



Tick bites

Certain ticks that bite humans may transmit agents causing Rocky Mountain spotted fever, Colorado tick fever, relapsing fever, tularemia or tick paralysis. Moreover, streptococcus infections sometimes occur in wounds from tick bites.

2. Of these diseases, Rocky Mountain spotted fever is the most prevalent in the United States. Its causative agent, *Rickettsia rickettsii*, is generally transmitted by tick bites, although many cases are a result of contamination while crushing an engorged tick during removal from animals, especially dogs, with unprotected fingers.

3. The Rocky Mountain wood tick, *Dermacentor andersoni*, and the American dog tick, *Dermacentor variabilis*, are most important in transmitting the agent of spotted fever to man. A large number of other tick species including the lonestar tick, *Amblyomma americanum*, have been found naturally infected with rickettsiae and have been proven capable of transmitting these organisms experimentally, but their significance as vectors to man remains to be established.

Rocky Mountain ticks

4. The Rocky Mountain tick is about the size of an ordinary ladybug. When not engorged, both male and female ticks are flat, but after feeding, the female becomes much distended and sac-like.

5. The young ticks feed (engorge blood) on a large variety of rodents and other small animals. The adult tick infests large animals, both domestic and wild, and to some extent small animals, particularly jack rabbits and porcupines. Rodents in particular are susceptible to spotted fever and maintain the causative rickettsia for several days

in their blood. Ticks feeding during that time become infected and in their subsequent developmental stage transmit the agent to other animals or humans.

6. The larvae of Rocky Mountain ticks are active during the summer. The second-stage tick nymphs and the adults are active in the spring and early summer. Their activity may occur later in the spring and run into the fall, depending on the weather. Cases of spotted fever have been reported as late as December in the southeastern part of the United States where the disease is transmitted by the American dog tick.

Dermacentor variabilis

7. Ticks are generally found on low-hanging shrubs or grass, usually less than 18 inches above ground. They transfer from grass to the clothing of the passerby. They slowly climb the clothing until they come to an uncovered portion of the body. They then attach. One of the common sites is the neck. Frequently, a tick will crawl inside a loose boot or up the inside of a trouser leg and attach on the leg above the sock.

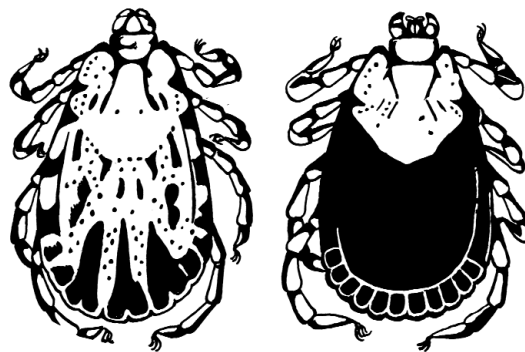


Figure 1. One tick which transmits Rocky Mountain spotted fever is the *Dermacentor andersoni* (male on left, female on right).



Figure 2. The female *Dermacentor andersoni* is smaller than a fingernail.
(Courtesy Rocky Mountain Laboratory, U.S. Public Health Service.)

Rocky Mountain spotted fever

8. Spotted fever can be one of the most severe of infectious diseases and sometimes leads to death. Without specific antibiotic therapy, the mortality rate is more than 20 percent. However, broad-spectrum antibiotics (tetracyclines, chloramphenicol) are very effective and early treatment usually brings recovery.

9. The fever occurs four to eight days after exposure and is characterized by sudden onset of chills, headache, general aching and malaise. The fever rises rapidly within 24 hours to between 103–104° F. The rash, initially rose-colored, characteristically starts around the wrists and ankles three or four days after onset. Within 24–72 hours the rash spreads to the arms, thighs, back, chest, forehead, and abdomen, soles of the feet and palms of the hands. As the disease progresses, the spots become deep red or purplish in color and do not disappear on pressure. An case of average severity lasts about three weeks.

10. Spotted fever frequently has been mis-

takenly diagnosed as measles. The history of tick exposure plus knowing characteristic signs and symptoms are helpful in establishing a diagnosis.

Colorado tick fever

11. Colorado tick fever occurs only in the Rocky Mountain region, which is within the distributional area of the Rocky Mountain wood tick *Dermacentor andersoni*. The percentage of ticks infected with Colorado tick fever virus is far greater than that for spotted fever rickettsiae.

12. A typical case of Colorado tick fever is marked by a sudden onset of chills, headache and fever that follow a tick bite by four or five days. There is usually a marked decrease in the white cell count, nausea and sometimes vomiting. The fever ranges from 102° to 105° F and is usually sustained for 36–48 hours. It then falls and remains low for two to three days, after which there are another two to four days of high fever. After this second period of fever, the temperature usually drops sharply to normal and remains there, but convalescence is apt to be rather prolonged.

13. Colorado tick fever is different than Rocky Mountain spotted fever in that it is not accompanied by a rash, and death has not been reported as a result of it. However, Colorado tick fever is not as benign as was at first believed. A few cases exhibiting severe encephalitic symptoms or severe hemorrhages have been recorded.

14. The physician should be able to diagnose Colorado tick fever from the course of the disease. It is important that the early stage of Rocky Mountain spotted fever not be mistaken for Colorado tick fever, with a resultant delay in the treatment. As information accumulates, it is evident that the latter is the more common disease.



