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THE CHICKEN TICK

(*Argas miniatus*, Koch)

BY C. E. SANBORN AND H. R. PAINTER

DEPARTMENT OF ENTOMOLOGY

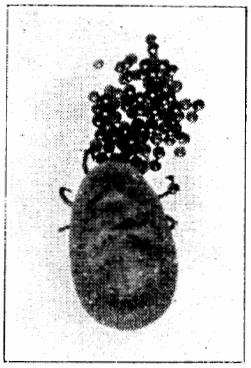

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Plate I

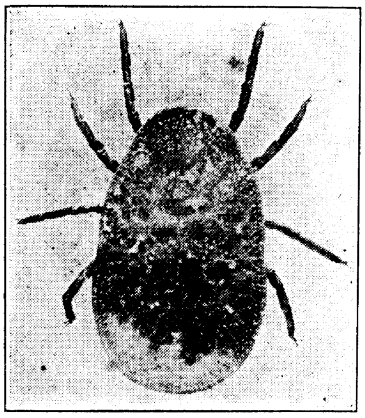


Figure 1
Adult Fowl Tick

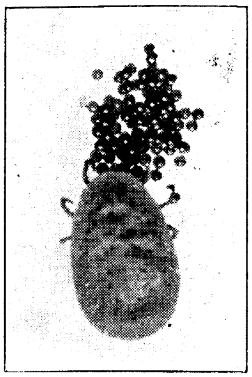


Figure 2
Eggs

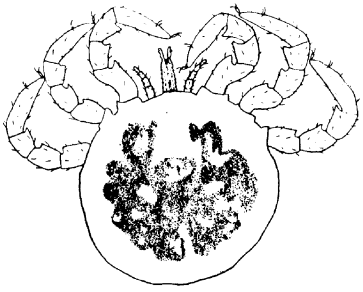


Figure 3
Young or Seed Tick

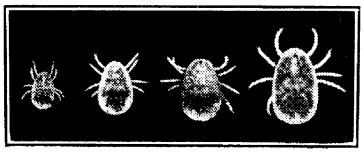
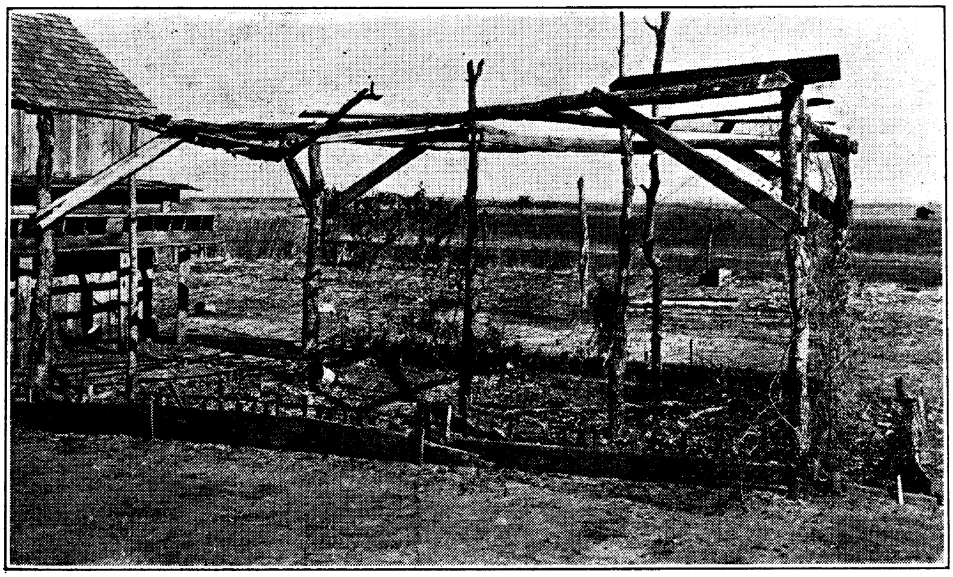


Figure 4
Three Nymphs at Left, Adult at Right

Plate II



View of Structure Used for "Open-Air" Roosting Place for Fowls

THE CHICKEN TICK

(*Argas miniatus*, Koch)

BY C. E. SANBORN and H. R. PAINTER

Introduction

The fowl tick (*Argas miniatus*, Koch, Plate I, Figure 1), belongs to the superfamily Ixodoides of the order Acarina, known as "blue bug", "bloodsucker" and "tampan". Poultry-raising is often seriously handicapped on account of damage done by this pest. It is probable that the loss amounts to many thousands of dollars annually. Fowls suffer discontent during the process of feeding by the ticks, and on account of the loss of blood are rendered more susceptible to disease and are less active in the production of eggs.

