Scrub Typhus

FACT SHEET 18-038-0919

Scrub typhus, also known as brush typhus, is a disease caused by Orientia tsutsugamushi bacteria*. The disease is transmitted by the bite of infected, immature mites (chiggers) primarily of the genus Leptotrombidium. The mites are typically found in grassy or scrubby vegetation and in areas that have undergone clearing, reforested areas, overgrown terrain, oil palm estates, and new settlements. Habitats may include sandy beaches, mountain deserts, cultivated rice fields, and rain forests. Scrub typhus is a severe bacterial disease that can cause debilitating symptoms and even result in death within 2 weeks if left untreated.*

How do people get scrub typhus?

You can get scrub typhus if you are bitten by a chigger that is infected with *O. tsutsugamushi* bacteria. The bacteria are found throughout the body of the chigger; although, the highest concentration is present in the salivary glands. Bacteria are transmitted to the host when an infected chigger feeds on a host (human or other animal).

Ventral view (underside) of the larval stage (chigger) of a *Leptotrombidium* mite, the vector of scrub typhus.

Do all mites transmit scrub typhus?

Most human cases of scrub typhus are acquired from *Leptotrombidium akamushi* and *L. deliense* (or other trombiculid mites depending on the geographic location). Only the larval life stage (chigger) of *Leptotrombidium* transmits the disease since the other life stages (nymph and adult) do not feed on vertebrate animals. Small, ground-dwelling mammals like rats, voles, and tree shrews are the primary hosts for chigger mites and are important in the ecology of the bacteria. *Leptotrombidium* mites act as the primary reservoirs for bacteria *O. tsutsugamushi*. Chigger mites become infected by feeding on the blood of infected rodents (especially rats, moles, and mice), and maintain the infection throughout all their life stages, ultimately passing the bacteria to their eggs in process called transovarial transmission. Transovarial transmission lets *Leptotrombidium* mites maintain the bacteria in their populations over long periods of time. Infected mites feed on rodents, and the rodents become a secondary reservoir host that can infect other uninfected mites.

How common is scrub typhus?

Scrub typhus is present in southeastern Asia, including Pakistan, Afghanistan, Korea, Thailand, Japan, and the Philippines. It can also be found in eastern China and southeastern Russia, India, northern Australia, Indonesia, and the islands of the southwestern Pacific. While scrub typhus does not occur in the United States, it is sometimes diagnosed in travelers who have visited the before-mentioned countries. Disease transmission is usually caused by small "pockets" of infected chigger mites, known as "mite islands" or "typhus islands," and these pockets can persist for years. Infected mites have been found in sites as varied as subarctic regions, seashores, mountains up to 10,000 feet, rain forests, river banks, semiarid deserts, rice paddies, and urban areas. Scrub typhus was first described in Japan in 1899. During World War II, scrub typhus killed or incapacitated thousands of troops fighting in rural or jungle areas of the Pacific theater (5,441 cases with 283 deaths among U.S. Army personnel). It is the suspected leading cause of fevers of unknown origin in U.S. Forces during the Vietnam conflict and caused two confirmed cases among U.S. troops during the Korean War. Two outbreaks of scrub typhus occurred among U.S. Marines training at Camp Fuji, Japan in 2000 and 2001.

Photos: LTC R. Likeman, Australian Defense Force[1]

Typical eschar of scrub typhus, located at the site of the chigger bite.

Secondary spotted rash of scrub typhus spread across the torso.

Photo: Dr. Massie Ikeda, Fujita Health University

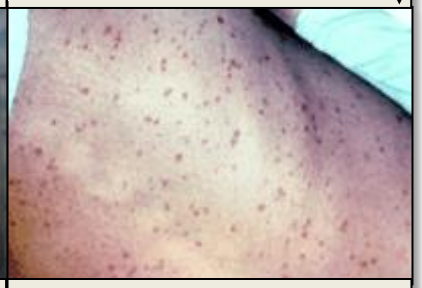

Photo: Dr. George Cowan 1999

What are the symptoms of scrub typhus?

