

# Studies in the Cambridge rainforest

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CDC West Nile Project

Harvard School of Public Health



# A collaborative study

CDC Division of Vector-Borne Infectious Diseases, and:

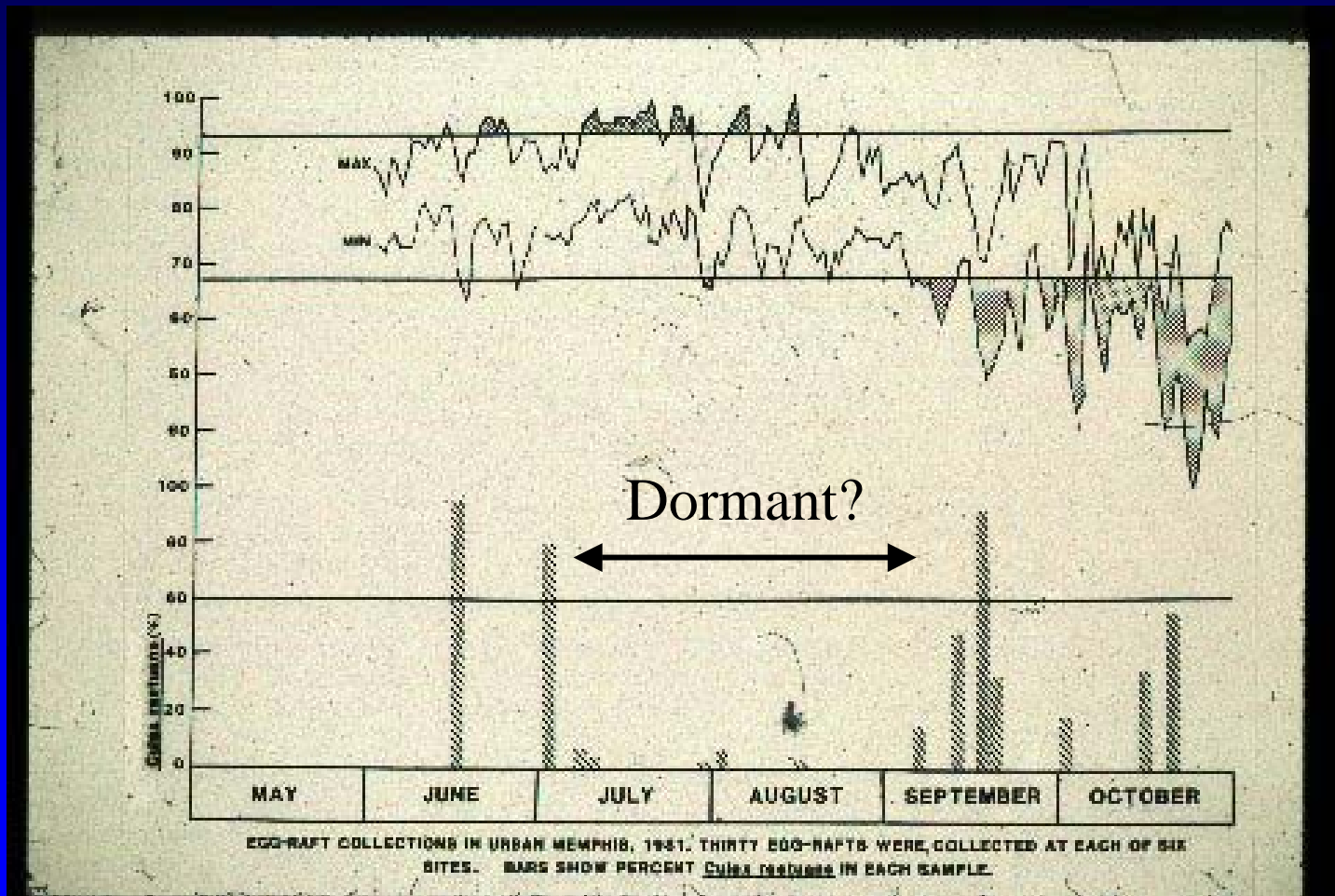
- Harvard School of Public Health
- Massachusetts State Laboratory Institute
- Cambridge Public Health Department
- East Middlesex Mosquito Control Project
- Central Massachusetts Mosquito Control Project



