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SOME LICE AND MITES OF THE HEN

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SOME LICE AND MITES OF THE HEN.

Birds in general are infested with numerous species of lice and mites. The common hen does not differ from others of the class in this respect for there are at least a dozen different species of lice that make hens and chickens their hosts together with several species of mites, the attacks of which are even worse than those of the lice.

Owing to the great economic importance of the hen and her products it is essential that each phase of her life having a bearing upon her productiveness be given considerable study.

There is considerable literature on this subject in books,

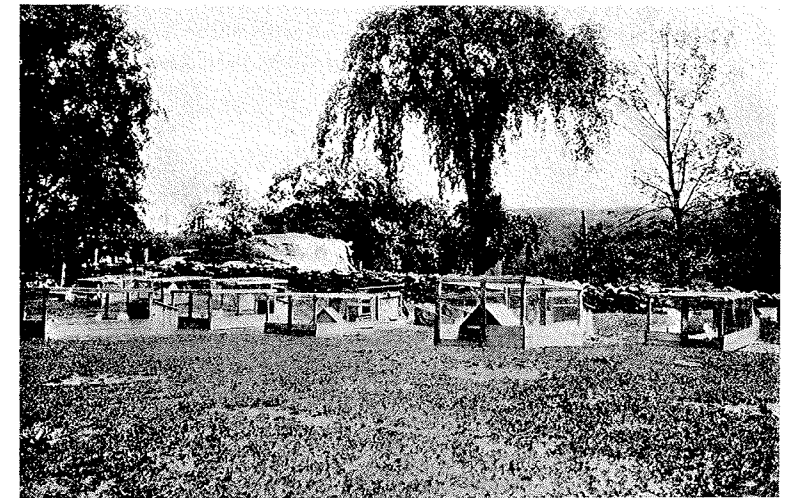


FIG. 1—Pens used in lice experiments.

bulletins, and in agricultural papers but much of it deals with the description of the parasites and not with the little known life histories of these forms while few publications deal with experiments in the use of different control measures when compared with one another under similar conditions. This has been done with many of the fruit and some other insects but few comparisons of insecticides for lice or control measure for mites have been made.

We have placed chickens in the laboratory where they could be under very close observations over an extended time, and have

used a large number of hens and chickens out of doors for the purpose of making comparative tests of different control measures to ascertain their value. (See Fig. 1.)

This work has been carried on at various intervals chiefly during the summers of the past two years though studies were made on the subject several years prior to this time.

The most discouraging thing for those who have had these parasites to deal with is to find that the measures recommended for their control lose their effectiveness very quickly after application. Then they have given up the attempt at control feeling sure that there was no real remedy for these pests.

It is the purpose of this bulletin to show the effectiveness and ineffectiveness of certain control measures for lice and mites and to emphasize the essential phases of their habits, a knowledge of which is essential in order to apply properly suitable remedies.

BIRD LICE (*Mallophaga*).

The lice that are found on poultry belong to that group of insects called *Mallophaga* and are generally known as bird lice or biting lice. They are commonly found upon birds though a few infest mammals. They do not occur indiscriminately but usually each species is peculiar to a certain species of animal. Sometimes the same species may be found on other than its normal host and when this occurs it is generally observed that their hosts are nearly related forms or are brought into close contact by their modes of life. On the other hand a given host may support several species of lice. Certain lice even show a preference for restricted regions of the bird's body.

These parasites have bodies much flattened although this is not noticeable when looking on them from above but is very conspicuous if one observes them from the side. The body is well protected by a hard outer covering. The head is quite large, varying in shape, and having about half way back on the side two feelers (antennae) which differ greatly in the various species, sometimes being different even in the male and female of the same species. The antennae may consist of three, four, or five segments. On the under side of the head and near the middle is the mouth, which is fitted for biting the hairs, feathers,

and scales of the skin. The principal structures of the mouth are the jaws; (mandibles). Bird lice do not suck blood. Naturally they eat the clotted blood that is found at the edge of a wound or cut. The bird lice are thus separated from the true blood-sucking lice that infest mammals. These true lice have beaks fitted for sucking blood and belong to an entirely different group of insects. The eyes of the bird lice are situated on the side of the head posterior to the antennae, in some species not being very conspicuous; in others large and prominent. The thorax apparently consists of two segments. The legs are rather stout; in some cases fitted for clasping, in others for running. The legs of all of the species that infest poultry have two claws and are well fitted for moving rapidly about. The first pair of legs is the shortest of the three pair. Lice never have wings. The abdomen is the largest region of the body; in some genera long and narrow, in others more robust. The end of the abdomen sometimes differs in the two sexes.

LIFE HISTORY.

Bird lice undergo an incomplete or direct metamorphosis. The eggs, commonly known as nits, are fastened securely to hairs or feathers. (See Fig. 2). They are usually laid singly or at least only a few together but when a bird is very badly infested the eggs may form large clusters on the feathers; fresh ones having been laid upon the empty shells of those already hatched. The young emerge in a few days, resembling their parents, being very small, light in color and with certain parts of the body not fully developed. There are several moults, each bringing the young nearer the size and likeness of the adult so that the markings of the adult appear gradually with the growth of the young. As soon as hatched they are active creatures fully capable of taking care of themselves. Lice remain upon their host throughout their entire lives and it is only by accident that they are found elsewhere. They spread rapidly from one individual to another, thus chickens easily become infested when hatched or brooded by a lousy hen. Often infestation is brought about by introducing hens which are infested, therefore, new stock should be isolated and treated for parasites before allowing

it to run with other birds. It has been supposed that the English sparrow is instrumental in spreading lice among poultry yards and since this sparrow is often closely associated with poultry it is possible that this belief is correct. Chickens from an incubator should be perfectly free and if brooded artificially and kept away from other stock should remain so for a time. Lice require a certain amount of warmth which they secure from their host so that they will leave a dead bird soon after the flesh cools. In this way they may become separated from the fowls and wander about seeking a new host but if unsuccessful, in a few days will die. Eggs do not occur away from the host except possibly where feathers have moulted with nits attached to them. Lice are not produced by filth, sawdust or any other means except by



FIG. 2—Eggs of hen lice.
Natural size.

eggs which have been laid by other lice so that one can be sure that lice are not increasing and developing in any location except on the body of the host.

