

RESISTANCE TO DESICCATION IN SIX STRAINS OF THE *CULEX PIFIENS* COMPLEX

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INTRODUCTION. While studying the feeding preferences in six strains of the *Culex pipiens* complex (Chamberlain, Sudia and Gillett, 1959) it was noticed that mosquitoes in some of the containers survived the conditions imposed on them better than those in others. It appeared that there were differences between strains in their capacity to withstand desiccation, and two experiments were carried out to test this; the results are described below.

MATERIALS AND METHODS. Two strains of *Culex pipiens* L., and four of *C. quinquefasciatus* Say (= *C. fatigans* Wied.) were used; their places of origin and history are shown in Table 1. The mosquitoes were kept in standard 0.6 litre ice-cream cartons, both ends of which had been replaced with netting (Chamberlain *et al.*, 1959). For the survival tests the

cartons were placed inside desiccators containing 87.5 gm KOH/100 ml. H₂O. These were kept at 26.5° C. and provided a relative humidity of around 32 percent (Peterson, 1959). Records of the number of mosquitoes that had died in each carton were made at two-hourly intervals for 22 hours (in the first experiment three more readings were made at 25, 27 and 32 hours respectively).

Experiment 1 was carried out in Dr. R. W. Chamberlain's laboratory at the Communicable Disease Center, Montgomery, Alabama (31 December 1955-1 January, 1956); Experiment 2 was carried out in Professor L. E. Rozeboom's department of Medical Entomology, Johns Hopkins University, Baltimore, Maryland (19-20 January, 1956).

RESULTS. In Experiment 1 (Table 2)

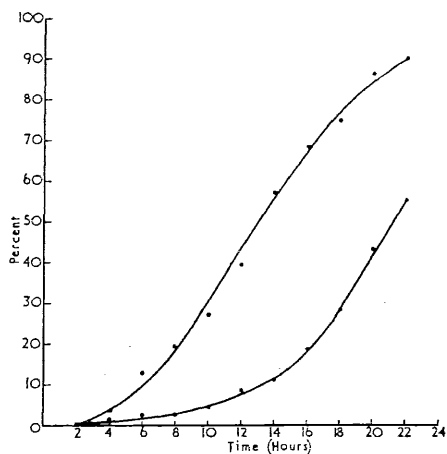


FIG. 2.—Cumulative mortality curves in two groups of three strains each of the *C. pipiens* complex kept in dry air at 26.5° C. Curve on left—Montgomery, Pharr and New Jersey C-1; Curve on right—California Colony, California Wild and New Jersey CH (Curves fitted by eye).

the results fell into two groups: those with the 50 percent end-point < 16 hours (Montgomery, Pharr and New Jersey C-1), and those with the 50 percent end-point \geq 20 hours (the two Californian strains and New Jersey CH). In Experiment 2 (Table 3) the results fell into two similar groups, although survival in California Wild was somewhat shorter. The results of the two experiments have been combined for each of the six strains in Figure 1 and the difference between the two groups is clearly shown in Figure 2.

It is impossible to say at this stage whether these differences reflect adaptations to the natural environments of the original homes of these strains, or whether they are products of laboratory rearing or merely laboratory artifacts. It is tempting to relate the resistance to desiccation in the two Californian strains to the semi-desert conditions of their original home, and the similarity between the old estab-

lished laboratory strain and the newly colonized 'wild' strain supports this view. Here it is important to note that the newly established Pharr strain showed very poor resistance to desiccation, and this again supports the view that these differences have a significance outside the laboratory. The most striking and consistent difference was that between the two New Jersey strains of *C. pipiens*, the anautogenous C-1 and the autogenous CH. One would like to know in what manner resistance to desiccation is associated with autogeny, and it is hoped to follow this work with some histological studies at a later date.