# Egg-rafts in natural sites



# *Cx. restuans* egg-rafts, Memphis, 1981



# Hay infusion



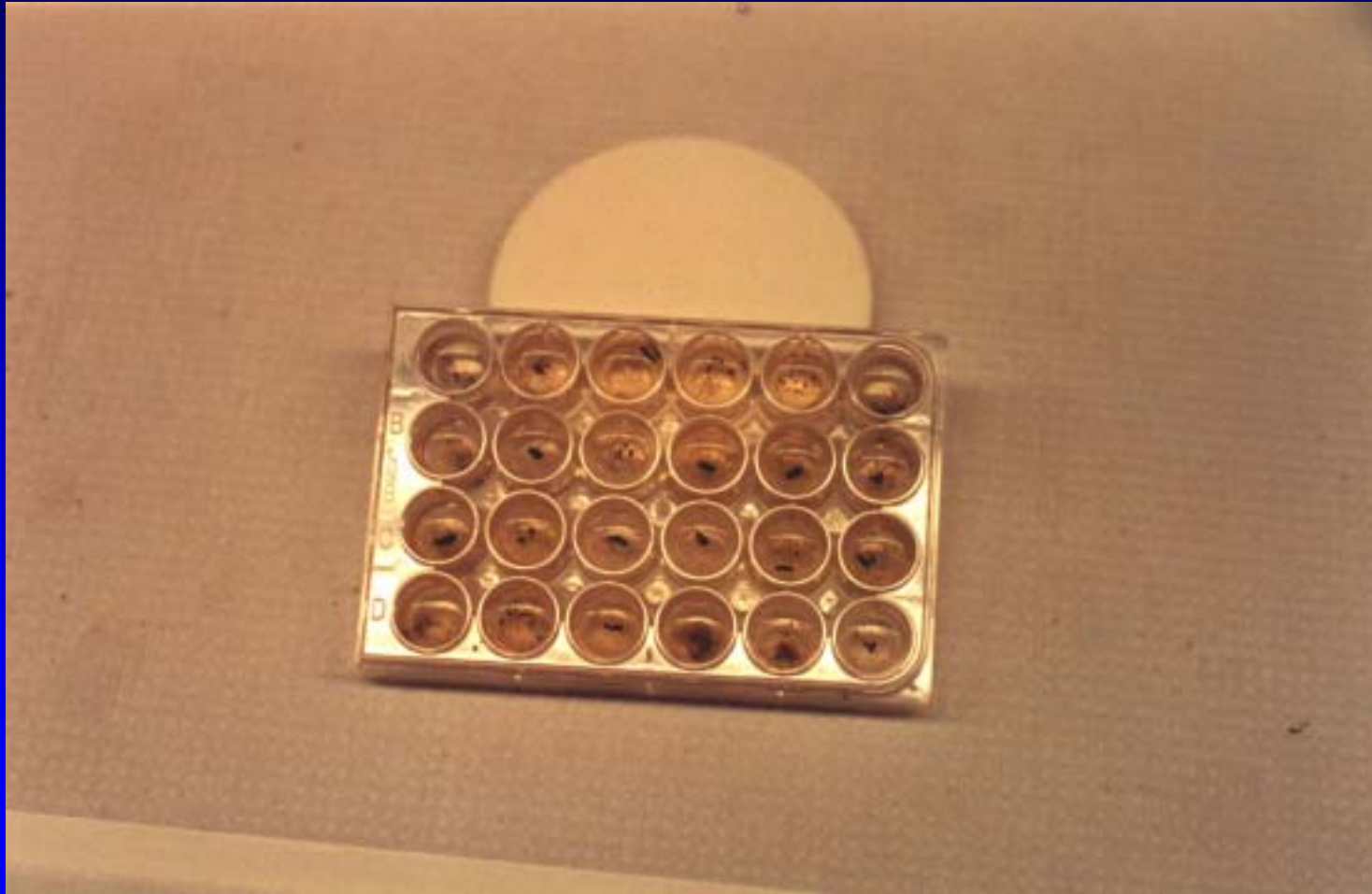
# On the road



# The trap is laid



# Convenient