There are about a dozen species of lice that infest the domestic fowl, of which perhaps four or five are common while the others are not as numerous. These are included in four genera, namely: *Menopon*, *Lipeurus*, *Goniocotes* and *Goniodes*. The common body lice belong to the genus *Menopon*. Those species that belong to *Lipeurus* are rather long and narrow although the head louse is quite robust. *Goniocotes* and *Goniodes* are very robust forms.

LARGE BODY LOUSE.

Menopon biseriatum Piaget.

The large body louse, (Fig 3), is one of the species most commonly found upon poultry. We have found it to be more

abundant than the small body louse. These two species resemble each other, both in habits and form but the one under discussion is much larger. It has two transverse rows of hairs on the dorsal side of the first seven abdominal segments while the smaller species has only one. The head is quite small in comparison with the remainder of the body, having highly pigmented eyes. Adults vary from one-tenth to one-eighth of an inch in length and are yellowish in color, oftentimes with dark centers due to food in the body.

LIFE HISTORY AND HABITS.

The eggs (Fig. 4) are attached securely to the feathers near the body of the host. On young stock or slightly infested fowls, the eggs are more or less scattered with only a few on a feather while on badly infested stock large masses of eggs, hatched and unhatched, may be found on the feathers below the vent. The first eggs laid on chickens are fastened to the feathers of the back of the head and neck; later the eggs are laid near the vent. The egg is whitish, and elliptical, pointed somewhat like a torpedo, fastened at one end and having near the opposite end a ring of spines. The egg is about one thirty-fifth of an inch in length.

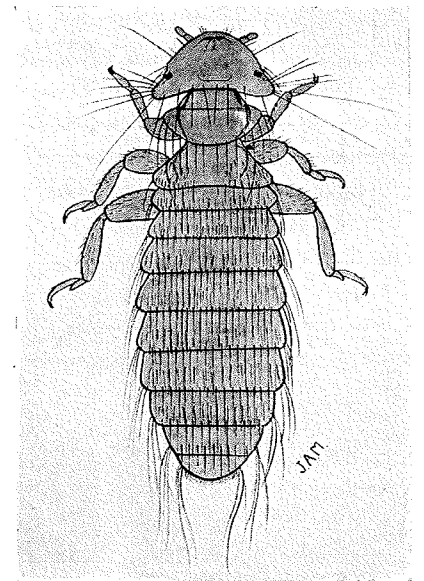


FIG. 3—Large body louse (*Menopon biseriatum*) 19 times natural size.

A few eggs on chickens were found to hatch in from five to seven days, the young reaching maturity and laying eggs in somewhat less than seventeen days. This would indicate a life cycle of about three weeks. No doubt varying temperatures and other conditions tend to modify the lengths of these periods.

This louse is found on certain regions of the hen oftener than on others. On infested chickens it is more abundant under the wings where it finds warmth, but is also abundant around the vent and may be found on the head while the rest of the body is more sparsely infested. The most common area infested on older birds is around the vent but specimens will be found scattered about the body. It is very active, dodging about and escaping capture with a marked degree of agility. This species, as well as the next, is a body louse for it is rarely found on feathers or any part of the bird except the flesh.

The large body louse increases rapidly. Three to four week old chickens are often very badly infested while older stock may harbor thousands of lice. Three thousand six hundred of this species were counted from one chicken and this number probably did not include one-half of those present. Most of them had increased from perhaps a dozen lice in three months. From another chicken one month old nine hundred and twenty five lice were counted.

It is difficult to determine the amount of injury done to poultry by lice. As pointed out elsewhere, the serious effects caused by mites are often attributed to lice as the latter are more easily noticed. Poultrymen do not agree in regard to this subject as some believe lice responsible for many diversified ailments and an important factor in the health, weight, and egg production of hens while others

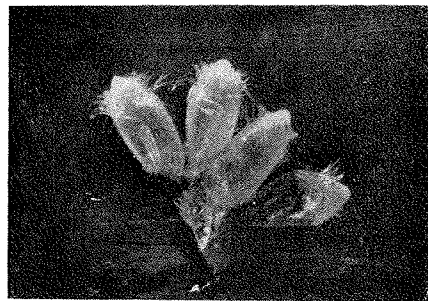


FIG. 4—Eggs of large body louse
23 times natural size.

have the conviction that they are not of enough importance to trouble with. While they cannot produce some of the injurious effects credited to them it is obvious that the irritation caused by thousands of jaws biting the scales of the skin and the ceaseless running about of a still greater number of feet, each foot armed with two sharp claws, must be considerable. The flesh just

below the vent of badly infested fowls is often much reddened by this constant irritation and may even show the presence of clotted blood. Great numbers of lice are frequently found upon sick hens and are believed by some to be the cause of the unhealthy condition of their hosts, but this is not always true. Birds weakened by sickness present a condition favorable to a very rapid multiplication of lice; on the other hand, those weakened by lice are more liable to contract disease. As might be supposed chickens are more seriously effected than the older birds.