The writer has received help for this small-scale investigation out of all proportion to its size. He wishes to take this opportunity to acknowledge his debt to the Rockefeller Foundation, who generously provided funds by the award of a Fellowship to visit the U.S.A., and to thank those who provided the strains of mosquitoes (Table 1), and to thank Dr. R. W. Chamberlain and Professor L. E. Rozeboom for the provision of laboratory facilities, and Mr. W. C. Lewis, Topographer, Uganda Geological Survey, for drawing the graphs.

SUMMARY. 1. Resistance to desiccation has been studied in six strains of the *Culex pipiens* complex.

2. The strains can be divided into two groups: two strains of *C. quinquefasciatus* and one of *C. pipiens* that survived badly in dry air; two strains of *C. quinquefasciatus* and an autogenous strain of *C. pipiens* that survived well in dry air.

References

- CHAMBERLAIN, R. W., SUDIA, W. D., and GILLET, J. D. 1959. St. Louis encephalitis virus in mosquitoes. *Am. J. Hyg.* 70(3):221-36.
 PETERSON, A. 1959. *Entomological Techniques. How to Work with Insects* (Ninth Edition). Edwards Brothers, Inc., Ann Arbor, Michigan.

TABLE 1.—History of six strains of the *Culex pipiens* complex.

Species	Strain	Origin	Contributor	Colonized
<i>C. pipiens</i>	C-1	Sandy Hills, N.J.	P. P. Burbutis	1 1/2 yrs.
"	CH	Hoboken, N.J.	P. P. Burbutis	1 yr.
<i>C. quinquefasciatus</i>	Montgomery	Montgomery, Ala.	R. W. Chamberlain	7 yrs.
"	California	Kern Co., Calif.	R. E. Bellamy	Several yrs.
"	Colony (KMAD)	"	R. E. Bellamy	Newly
"	California Wild (REB-1)	"	R. E. Bellamy	"
"	Pharr	Pharr, Tex.	W. D. Sudia	"

TABLE 2.—Number of mosquitoes dying (cumulative) in six strains of the *C. pipiens* complex exposed to dry air (Experiment 1).

Strain	Age (days)	No. used	Time of recording in hours															
			0	2	4	6	8	10	12	14	16	18	20	22	25	27	32	
Montgomery	20	30	0	0	0	0	0	2 7%	5 17%	11 37%	16 53%	19 63%	24 80%	26 87%	28 93%	28 93%	28 93%	
Pharr	30	30	0	0	0	0	2 7%	3 10%	7 23%	13 43%	17 57%	18 60%	20 67%	24 80%	27 90%	28 93%	29 97%	
NJ, C-1	29	30	0	0	0	1 3%	4 13%	7 23%	10 33%	16 53%	19 63%	23 77%	25 83%	29 97%	30 100%	
California Colony	30	30	0	0	0	0	0	0	0	2 7%	7 23%	12 40%	15 50%	16 53%	18 60%	23 77%		
California Wild	17	30	0	0	0	0	0	0	0	1 3%	4 13%	6 20%	8 27%	12 40%	13 43%	19 63%		
NJ, CH	30	30	0	0	0	0	1 3%	3 10%	3 10%	3 10%	8 27%	15 50%	18 60%	23 77%	24 80%	24 80%		

TABLE 3.—Number of mosquitoes dying (cumulative) in six strains of the *C. pipiens* complex exposed to dry air (Experiment 2).

Strain	Age (days)	No. used	Time of recording in hours											
			0	2	4	6	8	10	12	14	16	18	20	22
Montgomery	2-4	32	0	0	1 3%	3 9%	4 13%	4 13%	6 19%	10 31%	17 53%	21 66%	29 91%	29 91%
Pharr	2-4	30	0	1 3%	2 7%	9 30%	9 30%	12 40%	19 63%	25 83%	25 83%	25 83%	27 90%	27 90%
NJ, C-1	2-4	31	0	0	4 13%	11 36%	17 55%	22 71%	26 84%	30 97%	31 100%
California Colony	2-4	32	0	1 3%	1 3%	1 3%	2 6%	2 6%	3 9%	4 13%	7 22%	11 34%	17 53%	23 72%
California Wild	2-4	32	0	0	2 6%	3 9%	3 9%	4 13%	6 19%	12 38%	16 50%	16 50%	21 66%	25 78%
NJ, CH	2-4	31	0	0	0	0	0	1 3%	3 10%	3 10%	5 16%	6 19%	10 32%	14 45%