collecting vessel





# Species identification in the 1st instar

egg-breaker

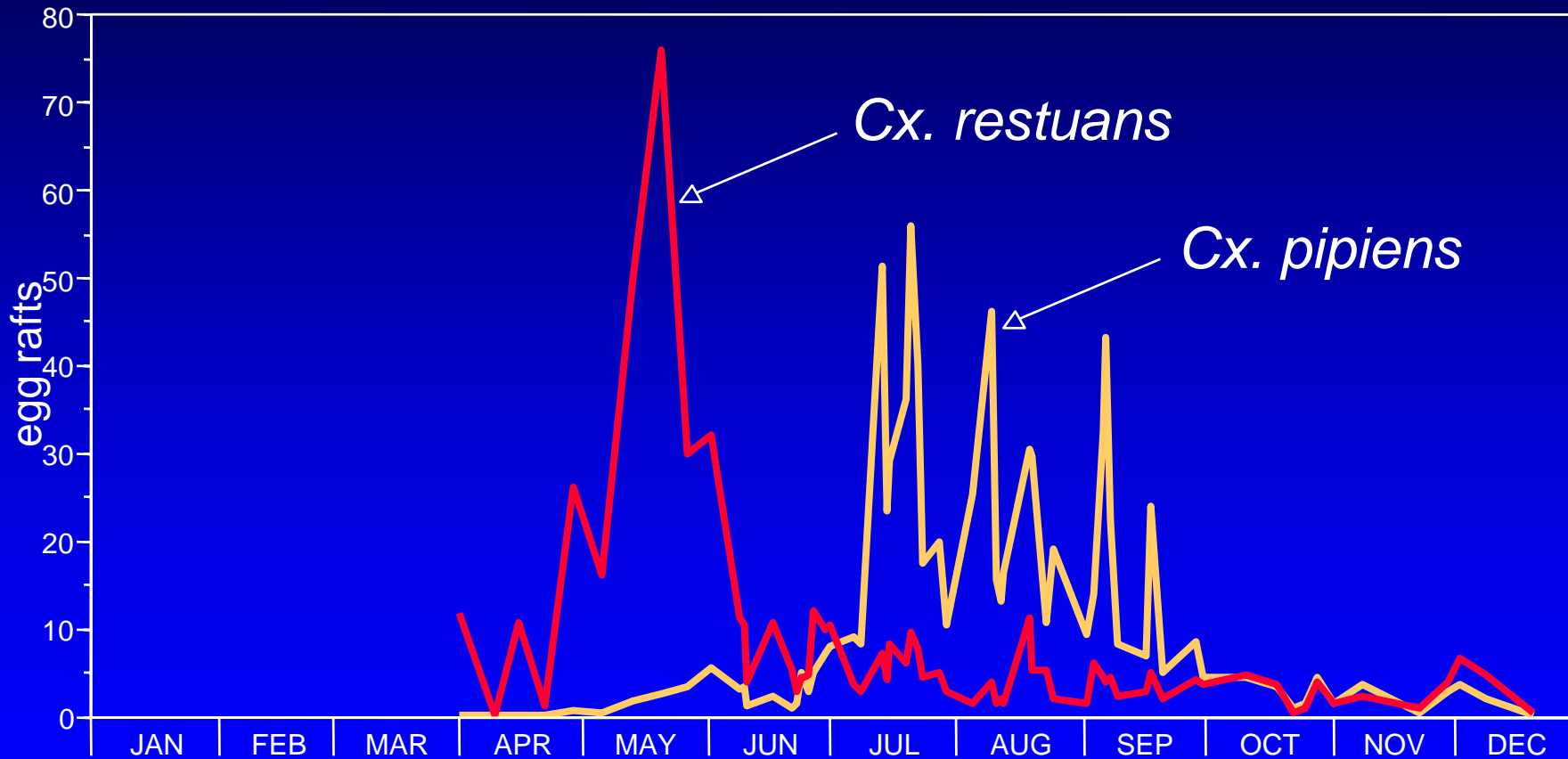


*Culex pipiens*

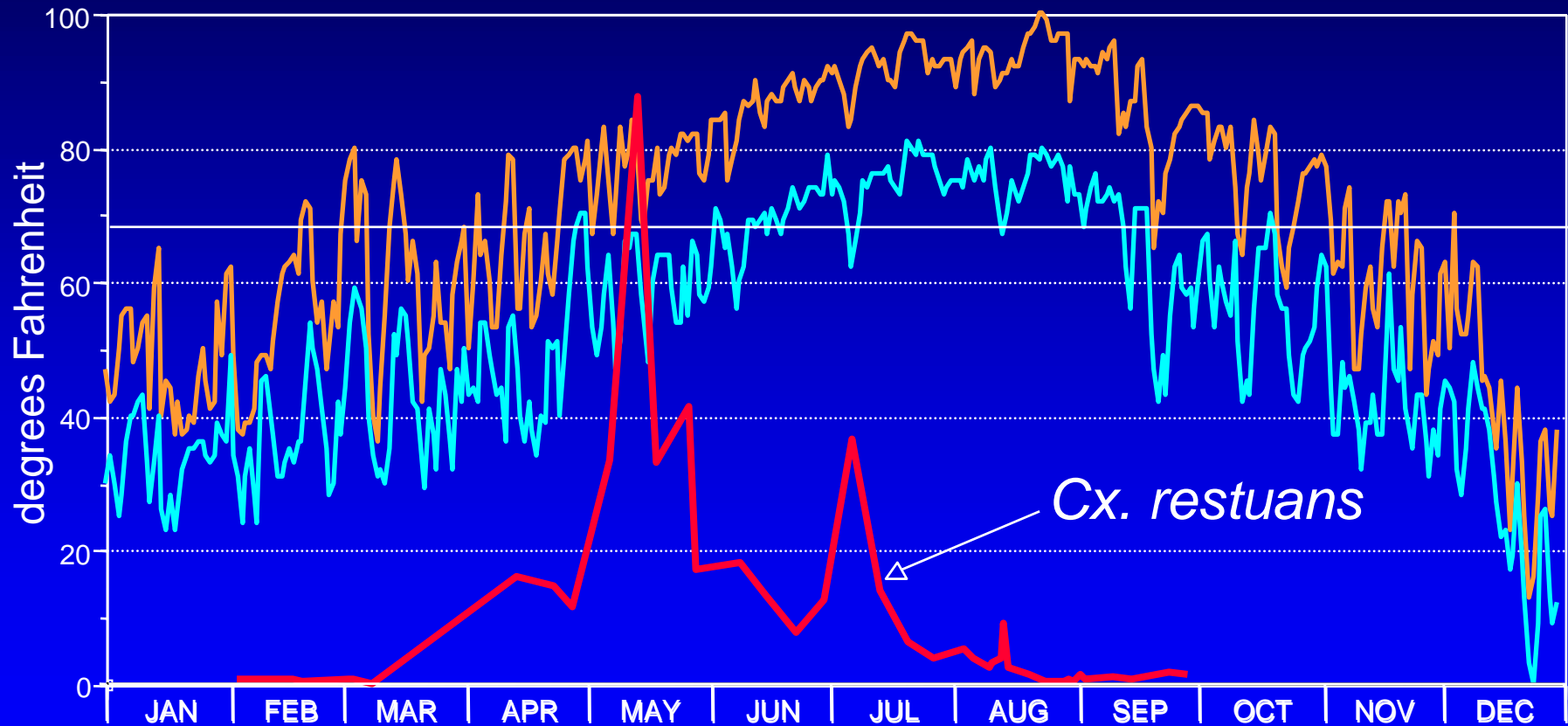