History

The earliest record of the occurrence of the fowl tick in the United States was in 1872. Dr. A. S. Packard received specimens from Mr. G. W. Belfarge, who collected them in Southwestern Texas. These were identified by Dr. Packard as being the genuine fowl tick. Dr. L. O. Howard states that ticks were received from Dimmit county, Texas, in November, 1884. The pests were doing considerable damage to fowls at that time. In the Prairie Farmer, January 7, 1889, Professor C. M. Weed states that the fowl tick was present in Marcopi county, Arizona. In 1894 the pest was found at San Diego, Texas, by Mr. C. H. T. Townsend. Mr. E. M. Ehrhorn reported it to be attacking chickens and turkeys at Merced, California, during the same year. The tick was probably brought into Texas from Mexico when the country was first settled. The infestation is gradually extending northward, covering more territory.

Distribution

The fowl tick is adapted to an arid or semi-arid climate. A high degree of humidity is unfavorable to normal development. The tick has been reported a number of times from Florida. The present infested portion of the United States is confined chiefly to California, Southern Arizona, Southern New Mexico, the greater part of Texas and Southern Oklahoma. The Marx collection in the United States National Museum contains specimens from Iowa.

The tick also attacks poultry in other parts of the world. It occurs in North Central Mexico, Panama, British Guiana, Brazil, Cuba, Jamaica, Persia, India, Southern Russia, Roumania, North and South Africa, and various parts of Australia, Asia and Europe. When an infestation is observed outside of its normal habitat it is generally due to transfer of infested fowls. In such cases the ticks rarely become of economic importance, since they are not adapted to the different climatic conditions and gradually die out.

Description

Egg.—The egg (Plate I, Figure 2) is round, brownish in color, and rather glossy. Size may vary slightly, but the average diameter is about .5 to .7 millimeters.

Young or Seed Tick.—The young tick (Plate I, Figure 3) just emerged from the egg, is similar in general appearance to the adult, except that it possesses only six legs, while the adult has eight. The color is dull gray with the margin of body lighter. Length of body is .8 mm.; width, .6 mm.

Nymph.—After the first molt, the tick (Plate I, Figure 4) possesses eight legs and is brownish in color. After feeding the color is of a deep purple hue, due to the presence of blood taken from the host. Body measurements range from 2 to 8 mm. in length, and from 1 to 5 mm. in width. The variation in size is due to age, and whether or not the ticks are engorged with blood.

Adult.—As a rule adults are larger than nymphs; however, this fact does not maintain in all cases. The chief distinguishing feature of adults is the complete development of the reproductive organs. Body length ranges from 4 to 12 mm. and width from 3 to 7 mm. Males are generally smaller than females. (See Plate I, Figure 1.)

Hosts

The chicken is the main host of this pest. The tick, however, attacks turkeys, geese and ducks. Other writers state that ticks have been known to feed on ostriches and canaries with serious results. Experimentally, ticks have been induced to feed on rats, mice and guinea pigs. Mr. J. D. Mitchell states that ticks were found on a jackrabbit. Professor Lounsbury in South Africa allowed ticks to feed upon his arm with no serious results. Experimenters have also found the ticks feeding on the meadowlark and wild turkey in Southern Texas. The writer succeeded in causing ticks to feed on sparrows. Since the ticks feed on hosts other than domestic fowls, it is evident that an infestation may be easily carried to a non-infested locality.

Injury to Hosts

Ticks possess a strong beak, attached to the under surface of the front portion of the body. They insert this organ into the tissue of the host and withdraw blood. Soon after a tick begins to feed a reddish coloration forms in the outer tissues of the host, due evidently to blood brought to the surface. When the ticks become engorged and detach from the host they generally regurgitate a clear, watery fluid.