These body lice, in some way, travel from one bird to another readily so that if one bird in a pen is lousy, the others are sure to become infested but the infestation may not be evenly distributed. This species even travels to other barnyard fowls and seems able to carry on its life activities there. We have found it upon turkeys.

SMALL BODY LOUSE.

Menopon pallidum Nitzsch.

The small body louse (Fig. 5) is reported by most authors

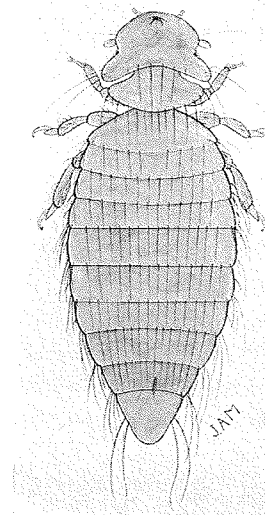


FIG. 5—Small body louse (*Menopon pallidum*) 36 times natural size.

as the commonest louse infesting the hen in the United States. It is smaller than the one just discussed and is lighter in color. The length of the body is somewhat less than one-sixteenth of an inch. Each segment of the dorsal side of the abdomen, except the posterior two, has a single transverse row of hairs.

The general habits of this louse are similar to those of *M. biserialatum*. It is an active body louse, usually more abundant around the vent, and passes through a life history comparable with the species before mentioned. It has been reported to infest horses which have been stabled near poultry.

HEAD LOUSE.

Lipeurus heterographus Nitzsch.

Because of the habits of this species it seems natural and justifiable to call it the head louse (Fig. 6). It shows a preference for that region of the fowl and only occasionally is found on other parts. Infestation is most prominent on the feathers of the head but it often shows on the neck and sometimes a few lice are found on the feathers of the wings. It has been stated often that lice dig into the flesh and even eat the brains of chickens. Undoubtedly this is the species that has caused this misconception. Often it is found on a feather with its head close to the body of the chicken but we have never seen the head imbedded in the skin. The mouthparts are not fitted for this sort of work, so that it does not seem probable that these lice ever actually bite through the skin.

The head louse is much darker in color than either of the body lice and is quite easily seen especially if the feathers are white although it might be mistaken for a bit of earth or other foreign matter on the plumage. The body is edged with dark bands and there are markings of the same shade across the abdomen. The first segments of the antennae of the male are very large and the third segments are branched while the antennae of the female are slim. This louse averages slightly less than one-tenth of an inch in length.

LIFE HISTORY AND HABITS.

This louse lives differently from the two previously described, being found upon the feathers and not on the flesh. It is much less active but can easily slip between the barbs of the feathers and disappear from sight. Its feet are better fitted for this work than for running on a plane surface. While usually found near the body it is sometimes seen an inch or two from the base of the feathers. It can live away from the fowl at normal temperatures for a longer period than the body lice, probably because it is accustomed to the cooler region of the feathers. The head louse does not multiply as rapidly as these other lice. Hens are often found with only a moderate infestation although they

may not have been treated for lice for a long time, however, this louse increases very rapidly on chickens.

The eggs are glued to the feathers of the head and neck, being attached to the barbs, often between the shaft and after-shaft. Eggs were observed to hatch on chickens; some in four days, others in five, the average being five days. These reached maturity and in turn laid eggs in ten days after hatching. Thus the period from egg to egg would be about fifteen days.

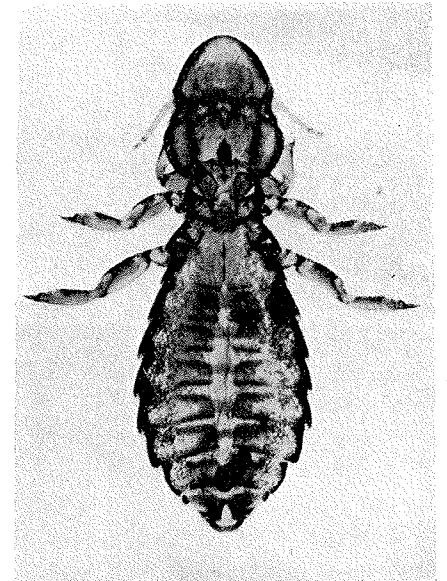


FIG. 6—Head louse (*Lipeurus heterographus*) 26 times natural size.

OTHER LESS IMPORTANT LICE.

Besides the three species of lice previously discussed there are several others of more or less importance infesting hens. These do not seem to be so widely distributed nor are they so abundant when found. *Lipeurus variabilis* resembles the head louse in a general way with its body smaller and somewhat narrower but marked along the edges and middle of the abdomen in much the same manner. This louse is usually found upon the feathers of the wings. *Gonicotes abdominalis* (Fig. 7) is a very large species with its head broader than long and its abdomen very robust, and margined by a series of tongue-shaped blackish markings. The length of the body is one-eighth of an inch or slightly longer. *Gonicotes hologaster* is small and rather inconspicuous, being about one twenty-fifth of an inch in length.

Its body is rounded, light in color, and with small markings along the edge. We have found it upon the feathers on the under side



FIG. 7—(*Geniocotes abdominalis*) 23 times natural size.

of the hen. There are a few other species of lice that have been collected on hens but they are not common enough to be of much importance.

