# Ixodes ricinus

## Ticks – an overview

Ticks (Ixodina) are hematophagous ectoparasites. There are 7 known epidemiologically important tick species in Central Europe. Depending on types of parasitism, we divide them into 2 separate categories:

- **exophilic parasites** – they actively look for their host in vegetation, these include: the **castor bean tick** (*Ixodes ricinus*), the **rodent tick** (*Haemaphysalis concinna*), the **red sheep tick** (*Haemaphysalis punctata*), the **winter tick** (*Haemaphysalis inermis*), the **ornate cow tick** (*Dermacentor reticulatus*), the **ornate sheep tick** (*Dermacentor marginatus*).
- **endophilic parasites** (nidicolous ticks) – they live in the shelters of their hosts, the most common human-tick encounter is with the **hedgehog tick** (*Ixodes hexagonus*).

The most common and epidemiologically important tick is the **castor bean tick** (*Ixodes ricinus*) [1].

## Ixodes ricinus

### Biotope

The tick is widespread throughout Europe, North Africa, and Southwest Asia. It can also be found in Central Europe, but its occurrence varies. The environment is a limiting factor for ticks. Their occurrence and activity are influenced by several factors. The most important factor for ticks is the presence of a host. Temperature and humidity are important abiotic factors affecting the vegetation, which creates great life conditions for these parasites, and their hosts. Therefore, both short-term and long-term climate change have an impact on the ecology and epidemiology of zoonoses. The occurrence of ticks depends on the geological subsoil, soil type (these ticks do not occur in wetlands, acidic, sandy, or cultivated soils and vineyards), vegetation cover (does not occur in spruce monocultures, pine forests where their pH is less than 7), climatic conditions (ideal temperature for ticks is around 5 to 32 °C), and humidity (ideal humidity should be around 80%). The typical habitat for these parasites are deciduous oak and mixed forests, groves, forest meadows, and pastures up to 600–800 m above sea level; however, the impact of global warming causes this altitude to exceed 1000 m above sea level. The highest density of ticks is around forest roads and paths. Ticks gradually invade the urban areas and cause outbreaks of multiple zoonoses.[1].

### Hosts

The most important hosts are **competent animal reservoirs** infected by pathogens, in which the infection is inapparent or subclinical. These hosts represent not only a source of blood for ticks, but also a long-term source of infection for ticks that have not yet been infected.[2] These are mainly small terrestrial mammals, of which the yellow-necked mouse *Apodemus flavicollis* (with over 30% being infected) and the bank vole *Clethrionomys glareolus* (with 15% being infected) are the main reservoirs for Lyme disease. [1] Other animals hosts include rats, dormice, squirrels, hedgehogs, rabbits, birds such as pheasants, titmice, finches, thrushes, robins, and also reptiles, especially lizards. **Incompetent reservoirs** form another group of hosts, that primarily represent blood donors for ticks but are unable to transmit the pathogen to other ticks. These include roe deers and red deers. Infection of accidental hosts such as humans and pets (so called **dead-end hosts**) does not allow the circulation of pathogens, but can still cause serious disease.[2]

### Tick lifecycle

All ticks have four life cycle stages: the embryonated egg → larva → nymph → adult. A tick egg hatches into 6-legged brown larvae, which suckle on small vertebrates (small forest mammals, birds, reptiles) for 2-6 days, then fall off and metamorphose into 8-legged nymphs in their shelters. These nymphs, parasitizing on larger mammals such as squirrels, hedgehogs, rabbits, stray dogs and cats, parasitize for 2-7 days and after a certain period of rest, they turn into sexually differentiated adult ticks. Males suckle only to a limited extent, females suckle on large animals such as roe deers, deers, sheeps, goats, foxes, badgers and dogs for 5-14 days. Copulation takes place on the host during suckling, but also on the ground in a natural shelter, with the male looking for a female. Eggs develop in a moist shelter (raked soil, top layer of soil). The process is called oogenesis.[1] The female lays around 2000-5000 eggs and dies shortly after that. The larvae hatch from the eggs within a month. Their ontogenesis usually lasts 3 years, but can vary, depending on environmental conditions, between 2-6 years.

### Seasonal activity

*Ixodes ricinus* appears in early spring, in particular places with high humidity. Ticks could be spotted in March. The occurrence in our conditions has its maximum peak levels in May and June. In the hot summer months there is a sharp decline in their activity, but they can still be seen in damper deciduous forests. We observe a further increase in September and October and we usually find the last specimens in November. During the mild winters, they rarely occur. However, very hot and dry summers can cause increased tick deaths, resulting in a reduced tick density in the autumn. Then, we talk about a single-peak curve of their seasonal activity.[1]

### Medical importance

Ticks transmit the widest range of different pathogens (after mosquitos).[1] Since the life cycle of ticks is three-hosted, it changes alternates between three usually ecologically different hosts. In this way, ticks could be infected and transmitted to other different groups of animals.[3] This represents their epidemiological significance. *Ixodes ricinus* is a vector of the causative agents of many diseases, such as the most common causative agent of Lyme disease, the spirochete *Borrelia burgdorferi* sensu lato. The work of many authors confirms the widespread infection of *Ixodes ricinus* by borrelias. This means that outbreaks of Lyme disease could be found wherever the ticks are, unlike other diseases, such as Tick-borne encephalitis. *Ixodes ricinus* also transmits rickettsiae, Coxiella burnetii (causative agent of Q fever), anaplasmas, ehrlichias and *Francisella tularensis* (causative agent of tularemia). It also transmits babesiosis to cattle (*Babesia divergens*), sheep (*B. ovis*), and dogs (*B. canis*), as well as tick-borne relapsing fever in humans, human granulocytic anaplasmosis (HGA), and many others. The causative agents of listeriosis, dysentery, brucellosis and toxoplasmosis, were also isolated from ticks [1].

### Prevention

Protection against ticks involves individual and collective measures. The key to individual protection is a thorough examination of the body after returning from a potentially infected environment, especially in the genital area, groin, nape, neck, chest, and popliteal fossa. Since ticks love to hang onto clothing, appropriate clothes are essential when staying in the forest, as the tick comes in contact with the ground vegetation and crawls upward on human skin. Light long pants and a shirt tucked into the pants are recommended. An additional protective method is to apply repellents and acaricides to clothing or naked body. If we find a tick attached to the skin, it is important to remove it as soon as possible. Applying cream or oil is inappropriate, since the tick begins to suffocate, and tries to release itself from the skin, while releasing a lot of saliva, which can increase the risk of the infection. The most effective way is to hold it tight with tweezers, carefully pull it out with a swinging motion and check if the rest of the tick´s body has been completely removed. The wound must be disinfected, preferably with iodine. Collective protection is based mainly on the mechanical destruction of high vegetation along sidewalks and roads, in an effort to eliminate the human contact with ticks.[1]

## Links

### Related articles

- Tick-borne encephalitis • Lyme disease • Ehrlichiosis

### References


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3. ROSICKÝ, Bohumír, et al. *Škůdci lidského zdraví : Boj s hmyzem II.* 1. edition. Praha : Přírodovědecké vydavatelství, 1952. pp. 512-522.