



New strategies in the battle against the fox tapeworm

A trail of **deadly** parasites

Red foxes are moving to the city. This may lead to more people being infected with the harmful fox tapeworm. For some years, this parasite has been successfully controlled with an active substance from Bayer HealthCare. However, now that these woodland animals are venturing into urban areas, new strategies are needed. Bayer researchers are currently working on a large-scale study in association with the Technical University in Munich.

As a hunter, the fox is known for its cunning. In fairy tales and fables, it is credited with considerable finesse. Above all, however, this animal is also adaptable. And in recent years, Brer Fox has been taking control of our towns and cities. Foxes are now more often to be encountered there than in woodland. In Berlin or Munich, for example, foxes prowl the gardens of residential areas, hang around school playgrounds and ransack the garbage bins of fast-food restaurants for leftovers. This alone would not be the end of the world. But

while they have a bad reputation for stealing chickens, foxes are now feared more for what they leave behind. For fox scats, as experts call the animal's droppings, may transmit a harmful parasite. This is the route taken to reach the outside world by the eggs of the fox tapeworm, *Echinococcus multilocularis*. If consumed by a mouse, a muskrat or another intermediate host, an intermediate stage of the tapeworm can develop. Only once they are inside the body of a fox that has eaten the infested rodent, however, do the para-

sites reach sexual maturity – and in turn produce more eggs that are shed into the fox's gut. Under certain circumstances, cats and dogs may also act as the final host.

Humans do not actually feature in this complex life cycle. As an accidental intermediate host, they may nevertheless become infected with the fox tapeworm and develop life-threatening alveolar echinococcosis. The parasite predominantly infests the liver and the lung but also the brain. The larvae destroy the organs insidiously. The

Beware of Brer Fox

- *Do not touch dead foxes; contact your local authority*
- *Dogs that have been in a fox's den should be given a shower and washed.*
- *Remove fox droppings from the garden with gloves or a shovel and put them in the garbage, not in the compost.*
- *Woodland fruits, berries, fungi and windfalls should be washed thoroughly before eating and if possible cooked. Freezing does not kill the parasite's eggs.*
- *Cats and dogs that eat mice may also be infested with the fox tapeworm and may excrete eggs for some time. They must be regularly dewormed with a product for tapeworms.*

Insidious hazard: foxes are increasingly moving into urban settings in their search for food in garbage bins (photo, left). In doing so, they are bringing a dangerous disease pathogen closer to man: the fox tapeworm. Dr. Klemens Krieger (photo, right), a parasitologist at Bayer, is not only working on the development of new active ingredients to prevent this pest from spreading. Together with forestry specialists, he has also tested a new combination strategy to control the disease.



disease usually goes unnoticed for the first ten to twenty years. One of the reasons for this is that the symptoms in cases of infestation of the liver, for example, share certain similarities with those of liver cancer or cirrhosis. In addition, many non-specific symptoms such as fatigue, lack of appetite and abdominal pain generally only occur once the area of tissue infested with parasites is already very extensive. The treatment of a patient with alveolar echinococcosis takes a long time and is extremely costly. At an advanced stage, infested tissue can usually no longer be removed surgically. Patients then have to undergo lifelong chemotherapy, which places its own massive strain on the body. Left untreated, however, alveolar echinococcosis is usually fatal.

Life-threatening for those with compromised immune systems

"So far there are reports of only a few hundred people being infected, although actual numbers are probably higher – and the rate of infection is rising, slowly but steadily," reports Dr. Klemens Krieger, a parasitologist in Bayer HealthCare's Animal Health Division. New data show that the number of people with antibodies to the parasites in their blood is much higher than the infection rate. Contact therefore does not always lead to development of the disease, as the invader can usually be

successfully combated by the immune system. If the body's defenses fail, however, the parasite may continue to develop even in the human body, with potentially life-threatening consequences.

"There are several conceivable routes of transmission to humans, even though their actual significance is still uncertain," says Krieger. Repeated contact with infested foxes, dogs and cats, however, increases the risk. That also applies to the animals' excrement. This is the means by which the tapeworm eggs are deposited on soil and plants. If humans then eat contaminated fruit, berries or fungi, they may easily become infected. For this reason, experts aim to control the parasite before it comes into contact with humans.

Back in the 1970s, Bayer developed the active ingredient praziquantel, which is also effective against *Echinococcus multilocularis*. "The substance is well tolerated and highly effective at widely ranging dosages," explains Krieger. "It is therefore ideally suited for distribution in bait." In presentations designed to be attractive to foxes, the active substance was distributed a few years ago over large areas by plane – with considerable success; the infestation rate in animals within the fly zones fell virtually to zero. This method of control is not practicable, however, in municipal parks or densely populated residential areas in the suburbs. Researchers need to develop new meth-

ods for fighting the parasite. "We are therefore currently testing a combination strategy," reports Dr. Andreas König, a forestry scientist from Munich's Technical University, who is leading a study that is being performed in association with Bayer Animal Health in which bait will be distributed from planes except in residential areas, where it will be placed by hand.

Infection means expensive treatment and follow-up costs

The results of the study could also be of benefit internationally, as the fox tapeworm is prevalent in all Central European countries and continues to spread. Even in Britain, which until now has remained unaffected, the fox tapeworm will in all likelihood be introduced via imported beavers. Concerted action is therefore necessary on the part of many local, district or even regional authorities, as in the campaign against rabies. Another reason why König considers such action to be advisable, despite the costs, is that infection with the fox tapeworm is extremely distressing for patients – and the total cost to the economy of treatment and follow-up would be far higher than for a deworming campaign.



www.research.bayer.com/foxtapeworm
More information on this topic