# PARASITES OF VERTEBRATES INHABITING PRAIRIE DOG TOWNS IN OKLAHOMA. I. ECTOPARASITES

Jack D. Tyler and Henry N. Buscher

Department of Biology, Cameron College, Lawton, Oklahoma,
and Department of Biology, Austin College, Sherman, Texas

During August of 1969, 62 vertebrates were collected from active prairie dog towns in Oklahoma and examined for ectoparasites. Seven species of ectoparasites including three fleas, two mallophaga, one tick and one dipteran larva were identified. The potentiality of these ectoparasites for functioning in epizootics is discussed.

Several animals are known to take up residence in the abandoned burrows of active "towns" of the black-tailed prairie dog, *Cynomys ludovicianus*. Notable among these are prairie rattlesnakes (*Crotalus viridus*), burrowing owls (*Speotyto cunicularia*), thirteen-lined ground squirrels (*Spermophilus tridecemlineatus*), desert cottontails (*Sylvilagus audubonii*), badgers (*Taxidae taxus*) and swift foxes (*Vulpes velox*) (1).

In recent years extensive poisoning campaigns by land owners and federal predator and rodent control agents have drastically reduced the populations of this once-abundant and widespread rodent. As a result, only about 100 total hectares of active prairie dog colonies remained in Oklahoma in 1967 (1).

Elimination of prairie dogs results in the subsequent loss of their vertebrate associates. For example, in his study of 1968, Tyler found that there were only about 900 burrowing owls left in the remaining prairie dog colonies in Oklahoma. There is little substantive information concerning the complex ecological inter-relationships of vertebrates inhabiting prairie dog towns. The continuing drastic reduction in both number and distribution of dog towns in Oklahoma underscores the urgent need to study these animals under natural conditions.

One aspect of the ecology of prairie dog colonies for which there is relatively little information is that of parasitism. Ectoparasites, however, especially fleas because of their potentiality as plague vectors, have received considerable attention (2, 3). The impact of these parasites and their disease-transmitting capabilities on natural rodent populations has been dramatically documented by Ecke and Johnson (4). They found that sylvatic plague, which is transmitted by a variety of fleas, exterminated virtually all the prairie dogs on 627,000 acres in Park County, central Colorado, from 1945 to 1949.

The present study was carried out to determine the identity and incidence of parasites inhabiting prairie dogs and some of their vertebrate associates in Oklahoma. This paper reports the ectoparasites found on four species of vertebrates collected during the summer of 1969 in prairie dog towns in five widely separated counties in Oklahoma. Information concerning helminths of these vertebrates will be published in another paper.

## MATERIALS AND METHODS

During August of 1969, 62 vertebrates (30 black-tailed prairie dogs, 26 burrowing owls, 4 desert cottontails, and 2 thirteen-lined ground squirrels) were collected from active prairie dogs towns in five counties in Oklahoma. Specimens were collected with either a .22 caliber rifle or a .410 gauge shotgun and immediately placed individually into bags to facilitate the collection of ectoparasites.

After exposing ectoparasites to ether, hosts were brushed and examined thoroughly as were the individual bags. All ectoparasites found were preserved in 70% EtOH. Fleas and mallophaga were prepared for mounting and identifying according to standard laboratory procedures. Other ectoparasites were identified without further preparation. Ectoparasites are deposited at Austin College in Sherman, Texas and study skins of the hosts are housed in the

Cameron College Museum of Zoology in Lawton, Oklahoma.

## RESULTS

A total of seven species of ectoparasites representing six families in four orders were recovered. These included three species of fleas, two species of mallophaga, one species of tick and one species of dipteran larva. The incidence of these ectoparasites in their respective hosts is shown in Table I.

## DISCUSSION

Only one of the ectoparasites, viz., *Pulex* sp., was found on more than one host species. It seems probable that this incidence was conservative. While *Opisocrostis*, for example, was found primarily on prairie dogs, it has been frequently found on *Spermophilus* and occasionally on other animals including burrowing owls. Therefore, one would expect that this flea also utilized these hosts in the study areas even though it was not found. *Dermacentor* and *Cuterebra*, found on only one host (the desert cottontail), also are known to utilize a variety of host species including prairie dogs and ground squirrels. On the other hand, *Philopterus* and *Colpocephalum*, being bird lice, are more host specific and would not be expected to be found on mammalian associates.