LICE CONTROL.

One finds in literature on lice control many methods recommended. The most effective method tried for body lice was the application of a dilution of either mercurial ointment or blue ointment. Mercurial ointment contains fifty per cent. of metallic mercury.

Blue ointment is a mixture consisting of sixty-seven per cent. of mercurial ointment and of thirty-three per cent. of vaseline and, therefore, contains thirty-three and one third per cent. of mercury. Mercurial ointment costs one dollar and a half per pound while blue ointment costs one dollar and a quarter, so that the former is cheaper considering the amount of mercury present.* The mercury is the most important ingredient as it is most active in killing the lice, although vaseline and lard have some merit.

In our experiments these ointments were tried in various strengths and were applied in varying amounts to different regions of the body. One hundred and four chickens were treat-

*These are representative prices for 1915-16 and are probably much higher than will occur in the future, owing to conditions caused by the European war.

ed in the laboratory where they could be under close observation and many fowls of all ages were used out-of-doors. The normal strength of blue ointment was found to be very effective and even a dilution of this proved satisfactory but the effectiveness decreases with the amount of mercury present. The cheapest method is to buy mercurial ointment and mix it with vaseline at home using one part of the ointment to one or two parts of vaseline. Place these ingredients on a pane of glass and work them together with a case knife. Be sure that the mixing is thoroughly done so that a smooth ointment is obtained. Place in a receptacle and be sure to label. An ounce is sufficient to treat about seventy-five hens.

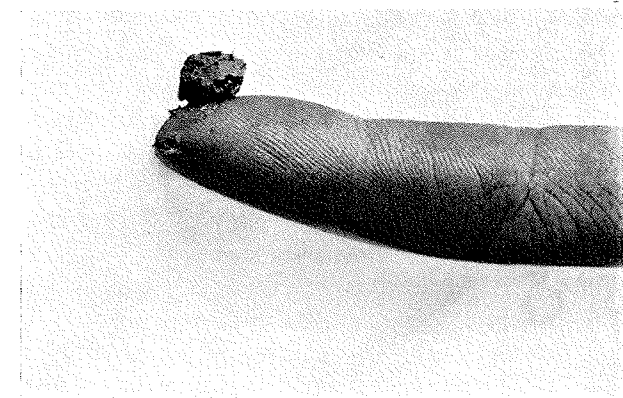


FIG. 8—The approximate amount of ointment used for one hen.

On chickens the most vulnerable point of attack proved to be on the body under the wings while an application around the vent or anus was also effective. Ointment placed on the head was not as efficient. The best region for application on older stock is just beneath the vent. The method of application is to take an amount about the size of a pea on the finger (Fig. 8) and after parting the feathers rub it on the flesh just below the vent. This will not cover a large area but it is not necessary to do so. This method has been proved successful by repeated tests and has many advantages over other methods. It is often im-

possible to find a single louse on birds thus treated. The ointment remains effective for a considerable time so that lice hatching from eggs laid before the treatment are also killed. In other words, one application will keep the hen practically free from these lice for several months. This method of control is simple, cheap, and efficient. If one wanted to be doubly sure of results one could apply the ointment to two or more regions or could repeat the application. Ordinarily these precautions are not necessary.

In spite of the care taken to apply the ointment only on the flesh some of the feathers also will be smeared. These will present a soiled appearance due partly to the ointment and partly to the dirt and dust that stick to the greasy feathers. Fowls that must be kept clean for exhibition or show purposes can be treated for lice by dusting, as explained on page 195.

Mercurial ointment sometimes causes a slight burning, shown by a reddening of the skin which happens more commonly on young chickens. It is thought by some that this is brought about by the bird becoming wet after the treatment. We have never had any serious nor permanent effects from this burning.

A large share of the time used in treating hens for lice is spent in catching the birds. This may be reduced and much trouble saved if the application is made at night after the hens have gone to roost.

It does not seem possible that a small amount of mercurial ointment applied to a restricted region of a bird's body will free it from body lice but the results are certainly above expectation. A hen thus treated was kept in a glass case where close observation was possible. Many dead lice dropped to the floor of the case while only three live ones were seen to leave the bird. The ointment evidently kills the lice on the bird and also those that hatch soon after the application. Fowls show a great reduction in infestation on the day after treatment and in a few days are free. No doubt those eggs that happen to be covered with the ointment are killed but, of course, not all are touched so we have young hatching out for several days even after the adults have disappeared. The common body lice roam about over the body of the host. It is commonly believed by some that they must go

regularly to the vent of the fowl for moisture. If this is so then the best place for the application is around the vent, but experiments with chickens show that the most effective point of attack with them is under the wings on the body. Even treatment of the head brings about a great reduction in the number of lice. Thus it would seem that the lice move about promiscuously over the body of the fowl, frequenting some regions more often than others. When they are unfortunate enough to travel to the region treated they are killed or driven away by the ointment.

One of the oldest and most common methods advised for treating lousy birds is that of dusting which is discussed on page 195. In our experiments this method has proved unsatisfactory. Its effect is only temporary, not all of the lice nor the eggs are killed so that the process must be repeated once or twice to be at all effective.

Dipping the fowls in an insecticide is another method sometimes recommended. We do not believe this method necessary nor advisable.

When poultry is infested with the head louse a slightly different line of treatment is necessary.

Blue ointment, lard and vaseline, applied to the head, have been found to be more or less effective. Lard used liberally is perhaps the best remedy, taking into consideration cheapness, safety, availability and effectiveness. It has been our experience in most cases that a second application should be made in less than two weeks after the first. Perhaps the reason why the head louse responds more slowly to treatment is because it moves about less.