Tularemia

15. Next to contacts with infected rabbits, the bites of ticks are the most important source of human infection with tularemia. All three species of ticks that attack man are known to be carriers. The Pacific Coast tick (*Dermacentor Occidentalis*), the rabbit tick (*Dermacentor parumapertus*), and the deer tick (*Ixodes pacificus*) have been found naturally infected with the *Pasturella tularensis*, the etiologic agent of this disease.

16. Because tularemia occurs in at least six forms with considerably different symptoms, diagnosis may be difficult except by laboratory methods. It is essential that the disease be diagnosed early if the treatment is to have maximum effectiveness. Several antibiotics are effective.

Suggestions for management

17. Employees working in tick-infested country should receive definite instructions about clothing and regular personal inspection. Emphasize that although a tick bite does not necessarily result in infection, it may, and therefore bites should be carefully avoided.

18. Where a first aid department is maintained, the doctor or first aid attendant should remove embedded ticks. If the worker cannot report to the first aid department within one-half day, he himself should remove the ticks (see paragraphs 30–34).

19. The U.S. Public Health Service has indicated that impregnation of outer clothing and socks with butylacetanilide, benzyl cyclohexanol, phenyl cyclohexanol, benzyl henzoate or dimethyl phthalate may protect against ticks. The effectiveness of the compounds in these tests decreases in the order in which they are listed. Commercial repellents also are available.

20. Spotted fever vaccine, manufactured for many years by the U.S. Public Health

Service but now prepared by commercial laboratories, has definite immunizing value and can be purchased from drugstores in affected areas. People who are exposed to tick bites should avail themselves of this protection. The vaccine should not be given to anyone who is allergic to eggs.

21. Vaccination does not necessarily mean immunization. In some individuals the protection is very good; in others, little if any difference is noted. The maximum degree of protection is said to last for less than one year in most cases. When the vaccine can be obtained and the hazard warrants, the employees should be encouraged to submit to vaccination, because prevention is easier than cure.

22. An attack and recovery from Rocky Mountain spotted fever or Colorado tick fever usually renders a person immune for life against the respective disease.

Precautions for employees

23. For work in a tick-infested area, employees should wear clothing that will make it difficult for ticks to get to the skin. Each outer garment should overlap the one above it, to impede the penetration of ticks between clothing layers. Leather puttees, high boots, leggings, wrapped puttees or socks worn over the trouser legs are of real value. Boots should not be loose at the knee.

24. Ticks crawling on the skin sometimes cause a tickling sensation and should be removed immediately. Field workers should feel the backs of their necks frequently during the working hours to make certain no ticks are there.

25. Workers should disrobe entirely at the end of the day and inspect their bodies for tick bites or ticks embedded in the skin. They can inspect one another's backs. Because ticks seldom attach themselves to the body at once and rarely transfer infection until they have fed for several hours,



two examinations a day, at noon and at the end of the work day, are usually sufficient.

26. Ticks can secure a better hold on rough clothing than on clothing of smooth texture, but their progress is impeded by the nap of rough cloth, such as the top of a wool sock rolled over the top of a boot.

27. Clothing should not be placed on the ground or where ticks can crawl from it into the bed. The practice of sleeping in underwear should be discouraged in order to prevent infection from undiscovered bites.

28. Camp sites should be free of ground growth, low vegetation and rodents. When feasible, workers should keep away from sage brush or old trails and roads. Ticks tend to congregate on the vegetation on each side of a trail or on the upper sides of trails across slopes. Grassy strips in the middle of rarely-used roads and the vegetation alongside roads are sometimes heavily infested.

29. In spite of all precautions, ticks will reach the skin of a worker who is continually in tick-infested areas. Where a first aid department is maintained, workers should report for removal of ticks. If this is not possible, they should remove the ticks themselves.

30. Attached ticks should be removed immediately by pulling them off gently with the fingers, forceps or tweezers; be careful not to crush the ticks. The head and sucking mouth should be removed completely. Although there is a slight possibility that a worker may be infected when he removes a tick, it is better that he remove the tick promptly than delay and run the risk of spotted fever.

31. The bite wound should be treated with an antiseptic and the hands, which may be contaminated with infectious tick fluids, should be washed thoroughly with soap and water.

32. The mouth parts of certain long-jawed types of ticks break off easily. To remove these types whole, the skin should be pulled above the bite, forming a little tent-like area. A sterile knife point or scalpel inserted through this skin tent and under the tick will remove it whole. This method should be used only where sterilization is possible. The use of chloroform, turpentine, kerosene or similar materials does not make ticks let go and is discouraged by most doctors.

33. As soon as the tick is removed, the wounds should be treated with an antiseptic recommended by the company medical department or a local doctor.

34. Should unusual symptoms follow a tick bite, even though the tick has been removed and the wound treated, the victim should see a doctor for treatment.

Acknowledgment

This data sheet replaces Data Sheet 228, which is also titled Tick Bites. This data sheet was prepared by the Railroad Section of the National Safety Council, 1121 Spring Lake Drive, Itasca, IL 60143.

Copyright ©2008 National Safety Council. All rights reserved.

Although the information and recommendations contained in this publication have been compiled from sources believed to be reliable, the National Safety Council makes no guarantee as to, and assumes no responsibility for, the correctness, sufficiency or completeness of such information or recommendations. Other or additional safety measures may be required under particular circumstances.