiracles of the larva of the human bot fly, *Dermatobia hominis* (Linnaeus Jr.).
Credits: C. Roxanne Connelly, UF/IFAS

Figure 11. Side view of posterior spiracles of the larva of the human bot fly, *Dermatobia hominis* (Linnaeus Jr.).
Credits: C. Roxanne Connelly, UF/IFAS

Adults

Bot flies emerge from the pupal cases, and their extremely sensitive antennae (making up for poor vision) allow the males and females to find each other quickly (Fernandes et al. 2004). During the adult stage, *Dermatobia hominis* does not feed.

Figure 12. Third instar larva of the human bot fly, *Dermatobia hominis* (Linnaeus Jr.).
Credits: C. Roxanne Connelly, UF/IFAS

Hosts

The most common hosts for the human bot fly are cattle and dogs. However, they are found in many warm-blooded animals including buffalo, cattle, cats, dogs, humans, monkeys, pigs, rabbits, and sheep.

Symptoms and Treatment

Dermatobia hominis larvae cause a raised lesion in the skin that becomes hard and sometimes painful. In some cases the patients can feel the larvae moving when they shower or cover the wound (Haruki et al. 2005; Sampson et al. 2001). The host reacts with elevated white cell counts and a high amount of macrophages can be found around the wound. For this reason, the lesion often secretes pus.

There are several treatment options for treatment of *Dermatobia hominis* myiasis. The most conventional way of removing the larvae is with a simple surgical procedure that includes local anesthesia. Using a scalpel to cut a slit to enlarge the wound, the larvae can be taken out.

Dermatobia hominis survives in its host by breathing through spiracles that are flush with the skin. In order to coax the larva out, the spiracles need to be covered. They can be covered with bacon, petroleum jelly, beeswax, or any other thick substance that prevents the larvae from breathing. The larvae will come up out of the lesion to breathe allowing it to be removed with forceps.

In some cases the larva maybe popped out by applying pressure around the wound. Tamir et al. (2003b) cited a technique that used two wooden spatulas to apply pressure to pop the larva out. There may be some difficulty with this method due to the spines that anchor the larvae in the wound.

Several authors (Diaz et al. 2006; Kahn 1999; Safdar et al. 2003; Tamir et al. 2003b) have cited the use of lidocaine injections underneath the cyst. This creates pressure that pushes the larva out.

After any of these procedures, antibiotics are given to prevent infection. The wound should heal in one to two weeks with little or no scarring.

Figure 13. Raised lesion on the skin caused by the presence of a larva of the human bot fly, *Dermatobia hominis* (Linnaeus Jr.). Credits: Francisco M. Marty, M.D. and Kristen R. Whiteside, B.S., Brigham and Women's Hospital, Boston, MA

Management

Due to the increase in travelers to Central and South America, it is important to carefully monitor and control the vector population. Additionally, travelers to these regions need to take preventive measures, including applying insect repellent and wearing protective clothing (Diaz et al. 2006; Maier and Honigsmann 2004).

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