The specimens of *Pulex* recovered in this study present an interesting problem. Apparently there are only two representatives of this subgenus in North America, viz., *P. simulans* and *P. irritans*, however, specimens collected in this study have features that are not consistent with either form. For example, the size of the specimens was similar to *simulans*, i.e., smaller than an average *irritans*. Although the dorsal aedeagal sclerite of the male resembled that of the neotype of *irritans* as described by Smit (5), crochets were rodlike and characteristic of *simulans*. Female specimens also resembled *simulans* in having a smaller size

TABLE I. *Incidence of ectoparasites by host in each county*

| | Host[a] and County | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *S. auduboni* | *C. ludovicianus* | | | | | *S. cunicularia* | | | |
| Ectoparasite | Cimarron 3/4[b] | Cimarron 8/11 | Harper 1/1 | Woods 3/6 | Grant 2/6 | Jackson 0/7 | Cimarron 5/11 | Harper 2/5 | Grant 2/4 | Jackson 0/6 |
| SIPHONAPTERA | | | | | | | | | | |
| Ceratophyllidae | | | | | | | | | | |
| *Opisocrostis hirsutus* | | 45[c] | 100 | 50 | 33 | 0 | | | | |
| Pulicidae | | | | | | | | | | |
| *Hoplopsyllus* (E.) *glacialis* | 75 | | | | | | | | | |
| *Pulex* sp. | | 36 | 0 | 0 | 0 | 0 | | | | |
| MALLOPHAGA | | | | | | | | | | |
| Philopteridae (Ischnocera) | | | | | | | | | | |
| *Philopterus syrnii* | | | | | | | 18 | 20 | 0 | 0 |
| Menoponidae (Amblycera) | | | | | | | | | | |
| *Colpocephalum pectinatum* | | | | | | | 36 | 40 | 50 | 0 |
| ACARINA | | | | | | | | | | |
| Ixodidae | | | | | | | | | | |
| *Dermacentor parumapterus* | 25 | | | | | | | | | |
| DIPTERA | | | | | | | | | | |
| Cuterebridae | | | | | | | | | | |
| *Cuterebra* sp. (larva) | 25 | | | | | | | | | |

[a] Does not include two *S. tridecemlineatus*, one from Cimarron Co. and one from Harper Co. which did not yield any ectoparasites.
[b] No. infected/no. examined
[c] Percent infected

than an average *irritans* and a larger number of setae on sternum VII. In view of these considerations, together with the observation that *P. simulans* occurs more commonly on colonial rodents, we believe the characteristics of specimens collected to be those of *P. simulans*.

The ability of these ectoparasites, particularly the fleas, to function in epizootics has not been adequately established. *Opisocrostis hirsutus*, for example, was shown to have only a fair efficiency (0.3) as a plague vector (6) although Ecke and Johnson (7) demonstrated that it was the only flea involved in an epizootic among prairie dogs in New Mexico in 1938. Eskey and Haas (6) also infected a small percentage of *H. glacialis* with plague but were unable to accomplish transmission. The misidentification of *P. simulans* as *P. irritans* in the past has undoubtedly led to a misinterpretation of the vector capacity in relation to plague of these two species (5). However, since *P. simulans* does occur more commonly, perhaps primarily, on colony-forming rodents such as prairie dogs, while *P. irritans* occurs mainly on larger animals including man, it would seem logical that *P. simulans* would have a more significant role as a reservoir for plague among these rodents than would *P. irritans*. Because of the lack of sufficient accurate data concerning plague transmissions by these two species in nature, however, this question must remain unanswered.

The tick, *D. parumapertus*, is a known vector of tularemia in wildlife populations including *S. auduboni* from which tissue isolates have been obtained (8). This tick has also been incriminated in the transmission of Rocky Mountain spotted fever and could possibly be suitable as a vector for Colorado tick fever as well as salmonellosis, myxomatosis and other diseases known to be detrimental to these animal populations.

Although the sample size of hosts is admittedly small, our collection does indicate that the vectors necessary to precipitate an epizootic in the state are present. Should one occur in combination with intensive poisoning campaigns, the entire population of prairie dogs in Oklahoma could be endangered.

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