*Culex restuans*

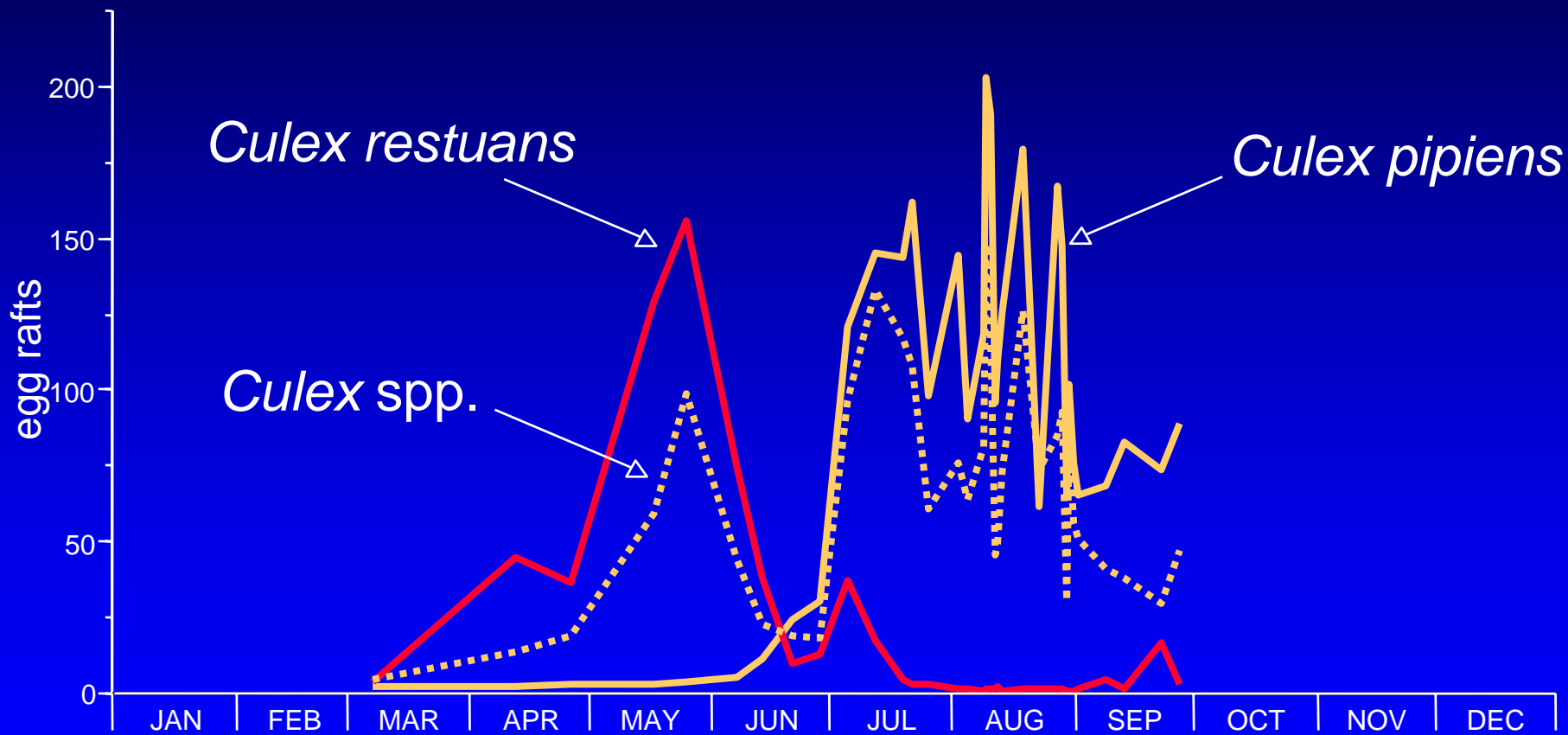
# Egg rafts, Memphis, 1982



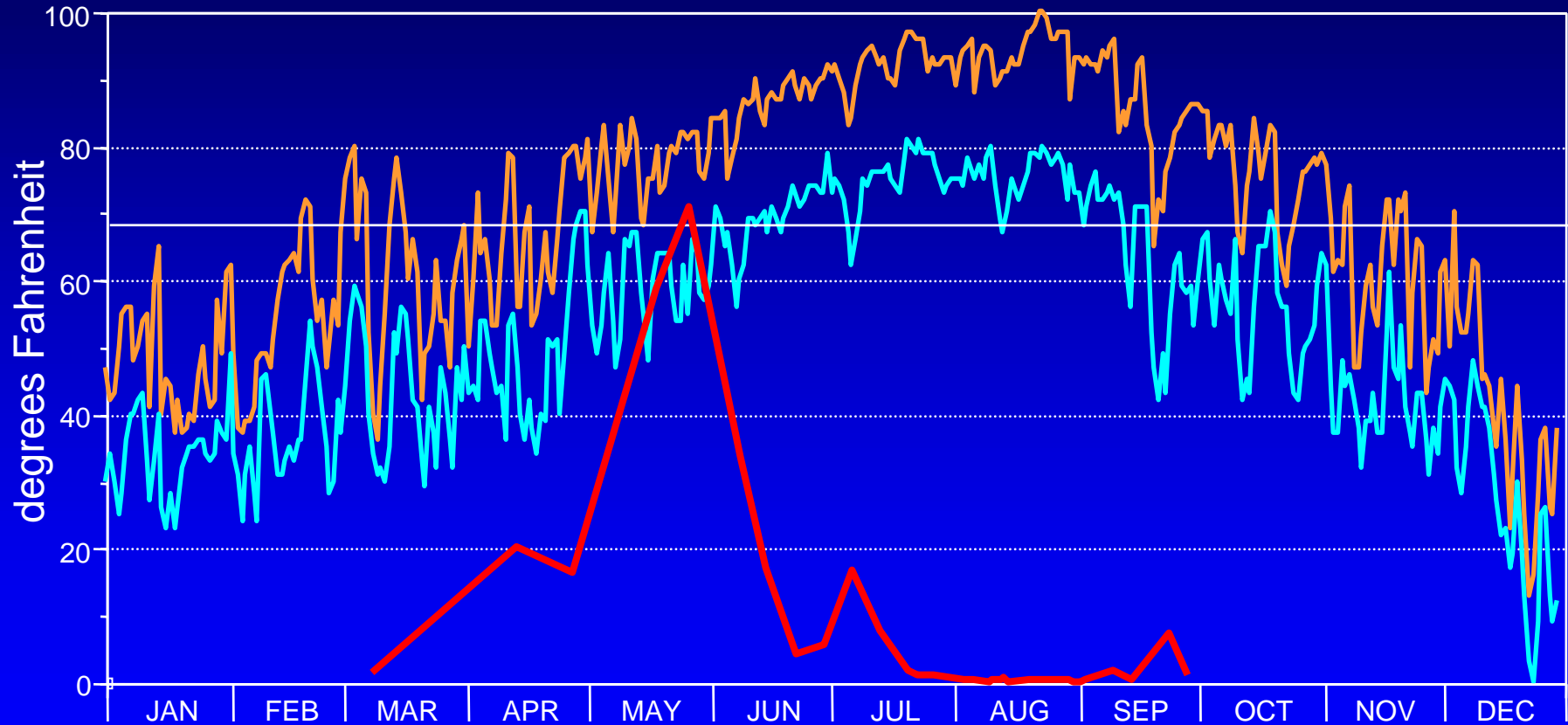
# Memphis, 1983, *Cx. restuans* eggs



# Gravid mosquitoes, 