Since the vitality of the fowls is weakened on account of the loss of blood, they are rendered more susceptible to disease. Ticks may transmit disease during the process of feeding. Loss may be sustained on account of the annoyance to setting hens. Egg production is also lessened. Since the ticks are active at night it is evident that fowls suffer annoyance while they should have rest.

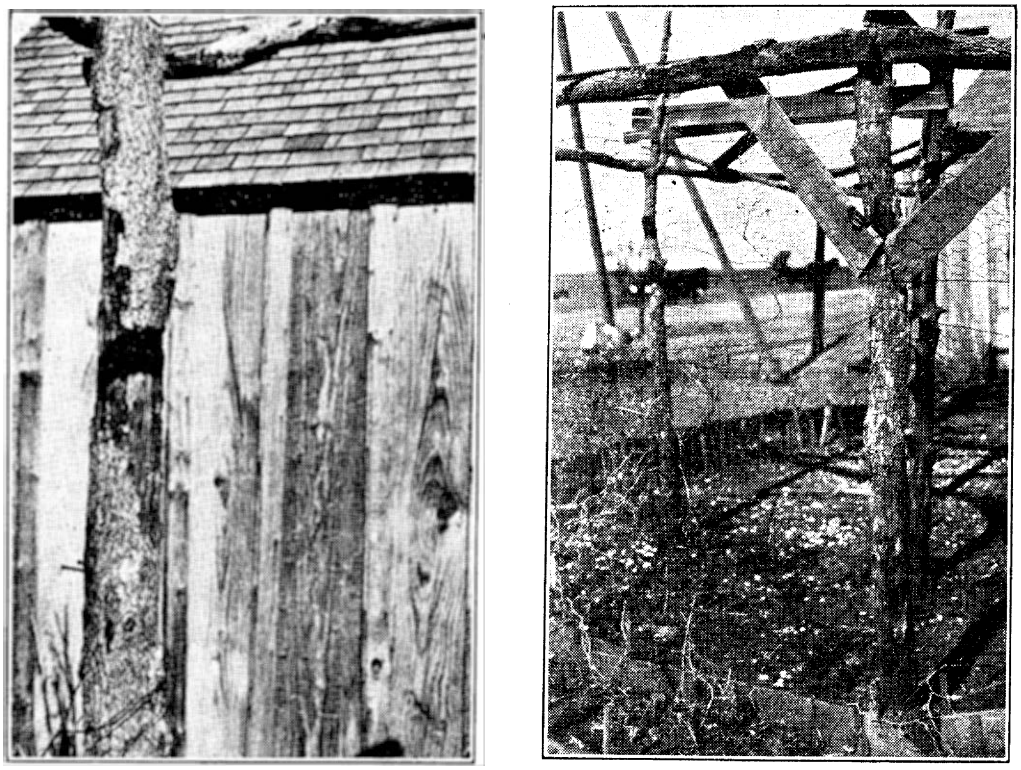
Life History

Eggs.—Eggs are deposited in masses in cracks and crevices about the poultry house or roosts. In fact, any place affording suitable shelter for the adults may be used for oviposition purposes. In one instance in Southern Oklahoma, numerous eggs as well as ticks

in all stages of development were found underneath the bark of poles constituting an "open-air" roosting place. (See Plates II and III.) The time required for eggs to hatch may vary considerably, depending upon climatic conditions. Sixteen different groups of eggs were held for the purpose of learning the period of incubation. Some hatched ten days after deposition, while others did not hatch until thirty-one days after being deposited. The average was twenty-two and one-fourth days. This data pertains to the summer season. During the winter the incubation period may range from three to four months.

Young.—The young tick just hatched is known as a "seed tick". These forms remain quiet on the egg-mass for a few days after hatching, then during the night they become active and search for a host. When a suitable host is found they attach themselves and begin to suck blood. Attachment generally takes place on the breast, thighs or wings. The seed tick remains attached to the fowl from five to eight days, according to data obtained by the writer. Other experimenters state that the period may range from three and one-half to ten days. When fully engorged the seed ticks drop from the host. As a rule the ticks drop during the night and conceal themselves in a crevice in the roost or other convenient place. They remain more or less inactive for about six days, and then molt or shed their skin. In cool weather this stage may last a month or more. After the first molt the tick possesses eight legs. It is now known as a nymph.

