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Texas Screw-worm (Compsomyia (Lucilia) macellaria)

Harcourt Alexander Morgan

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BULLETIN

OF THE

AGRICULTURAL EXPERIMENT STATION.

WM. C. STUBBS, PH. D., Director and Official State Chemist.

TEXAS SCREW-WORM.

(*Compsomyia* (*Lucilia*) *Macellaria.*)

—BY—

PROF. H. A. MORGAN, ENTOMOLOGIST.

ISSUED BY THE BUREAU OF AGRICULTURE.

T. S. ADAMS, Commissioner.

BATON ROUGE, LA.

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THE AGRICULTURAL EXPERIMENT STATION,

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BUREAU OF AGRICULTURE.

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STATE EXPERIMENT STATION,
Baton Rouge, La.

HON. T. S. ADAMS, Commissioner of Agriculture, Baton Rouge, La.—

Dear Sir: I hand you herewith a bulletin upon the Texas Screw-worm Fly (Compsomyia (Lucilia) macellaria) prepared by Prof. H. A. Morgan, Entomologist of the Station. This bulletin is the result of a most patient and intelligent investigation of an insect which has occosioned great injury to the stock of this State. An insect long known in Texas, and believed to be imported into this State with Texas cattle in the last year. I most respectfully ask that you print this Bulletin No. 2, Second Series, and earnestly invite the careful perusal by every farmer of its contents. Respectfully,

WM. C. STUBBS, Director.

LOUISIANA STATE UNIVERSITY AND A. & M. COLLEGE,
STATE EXPERIMENT STATION, Baton Rouge, La.

TO PROF. W. C. STUBBS, PH. D., Director:

Dear Sir: In accordance with your request, investigation has been made of the Screw-worm Fly (Compsomyia (Lucilia) macellaria) which has been so destructive to stock throughout the State during this season.

I herewith hand you a bulletin containing a report of the investigation made, and trust that benefit may be derived from the work done.

In the preparation of this bulletin I am indebted to Dr. Dalrymple for his assistance and information in the treatment of stock attacked and in the actions of the different agents used.

Yours obediently,

H. A. MORGAN.

SCREW-WORM FLY.

(*Compsomyia* (*Lucilia*) *Macellaria.*)

INTRODUCTION.

During the present summer much alarm has been raised in connection with maggots which were at first supposed to be those of the common blow fly (Calliphora vomitoria) but afterward determined to be those of the Screw-worm fly (Compsomyia [Lucilia] macellaria).

Not only does this inscet attack all the lower animals—(fowl)—dogs, sheep, deer pigs, cattle and horses) but it attacks members of the the human family, and from the statement of those who have suffered, we learn that the pain is excruciating and almost unbearable; thus we can easily account for the ready emancipation and rather sudden death of animals that have been attacked by Screw-worms and that have not received treatment and proper attention.

In order to become familiar with the habits and life-history of this insect, animals were purchased for the purpose of investigation, and although many things were discovered which will I trust, be of value, yet the winter requires to pass over us before information can be given as to its complete eradication.

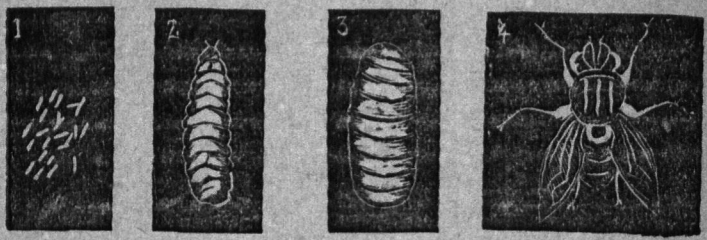
History of the Screw-worm Fly.

This fly has long been known as in South America, where it is much dreaded on account of its attack apon the human race; and while it has been known to to exist all the way from Patagonia to Canada, yet its effects were never seriously felt in North America outside of Texas, until this season. In Texas its first appearance dates as far back as 1834, and from its long sojourn

in that State it is commonly known in the South as the "Texas Screw-worm Fly." Since 1834 it has proven very troublesome during the Summer season but seems to cease its depredations at the coming frosts.