1983



# 1983, *Cx. restuans*, gravid females

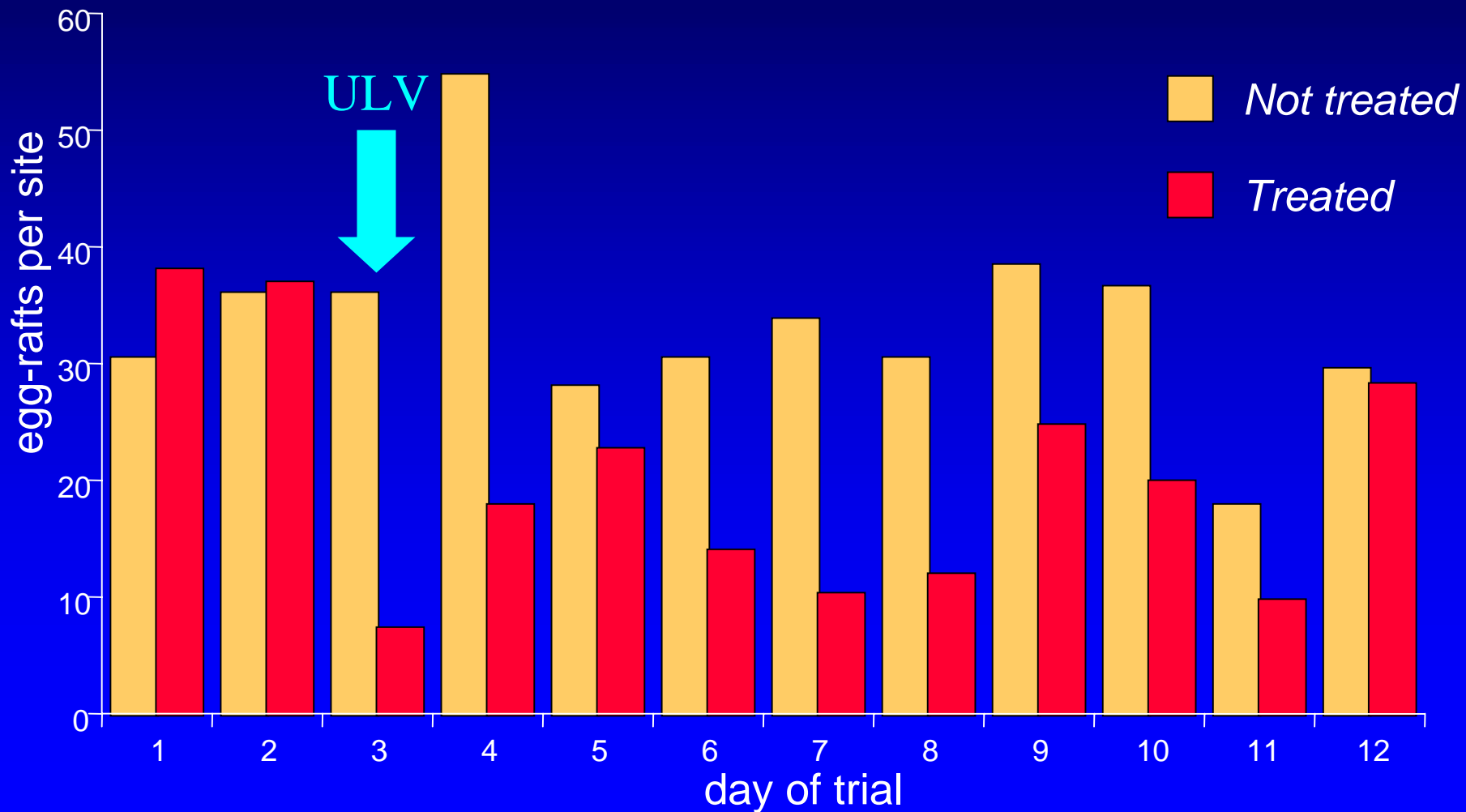


What is the **impact** of  
**ULV** treatments on  
*Culex pipiens* and *Cx.*  
*restuans*?