Plate III



Corner Posts and End View of "Open-Air" Roosting Structure. The Ticks Seclude Themselves Underneath the Bark During the Day and Come Out at Night to Feed

Nymph.—With the exception of size, there is little difference between a nymph and an adult in general appearance. Nymphs feed almost exclusively at night. Time required for engorgement varies considerably. Some may feed only ten or twelve minutes, while others may remain attached an hour or more. In a few instances nymphs were observed to attach directly over a blood vessel. In such cases the ticks become completely engorged in about ten minutes. Nymphs feed and shed their skins two and sometimes three times before reaching the adult stage. After each molt and engorgement the nymphs increase in size, but retain the oval form.

Adult.—After the last molt the reproductive organs are completely developed. General body color is a dull brown until after feeding, when it changes to a dark blue. Engorgement increases the size considerably. The males, however, are a little smaller than the females. After feeding, the adults mate. The female begins to deposit eggs about five or ten days after mating. During the winter the female is less active in producing eggs. The egg-laying period ranges from ten to twenty days. The average rate of deposition of a group of ticks studied by the writer was six eggs per day during the period of oviposition. The average number of eggs deposited by a single female during the entire egg-laying period was eighty-six.

This pest differs from most other poultry pests on account of its ability to live a considerable length of time without food. A number of young ticks just hatched were placed in a tin box and never allowed to feed. They were observed daily to learn how long they would live without ever having taken food. The first tick that died remained alive thirteen days. The last one to die remained alive thirty-four days. The average number of days of longevity or ability to live without food was twenty-three days. This data was obtained during the month of February. The results would probably be different during the summer months. Other writers state that the seed ticks have been known to live for a period of five and one-half months without food. The period of longevity of ticks varies considerably in accordance with the degree of maturity. Adults will survive longer without food than nymphs.

A group of about 100 ticks were placed in a tin box and held to see how long they would survive without food. There were practically all stages of development present except seed ticks. Some of the ticks were fully engorged at the time the experiment was bgun, while others evidently had not fed for some time. Ticks were exmained from time to time and a few dead ticks were found at practically every examination. The last tick to die remained alive ten months. Quite a number of the ticks remained alive seven or eight months without food. Other writers state that adults have been known to remain alive from two and one-half to three years. The statement has been made by Dr. C. V. Riley that ticks have been known to live five years without food.

Control Factors

Natural.—Ticks do not thrive in a warm, moist climate. A warm temperature is favorable, but excessive moisture with it is adverse to natural development. Ticks do not occur in a cold region. They are able, however, to withstand extreme cold weather.

In order to learn the effect of low temperature on the ticks, three small tin boxes containing a few ticks each were placed outside at 9:30 a. m. December 14, and exposed to a cold wind until the following morning. A bit of cotton was placed in one of the boxes to offer

a little protection. The other boxes contained nothing besides the ticks. Minimum temperature was 15° Fahrenheit. The following morning the ticks were brought inside and examined. They were inactive when first observed, but within a half hour they all showed signs of life. This experiment was repeated with similar results.

Another tin box containing sixteen ticks in all stages of development except seed ticks was buried outside about an inch deep in a mass of sleet. The ticks were exposed from 3 o'clock p. m. January 28 until 11 o'clock a. m. the following day. Minimum temperature January 28 was 6°; January 29 10°. When the box was first opened all of the ticks were inactive. Two hours later twelve showed signs of life. Some were sluggish, while others were quite active. The ticks used in this experiment apparently had not fed for four or five months. The ticks were allowed to remain inside until the following day, and it was learned that four had been killed. The others were placed outside again under the same conditions as before and allowed to remain three days. None was killed during this exposure.

