

OKLAHOMA  
AGRICULTURAL AND MECHANICAL  
COLLEGE

AGRICULTURAL EXPERIMENT STATION  
STILLWATER, OKLAHOMA

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BULLETIN No. 130  
BULLETIN NO. 123--REVISED

FEBRUARY, 1920

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# THE CHICKEN STICKTIGHT FLEA

(*Sarcopsylla gallinacea* Westw.)

BY C. E. SANBORN, ENTOMOLOGIST

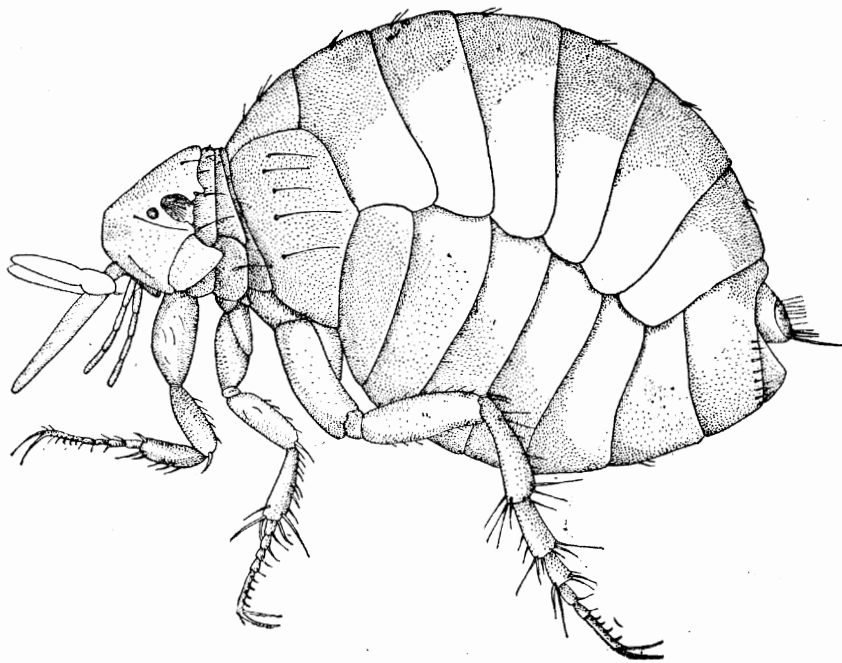
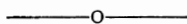


ILLUSTRATION OF FLEA (Sanb.)

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## THE CHICKEN STICKTIGHT FLEA

(*Sarcopsylla gallinacea*, Westw.)

BY C. E. SANBORN

*Entomologist*

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Poultry-raising in Oklahoma is of great economical importance from many different standpoints. As an insect control, domestic fowls are perhaps superior to any group of animals except the wild birds. Field, fruit and truck crops are frequently partially or wholly destroyed by insects of southern or northern origin, which seem to merge with, and overlap, eastern and western depredating forms in this state. Many of them, especially grasshoppers, ground beetles and crickets, are easily captured and greedily devoured by chickens. Unfortunately, however, for the chickens, they themselves are subject to destruction by some insects.

The chicken, or stick-tight flea, sometimes known as the hen flea, is one of the chicken-eating insects. It seems to have originated in Ceylon; at any rate, the earliest record of it was made from specimens received from Ceylon by Professor Westwood\* of England.

The first United States record (1886\*\*) was made from specimens found in Florida. At present the infestation is in all of the southern states, and has been reported present also in Kansas. It thrives best in an arid or semi-arid, mild climate.

**Methods of Dissemination.**—This insect has no wings; but it can hop or jump a short distance. Its relatives, the cat and dog fleas, can outjump it, and are universally distributed. All fleas, however, do not jump from one country to another, but are generally carried by the agencies of man. After a stick-tight flea attaches itself to a host, its habit somewhat resembles that of the tick in so far as it is not easily detached. Infested chickens, therefore, by being moved from one locality to another, may, if infested, easily carry the stick-tight fleas.

**Mouth Part Peculiarities.**—As the name implies, the flea sticks tight to its host. Practically all other fleas flee quickly when seriously disturbed. This one anchors itself to its host with its beak and can neither quickly detach itself nor be easily detached. The beak is about one-fourth the length of the body and composed of pairs of lancets which have numerous very small lateral, recurved barbs that can be slightly extended outward. When the barbs are not extended the beak appears somewhat smooth.

\*Westwood, J. O. Entomologists' Monthly Magazine, Vol. XI, p. 246.