# Bioassay Cages

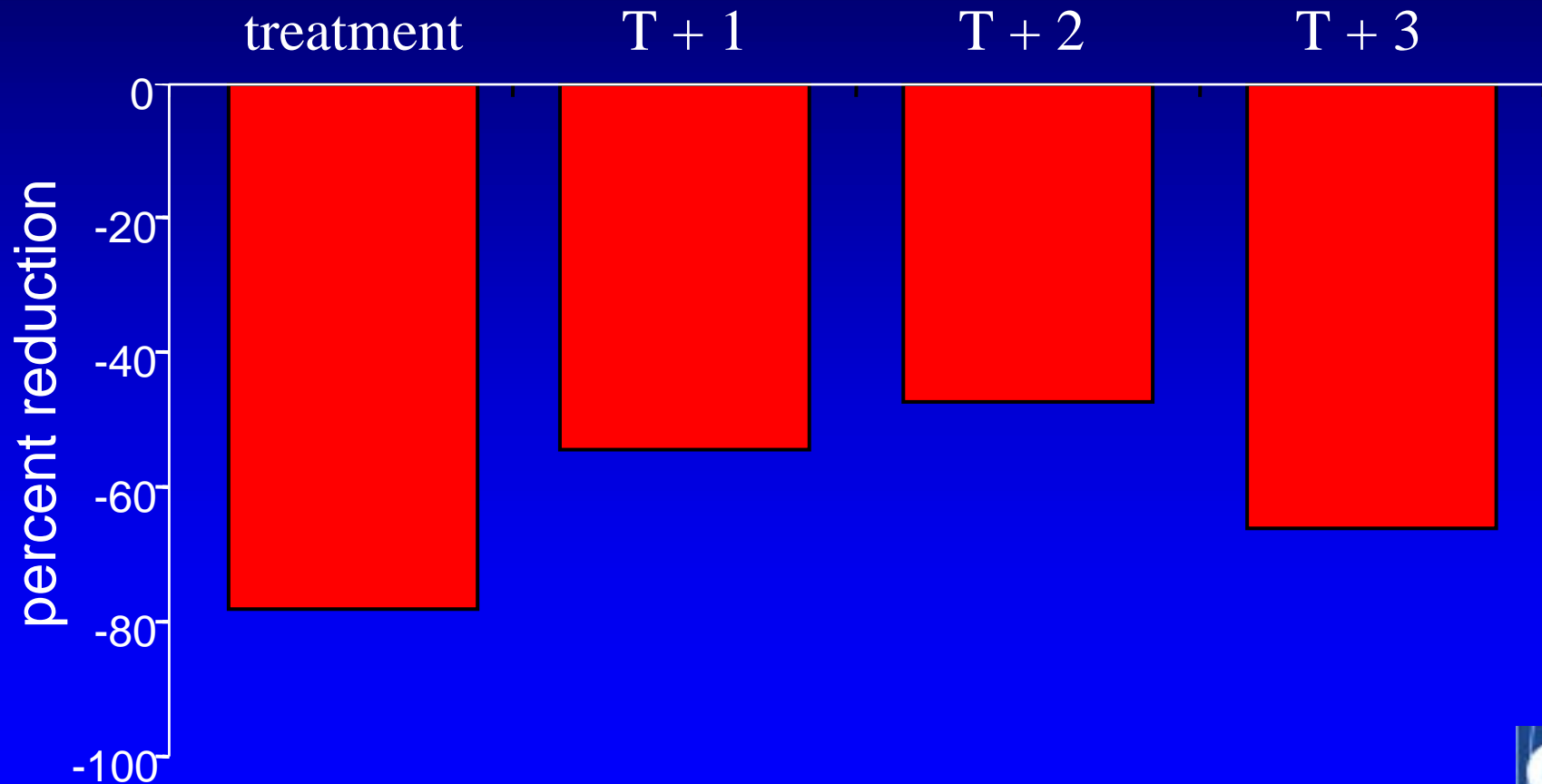


# Memphis, Resmethrin, 0.0062 lb/acre





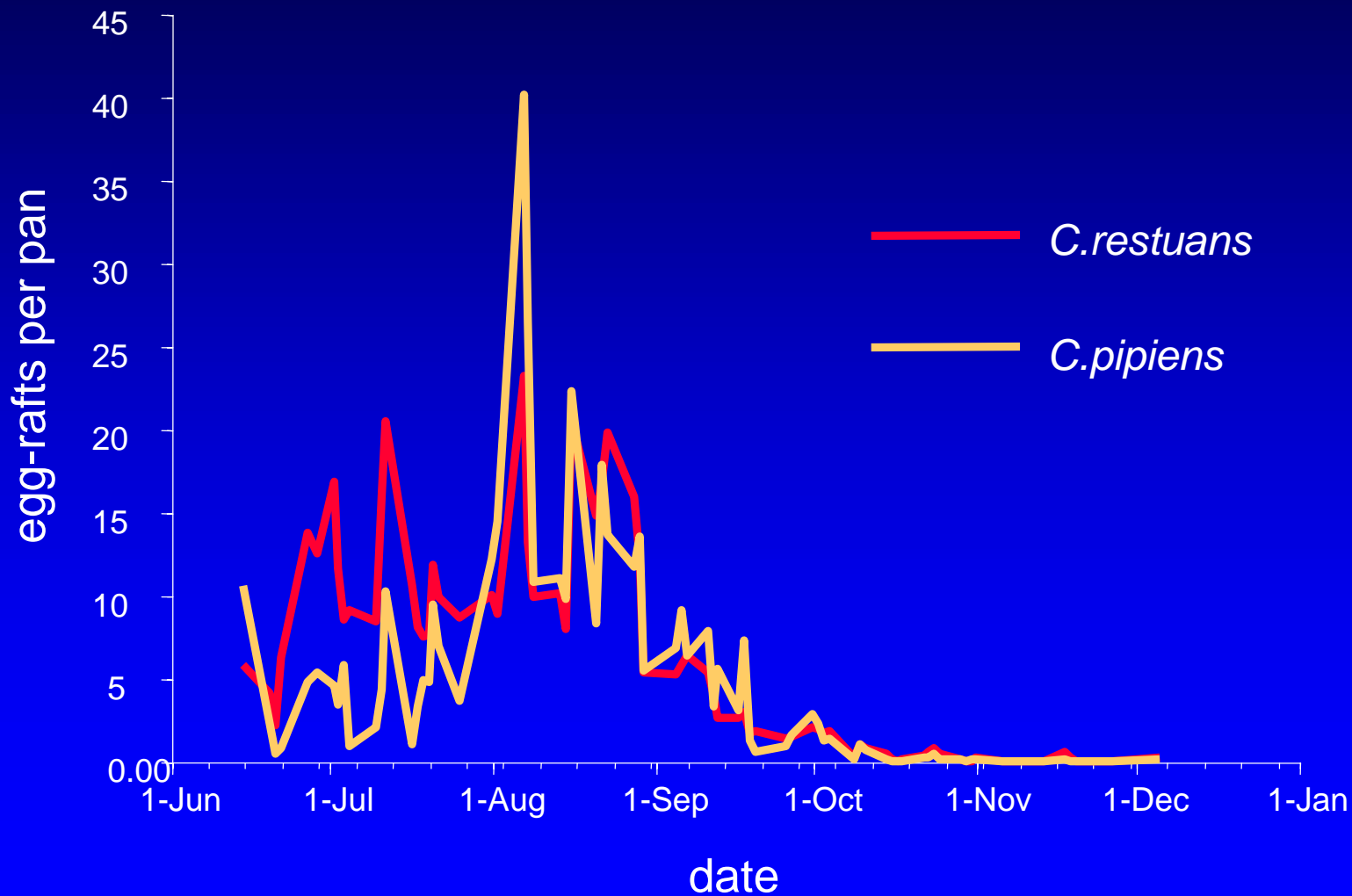
# Memphis, mean % change, 4 trials



# Summary of observations, Memphis

- Springtime *restuans* and enzootic transmission coincide
- Dramatic early summer disappearance of *restuans*
- Dramatic fall reappearance of *restuans*
- Principal *Cx. pipiens* activity after *restuans* dormancy
- ULV resmethrin effective against *Culex* species