One of the commonest mixtures prescribed for lice on the heads of chickens is composed of sulphur and lard. This is a dangerous mixture to use on poultry as pointed out elsewhere in this bulletin.

GENERAL CHARACTERISTICS OF MITES—*Acarina*.

Mites belong to the same class as the spiders, the *Arachnida*. They differ from the insects in several marked characteristics: the most readily distinguished differences are in the body regions and in the number of legs.

Insects have three body regions, head, thorax and abdomen, while the spiders have the head and thorax fused to form a cephalothorax, also an abdomen. The insects have six legs while the mites have eight.

The mites deposit eggs as do the insects, though some of them have their young born alive, without depositing eggs, the viviparous method of reproduction. Usually, however, the young hatch from the eggs with six legs and are called larvae, later they pass to the eight legged stage and are called nymphs. During this stage they moult several times and in due time become mature or adult mites.

Many of the species are very small but they make up in numbers what they lack in size.

Instead of biting off scales of the skin and working on the feathers as do the lice, the mites suck the blood from the animal or the juices from the plant upon which they are at work. Not all of the mites are parasitic, many are to be found on the ground, among the leaves.

Owing to the fact that the roost mites hide away during the day in some part of the poultry house, they may exist a long time and not be seen by the poultry keeper who ascribes all abnormal conditions of the hens or chickens to the lice which are to be found on the hens being so plainly seen and even felt when their numbers become great.

The hen must be treated for the lice and the scaly leg mite but the roosts and parts of the house must be treated for the poultry or roost mite.

While lice are relatively short lived, mites are long lived, lying dormant in their hiding places for several months without food.

The Texas fever tick is somewhat related to the roost-mite and it has not yet been determined how many poultry diseases are transmitted by these minute forms of life, the mouthparts of which are not unlike hypodermic needles that are inserted into one hen to draw a certain amount of blood and later applied to another hen. There are so many examples of disease transmission by similar methods that it would not be strange if future

study shows that the roost or poultry mite is as important a disease carrier among poultry as mosquitoes, fleas and body lice are among men.

THE POULTRY MITE OR ROOST MITE.

Dermanyssus gallinae DeGeer.

Hens and chickens are infested with very small spider-like parasites that differ distinctly from the lice in their form, development and method of attack. There are many kinds of mites, among the most common of which are the scaly leg mites, depluming mites, cheese mites and the roost mites, often called by some the poultry mite or red mite. It is this last named species that we desire to describe. (See Fig. 9.)

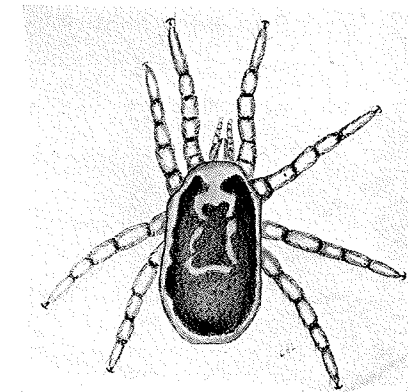


FIG. 9—Poultry or roost mite (*Dermanyssus gallinae*) 27 times natural size.

Instead of remaining on the hens and chickens at all times as do the lice, these mites hide in the cracks and crevices of the poultry house during the day. At night they crawl along the roosts to the fowl and after finding a suitable place to feed they suck the blood from the hen or chicken and usually conceal themselves again at the approach of light.

The most common place of hiding is between the boards supporting the roosts and the sides of the poultry house. When these boards are removed white frosted areas appear in which one may find thousands of minute spiders struggling to get away from the light and beside them are their eggs together with the cast skins of numerous generations. (See Fig. 10.) Sometimes small numbers are found in knot holes and cracks in the roosts.

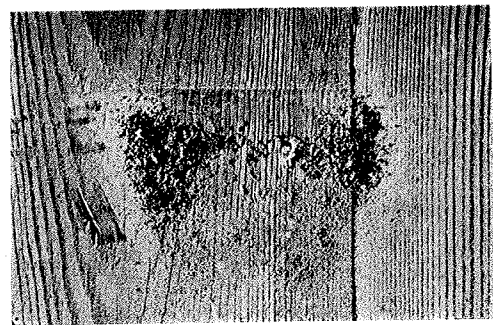


FIG. 10—Swarms of mites found behind roost support. About natural size.

If poultry keepers are unfamiliar with the signs of these mites they are not likely to see them unless they remove one of these boards covering their hiding place, for mites are usually so well concealed that their presence is seldom noticed until they get to be very numerous.

DESCRIPTION.

Mites are .9 m. m. ($1/29$ of an inch) in length and vary in color. When without food for a long time they are usually light gray but immediately after feeding they are bright red, due to the engorged blood. The color changes as time goes on so that they may be almost black, then the body grows lighter until it is gray. This process takes several days.

Eggs are laid from early spring until late fall. Usually each female lays about four eggs in a period of two or three days, repeating this at intervals for a considerable length of time. These eggs hatch in from two to six days, the period of incubation depending on the temperature and averaging four days. The eggs when viewed under the microscope are seen to be spherical in shape, white and glistening. They can be found in the hiding places of the mites.

When first hatched the young have but six legs and are colorless. The first moult or skin-casting process occurs in a day or two and then the mite has eight legs. The young can

live a considerable length of time before feeding; a few of the young have been kept through the entire winter without having had an opportunity to get food.

LIFE HABITS.

