

Rhipicephalus (Boophilus) annulatus

Cattle Tick,
Cattle Fever Tick,
American Cattle Tick

Last Updated: June 2022

Importance

Rhipicephalus (Boophilus) annulatus (formerly *Boophilus annulatus*) is a hard tick found most often on cattle. Heavy tick burdens can cause anemia, decrease livestock productivity and damage hides. *R. annulatus* can also transmit several pathogens including *Babesia bigemina* and *Babesia bovis* (bovine babesiosis) and *Anaplasma marginale* (anaplasmosis). It is closely related to *B. microplus*, another important vector for these two *Babesia* species. Control programs for these two tick species, conducted between 1906 and 1943, were key to eliminating bovine babesiosis (also called “cattle fever”) from the United States. Before its eradication, this disease cost the U.S. an estimated \$130.5 million in direct and indirect annual economic losses; in current dollars, the equivalent would be \$3 billion. *R. microplus* and *R. annulatus* still exist in Mexico and South America, and a permanent quarantine zone, with continued surveillance and special regulations for livestock, is maintained along the Mexican border to prevent their reintroduction into the U.S. However, wildlife hosts for these ticks, as well as both legal and illegal importation of cattle, complicate control programs.

Species Affected

Cattle are the major hosts for *R. annulatus* in most regions, but it is also common on water buffalo (*Bubalus bubalis*) and probably occurs on related bovids. This tick is found occasionally on other domestic animals including equids, sheep, goats and dogs, as well as some free-living or captive wild mammals. In wildlife, it has been described on several species of cervids, including white-tailed deer (*Odocoileus virginianus*) and red deer (*Cervus elaphus*), as well as nilgai (*Bosephalus tragocamelus*) and gazelles (*Gazella gazella*), and high tick burdens were seen on Nubian ibexes (*Capra ibex nubiana*) in Israel. White-tailed deer appear to act as alternative maintenance hosts in North America, and feral nilgai may also play a role, though the tick’s reproductive success was lower on these species than on cattle. There are a few reports of *R. annulatus* in wildlife other than large ungulates, such as capybaras (*Hydrochoerus* spp.) and a hedgehog (*Hemichinus auritus libycus*).

Geographic Distribution

R. annulatus is widespread in subtropical and tropical regions, but some studies suggest that it may be adapted to somewhat cooler and drier regions than its close relative *R. microplus*. *R. annulatus* is endemic in Mexico and parts of Asia, Africa, the Middle East, South America and Europe, including the southern regions of the former U.S.S.R.; and the Mediterranean region in Europe. It has been eradicated from most of the U.S., but still occurs in a buffer quarantine zone in California and Texas, along the Mexican border, with occasional incursions beyond this zone.

Life Cycle

Ticks in the subgenus *Boophilus* can complete their life cycle in as little as 3-4 weeks, which can result in a heavy tick burden. *R. annulatus* is a one-host tick: once the larva hatches and finds a host, all of its life stages are usually spent on that animal.

Female *R. annulatus* typically deposit their eggs in crevices or debris, or under stones. Once the larvae hatch, they crawl up grass or other plants to find a host. They may also be blown by the wind. In some climates, the larvae can survive for as long as 3 to 4 months without feeding in summer, and up to 6 months in cooler temperatures. Thus, a tick may spend up to 80% of its life as a questing larva. Ticks that do not find a host eventually die of starvation.

Newly attached larvae (also called ‘seed ticks’) are usually found on the softer skin inside the thigh, flanks, and forelegs. They may also occur on the abdomen and brisket. Each developmental stage (larva, nymph and adult) feeds only once, over a period of several days. Larvae and nymphs molt to the next stage after feeding, while remaining on the same animal. Adult male ticks become sexually mature after feeding, and mate with feeding females. An adult female tick that has fed and mated detaches from the host and deposits a single batch of many eggs in the environment, then dies after ovipositing.



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Identification

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R. annulatus belongs to the family Ixodidae (hard ticks). Hard ticks have a dorsal shield (scutum) and their mouthparts (capitulum) protrude forward when they are seen from above. Members of the subgenus *Boophilis* have a hexagonal basis capitulum. The spiracular plate is rounded or oval and the palps are very short, compressed, and ridged dorsally and laterally. Males have adanal shields and accessory shields. The anal groove is absent or indistinct in females, and faint in males. There are no festoons or ornamentation.

