THE RELATIVE IMPORTANCE OF AMPHIBIANS, REPTILES, BIRDS AND MAMMALS AS HOSTS FOR CHIGGERS AND OTHER ECTOPARASITES

BY

H. E. EWING.

REPRINTED FROM

ANNALS OF THE ENTOMOLOGICAL SOCIETY OF AMERICA

Vol. XXIV, No. 4.

COLUMBUS, OHIO,

December, 1931.

THE RELATIVE IMPORTANCE OF AMPHIBIANS, REPTILES, BIRDS AND MAMMALS AS HOSTS FOR CHIGGERS AND OTHER ECTOPARASITES.

H. E. Ewing,
United States Bureau of Entomology.

Introductory.

Ectoparasites have long received the attention of entomologists and parasitologists and their importance economically to man, likewise, has long been recognized. Yet, notwithstanding the attention they have received, resulting in the production of a voluminous literature, we are yet in ignorance of most of the fundamental facts in regard to the relative importance of the different groups of ectoparasites upon the different major classes of vertebrate hosts. Our lack of information in this regard was most forcibly brought to the writer's attention during the early days of his investigations of chiggers. When these investigations were begun about fifteen years ago, we had no knowledge regarding the natural hosts of these minute acarids and but very little in regard to their habits. Our common chigger, *Trombicula irritans* (Riley), was supposed in nature either to feed upon insects or to suck the juices of plants. Today how different! Now we know not only that they never do these things but that they occur as normal parasites on various species of vertebrates belonging to four of the five classes.

Some may ask why it was that chiggers were so long overlooked upon their natural vertebrate hosts. It would seem that any of the ectoparasites so persistently attacking man and his domestic animals would be revealed by scientists upon some of their wild vertebrate hosts. But they were not. Doubtless the chief reason for this was because of their small size. Then again, they attach themselves directly to the skin and are largely or completely concealed by the hair or feathers of the host.

Taking an Ectoparasite Census.

The demonstration of the wide occurrence of these very important parasites of man upon so many wild vertebrates was a most significant revelation of our utter lack of information in regard to the occurrence of certain ectoparasites upon the major classes of vertebrates. Hence, beginning with the summer of 1925, it was decided that a complete inventory of all arthropod parasites would be made of all amphibian and reptilian hosts that could be collected in the Central Atlantic and South Atlantic States. Three years later the same method was extended to include birds and mammals.

In taking this census of ectoparasites special methods were employed to prevent, as far as possible, their escape from their hosts before examination and also to prevent their straggling from their natural hosts to unnatural ones. Every individual parasite was taken with the exception of minute mites belonging to a few species. Each specimen was determined to species, its stage or instar recorded, and if adult its sex noted. The presence of eggs of the parasites was recorded, the nature of injury to the host and the region of the body infested, and many other items of general biological interest were put down.

Special information in regard to the host included its age (whether nestling, juvenile, breeding adult, etc.), state of health, and many other items that seemed to be of importance.

The Value of an Ectoparasite Census.

The information thus obtained will eventually give us a wealth of facts bearing upon many problems aside from the knowledge of the presence or absence of particular species upon a particular host. Some of these may be here enumerated. They have to do with:

1. The life history of the parasites themselves.
2. The seasonal history of the parasites.
3. The relative abundance of two or more parasitic species when occurring upon a single host species.
4. The time and method of spread of individuals of a parasitic species from one host individual to another.
5. The ecology of the scaly, feathered, or hairy environment furnished by the host.
6. The correlation, or lack of correlation, between the life history of the parasite and that of its host.

The data obtained up to the present are not sufficient for throwing much light upon some of these problems, but in regard to the relative abundance of the different major groups of ectoparasites on four of the classes of vertebrates it is believed that the data are of value. This of course does not apply to ectoparasites occurring outside of the territory under consideration or for the colder months of the year when no collections were made.

Host Group	Number of hosts examined	Species or subspecies represented	Without ecto-parasites	With chiggers only	With chiggers & other ectoparasites	With ectoparasites other than chiggers	Percent infested with chiggers	Percent infested with all ectoparasites
Amphibians	462	23	352	110	0	0	23.8	23.8
Reptiles	281	30	219	46	0	16	16.4	22.1
Birds	103	37	73	10	3	17	12.6	29.1
Mammals	84	13	36	2	5	41	8.3	57.1

TABLE I. Percentages of infestation with chiggers and other ectoparasites of four classes of vertebrates. (Data for spring, summer, and fall months from Atlantic States, Maryland to Florida, inclusive.)

