

fested regions to concentrating points from which they were transhipped to Europe for military purposes may have resulted in the establishment of other foci of infestation not now known. Increased activity at this time in the shipment of horses from the infested territory for use in our own cavalry and for agricultural purposes will no doubt give every opportunity for the insect to become widely established if some natural agencies do not prevent or steps are not taken to destroy the bots before horses are shipped.

The accompanying map shows the probable present distribution of the species in the United States, and indicates the points where its presence has been observed by us or recorded by correspondents. The comparatively small number of large dots in North Dakota is explained by fewer circulars being sent there rather than by a smaller number of nose flies.

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## PRELIMINARY EXPERIMENTS WITH SODIUM FLUORIDE AND OTHER INSECTICIDES AGAINST BITING AND SUCKING LICE.

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The very satisfactory results secured by the authors with the use of sodium fluoride against various species of biting lice (Mallophaga) on chickens and other domestic fowls<sup>1</sup> naturally has led to inquiry from many sources as to the effect of this compound on lice of cattle, horses, and other domestic animals. So it is thought advisable at this time to publish a few preliminary notes on the results of the use of this material and other insecticides against several species of Mallophaga and sucking lice on such hosts. A few experiments carried out during 1910 and 1912 indicated that the standard arsenical dip usually known as the B. A. I. formula (8 lbs. white arsenic, 24 lbs. sal soda, 1 gal. pine tar, to 500 gals. water) is a very effective insecticide against both the Mallophaga and Anoplura. In these tests it was found that one thorough spraying or dipping of cattle quite heavily infested with biting lice (*Trichodectes scalaris* Nitzsch), and the short-nosed ox louse (*Hæmatopinus eurysternus* Nitzsch) completely destroyed them in

<sup>1</sup> See Farmers' Bulletin No. 801.

two treatments at weekly intervals. It was not ascertained, however, if one application would be sufficient.

More recent work included tests of a considerable number of insecticides. The results of the early tests with arsenical solution were completely borne out and it appeared that all forms of both the biting louse (*T. scalaris*) and the long-nosed ox louse (*Linognathus vituli* L.) were destroyed with one dipping. In one experiment with arsenical solution of one-half the normal strength both adults, larvæ, and eggs of *T. scalaris* were destroyed. The use of this strength against the long-nosed ox louse did not accomplish complete destruction. The action of the arsenical solution against the biting lice was quite prompt, but the sucking lice were killed more slowly, as in the case of ticks.

All of our tests prove that the biting lice are quite susceptible to the action of caustic or poisonous substances. They seem to be killed uniformly more easily and quickly than the sucking species. In a series of experiments against the biting lice of cattle the following substances were used in addition to arsenical dip: Kerosene emulsion (2 gals. kerosene,  $\frac{1}{2}$  lb. laundry soap, 1 gal. water, reduced 1 to 8 and 1 to 12); flowers of sulphur ( $\frac{1}{2}$  lb. per animal); 40 per cent. nicotine sulphate (1 to 800); soap and water (1 oz. per gal.); sodium fluoride (commercial, 90 to 98 per cent.) as dust and dip. All of these substances, with the exception of the soap and water, killed all stages. The soap and water destroyed everything but the eggs, which hatched successfully.

The sodium fluoride (97 to 98 per cent.) was used as a spray at the rate of one ounce and also one-half ounce per gallon. In both of these strengths all stages were promptly destroyed. When applied as a dust the material was put on with flour in the proportion of one ounce to five ounces of flour, six ounces of this mixture being used on a yearling. Three ounces of sodium fluoride were applied to an animal with a shaker and the material worked into the hair, and in another test one ounce was applied with a bellows dust gun. In each of these tests the destruction was complete.

A number of experiments were also conducted with the use of sodium fluoride against the biting dog louse (*Trichodectes latus* Nitzsch). Some of the animals treated were very heavily infested and covered with sores evidently caused by the presence of the lice. In some tests the material was applied by hand with a dust can,

about one ounce being used to each animal, and in others it was applied as a dip, the sodium fluoride being dissolved in water at the rate of one ounce to the gallon. In all of these tests the destruction was complete and the lesions promptly healed.

Experiments conducted thus far with sodium fluoride clearly show its efficacy in the case of Mallophaga on domestic animals. Owing to the comparatively high price of the substance (about 50 cents per pound) it is inadvisable to recommend its use in the form of a dip for large animals as other equally effective dips which are much cheaper may be used. The tests indicate, however, that the substance may be very useful for the winter treatment of animals, especially in the northern states where dipping during the cold weather is impractical. Attention also should be called to the fact that infestations are normally heaviest during the winter and spring months, just at a time when the practice of dipping might be dangerous. The application of sodium fluoride with a dust gun is not laborious, and since it appears that only about one ounce of material per animal is necessary the treatment would not be expensive. Our preliminary tests also indicate that if all animals in a herd are treated at one time in this way, one application will be sufficient. Although we have found that lice may live from 7 to 15 days when removed from the host it appears that under usual circumstances sodium fluoride is retained in the hair for sufficient length of time to destroy any lice which may happen to return to the host.

While there appears to be some possibilities in the use of sodium fluoride against sucking lice the experiments thus far conducted indicate that it can not be relied upon for use against any of the members of this order.

## GEOMETRID NOTES.

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I am convinced, after a careful study of the genitalia, that the American form of *Eucymatoge*, now listed as *Horisme vitalbata*, D. & S., is distinct from the European. I have received a number of specimens, of the American form of *vitalbata* through Mr. Wolley Dod from Calgary, Alberta, and of the European through Dr. Bastelberger and I can find only very slight external differences. The American form of *vitalbata* seems to have the yellow band of primaries, more of a grayish cast, where the European is a deep yellow. Also the band of the primaries seems narrower than the European and at the apex is more clouded. It is very hard to draw any definite characters for separating them except on the genitalia which prove most distinct and so would list the American form as a race, if not later may turn out to be a good species.

***Horisme vitalbata* D. & S. var. *incana* nov.**

The valvæ are narrower and longer than the European *vitalbata* and the sacculus is most distinct, being bifurcate at tip. It resembles slightly the shape of a boy's mitten, with the thumb projecting at an angle. In the European *vitalbata* this process is rounded with but a single jointed projection. Also the penis of the American form is thicker than the European and the œdeagus is spined in the middle, which is lacking in *vitalbata*. The tip of the penis is bulbous with short spines apparently knobbed at the base, and the vesica has wide and long cornuti. The saccus is broad and rounded. The ductus bursa of the female genitalia has three elongated patches from which long stout spines protrude. At the junction of the neck or ductus bursa and the bag or bursa there is a row of very stout spines projecting at all angles. The bursa is instrate or covered with fine spines not heavy and thick as in *vitalbata*. The edge of the bursa in *vitalbata* is surrounded with heavy spines, where in *incana* they are not any thicker than in the other sections. The true *vitalbata* D. & S. may possibly occur in North America as our material at present is so limited, so I have listed the American form as a race until we know more about



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