Life History.

Herewith is an engraving of the different stages of the Screw-Worm Fly as made from photos, magnified two diameters, (except Pupa, which is two and one-half.



(1) Eggs. (2) Maggot or Larva. (3) Pupa or Chrysalis. (4) Fly or Adult.

EGGS.

Eggs, about one-sixteenth of an inch in length and of a light yellow color are deposited in immense numbers (flies of the same family have been known to contain 20,000 eggs within the oviunct at once) usually in the evening so that they may escape the sun's rays while hatching; where a wound is present they are invariably deposited near it, but on dead animals they are placed on the under, or shaded side, as eggs exposed to the hot sun soon lose their vitality. In order to prove that the eggs deposited were those of the Screw-worm Fly several flies were dissected and the eggs found within the bodies were identical with those deposited. Since then, however, the Screw-worm Fly has been developed from eggs which I witnessed being deposited.

LARVA OR MAGGOT

When full grown is three-fourths of an inch in length and about one-eighth of an inch in diameter. The body of a dull white color* is made up of segment while between each segment is a ring of bristles which causes the maggot to bear resemblance to a screw and from which the name is derived. The headed is pointed and contains two strong, sharp-pointed black hooks bending ventrad. These hooks, together with the bristles, cause great irritation and flow of blood, as well as assist the maggot in its movements and in securing its food. The caudal end of the body is very much truncated. The larvæ we had under our control remained in this condition from the 19th of August until the 24th and 25th of August when they entered into the pupa or chrysalis condition.

*The color and size of larva is influenced to some extent by the character of the food. Those fed upon decaying animal and vegetable matter are darker and not so large as those which prey upon living flesh.

PUPA OR CHRYSALIS.

When the larva is full grown it falls from the wound and just below the surface of the ground assumes the pupa condition in which it remains for seven or eight days (one lot remained from the 7th of August to the 14th of August, while another from the 13th of August until the 20th). The pupa is dark red in color, about one-third of an inch in length, while segments are plainly shown.

IMAGO OR FLY.

When the fly emerges it is gray, but soon assumes its permanent color, which is a bright metallic green; just behind the head (thorax) there are three dirtinct black stripes running from the head to the abdomen. The eyes are of a dull red color and quite prominet. The wings are long and in many instances lap one over the other on the body, presenting a narrowed appearance. The whole fly is a little larger than the ordinary house-

fly (Musca domestica) and begins depositing her eggs the second day after emerging from the pupa.

Character of the Fly.

It is readily attracted by the odor of decaying animal and vegetable matter, and feeds very voraciously upon these until satisfied, when it will lodge upon plants in the immediate vicinity of its food. I have seen plants in the neighborhood of a dead animal completely covered with these flies.

WILL THE SCREW-WORN FLY DEPOSIT HER EGGS UPON DECAYING ANIMAL AND VEGETABLE MATTER, AND WILL THE MAGGOTS MATURE IN THOSE DECAYING SUBSTANCES,

There has been a very great deal of controversy on this point, and particular investigation was made in order to arrive at something conclusive regarding this. If it is so that they mature in decayed animal and vegetable matter the knowledge of this will be first importance in aiding us to keep this terrible pest in check.

The first experiment to determine these points was as follows: A large number of flies were captured on June 28th, killed with gasoline, and put into a tin box with cover. On the 29th of June the eggs, which were within the bodies of the female flies hatched; no food whatever was given except the dead bodies of flies. On the 3rd of July, the young maggots, being nearly full grown, were removed with the hopes of carrying them through the different stages, but unfortunately they were placed in the hot sun by mistake. Although the specimens could not be carried through the complete circle they were sufficiently matured to prove that they would live upon decaying animal matter.

The maggots found upon decaying animal and vegetable matter were carefully observed under the microscope both by Dr. Dalrymple and myself, and while different species were found —blow-fly maggots, (Musca calliphora vonitoria), flesh-fly mag-

gots (Sarcophaga Carnaria) yet specimens—which were matured, by the way, to the perfect Screw-worm fly—were generally found, which seemed identical with the maggots taken from the living animals.