Mites of different color can be found together at the same time, indicating that they do not feed every night but at irregular intervals of time.

Adult mites were kept alive out of doors from November to March in test tubes and during this period they had no opportunity to eat. Live specimens were found in a poultry house in which no hens or chickens had been kept for five months, including some of the winter months.

Mites are not active during the cold weather. In November and March they are seen on warm days. Their numbers increase slowly at first but faster as the temperature rises. In the

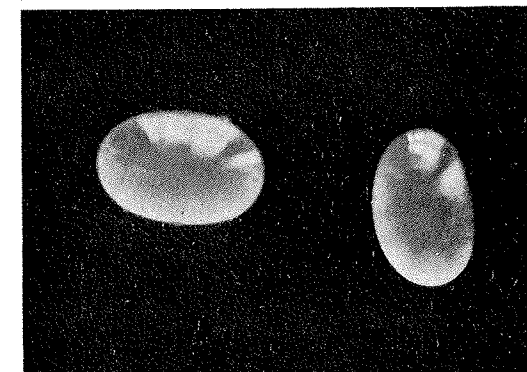


FIG. 11—Eggs of poultry or roost mite.
57 times natural size.

fall they gradually decrease. On warm days or nights during the winter some may be active and feed, but as the weather turns colder they hide away to become dormant.

Just how these parasites find their way into newly constructed poultry houses will probably always remain mysterious owing to their small size and inconspicuous appearance which

allow a few of their number to pass unnoticed, and their presence is only known when they increase to a point that makes bird life distinctly uncomfortable.

Cases have been reported where these mites have proved annoying to man. It is not uncommon for them to attack several farm animals, particularly horses.

They cause the death of some hens, particularly setting hens that are placed in dark houses where the mites swarm over them and feed on them a goodly proportion of the twenty-four hours. That they kill or stunt chickens and causes hens to stop laying is certain.

REMEDIES.

Like all serious conditions difficult to control there have been a large number of different measures recommended to kill or repel mites in the poultry house. The list is a long one, containing kerosene, kerosene emulsion, carbolic acid, zenoleum, the use of tar paper on the sides of the walls of the house, dipping or soaking the roosts in tallow, many kinds of oils, oil cups, white wash and other remedies, each of which has some good quality to recommend it and may be somewhat effective.

The control of a parasite must of necessity be regulated to meet its method of attack. Because the mites are usually hidden either in cracks or holes in the roosts or about the poultry house, having to pass over the roosts to attack the hens, it is important that the roosts do not offer hiding places for the mites. An application to the roosts and particularly to the boards supporting the roosts that will either repel or kill the mites as they crawl over these points to reach the hen is the efficient method of control.

We have found that such applications as kerosene evaporate so quickly that they lose their effectiveness in a few days and the mites soon become as numerous as before. The control measure must remain effective for a long period of time. Many control measures are not strong enough to repel so tough an invader as the roost mite proves himself to be for this reason the control measure to be effective must contain a very active agent.

In comparison with kerosene oil, zenoleum and carbolic acid we have found that carbolenium is a far more effective means of ridding the hen house of the roost mites. Containing a coal tar product and carbolic acid it acts as a wood stain and remains effective for a long period of time, being even more effective than pure carbolic acid. While carbolenium is recommended because it has been tried and found most efficient it is quite likely that other coal tar products have a similar degree of effectiveness. These are sold under different trade names, one of which is "Flykill." This is cheaper than carbolenium costing \$11.50 for fifty gallons and is nearly as effective. Ordinarily the carbolenium is sold for one dollar and a quarter a gallon or five dollars for a five gallon lot. For flocks of hens where a comparatively small quantity of liquid is used for mites we would recommend using carbolenium but for those who need larger quantities we would recommend one of the coal tar mixtures that can be bought by the barrel at a lower rate.

Discretion is necessary in the use of any of the coal tar products as an excess amount either on the roosts or on the adjoining boards may result in eye trouble to the hens or chickens. To avoid this it is best to make the application when changing the stock from one house to another, giving time for the mixture to dry into the wood for at least two days, or if treating the house for chickens, allow a week or ten days for it to become thoroughly dry. If this cannot be done it is better to dilute the product with kerosene or to apply sparingly with the brush, wiping off the excess with an old rag and allowing the place to dry for a day before returning the stock to the house. If roosts are allowed to dry outside of the poultry house there is less danger of injury to the fowl. If used regularly each year one application is usually sufficient. Should there be signs of the return of the mites, however, another application should be made or if the houses are badly infested two or more applications may be necessary.

ROOSTS.

An obstacle to the control of mites in the poultry houses is often found in the manner in which roosts are supported by boards nailed directly to the sides of the house. This prevents

the liquid from reaching the most common hiding place of the mites and usually the surfaces are only partially covered with the

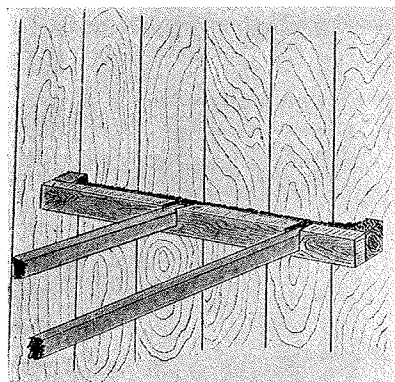


FIG. 12—A suggested method of reducing the breeding places of mites.

liquid. Owing to the fact that the boards are so close together that it is impossible to do more than thoroughly soak the point where these meet, much surface is left uncovered because of this chance method of application. To overcome this we suggest blocking the roost supporting boards at least two inches from the walls of the house to facilitate the application of any control mixtures with a brush and to reduce area of the hiding surface for mites.

