



FIG. 1. (C. W. Seal)—Gynandromorph of *C. pipiens quinquefasciatus* (Say).

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GYNANDROMORPHISM IN *Culex* (LINNAEUS)  
MOSQUITOES, TAMPA BAY AREA,  
FLORIDA—1965<sup>1</sup>

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Recent reports of gynandromorphism in mosquitoes were summarized by Taylor, Meadows,

and Branch in 1966, when 20 new cases of gynandromorphism in *Culex* (Linnaeus) mosquitoes were described. The majority of the 20 specimens had typical female antennae, palpi, and proboscises, and typical male genitalia. Since this paper was prepared, 10 additional gynandromorphs have been collected in the Tampa Bay area.

DISCUSSION. From January through December 1965, 296,179 mosquitoes were identified in the course of encephalitis studies by the Encephalitis Research Center, Tampa, Florida. Gynandromorphism was displayed in 10 specimens. Of 36 species, this abnormality was exhibited by three species, all belonging to the subgenus *Culex* (*Culex*): *Culex nigripalpus*, Theobald, 7 times; *Culex pipiens quinquefasciatus*, twice; and *Culex salinarius*, once (Table 1). These were geographically limited to three of the four counties included in the encephalitis study area: Hillsborough 4; Pinellas 5; Manatee 1; and Sarasota 0. No gynandromorphs were found among the other 33 species collected.

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<sup>1</sup>The research on which this report is based

TABLE 1.—*Culex (Culex)* spp. mosquitoes demonstrating gynandromorphism collected in 1965.

Ser. no.	Date	Species	Site-county†	Type*	Trap	Antennae	Palpi	Condition**	
								Termin.	
21	23 March	<i>Cu. quinquefasciatus</i>	So. D. Mabry, Hills.	U	Bait	F	F		M
22	13 April	<i>Culex salinarius</i>	So. D. Mabry, Hills.	U	Bait	F	F		M
23	22 June	<i>Culex nigripalpus</i>	So. D. Mabry, Hills.	U	Bait	F	F		M
24	1 July	<i>Culex nigripalpus</i>	Exp. Station, Manatee	U	Bait	F	L-F, R-M		M
25	28 July	<i>Culex nigripalpus</i>	Sawgrass Lake, Pine.	S	Light	F	F		M
26	11 Aug.	<i>Culex nigripalpus</i>	Sawgrass Lake, Pine.	S	Bait	F	F		M
27	12 Aug.	<i>Culex nigripalpus</i>	Maggiore Zoo, Pine.	U-S	Lt/CO <sub>2</sub>	F	F		M
28	18 Aug.	<i>Culex nigripalpus</i>	Sawgrass Lake, Pine.	S	Light	F	F		M
29	2 Sept.	<i>Culex nigripalpus</i>	Maggiore Zoo, Pine.	U-S	Lt/CO <sub>2</sub>	Damaged	L-F, R-M		M
30	10 Sept.	<i>Cu. quinquefasciatus</i>	Temple Terrace, Hills.	U	Bait	F	F		M

† Hillsborough, Pinellas.

\* U—Urban, S—Swamp.

\*\* F—Female, M—Male, L—Left, R—Right.

TABLE 2.—Ratios of Affected Mosquitoes

	1965		1964		1963		1962	
<i>Culex nigripalpus</i>	7:	213,400	11:	133,724	3:	28,561	0:	32,428
<i>Culex quinquefasciatus</i>	2:	8,509	3:	18,986	0:	5,064	0:	96
<i>Culex salinarius</i>	1:	16,988	3:	22,067	0:	7,465	0:	763

The gynandromorphs were collected from their natural habitat, five by chick-baited lard-can traps and one by a hen-baited trap, and four by CDC miniature light trap. Two of the latter collections were exceptionally large because of dry ice suspended above the trap. These were collected on August 12 at Maggiore Zoo (1 *Culex nigripalpus* gynandromorph of total catch of 2279 mosquitoes) and on September 2 also at Maggiore Zoo (1 *Culex nigripalpus* gynandromorph of total catch of 1206 mosquitoes).

The ratios of affected mosquitoes (data for 1962-64 refer to Taylor *et al.*, 1966) for each species are shown in Table 2.

Seven of the 10 specimens (Table 1) were bipolar with head and thorax—female, abdomen and terminalia—male. These characteristics probably applied to the damaged one also, *Culex nigripalpus* (No. 29). Numbers 1 through 20 were described in the previous gynandromorph paper (1).

The remaining two specimens showed some variation:

Number 24, *Culex nigripalpus*, from a bait trap, had female antennae, female left palpus, atrophied male right palpus, and male abdomen and terminalia.

Number 28, *Culex nigripalpus*, from a light trap, had female antennae, female left palpus, atrophied male right palpus, and male abdomen and terminalia.

All terminalia had rotated in a normal manner.

**SUMMARY.** During 1965, a total of 296,179 mosquitoes were identified in collections made by power aspirator, bait, and light traps, operating in four counties in the Tampa Bay area of Florida in a program directed by the Encephalitis Research Center at Tampa. Of this total, representing 36 species, 10 were classified as gynandromorphs. All belonged to three species of the subgenus *Culex* (*Culex: nigripalpus*, *pipiens quinquefasciatus*, and *salinarius*).

Seven of the gynandromorphs clearly showed bi-polar differentiation, with female features anteriorly, and male posteriorly. The remaining two displayed a variation of sexual diversity.

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#### Literature Cited

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#### LENGTH OF EXPOSURE PERIOD AS A FACTOR INFLUENCING THE EFFECTIVENESS OF LARVICIDES FOR BLACKFLIES (DIPTERA:SIMULIIDAE)<sup>1, 2</sup>

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In blackfly larval control programs, streams are treated with insecticides applied over relatively short periods, often less than a minute if applied by aircraft, or over periods of 15 minutes to an hour if dispensed by hand pouring, spraying or mechanical dripping devices (WHO, 1963). It would be of some practical value to know whether the best control with a given amount of insecticide can be achieved by applying it over a short period, resulting in a high concentration for a limited time, or by applying it slowly, resulting in a low concentration over a longer period. However, up to the present time, systematic comparisons of the differences in effectiveness of insecticides applied at different rates have not been described.

This aspect of blackfly larval control was investigated at the New York State Conservation Department Fish Hatchery in Cambridge, N. Y. Tests were carried out in troughs 3 feet long, 1 foot wide, and 6 inches deep, each with an effluent lip 6 inches wide and 4 inches long. When stones with blackfly larvae attached were placed in a trough just above the effluent lip, most of the larvae soon migrated "downstream" to the shallow and rapidly moving water flowing over the lip. Here they could readily be counted before and after treatment and their reactions observed following exposure to insecticides. Details of the procedures used in testing insecticides in these troughs are described elsewhere (Jamnback, 1964; Jamnback & Frempong-Boadu, 1966).

Methoxychlor was used as the test insecticide because it has largely replaced DDT in blackfly control programs in New York State. Tests were carried out using 90 percent methoxychlor dissolved in acetone and alcohol. The amount of water flowing through the troughs was the same in all tests. The apparatus used for dispensing the insecticide in small amounts, at an even rate, over periods ranging up to 12 hours consisted essentially of a disposable 5 cc syringe, a micrometer with the frame removed, and a small electric mo-

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