On August 18th a sheep died, and on the evening of the same day large masses of eggs were deposited on the underside of this animal. A cage was constructed so as not to allow the entrance of other flies, and provided with earth in the bottom that the maggots when full grown might retire to this earth and pupate. On the same evening a portion of the dead animal was placed within the cage as well as masses of eggs. In the course of fifteen hours the eggs hatched, when the young larvae at once began feeding upon the decayed flesh, and continued feeding until August 23rd and 24th when they pupated, coming out as perfect Screw-worm flies on August 29th and 30th, *hence we may safely say that decaying animal and vegetable matter encourages the reproduction of the Screw-worm Fly.*

Its Attack Upon the Human Family.

Apart from the death caused by this insect in stock there have been some deaths recorded in the human family; some in this State as well as some in other States. However, it is sufficient to know that the human family may be attacked, the openings of the head usually being the seats of attack, while the armpits or any exposed portion of the body are equally liable. Flies have been know to deposit their eggs during the dressing of a wound. The cases in this vicinity have in some instances caused death, while all caused the most excruciating pain. I have observed on liberating a fly at night in a lighted room that it is not as stupid as other flies are, but comparatively active, hence the necessity of mosquito bars in localities where the Screw-worm Fly is prevalent.

Questions have been asked if there is any danger in taking this insect into the system by means of food. There is a disease (Myiosis intestinalis) caused by the maggot of a fly of the family

Anthomyiedae which enters the body with decaying vegetables, the decay being wholly unnoticed by the presence of some seasoning article, as vinegar, etc., but no cases have ever been recorded where the larvae of flies of this family have ever caused any internal diseases.

ARE THERE SOME PARTS OF THE ANIMAL MORE SUBJECT TO ATTACK THAN OTHERS?

All the natural openings of animals are liable to be attackd, particularly the sheaths of horses and mules and the navels of newly born stock, while in all animals where an abrasion of the skin is made an attack may be expected.

Among the worst cases that have come under my observation were when the horns of animals had been broken; the maggots penetrated the head, and when animals were not at once attended to they soon died. The majority of cases throughout the country resulted from the deposition of eggs upon the animals in the vicinity of where ticks (Ixodes bovis) had been killed, the flies being attracted by the blood. I have observed that when sheep become sick and ematiated that the odor characteristic of sick sheep attracted the flies, and masses of eggs were deposited in the folds of the wool, and the young larvae penetrated the skin where no wound had been made.

Remedies and Preventatives.

It is to the complete eradication, if possible, of this insect that we look to with great interest, and it is not with the whole-souled and vigorous work of a few that the work is to be accomplished, but that of the untiring energies and assistance of every person throughout the State.

Experience has proven that the tendency of the mass of mankind is not to resort to extreme measures until they are com-

pelled and few appreciate that time-honored adage "That a stitch in time saves nine."

From the following facts conclusions may be drawn—

(1.) The Screw-worm Fly has never given any trouble in Louisiana before this year, except during the war, when animals were removed from States where these flies were prevalent, to Louisiana and other States with impunity—and when communication throughout the Southern States was brisk.

(2.) There was importations of cattle into this State last season from places where Screw-worm Flies were prevalent and from where the maggots were also imported.

(3.) Last winter was an exceptionally warm one and one very propitious to the carrying through of insects that could not have endured our usual winters.

(4.) This fly did not remain in this State to do damage when introduced during the war.

CONCLUSIONS DRAWN.

These must be taken for what they are worth and not as positive.

1. The coming winter, if severe, may exterminate this insect.

2. If these insects are eradicated care should be exercised to forbid the importation of stock from districts where the Screw-worm Fly is always present. This may seem selfish, but every intelligent person cannot help but admit that insects of this order (many of them feeding and reproducing in decaying animal and vegetable matter) with unlimited range will reproduce more readily than those kept within a limited range, and that where they are present in great numbers some are more liable to escape the winter than where these numbers are small. It is therefore wise that steps be taken to keep these pests within the borders where they are not influenced by the winters of those districts.

