FIG. 1.—Merthid-parasitized male *Culicoides stellifer* showing female-like antennae, male genitalia, and worms coiled in abdomen.

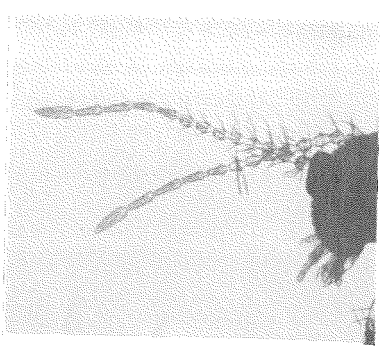

FIG. 2.—Enlarged view of head of *C. stellifer* male showing female-like antennae.

the missing arculus connecting the larger light spot in cell R_5 with the smaller distal spot. The absence of this arculus is frequent in specimens from the area. Internal organs could not be observed due to the distention of the abdomen by the parasites.

The specimen described was captured in a New Jersey mosquito light trap located in the southern residential area of Gainesville, Florida, on Oct. 20, 1965. The trap was located near the crest of a wooded ridge above a small spring-fed pool and its spillway ditch. Additional *Culicoides* taken in the same light trap catch consisted of 5 *C. insignis* Lutz (2♂, 3♀), 17 *C. haematopotus* Malloch (3♂, 14♀), 18 *C. stellifer* (4♂, 14♀) and 1 female of the *C. debilipalpis* Lutz group.

The rate of natural parasitism of *Culicoides* by mermithids is apparently very low in Alachua County, Florida, since only this specimen has been found in one year's observations and examinations of thousands of specimens. However, the possible culture and dissemination of arthropod-parasitic nematodes is considered by Welch (1965) to be a promising method of biological control for certain pestiferous insects.

Acknowledgment is made to Dr. Vernon G. Perry, Professor of Nematology, for identification of the parasitic nematodes and to Mr. Charles C. Russell, graduate student in Entomology, for making the photomicrographs. This finding resulted from studies of the bionomics of inland species of *Culicoides* supported by NIH grant GM 12322.

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A NOTE ON *PISTIA* CONTROL

DR. J. S. DODGE
Consultant, (Malariologist) Ministry of Health, Northern Nigeria.
and
ABDU LADAN
Malaria Control Officer, Regional Malaria Unit, Northern Nigeria

Pistia stratiotes is commonly found growing in borrow pits in Northern Nigeria and interferes to a considerable extent with larval control measures. Borrow pits are found in considerable numbers in all the large towns (in Kano there are at present over 550 pits varying in size from 80,000 square feet to 600 square feet) and present a considerable surface of water available for mosquito breeding. The growth of *Pistia* weed renders the control of mosquito larvae by oiling nearly impossible and makes the action of DDT larviciding solutions much less effective as it is extremely difficult to ensure that the larviciding agent reaches all the water available for mosquito breeding.

Clearance of *Pistia* by hand, using long-handled rakes as noted by Service (1960) either from the side of the pit or from a home-made raft, is time-consuming and expensive in labour costs. The *Pistia* regenerates and has to be regularly

cleared. Herbicides have been used to control *Pistia* and have met with variable success: The more successful of these herbicides contain Diquat (1:1-ethylene-2, 2-bipridylium cation) and its use in Northern Nigeria has been described by Service (1962). After destruction of the *Pistia* by Diquat the *Pistia* will grow again, the period that elapses before it recovers the borrow pit increasing with each treatment. The presence of *Pistia* in other borrow pits nearby seems to be relevant and it may well be that birds can carry *Pistia* from one pit to another. Frequently borrow pits are linked together by ditches to form some sort of drainage system and in this case regrowth of *Pistia* along the course of the ditches has been noticed.

It was noticed that a number of borrow pits in Zaria City, the Provincial Capital of Zaria Province in Northern Nigeria (11.03 N, 07.43 E) are completely dried up in the dry season, when dried remnants of *Pistia* could be seen on a close examination of the dried surface of the borrow pit.

With the onset of the rains the borrow pits quickly filled with water and were soon covered with *Pistia*, to the comfort of mosquito larvae and the concern of the Health Office. It was therefore decided to try the effect of spraying with a herbicide during the dry season, when the *Pistia* might be eliminated. A herbicide with a residual action was chosen and the particular one used was "Atlamex," a herbicide with a long residual action. (Supplied by Imperial Chemical Industries Ltd.). This was sprayed onto the surface of two dried-up borrow pits in Zaria City in May 1965 at the dosage shown in Table I. In June with the onset of the rains the borrow pits began to fill with water. Two nearby borrow pits were selected as controls. These were also dried up completely in May and were left untreated. "Atlamex" contains 53 percent sodium chlorate, 27 percent fire depressant chemicals, and 10 percent Karmex Diuron weedkiller which contains 3-3, 4-dichloropheny 1-1, 1-dimethylurea. The L.D.50 for sodium chlorate is 1200 mg./kg. and for Diuron, 3400 mg./kg. and it was because of these low toxicities that "Atlamex" was selected for the trial. The pump used for the spraying was a Hudson "Metador" pump. This is a power sprayer with the spraying solution delivered at a high pressure to the nozzle tip. A working pressure of 100 p.s.i. was used in this work. Twenty lbs of "Atlamex" was used in 25 gallons of water.

TABLE 1.—Dosage of "Atlamex": Zaria *Pistia* Control Trial

Pit No.	Area (Square Yards)	Total Amount Water	Total Amount Atlamex
I	1,700	200 gallons	160 lbs.
II	900	100 gallons	80 lbs.

Desired dosage: 2 lbs. in 2½ galls. per 24 square yards.
Dosage achieved: Pit I 2 lbs. in 2½ galls. per 21 sq. yards.
Pit II 2 lbs. in 2½ galls. per 22 sq. yards.

RESULTS. No growth of *Pistia* occurred on one of the two borrow pits up to November 1965; in the other borrow pit, growth of *Pistia* was occurring along the ditch linking the borrow pit with one of the control borrow pits. By January, 1966 a few scattered small areas (1–3 square feet) of *Pistia* had appeared in the first borrow pit by direct spread from the ditch. The *Pistia* in the first of the sprayed borrow pits was young and growing vigorously whereas in October in the control pits the *Pistia* was matured and had completely covered the pits. No *Pistia* was present in the second borrow pit by January, 1966.

DISCUSSION. Complete eradication of *Pistia* was obtained in one borrow pit and in the other, re-introduction of the *Pistia* was by growth along a connecting ditch. Local residents from houses alongside the two treated pits stated that they had not known them free of water weed previously. Eight months after the spraying of the two pits no growth occurred in one of the pits and growth in the other one was due to direct spread from a neighbouring "infected" borrow pit.

No growth from the *Pistia* remnants left when the borrow pit dried up had taken place in contrast to the control pits where *Pistia* had rapidly appeared as soon as the pits became filled with water.

In Zaria about two-thirds of the borrow pits dry out completely in the average dry season and this proportion also applies to Kano (the Provincial Capital of Kano Province and an important international airport) where mosquito nuisance from the large number of borrow pits in the city is considerable. The results of the trial described herein suggest that the use of a herbicide such as "Atlamex" at the end of the dry season when the pits have dried out has considerable potential in control of this weed thus enabling anti-larval measures to be more easily carried out.

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