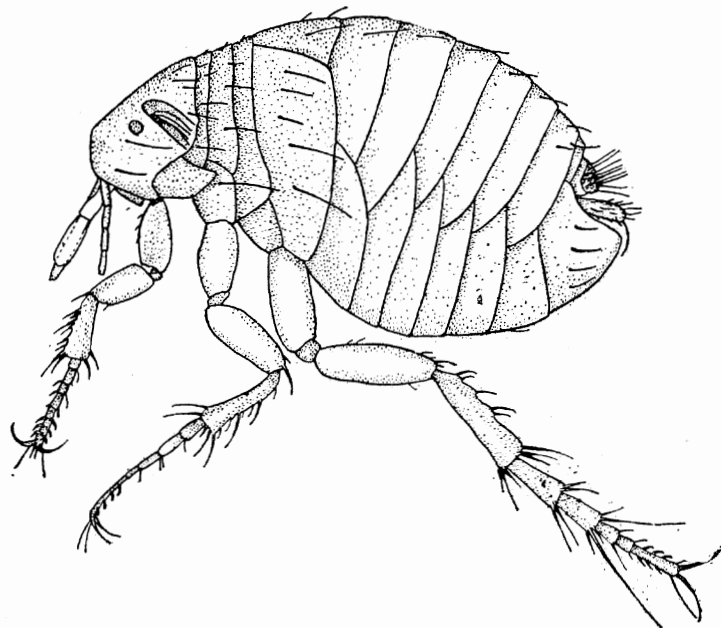
\*\*Howard, L. O. Proceedings, Entomological Society of Washington, Vol. I, No. 2, pp. 59-60.

While they are extended, the recurved prongs or barbs give the beak a very rough appearance and cause it to serve well as an anchor in the tissues of the host.

The lancets previously mentioned are modified jaws, known as mandibles and maxillae. These approximate each other, i. e., lie against each other and form a canal which ensheaths the hypopharynx or tongue. The latter is luminated, i. e., tube-like, and really answers as an extended esophagus through which the insect withdraws the blood of the host for subsistence.

When one of the lancets is thrust forward into the flesh, the others are used as a guide and anchor, and remain attached in the flesh by means of external barbs; and each in turn may then be thrust deeper into the tissues, while the others serve as an approximating guide and anchor.

So neatly is the anchorage made that no blood escapes from the wound except into the hollow tongue, through which it enters the flea's organs of assimilation. It finally embeds the entire length of its beak in the tissues of the host, where it remains attached without the use of its feet. After several days of such an existence the outer tissues of the infested chicken practically envelop the flea's head at the point of infestation.



Male Flea, Much Enlarged (Sanb.)

**Size and Appearance.**—Like most all other fleas, this one is of a light brownish or mahogany color. It is about the size of a moderate-sized pin-head, but rather elongate and shaped more like a grain of buckwheat.

These are much more gregarious in habit than other common fleas, i. e., they feed close together. In case of a badly infested animal, such as a chicken, they anchor their beaks so close together that the infested portion of the flesh becomes so thickly studded with their bodies that it is thusly

hidden. The wattles, eyelids and base of the comb become conspicuously patched-over in severe cases of infestation. So firmly are they anchored that the legs can be pulled off in an attempt to detach them.

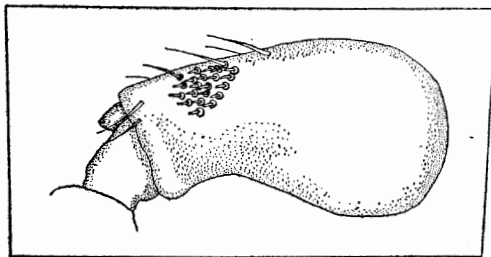
The segments or divisions of the flea's body are armed with sharp, stiff, backward-slanting hairs which apparently serve, as do also the caudal or back edges of the body sclerites or divisions, in aiding the flea to remain on its host when not anchored, by being retained in the hair, fur, or feathers, against which these projections bind, except in a forward motion of the insect.

The outer covering of the flea is very smooth and tough. If an individual flea is firmly appressed between a person's thumb and finger, it will move forward with nearly every contortion of its body until it can escape from the confinement.

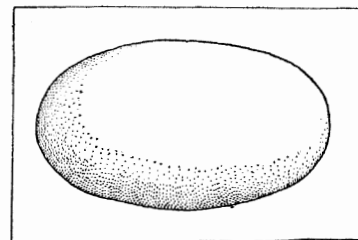
A surplus of moisture placed in contact with the flea's body can be used materially for capturing and confining it. This is one reason why some flea-infested dogs secrete an excessive amount of saliva when ridding themselves by mouth action. Chickens, however, can not moisten the fleas in this manner, and consequently are unable to relieve themselves. In scratching at the fleas in an attempt to dislodge them from their heads, however, they frequently dismember parts of the flea legs, especially the hind pair. This does not seem to seriously affect the fleas because they do not use their feet much after they have become permanently located. If the fleas are attached on such parts of the chicken's body as will permit the chicken to attempt their removal with the beak, they will withstand the attempt to a marked extent, since their extrication is so painful that a chicken seems to prefer the infestation to the pain resulting from extraction.