3. From the fact that this insect has been close to Louis-

iana for many years, and even here at one time, it would seem that there has been something which has had a checking tendency.

4. This tendency seems to have been the winter.

It is a very common practice throughout the South to allow dead animals to lie upon the surface of the earth to decompose, and to devoured by buzzards. Now, since the Screw-worm Fly lives on and reproduces its species in decaying animal and vegematter, it becomes of first importance, if not an absolute necessity, to have all decaying animal and vegetable matter buried. In connection with this, a small experiment was made in order to ascertain to what depth an animal might be buried that the maggots might not mature. It was found that at the depth of from two to two and one-half feet (of course deeper) the eggs would hatch, but the larvae would not mature, proving that the exclusion of air from the maggot will kill it. I cannot conceive of anything of more importance in the extermination of so vile a pest as having laws compelling stockowners to have all animals buried immediatoly after death. In many towns and cities it is quite a common practice to have a common "dumping place" where refuse of all kinds, animal and vegetable, is conveyed, let lie and decompose, thus causing stench, and attracting flies where they will feed and reproduce with great rapidity. From the great destruction of life, both of man and beast, caused by the prevalence of the Screw-worm Fly, it behooves every village, town and city to adopt such means as to have all refuse either buried or so disinfected as to forbid the generation of these flies. Refuse from kitchens, which is left standing in barrels for a day or two, will become completely alive with maggots.

To reckon the number of descendants from a pair of these flies in a single season would be almost as endless a task a counting the sands upon the seashore. It cannot be made more practical and conclusive than by asking a question. Reaumur has observed 20,000 eggs, as stated previously, within the oviduct of a fly of the same family (Muscidae) as the Screw-worm Fly. Now, supposing a pair of these Screw-worm Flies to be introduced into

a locality early in April, what would be the number of descendants by the end of October, allowing fifteen days to complete the circle from the egg to the fly, and 20,000 the number of young from each breed?

And now to discuss the particular remedies and those within the grasp of every person, permit me to state that careful watch and prompt attention are the principal features in restoring your animals. If animals are worth having they are certainly worth taking care of Should the fly remain within our State and continue to pest our people as it has done this season, stock will have to be handled on a very different plan from the present one in order to make the raising of them profitable. The introduction of docile breeds of stock and the herding of them in fields free from everything that would be liable to cause injury or abrasion of the skin will have to be considered. Barbed-wire fence and the Screw-worm Fly go hand in hand.

TREATMENT OF STOCK ATTACKED.

In the use of agents for the destruction of Screw-worm two things have to be taken into consideration, viz: the death of the worm and the effect upon the wound that these agents necessary to destroy the maggot would have. Then, again, care has to be exercised in the too free use of mercurials on account of animals licking the parts, or on account of absorption, thereby causing mercurialism and death. These maggots have wonderful vitality, as has been proven by taking them from a wound and subjecting them to the action of very powerful caustics, such as Trichloride of Antimony (Butter of Antimony), through which for a short time they seemed to move with impunity, such an agent as the above applied to a wound would, of course, destroy the vitality of the tissues and cause sloughing. So we see the necessity of bearing this fact in mind.

The remedies which have been tried and in use are numberless, and nearly every experimenter believes his own the most efficacious. This seems to prove that the virtue does not alto-

gether lie in the particular agent used, but in the careful application of it, and the untiring perseverance in attending to the stock, which are the victims of this pest, as also those that have escaped, but which at any moment may be attacked.

Strong remedies, such as Chloroform, Crude Carbolic Acid, Corrosive Sublimate, etc., should be used with care on account of their irritant properties when undiluted. When the Screw-worms are present in an animal, and have by their boring caused cavities or holes, the main object in view is to get rid of them, allow the wound made to heal up, and to prevent further attacks of Screw-worm Flies.