To explain this a diagram is shown, some modification of which may be adapted to local conditions. (See Fig. 12.)

Particular care must be taken of nest boxes of laying and setting hens. This is treated on page 194. In some cases brooders become very badly infested with mites causing considerable losses among the chickens. When this occurs it is always best to take the brooder apart, carefully painting all the wood-work with one of the cold tar products such as carbolenium, Flykill or crude carbolic acid and after it is thoroughly dried for at least two weeks the brooder may be used again.

The average poultryman desires to use something that he does not need to apply more than once or twice a year and feel certain that it will be effective.

We do not feel that spraying the interior of the house is necessary nor practical for the reason that the line of the attack mites is over a necessarily restricted area hence an application to the roosts and adjoining boards is simpler and in every way as effective. But few poultry houses are tight enough to make fumigating an efficient means of control. If used it must

be repeated in order to kill those hatching from eggs at a later date.

THE SCABIES OF SCALY LEG MITE.

Cnemidocoptes mutans Robin.

On the legs of some birds there occurs a parasite that is seldom seen, but the effects of which are very conspicuous. (See Fig. 13). Large irregular scales and gray masses on the feet of hens bear abundant evidence of the presence of scaly leg mite or scabies, a form closely related to the scabies on sheep. This is a minute and much degraded spider-like animal, so small that it cannot be detected with the naked eye, which burrows under the skin where it lives and breeds.



FIG. 13—The legs of a hen infested with scaly leg mites.

When the legs of the hen infested with the mite are examined bright red blotches will be noticed on the sides of the legs, due to the attacks of this parasite. More blood is drawn than is eaten by the mite and the remainder hardens and forces the scales upward and outward. Not only does this make a bad appearance but it is a great annoyance to the hens, causing them in some cases to stop laying. Lameness is often a result of the work of this parasite.

DESCRIPTION.

The mite is very small, measuring about .5 m.m. (1/50 of an inch) nearly round in shape and grayish white in color. (See Fig. 14). In order to find the mites it is best to soak the legs of the infested hen in soap and water for at least five minutes.

brushing away the dirt accumulated there, softening the abnormal masses of tissue and irregular scales. With a lens, mites may be seen well embedded in the skin beneath some of the scales. When placed under the microscope the body is seen to be nearly opaque, its surface covered with shallow transverse lines.

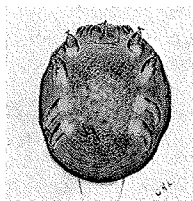


FIG. 14—Scaly leg mite
(*Cnemidocoptes mutans*)
44 times natural size.

The young have but six legs and move about until they find suitable place to feed, either on the hens on which they were born or upon others to which they may migrate. Undoubtedly the chief places where normal hens may become infested are the roost and nest boxes.

Many poultry raisers are not troubled with scaly legs on any of their flock until they buy an infested bird and thus start the trouble. When birds are badly infested with these minute tormentors the effects are very readily recognized but when the mites are less numerous the legs show little or no sign of being abnormal, for this reason a close observation of the condition of the legs of the hens is necessary in order to identify the trouble in the early stages. To do this saves a great deal of work and is much more satisfactory than to try to treat the birds after they have been badly infested.

REMEDY.

There are many remedies for this mite as any oily preparation having some penetrating power will kill them.

To prepare the legs of the infested hen for treatment it is best to soak them freely in warm soapy water using a brush to loosen the scales. Then apply the active agent for control. This may be any of the following:—sulphur ointment, kerosene and lard, caraway oil, caraway oil 1 part and lard 4 parts or a mixture of caraway oil and white vaseline. Some recommend dipping the infested hen's legs in kerosene oil though this is not without some danger of burning especially if the feathers are wet.

In our work we have found nothing better than caraway oil mixed with lard, one part of the former to four parts of the

latter. This remedy was first recommended by Haiduk.* At the present time caraway oil is sold at drug stores at about thirty-five cents an ounce; when this is diluted with either lard or white vaseline, however, it is not an expensive remedy.

Badly infested legs are slow to show signs of improving for while the mites are killed the scales may never gain a normal condition.

Another remedy, sulphur ointment, can be bought at the drug stores for about ten cents an ounce or one can buy the powdered sulphur and mix this thoroughly with lard, using nine parts of lard to one part of sulphur by weight.

Some poultry men kill a bird that is badly infested with this parasite, feeling that this is by far the easiest way out of the trouble. This, however, is not deemed necessary.

SANITATION.

In studying these external parasites of the hen the factors of free range, housing and feeding were found to be much more important than were at first judged possible; owing to the fact that hens in a healthy condition when given proper houses and food, together with the opportunity to exercise, are able to do well even though they are infested with lice.

An experiment was made with three hundred white leghorn chickens, one hundred and fifty of which were infested with lice during the first week of their lives. Another one hundred and fifty were kept nearly free from lice until they were six months old. Both lots were weighed after they were a day old and were kept in the same kind of houses with the similar kinds of food and range. Each lot was weighed at the end of each month. At the end of six months the average weight of those infested with lice was the same as the average weight of those not thus infested. Only nineteen of the three hundred were lost during the experiment and those deaths were mostly due to chills after the young chicken has got through the cardboard wall around the hover. The low mortality indicated a generally good condition of the stock, and with proper food, a goodly amount of sunlight and an opportunity to exercise, was enough to counteract the injurious effects of the lice.

