

The Indian Rat Flea, *Xenopsylla cheopis*, in Indiana

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The presence of *Xenopsylla cheopis* (Rothschild), the so-called Indian rat or plague flea, in the United States has been recognized for many years. It was reported first from coastal cities where it was introduced presumably by rats escaping from ships. It was first recorded from an inland locality by Wallace (1925) who found it on rats in Indianapolis. Since that time, the species has been reported from other midwestern localities. It was found on rats at Ames, Iowa, by Roudabush and Becker (1934), and Owen (1936) reported a severe infestation of an attendant in a dairy barn at the University of Minnesota. Ewing and Fox (1938) identified as *X. cheopis* fleas biting workers in an office at Youngstown, Ohio, and also reported that this species had been taken in an elevator at Urbana, Illinois. Trembley and Bishopp (1940) reported its appearance at Nashville, Tennessee, and Runner (1941) found it in residences and university buildings at Columbus, Ohio. Grundmann, Boles and Ackert (1941) have shown that the plague flea extends westward as far as Manhattan, Kansas. This flea has been regarded as a tropical and subtropical species which probably could not overwinter in the northern states but the observations of Ackert, Boles and Grundmann (1941) indicate that this is not the case.

Since 1935, wild rats have been killed from time to time on the Purdue campus and in the city of Lafayette and examined for parasites. Fleas on these rats were preserved and later used by students in parasitology in preparing whole mounts of arthropod material. Until 1939, *Nosopsyllus fasciatus* and a few *Ctenocephalides felis* were the only fleas found on these rats. In the spring of that year, however, rats killed in one of the animal houses on the campus harbored plague fleas exclusively. Since Wallace found *X. cheopis* in Indianapolis 17 years ago, this species probably spread to Lafayette long before we detected it.

During the writer's absence from the university in the summer of 1941, wild rats gained entrance to a room containing albino rats and mice. Upon returning in September, he found the albino rats suffering from extremely heavy infestations with plague fleas. Every rat had hundreds of them, was emaciated, and obviously suffered from loss of blood; several animals died before the infestation was brought under control. Curiously enough, neither albino mice, only a few feet away, nor persons entering the room were attacked to a noticeable degree. Although this room has been cleared of fleas, the infestation still persists in other parts of the building to which wild rats have access. In October, 1942, mixed infestations of *X. cheopis* and *Ctenocephalides felis* were noted on albino rabbits kept in the building.

The most disturbing aspect of the widespread occurrence of *X. cheopis*, particularly under war-time conditions, is the known ability of

this flea to transmit *Pasteurella pestis*, the plague bacillus. While bubonic plague has appeared sporadically in American coastal cities, it has in no case persisted for more than a few years at most, probably because of measures taken to segregate patients and prevent spread of the disease. One form of plague, the so-called sylvatic type, has become firmly established in wild rodents of the western states which, according to Eskey and Haas (1937), include California, Oregon, Washington, Idaho, Utah, Nevada, Arizona, Montana, Wyoming, and New Mexico. The disease apparently has spread over this area from original focal points on the West Coast where it was first observed in 1900. Meyer (1939) reported that 24 species of rodents may be naturally infected with sylvatic plague. It seems that this lack of host specificity and the widespread distribution of susceptible rodents would favor spread of the disease; Grundmann, Boles, and Ackert (1941) have pointed out that it is already east of the chief natural barrier, the Great Divide.

In view of the extent of sylvatic plague among rodents, surprisingly few cases of human plague have been reported; the fatality rate among these cases has been high, however. They have been attributed in most instances to handling infected rodents rather than to the bites of fleas. The various species of fleas seem to differ considerably in their ability to transmit plague. Although viable bacilli may be voided in the feces, the effectiveness of a flea in transmitting the disease depends apparently on the extent to which the digestive tract becomes blocked with plague bacilli which may be regurgitated when the flea attempts to suck blood. *Xenopsylla cheopis* is believed to be the most effective vector of the disease. Since this species apparently is not present in many localities where sylvatic plague of rodents is established, it may be that the rarity of human cases is due largely to the absence of effective insect vectors. In that event, further spread of sylvatic plague toward the east and *X. cheopis* westward may constitute a serious menace.

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