CHLOROFORM.—One of the quickest agents to stupify the maggots is Chloroform (I say stupify because it has been proven that the maggots will recover in some instances after the application of this drug) but after filling the cavity with chloroform for the purpose of deadening of maggots, it should be washed out to prevent the irritating effect of the drug on the tissues as well as getting out the dead or half-dead larvae or maggots, and cleansing the wound.

BI-CHLORIDE OF MERCURY (Corrosive Sublimate) is another powerful agent, caustic, corrosive and irritant in its action, and is much to strong in its undiluted state, but when used as a diluted solution (sixty grains to the pint of water) it may be left in the cavity without affecting the tissues for some time and has the effect of not only making the maggots lose their hold, but as it is the best antiseptic in use (in diluted state) it leaves the wound in a healthy state for healing.

CRUDE CARBOLIC ACID when used alone belongs to the irritant class. From experiment it appears to act almost as quickly as chlorom, and should be used in a similar manner, that is, use just sufficient to destroy the vitality of the maggots and then wash out the wound and its contents.

MERCURY SUB-CHORIDE (Calomel) is an agent much used and with success. It has the desired effect upon the maggots, but in too large quantities and often repeated it overstim-

ulates the wound, becomes an irritant, and if within the reach of the animal's tongue may be licked and cause mercurialism.

ETHER gives similar results to chloroform although less powerful.

SPIRITS OF TURPENTINE causes maggots to let go, but as its action is also irritant to the raw surface of a wound, it should be washed out afterward; if carefully used it has antiseptic properties and will assist the wound in healing.

COAL OIL—Its action and effects are similar to turpentine.

CHESYLIC OINTMENT.—This is a patent preparation. The name would imply its containing cresylic acid, which is much like carbolic acid, both being products of coal tar. It is very much lauded in Texas as a destroyer of the Screw-worm. Its action resembles that of crude carbolic acid and from experiment we do not find that it supercedes that agent.

AIR SLAKED LIME.—This has been tried with varying results; owing to its irritant action we do not recommend it.

GASOLINE or PUROLINE OIL is a light volatile liquid product obtained from the distillation of petroleum. It has a very deadly action on insect life, but being extremely volatile it becomes rather unreliable unless kept tightly corked. It may be used similarly to spirits of turpentine and coal oil.

McDougall Sheep Dip.

This is a patent medicine and has been highly recommended for the destruction of the maggots of the Screw-worm Fly, but being unable to procure any of this preparation we cannot recommend it from experience. However, this can be said in its favor, that being, when made into a wash, an invaluable remedy for the attack of vermon upon stock, it may be recommenced as a remedy for the cattle tick (Ixodes bovis) which seems to torm the ground work for the attack of the Screw-worm Fly.

Upon the recommendation of a number of parties, decoctions of the following were tried:

Leaves of China trees. (Melia Azederach.)

Leaves of Coffee plant (Cassia obtusifolia).

Sneeze weed or bitter weed—whole plant—(Helenium autumnaly).

Jamestown weed—leaves—(Datura stramonium).

"Pyrethrum Insect Powder."

Leaves af the Elder (Sambucus canadensis).

Leaves of Smart weed (Polygonum acre).

None of the above prove any way destructive to the maggots and thus cannot be recommended.

To Sum Up:

All these agents have been experimented with, but I think we are inclined to give the preference to Crude Carbolic Acid. It is a cheap article, and does the work well when carefully used as stated under the head of "Crude Carbolic Acid."

When the maggots have been eliminated from the wound, the latter should be washed thoroughly with warm water, and dressed with carbolized oil (one of carbolic acid to sixteen of oil.) If there is a cavity, lint cotton saturated with the oil should be inserted.

To prevent the attacks of the fly there is nothing simpler or more convenient than a mixture of tar and grease, or fish oil smeared about the parts; so long as the smell lasts the flies do not seem to deposit their eggs.

For the treatment of stock attacked by this fly there is no specific virtue in any one agent, as previously stated, over another that will prevent future attacks, after one application, but by daily and careful attention to stock the mortality will be lessened to a very great extent.