THE RELATIVE ABUNDANCE OF THE MAJOR ECTOPARASITIC GROUPS ON VERTEBRATES DURING THE WARMER MONTHS IN THE CENTRAL ATLANTIC AND SOUTH ATLANTIC STATES.

The results obtained for this survey are given in Table I and apply to the Atlantic States, from Maryland to Florida, inclusive. Records were obtained for the spring, summer, and fall months and largely from the States of Maryland, Virginia, and North Carolina. No records were obtained from the mountainous regions in the western part of these States.

The outstanding fact revealed in this census is the important role played by amphibians as hosts for ectoparasites. Of the 462 individuals obtained, representing 23 species, no less than 110, or 23.8 per cent, were parasitized. When this census

was begun ectoparasitism of amphibians, except for occasional records of attacks by ticks, was practically unknown. It revealed, however, that amphibiams are heavily infested with mites, and are in fact more heavily infested than are reptiles.

According to this survey, mammals are the most heavily parasitized with arthropods of any of the four classes of vertebrates considered. Over 57 per cent of the mammals were found infested.

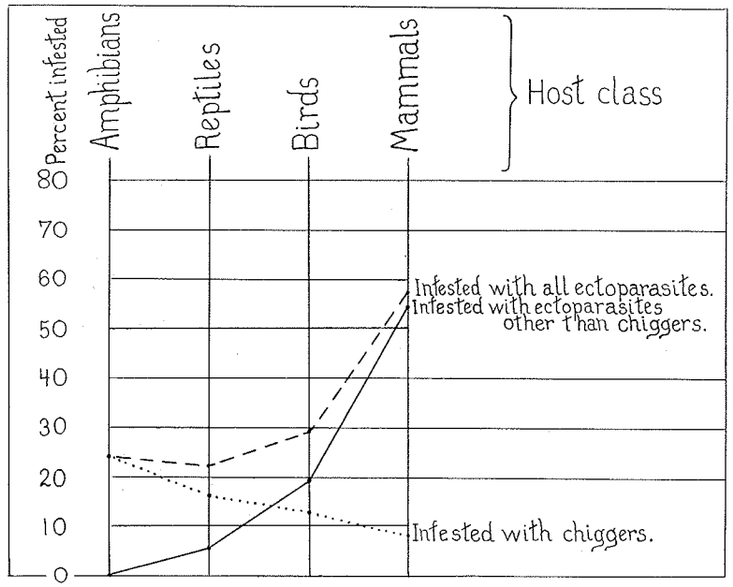

CHART I. Plot showing percentages of infestation with chiggers and other ectoparasites of hosts belonging to four classes of vertebrates.

The figures indicating the percentage of individuals infested with chiggers are of much practical importance from the standpoint of their control. Amphibians proved to be the most heavily parasitized with these mites, the percentage of individuals having them being 23.8. Reptiles came next with a percentage of 16.4, then the birds with a percentage of 12.6, while mammals were the least infested, the percentage being 8.3. In this paper no attempt shall be made to go into the details of the census taken. It might be well here to state, however, that young toads and frogs account for most of the percentage

figure for the amphibians; our common box-turtle, *Terrapene carolina*, for the reptiles; and ground-frequenting birds, for the figure for this class.

The relative abundance of chiggers and all other ectoparasites on amphibians, reptiles, birds, and mammals, as indicated by the number of individuals infested, is shown in the form of a diagram (Chart 1). This diagram indicates clearly how relatively unimportant the mammals are as hosts for chiggers, and also how this class far surpasses the other three in importance in furnishing hosts for ectoparasites other than chiggers.

Summary.

1. A preliminary report is given of what is believed to be the first census ever to be taken of the ectoparasites of four of our five classes of vertebrates, the amphibians, the reptiles, the birds, and the mammals.

2. This report is of a very general nature, and has to do primarily with the relative abundance of ectoparasites upon these four classes of vertebrates during the spring, summer, and fall months of the year in the Atlantic States from Maryland to Florida, inclusive.

3. Amphibians are shown for the first time to be hosts of major importance as far as the mites are concerned.

4. The relatively unimportant part played by mammals as hosts for chiggers in this section of the country is indicated.