**Egg-Laying.**—The nature of their habits is such that they are kept warm and engorged with an endless supply of nutritious blood which causes them to reproduce rapidly. They appear to lay eggs daily which drop promiscuously to the ground, except in cases where the skin of the host becomes encrusted over the fleas, thus permitting the eggs to hatch on the host, in which case it is the hatching larvae that escape. In either case, those dropping in the dry litter of hen houses or sheds have better advantages for development than those dropping in moist, clean places.

**The Flea Eggs.**—They look very much like a pigeon's egg in color and shape, but are small enough to drop through the eye of an ordinary-sized



Pore Pegs, Enlarged (Sanb.)



Flea Egg, Enlarged (Sanb.)

cambric needle, consequently they are not easily found. Under normal conditions they hatch within three or four days.

**The Flea in the Larval Stage.**—The eggs hatch into a footless, maggot-like worm, known as larvae. They do not feed on the fowls or other animals infested by the adults. They develop in the trash under the roost and in other similar litter. A rather dry soil is favorable to natural development. A large amount of air moisture is required; wet soil retards and sometimes prevents development. Direct sunlight also checks their activities. The larval stage extends over a period of from two weeks to a month.

**The Pupa or Changing Stage from Larva to Adult.**—This stage is passed in the same material as that in which the larvae develop. When mature the larvae spin silken cocoons in which to transform to pupae. The cocoons are covered with small particles of soil and are difficult to distinguish from small bits of earth. This stage, under favorable conditions, lasts about five days. In cold weather, such as winter, it continues until spring.

**Adult Fleas.**—When the adults, especially the females, attach themselves to the host with their beaks, they remain in this location practically throughout the remainder of their lives. They do not crawl about over the body of the host to any great extent, as is the case with many other species. They have the habit of collecting so thickly on the exposed portions of the head that an infested fowl can be distinguished at quite a distance on account of the dark flea-patched areas.

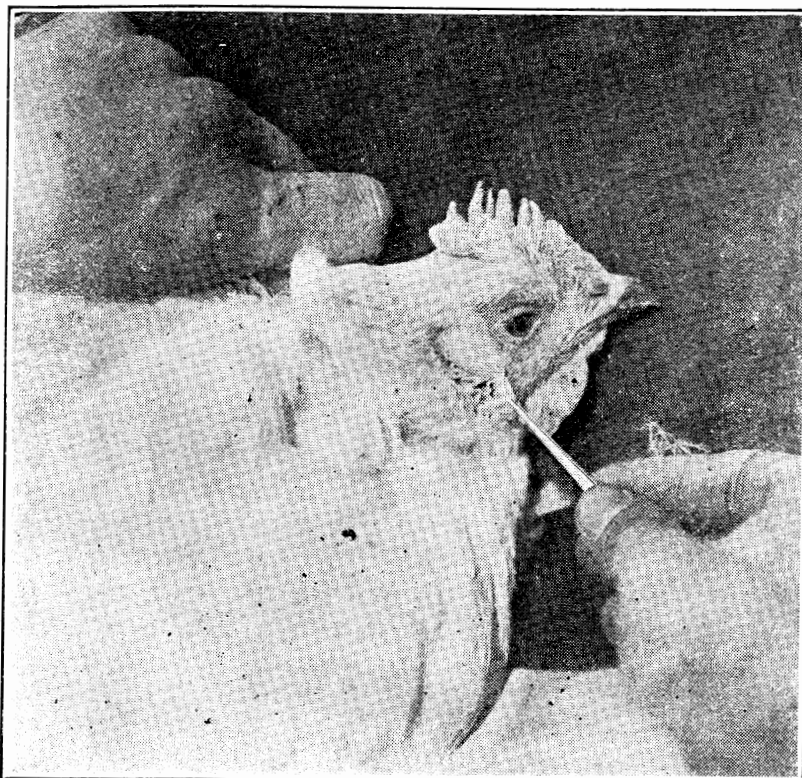
A severe infestation causes a scaly appearance of the infested skin of the host, due to a sort of upheaval of the tissue. The fleas sometimes become almost completely embedded in pockets of this formation. They prefer to locate on areas free from feathers; for instance, around the eyes, on the wattles and comb. In heavy infestations, however, they will locate on feather-covered areas, especially on the upper portion of the head and near the vent. On dogs and cats they generally infest the ears.