*Haiduk, T. Die Fussränder des Geflügels. Inaug. Diss. Giessen, 1909, pp. 1-58, Taf. I-VI.

Had the infested lot of one hundred and fifty chickens been kept in close confinement as is necessary in many suburban poultry houses, had they been poorly nourished and been kept in dark houses, the probable result would have been a great increase in the number of lice and a stunted growth with a poorer egg yield at maturity.

SETTING HENS.

In all probability it is the setting hen that suffers most from lice and mites though sick hens have much the same trouble. Inactivity on the part of the hens means a great increase in the number of the lice at all times, and offers the best opportunity for the attack of mites. Many setting hens are literally driven from their nests by these pests and it is not a rare thing to find that the hen has been killed by the mites.

Not only is the setting hen inactive but the nest made for her is very commonly placed in dark recesses where she will be less likely to be disturbed by other hens or by the keeper, hence she is placed under conditions best suited for the mites to work, not only during the night but much of the day. A close examination of the nests may reveal swarms of these mites well filled with the blood of the hen that was covered or too far away from the direct sunlight. In order to guard against this it is well to prepare for such emergencies, painting the nest boxes with carbolenium late in the winter or in early spring, giving time for them to dry thoroughly before they are to be used, by using clean nesting material, by placing the nests where some sunlight will reach them and if covering is needed, wire will be found preferable to boards.

In case the hen has been treated not long before setting with mercurial ointment no further treatment may be necessary but if large numbers of lice are found on the hen, use the ointment sparingly so as to avoid any excess that would grease the eggs as this might injure the developing embryo within by cutting off the supply of oxygen coming through the pores of the shell.

If dusting is practised it will be found necessary to repeat the application if the numbers are to be reduced hence further disturbance with more danger of broken eggs will occur.

DUSTING AND DUST BATHS.

The natural method for hens and chickens to rid themselves of lice is to wallow in dust. When there is free range and an opportunity for them to reach a sufficient amount of dry dust, they instinctively find relief in dusting. A certain amount of benefit is derived from a dust box placed in the hen house, giving the fowls the opportunity to take care of themselves somewhat. Too much is usually expected of this means of ridding hens of lice, however, for close observations have shown that the use of dusting and dust baths have only a temporary effect upon the numbers of these parasites to be found on the fowl.

In all probability the best dusting method is the use of the Cornell (Lawry) powder. It is made in the following way: "Two and one-half pounds of plaster of paris is spread in a shallow pan or tray, one-fourth pint of crude carbolic acid is poured into a receptacle, and into this is poured three-fourths of a pint of gasoline. The mixture of gasoline and acid is poured over the plaster of paris and thoroughly mixed. It is then rubbed through a wire screen on a piece of paper and allowed to stand for from one and one-half to two hours or until thoroughly dry. It must not be placed near a flame or any heat. The powder should be kept in a closed can or jar where it will retain its strength for a long time."* This should be applied while the bird is held head downward so that the powder will work well into the base of the feathers. It is recommended that this should be repeated in two weeks.

In our experiments the use of this powder as well as pyrethrum and other lice powders were all found unsatisfactory for within a few days after they had been applied the numbers of live lice on the fowl were not materially reduced. While one can shake many dead lice from a hen that has been thoroughly dusted at the time of application yet the dust is an active agent for so short a time that it cannot be considered as a desirable control unless it is applied at very frequent intervals. It is this difference between the temporary effect of dusting and the lasting effects of the mercurial ointment that we wish to emphasize.

*Circular Letter, Dept. of Poultry Husbandry Cornell University.

THE USE OF SULPHUR ON CHICKENS.

We cannot give too emphatic a warning against sulphur which is a very commonly recommended remedy for the control of the lice on chickens because its use usually leads to disastrous results. A great many have used sulphur and lard, a seemingly harmless combination, on chickens that have been infested from

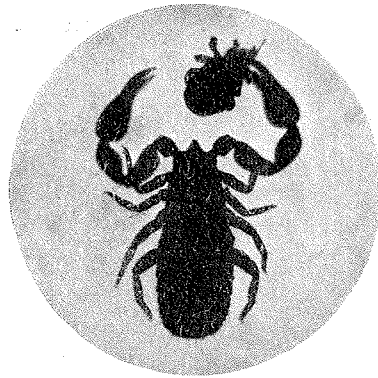


FIG. 15—A pseudoscorpion attacking a poultry mite 13 times natural size.

the lousy mother. Not knowing in just what proportion to make this mixture, the novice has added enough sulphur to make it yellow, feeling sure that it would be effective. It is the effectiveness of this preparation that leads to such bad results for the sulphur soon begins to burn the tender skin of the chicken, making sores that seldom heal and it is often the case that from one-quarter to one-half the young chickens thus treated die in from two to ten days after the application is made.

It is much better to use the lard, sweet oil or blue ointment but never subject young chickens to the danger of burns from the use of such an active agent as sulphur. Burns and subsequent sores should be guarded against as much as possible for more harm will arise from these than from the work of the lice.

NATURAL ENEMIES.

Both bird lice and mites seem especially free from the attacks of natural enemies. A pseudoscorpion collected in a poultry house showed a fondness for roost mites. (See Fig. 15). These little animals are not common so that their effect on the numbers of mites is probably negligible.

ACKNOWLEDGEMENTS.

We wish to express our appreciation to the members of the poultry department of the Connecticut Agricultural College and Experiment Station for their suggestions and coöperation in these studies.