R. annulatus resembles *R. microplus*; which, as adults, have a short, straight capitulum, pale legs, and an oval to rectangular body with a shield that is oval and wider at the front. The snout is short and straight. One subtle difference between *R. annulatus* and *R. microplus* is that the internal margin on the first palp of *R. annulatus* is long and slightly concave, while the margin is short and deeply concave in *R. microplus*. Unlike *R. microplus*, male *R. annulatus* lack a caudal appendage. In female ticks, the spurs and cleft between the spurs on the first coxa are less distinct in *R. annulatus* than *R. microplus*, and the second coxa does not have a spur (*R. microplus* has a small spur).

Control

Disease Reporting

Veterinarians who encounter or suspect the presence of an exotic tick should follow their national and/or local guidelines for disease reporting. In the U.S., state or federal authorities must be notified immediately.

Prevention

Measures used to exclude exotic ticks from a country include pre-export inspections to certify that animals are free of ectoparasites, quarantines upon entry, and treatment with acaricides. During the first half of the 20th century, *R. annulatus* and the closely related tick *R. microplus* were eradicated from most of the U.S. in order to eliminate bovine babesiosis. This program, which included acaricide treatment of both cattle and equids, was facilitated by these ticks' one-host life cycle and preference for feeding on cattle. It required considerable resources and time, and was complicated in Florida by the presence of white-tailed deer as alternate tick hosts.

Currently, tick incursions from Mexico are controlled by USDA APHIS Fever Tick Eradication Program personnel, including mounted inspectors called "tick riders." Tick riders patrol the Rio Grande River, inspect ranches in the quarantine zone, and apprehend stray and smuggled livestock from Mexico. If a ranch in this zone becomes infested, it is placed under a 6-9 month quarantine and the animals are treated with acaricides. Before being moved from the quarantine zone, all cattle and horses must be inspected and given a precautionary acaricide treatment. Due to the occurrence of ticks on white-tailed deer and possibly

feral nilgai, control programs also incorporate ivermectin-based feed and acaricide treatments for wildlife.

Acaricides are used in endemic regions to eliminate *R. annulatus* from an animal, but, without additional measures, they do not prevent reinfestation. Use of these agents can lead to the development of acaricide resistance in ticks, and may also have other adverse environmental effects, including incidental effects on other arthropods. Resistance to several acaricides and anti-parasitic agents, including ivermectin, has been reported in *R. annulatus*. Other control measures include pasture rotation, environmental modification to make sites less attractive to ticks, physical removal of ticks from an animal, the use of relatively tick-resistant breeds, and other strategies. Under the climatic conditions in the U.S. tick quarantine zone, an infested pasture must remain free of all livestock for 6 to 9 months or longer to break the tick life cycle.

European (*Bos taurus*) breeds of cattle usually remain fairly susceptible to ixodid ticks, even after multiple exposures. However, some cattle breeds such as Zebu (*Bos indicus*) and some Zebu crosses can become resistant. This resistance is most prominent against larvae, which are unsuccessful in their attempts to feed and soon die. Based on this principle, vaccines are under investigation for *B. annulatus*, and two vaccines against the closely related tick *B. microplus* were licensed in some countries. At least one of these vaccines was also effective for *B. annulatus*. However, the *B. microplus* vaccines were not a commercial success, due to variable efficacy against different tick populations and the requirement for frequent boosters. One is no longer made and the other has limited availability.

Public Health

R. annulatus can feed on humans.

Internet Resources

[Hard Ticks from the University of Edinburgh](#) (photographs)

[United States Department of Agriculture \(USDA\) Animal and Plant Health Inspection Service \(APHIS\)](#)

[USDA APHIS. Vector-borne diseases](#) (includes information on cattle ticks)

[University of Bristol. Tick Identification Key](#) (for ticks of veterinary importance).

[World Organization for Animal Health \(WOAH\)](#)

[WOAH Terrestrial Animal Health Code](#)

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* Link is defunct