

Typhus and Flying Squirrels

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Recently, SCWDS received an inquiry from a wildlife biologist involved in a project to protect the red-cockaded woodpecker, an endangered species that nests and roosts in holes in older (60+ years) southern yellow pines. During the examination of many tree holes, the biologist and his co-workers are in contact with southern flying squirrels (*Glaucomys volans*) and their nesting material. SCWDS was requested to provide information regarding the role flying squirrels may play in the epidemiology of louse-borne typhus fever of humans.

Also known as epidemic typhus, louse-borne typhus fever is caused by the bacterium *Rickettsia prowazekii*. The disease is well-known in less developed nations where transmission among people occurs via the human louse. Epidemic typhus rarely occurs in people in the United States because there is better personal sanitation. Here, the natural cycle primarily is limited to the established reservoirs, flying squirrels and their ectoparasites, and people only occasionally become infected. The strain of *R. prowazekii* in flying squirrels appears to be genetically distinguishable from the human louse strain.

Infection spreads among the squirrels primarily in the winter months when they congregate in their nests and there is a marked increase of ectoparasites. The flying squirrel louse (*Neohaematopinus scuiropteri*) is considered an important vector. The rickettsiae grow rapidly in the gut epithelium of the louse and are released in louse feces. When an infected louse defecates while taking a blood meal, the bacteria can be inoculated into the skin by subsequent scratching. Flying squirrel lice are host-specific and do not feed on humans. The squirrel flea (*Orchopeas howardi*) and fleas of other mammals also are highly susceptible and might be vectors. It is possible that fleas may transmit by biting, or if crushed, rickettsiae could be rubbed into the abraded skin. Inhalation of infected louse feces in dust may account for some infections.

Human disease has been reported in Georgia, Massachusetts, North Carolina, Pennsylvania, Tennessee, Virginia, and West Virginia. Some patients had a history of close or frequent contact with flying squirrels, their nests, or ectoparasites, but the mode of transmission to humans was not always clear. Occurrence of the illness is not necessarily seasonal, although the majority of reported human cases have occurred in the winter months. Person-to-person transmission has not been documented. Symptoms in people are characterized by acute onset of fever, headache, nausea, and muscle aches, with some patients developing a rash. Most cases are mild, but infection can be life-threatening. Prompt treatment of this disease with antibiotics prevents complications and results in early resolution of symptoms.

It was interesting to find that typhus cases had not been reported in wildlife biologists working directly with flying squirrels. Nevertheless, biologists should be aware of this special disease risk. If someone experiences the rather generic symptoms described above, they should inform their physician accordingly in order to get early diagnostic action and antibiotic therapy. Because studies have shown that *R. prowazekii* is present in populations of flying squirrels throughout a wide area of the eastern United States, the following

precautions are recommended for wildlife workers exposed to flying squirrels and their nests: (1) wear gloves; (2) inspect yourself for the presence of lice and fleas; (3) use Permanone® on field clothing; (4) handle nesting materials or flying squirrels with care; and (5) seek timely medical attention for potential symptoms. (Prepared by Jane Huffman and Victor Nettles)