Three ticks were placed in a tin box as before. The box was sealed tight with wax and immeresd in a pan of water and left outside over night. Ice was formed one-half inch thick around the box. The ticks were brought inside the following morning and examined. The two larger ticks, one practically matured and one about half grown, were quite active when the box was first opened. The other tick, about one-third grown, showed no signs of life until about one-half hour later. This experiment was repeated three times under similar conditions and the smallest tick was the only one killed. Some time after the freezing experiment had been performed one of the surviving ticks deposited eggs which hatched. No food had been taken since the freezing experiment.

On January 30 about thirty seed ticks that had never fed were placed in a tin box and buried outside in sleet. When examined the next morning all were alive. The group was placed outside again under conditions the same as before and allowed to remain three and one-half days. Only three of these ticks were killed during this exposure. The exact age of these ticks was not known. They were first observed on January 21 in a box where adults were being kept. They were probably not more than fifteen or twenty days old.

Record of Experiment to Determine Effects of Montana Temperatures on the Life of Chicken Ticks

(Data received from Dr. R. A. Cooley, Entomologist of Montana Experiment Station at Bozeman)

Ticks received from Professor C. E. Sanborn, entomologist of the Oklahoma Experiment Station, were placed out of doors away from a heated building in a roofed enclosure. They were brought in and kept at room temperature for twenty-four hours before the records were made.

Of the nine ticks in No. 2, two laid eggs while out of doors.

Lot No.	No. of Ticks	Date Put Out	Date Taken In	Results No. Alive	Results No. Dead	Temperature Max.	Temperature Min.
No. 1	16	Feb. 6, 1918	March 5, 1918	1 very feeble	15	49	—19
No. 2	9	Feb. 28 1918	March 5, 1918	8	1	49	— 6

Temperature Records Covering the Period

Date—Feberuary	6	7	8	9	10	11	12	13	14
Maximum	45	39	35	42	49	40	36	30	14
Minimum	24	20	8	15	21	25	16	10	5
Date—February	15	16	17	18	19	20	21	22	23
Maximum	8	28	37	0	0	0	20	37	45
Minimum .....—	7	0	0	—16	—17	—17	—19	5	32
Date—February	24	25	26	27	28	Mar. 1	2	3	4
Maximum	32	34	35	25	35	49	49	47	38
Minimum	15	— 4	25	6	2	14	23	26	8
Date—March	5	6							
Maximum	14	27							
Minimum .....—	6	—3							

From the data obtained in the freezing temperature experiments it is evident that the fowl tick possesses a remarkable vitality. It is not likely that the environment of the average poultry house would be so severe as conditions under which these ticks were exposed. Although ticks can withstand extreme cold, it is apparent that cold weather retards multiplication and other activities. This is probably the reason why they do not thrive in a cold region.

Few parasites are known to attack the fowl tick. A small black ant (Monomorium minutum) is known to destroy the eggs and young ticks. A few species of spiders also destroy a small percent of the more mature forms.

Rats and mice are also instrumental to some extent in controlling the pests. Fowls eat the ticks, when they have access to them, but since ticks are generally secluded in some crevice, fowls are able to get only a very small percent. For the same reason birds destroy very few, if any, of the pests.

Artificial.—A spray of crdue oil has been found effective in combating the ticks in all stages of development. The application should be thorough. The oil should be forced into all cracks and crevices that offer shelter for the ticks. It is necessary for the oil to come directly in contact with the pests to kill them.

A commercial preparation known as "Lee's Dip" is also effective in destroying the pests, but is more expensive than crude oil. This preparation should be applied as a spray to the infested quarters.

How to Guard Against Infestation

The construction of the poultry house has considerable to do with keeping this pest subjected. All possible hiding places should be eliminated. This means that dressed lumber only should be used in the construction of the house. No natural lumber with the bark still on it should be used, as this affords an ideal hiding place for these ticks. The interior walls of the house should be left as smooth as possible and be made only of dressed lumber. Cement floor is the most sanitary floor which can be used. If a cement floor is used, a good layer of sand and straw should be put on top of it. The walls should also be made of dressed lumber, so that they can be frequently painted with crude oil.

If systematic spraying is practiced at least once every two weeks during the summer with one of the common sheep or cattle dips, using a 3% solution, it would be hard for this pest to get a start.

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