Symptoms usually begin suddenly 6–21 days after the bite of an infected chigger. Initial symptoms can include moderate to high fever, severe headache, shaking, chills, cough, body aches, muscle pain, conjunctivitis (inflammation of the mucous membranes lining the eyes), rash, mental changes (ranging from confusion to coma), and swollen lymph nodes. A small (0.5 inch), flat ulcer forms at the bite

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site. Within a few days, the ulcer swells, fills with fluid, and ruptures, finally forming a black scab (called an eschar). Scarring may result. A red-spotted rash may appear on the torso and extend over the arms and legs in the first week after the bite. The rash can remain flat and fade away within a few days or become raised and intensely colored. If untreated, scrub typhus can also cause an enlarged spleen, lung infection (especially pneumonia), heart muscle inflammation, increased pulse rate, severe drop in blood pressure, delirium, loss of consciousness, and death by the end of the second week. In the most severe cases, untreated scrub typhus may kill up to 60% of infected people, though the death rate is highest for the elderly and those with compromised immune systems. Previous infections may provide some immunity to reinfection with scrub typhus.

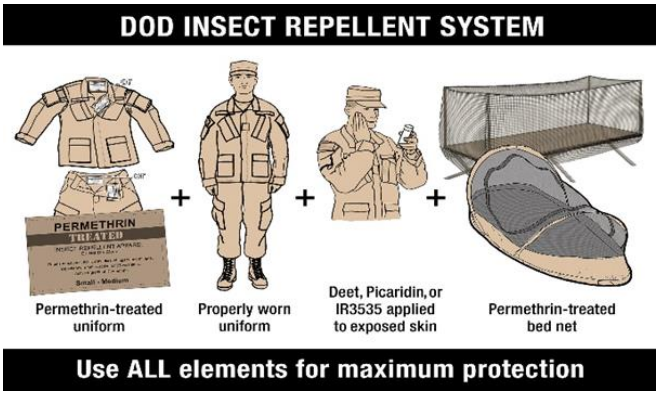
How is scrub typhus diagnosed?

See your healthcare provider if you develop the symptoms listed above after spending time in areas where scrub typhus is found. Blood tests and physical symptoms are used to diagnose scrub typhus. Your healthcare provider may order blood tests to look for scrub typhus or other diseases.

What can I do to reduce my risk of becoming infected with scrub typhus?

There is no vaccine for scrub typhus. Use the DoD Insect Repellent System to reduce your risk of scrub typhus and help you avoid infected chiggers. Follow these precautions when in endemic areas:

- Wear proper clothing as a physical barrier against chiggers—long pants tucked into boots or tightly-woven socks, long sleeve shirt, and shirt tucked into pants. Avoid walking barefoot. and do not wear open-toed shoes or sandals.
- Use Environmental Protection Agency (EPA)-approved insect repellents that contain 20% to 30% DEET, or other active ingredients registered for use against chiggers. DEET, picaridin, and permethrin-treated uniforms repel chiggers.
- Cutter® pump spray (NSN 6840-01-584-8598), 25% DEET; Ultrathon™ (NSN 6840-01-284-3982), 33% DEET; Ultra 30™ Insect Repellent Lotion (NSN 6840-01-584-8393), 30% Lipo DEET; and Natrapel® pump spray (NSN 6840-01-619-4795), 20% picaridin are EPA-registered products for use against chiggers.
- CHIGG-AWAY® lotion (NSN 6804-01-137-8456) contains 10% precipitated sulfur and 5% benzocaine and repels chiggers. This product also relieves itching caused by chiggers and other biting insects.
- When travelling to places where scrub typhus is common, avoid areas with lots of vegetation and brush where chiggers may be found. Stay in the middle of the trail and avoid grass and shrubs.
- Do not sit or lay down on bare ground, grass, or other vegetation. Always use a ground cover, preferably one that has been treated with permethrin repellent.
- Clear scrubby vegetation and keep grass short. Control chiggers with EPA-registered pesticides when other methods fail.
- Keep rodents and other animals out of camping and bivouac areas. Practice good food hygiene to discourage rodents that may be carrying mites.
- When possible, shower immediately after you have been in chigger habitat. Scrub your skin to help remove any attached chiggers.
- Launder your uniform and clothing regularly.



Where can I get more information about scrub typhus?

- Centers for Disease Control and Prevention: https://www.cdc.gov/typhus/scrub/index.html
- Merck Consumer Manual https://www.merckmanuals.com/home/infections/rickettsial-and-related-infections/scrub-typhus

[1] Likeman, R., LTC. 2006. Scrub typhus: a recent outbreak among military personnel in North Queensland. *Australian Defense Force Health*. April, 7(1):10-13.
[2] Devine, J. 2003. A review of scrub typhus management in 2000-2001 and implications for soldiers. *J. Rural and Remote Environ. Health,* 2(1):14-20.