

The Brown rat

FACTS SHEET BY THE CEPA SCIENTIFIC COMMITTEE

|CEPA|



What are the facts?

Introduction

The rodents can have large impact, particularly in economics & public health, if you let them to develop without acting. Among them, it exists several common species of interest in urban areas: *Rattus norvegicus*, *Rattus rattus*, *Mus musculus* & *Mus spretus*.

It seems that in urban areas, the most problematic and the most frequent rodent is *Rattus norvegicus* because of massive colonization of human spaces & biologic plasticity. *Rattus norvegicus* is a very opportunistic wild species.

Origin

Rattus norvegicus, commonly named "brown rat", is not native from Norway as its name might suggest. Its latin name *Rattus Norvegicus* was given in 1769 by John Berkenhout (a british naturalist), probably because the specimens came from a Danish vessel arrived from Norway (it's still an hypothesis).

This small urban mammal comes from different parts of Asia (southeastern Siberia, northeastern China, Japan & probably also southern China). This rodent started to invade Europe in XVI's century (first species observed) but massively in XVIII's century.

It was easily dispersed worldwide thanks to Trans-siberian construction & trade intensification by ships. Consequently, the infested area is now the whole world, except in Antarctic continent.

Ways of life

Brown rat usually lives where people lives. This mammal is nocturnal & omnivorous with opportunistic tendencies, feeds in particular with waste discharged into the sewers, hence the name "sewer rat". Brown rat likes sewers because he is safe from predators and finds a good opportunity for foods & nesting. Brown rat mainly lives in low and humid parts of buildings (basements, warehouses, sewers) because he is not a good climber as the black rat (*rattus rattus*) but a good swimmer.

Gregarious, brown rat lives most of the time in colonies, in small organized and hierarchical family units (groups). These groups are generally composed of 5 to 20 males and females with their pups defending a territory under the authority of dominant males.

Nowadays, we found them everywhere in cities: in streets where food waste is stored, in sewers, in public gardens, in garbages, in warehouses, sheds, cellars, storage cabinets, attics ...

Reproduction

Brown rat lives approximately a 18 months average. This short life period is mainly due to pest control services. Brown rat reproduction is very high. Dominant rats reproduce several times with all the females in a group. Each year, a female can deliver 1 to 5 litters of 7 to 14 pups each after 21 days of gestation. That means that one female can lead to 70 pups per year.

Propagation & costs

The cost of global rodents in health terms – whether through disease, malnutrition or damage to infrastructure – is a global and multisectoral phenomenon estimated to 23 billion euros a year worldwide. And among that, the economic and health impacts by *Rattus norvegicus* are considerable.

In term of economic losses : Rats get gnawing activities (wood, cables (fire risk), piping) but also scratch food packages (destruction and damage of packaging, soiling by excreta). They damage all kinds of objects and fittings. Considering economics losses, rats are major diseases vectors for animals & humans.

Risks to humans

Rodents represent a global and multifaceted threat to human health. *Rattus norvegicus* is globally distributed and concentrated in urban environments as we said, that's why urban areas are particularly a risk for zoonoses transmitting (=zoonotic pathogens = pathogens transmitted from vertebrate animals to humans & vice-versa = virus, bacteria, parasites).

The risk of zoonotic transmission is influenced by several factors (the high frequency of contact between animal reservoirs and humans is the most important). This parameter is largely due to the reduction of geographical or ecological separation between humans & rats but also the increase of people density & poverty where both rats & humans coexist.



There are a large variety of zoonoses transmitted by *rattus norvegicus* to humans worldwide. There are different from a country to another one. The most important are leptospirosis (*Leptospira Interrogans* bacteria) and salmonellosis (*salmonella spp.* bacteria). Other important disease is: Hemorrhagic fever with renal syndrome (*Hantavirus*)

Regarding the plague (*Yersinia pestis* bacteria) : it has not been detected for decades in Europe.

The preferred transmission mode of diseases by rats is through droppings and urine, transmission by bites is rare. In fact, the rat is commonly a vector (catching pathogens, replicating them, then releasing them in human environment). Zoonoses are responsible for large human morbidity and mortality each year.

What can you do against brown rat at home?

First action : to check presence of rats. Several characteristics signs exist: droppings (the most common), scratching noises, toothprints & tracks, urine (strong ammonia odor).

If no presence → preventive actions

- plug cracks and openings
- install grates at the end of pipes and on basement window wells;
- put garbage in a hermetically sealed bin (it's a very important point);
- keep food in closed place inaccessible to rats (it's a very important point too);

- do not accumulate a pile of objects in a cellar, attic or basement because rats can make their home inside.

If presence → preventive & curative actions

- Follow the previous preventive actions
- Curative actions
 - Use rodenticide products registered in your country & check always the label;
 - Use repellent, if you just want to push away rats;
 - Use mechanical traps (depending on the device: some kill, others catch & release animal elsewhere);
 - Contact a pest control professional because risk to fail by yourself is high.

What can you do about brown rat pathogens ?

Leptospirosis: diagnosis is difficult because of a wide variety of observed signs but also if notion of exposure to risk is not mentioned.

Around 10 days of incubation period, first symptoms of flu state & digestive signs. Then, organs may be affected (kidney, liver, lung, heart..). The context will be very important to know if it's leptospirosis disease (bathing, profession, risk area trip back). Detection of bacterial DNA in blood by PCR technique.

Treatment with antibiotic is the most common.

Salmonellosis: Frequent symptoms are bloody diarrhea and vomiting, kind of gastroenteritis, fever.

Treatment is based on antibiotic and anti-diarrhoea.

This disease is commonly frequent and rats are often the cause of contamination of human environment in urban areas.

Globally: in parallel of rats control, it's important to organize a disinfection operation to control pathogens.



Where can you find out more about this?

Contact the **CEPA** scientific committee through the **CEPA** Secretariat with your questions, they will be answered rapidly by e-mail. Relevant questions and answers will be posted as part of this fact sheet on the **CEPA** website.

In each country the respective ministries of health institutes provide the public with information in national languages. For obvious reasons we can't list them all here.

Information provided by travel agencies or other non-scientifically backed organisations may not always be accurate. In case of doubt always check with reliable high-quality sources mentioned above or ask us by e-mail.

The European Centre for Disease Prevention and Control (ECDC) offers different documents for further reading. The most important are listed below:

- Rodent control (RRAC group):
<https://guide.rrac.info/rodent-control/integrated-pest-management-1.html>
- ECDC factsheet about leptospirosis:
www.ecdc.europa.eu/en/leptospirosis
- ECDC factsheet about salmonellosis:
www.ecdc.europa.eu/en/salmonellosis
- Scientific report of international experts – 2019
[A new approach to rodent control to better protect human health \(S. Colombe. & al\)](#)

secretariat@cepa-europe.org