**Hosts, or Animals Infested By the Stick-Tight Flea.**—This insect is most injurious to poultry. It is known, however, to attack man, wild birds (owls, for instance), dogs, cats, rats, horses, and a few other similar wild animals. Young chickens suffer the most severe injury when they are subjected to infestation. Older fowls, which possess a more hardy constitution and tougher skin, are better able to resist an attack.

#### Technical Description of Stages

**Egg.**—The egg is elliptical and of a white, glossy appearance, about .25 mm. wide by .4 mm. in length.

**Larva.**—The larva is white and footless. It has antennae or feelers on the head and a pair of appendages extending posteriorly from the last segment of the body. The head is about .14 mm. and the body is .2 mm. in width, and averages about 3.24 mm. long.



Infested chicken head (Photo by H. R. Painter)

**Pupa.**—The pupa is similar to the adult in form, but is whitish in color. It is about .26 mm. wide and 1 mm. long. This stage is passed in a silken cocoon which is generally more or less covered with trash and soil particles. On account of this fact, it is likely to be mistaken for a small pebble or bit of earth.

**Adult.**—The adult is light brown to dark brown in color, and .8 to 1.5 mm. long. The head has two distinct angles on the cephalic margin, and four distinct setaceous hairs on each side. Each eye is located between the largest of these hairs and the antennal pocket. The beak is about .45 mm. long. There are five or six bristles on each metathoracic pleuron, also one located on each side of the median dorsal line on each abdominal tergum, as shown in the illustration (see frontispiece). A spiracle is present near the dorsal pleuron bristle and six other pairs are on each successive segment of the abdomen (not shown in illustration). The hind legs do not have heavy basal segments adapted for jumping. The coxal segment of each hind leg, near the distal end, and on the inner external side, has a patch of sensorial pegs which appear to be organs of touch, and gripping vices for retaining a hold on hairs or similar appendages of their hosts.

**Control.**—A 5% to 10% mixture of kreso in vaseline or lard applied to the infested areas on animals will destroy the pest. Owing to the fact that

some of the fleas may be protected by being partially imbedded in the flesh of the host, they can not be reached with the mixture if it is carelessly applied.

Another mixture, composed of carbolic acid 1 part and vaseline 5 parts, is also effective in destroying the adults. This preparation is applied in the same manner as the kreso-vaseline mixture, but one should prevent any excess of the mixture coming in contact with the flesh of the host, since it may cause inflammation.

One part of kerosene and 2 parts of lard applied to infested parts of animals is also a good treatment.

Direct sunshine on the immature stages checks flea development. The larvae cannot develop in moist places. If the chicken houses or sheds are not modern, and not kept sanitary, the development of the larvae can be prevented by broadcasting a little salt in them. This will finally become moist and retain moisture, but on account of its poisonous effect on poultry while dry, it should be sprinkled with water immediately after application so as to be more effective, and at the same time rendered in such a stage as to prevent chickens from eating it.

Four parts of zenolium in 100 parts of water, sprayed in the poultry houses and yards, is quite effective.

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#### BIBLIOGRAPHY

- 1875 Westwood, J. O., *Entomologists' Monthly Magazine*, Vol. 11,, p 246.  
 1886 Howard and Johnson, *Proc. Ent. Soc.*, Washington, Vol. 1, No. 2, pp 59-60.  
 1889 Johnson, Lawrence, C. *Proc. Ent. Soc.*, Washington, Vol. 1, No. 4, pp 203-205.  
 1894 Francis, M., *Vet. Sci.*; iv. notes on parasites, *Texas Agri. Exp. Sta. Bull.* 30, p. 452.  
 1894 Packard, A. S., "*Insect Life*", Vol. 7, pp. 23-24.  
 1894 Howard, L. O., "*Insect Life*", Vol. 7, p 280.  
 1895 Baker, C. F., "*Canadian Entomologist*", Vol. 27, pp 21, 111, 221.  
 1896 Osborn, Herbert, *Div. Ento., U. S. D. A., Bul.* 5, pp 144-46, Fig. male and female.  
 Herrick, Glenn. W., *Cornell University, Bull.* 359, pp. 254-258.  
 1913 Herrick, G. W., *Jour. Economic Ento.* Vol. 6, p. 84.  
 1914 Wilcox, E. V., *Hawaii Station Report*, p 24.  
 1915 Bishop, F. C., *Farmers Bulletin No. 683,* U. S. D. A., pp 6-7.  
 1915 Herms, *Medical and Vet. Ento.*, Photo of adult, pp. 8, 187, 292.  
 1916 Howard, "*The Insect Book*", p 192.