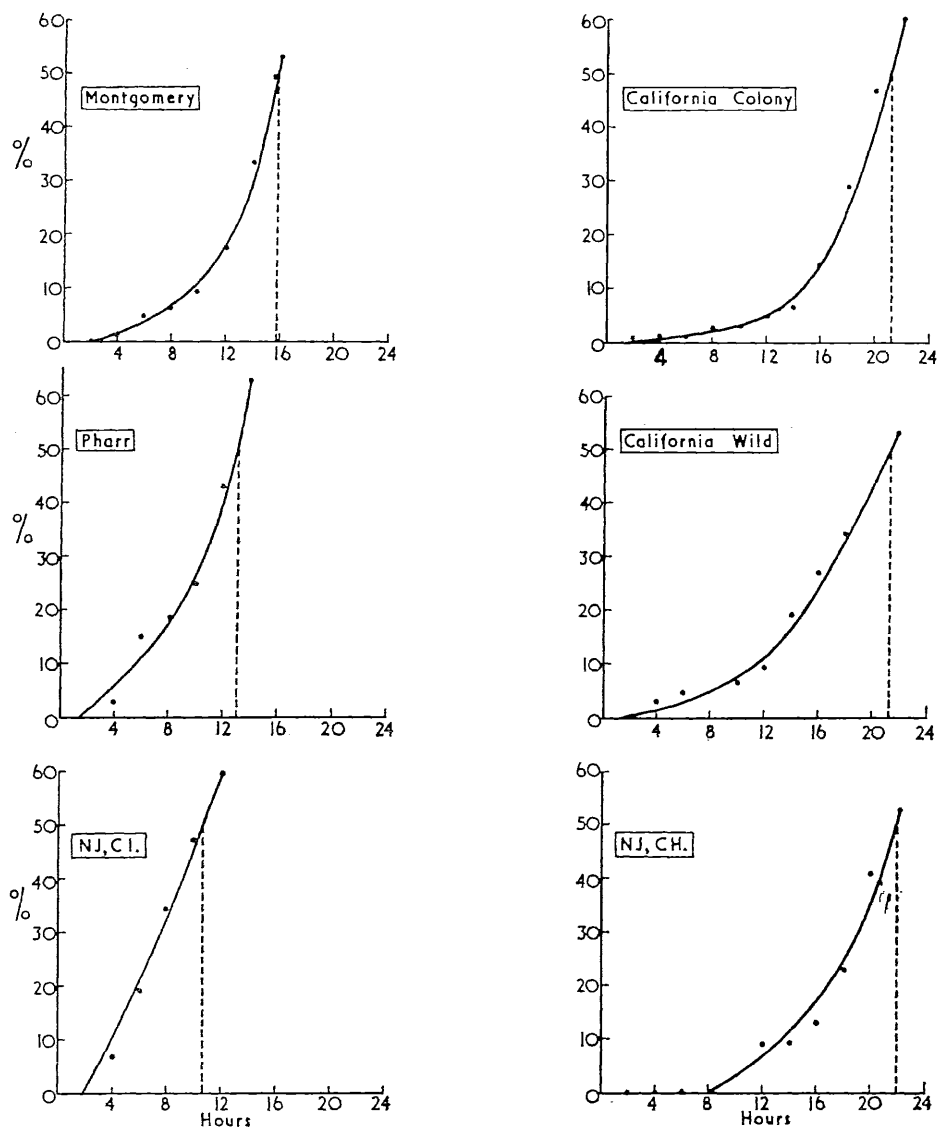


FIG. 1.—Cumulative mortality curves, showing the 50 percent end-points, in six strains of the *C. pipiens* complex kept in dry air at 26.5° C. (Curves fitted by eye).