# Egg-raft collections, Boston, 2001



# *Culex* larval infestation rates

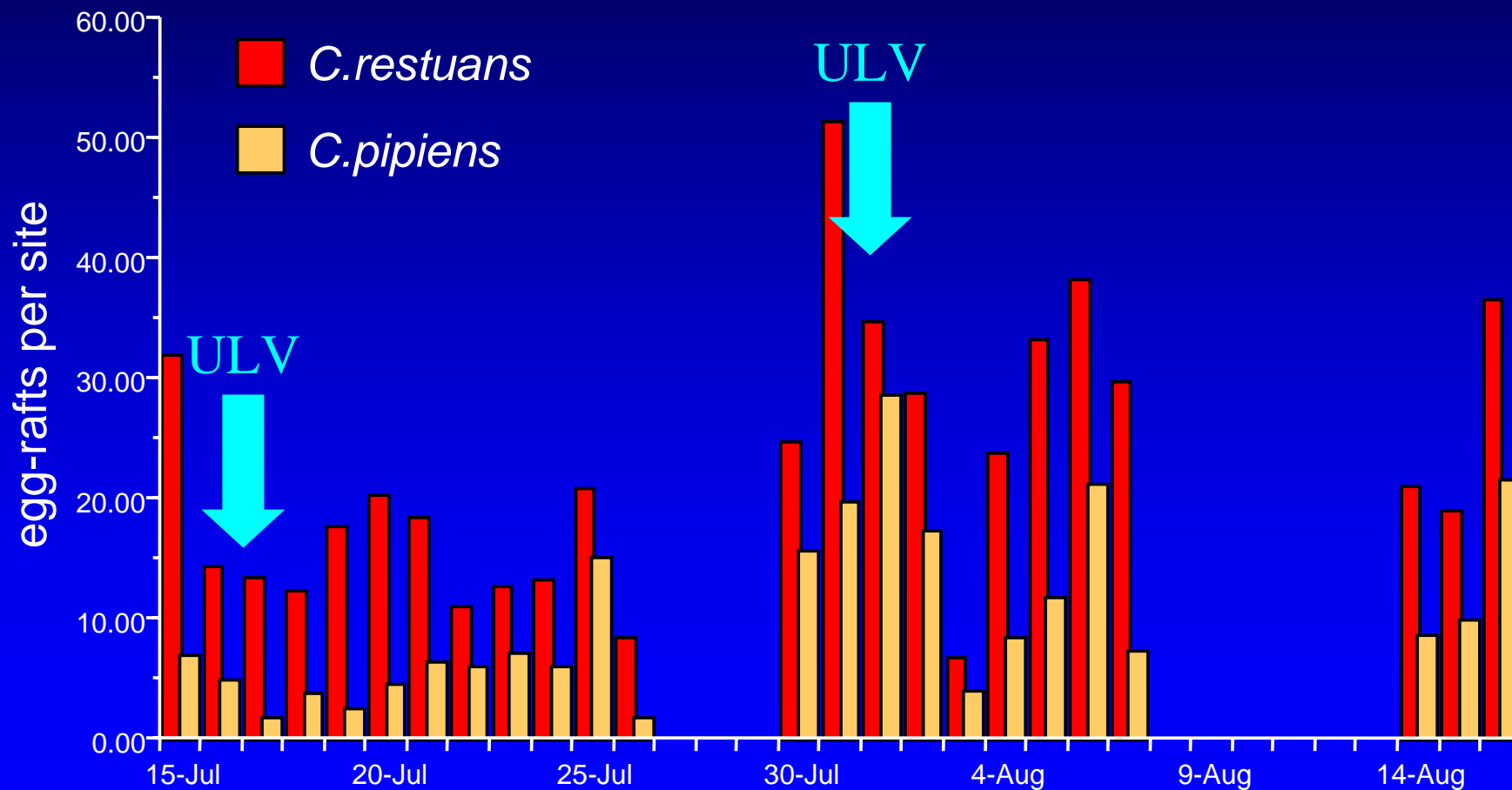
## Cambridge

Yards: 27% positive (n = 30)

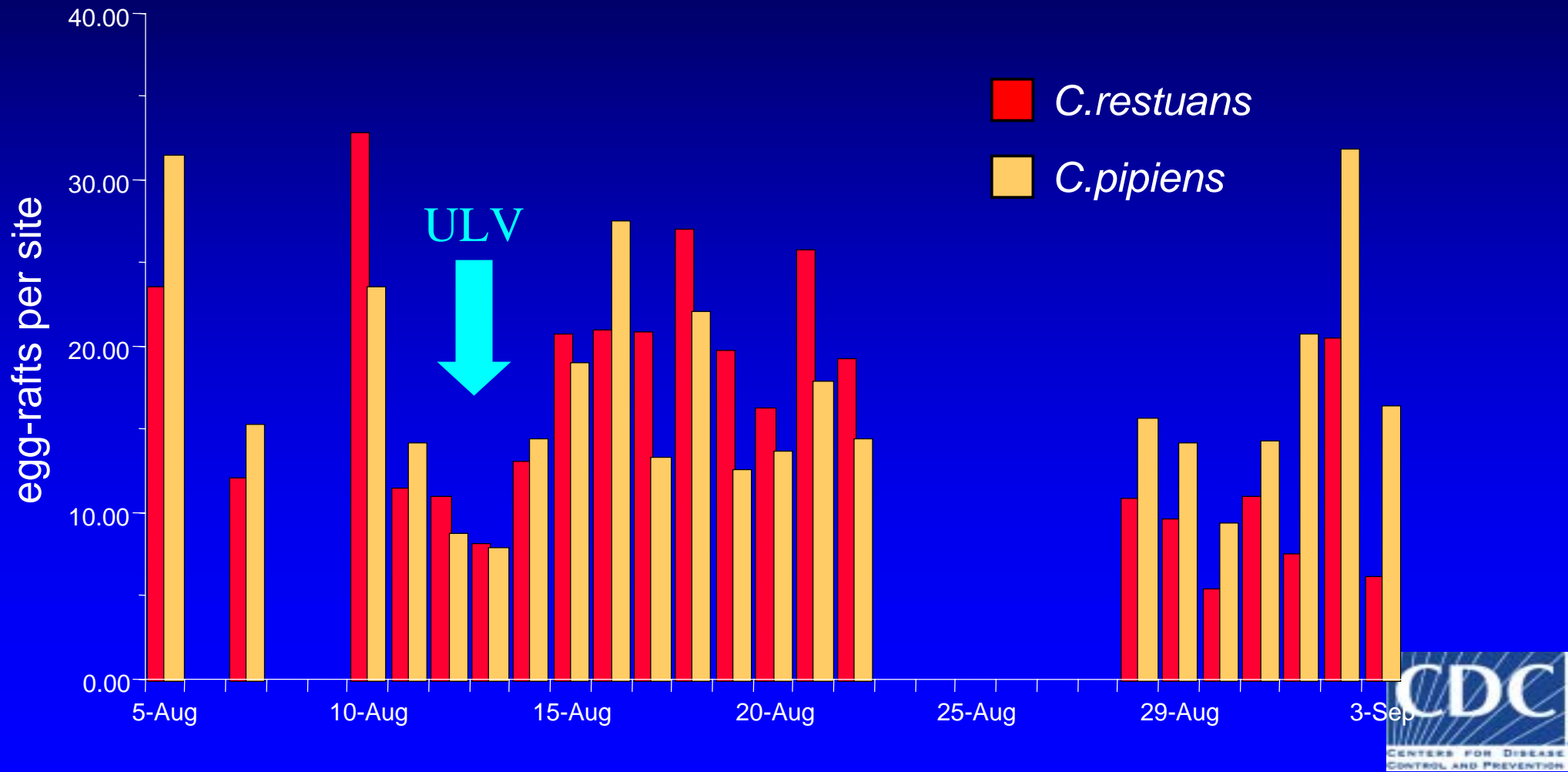
## Jamaica Plain

Catch basins: 38% positive (n = 100)

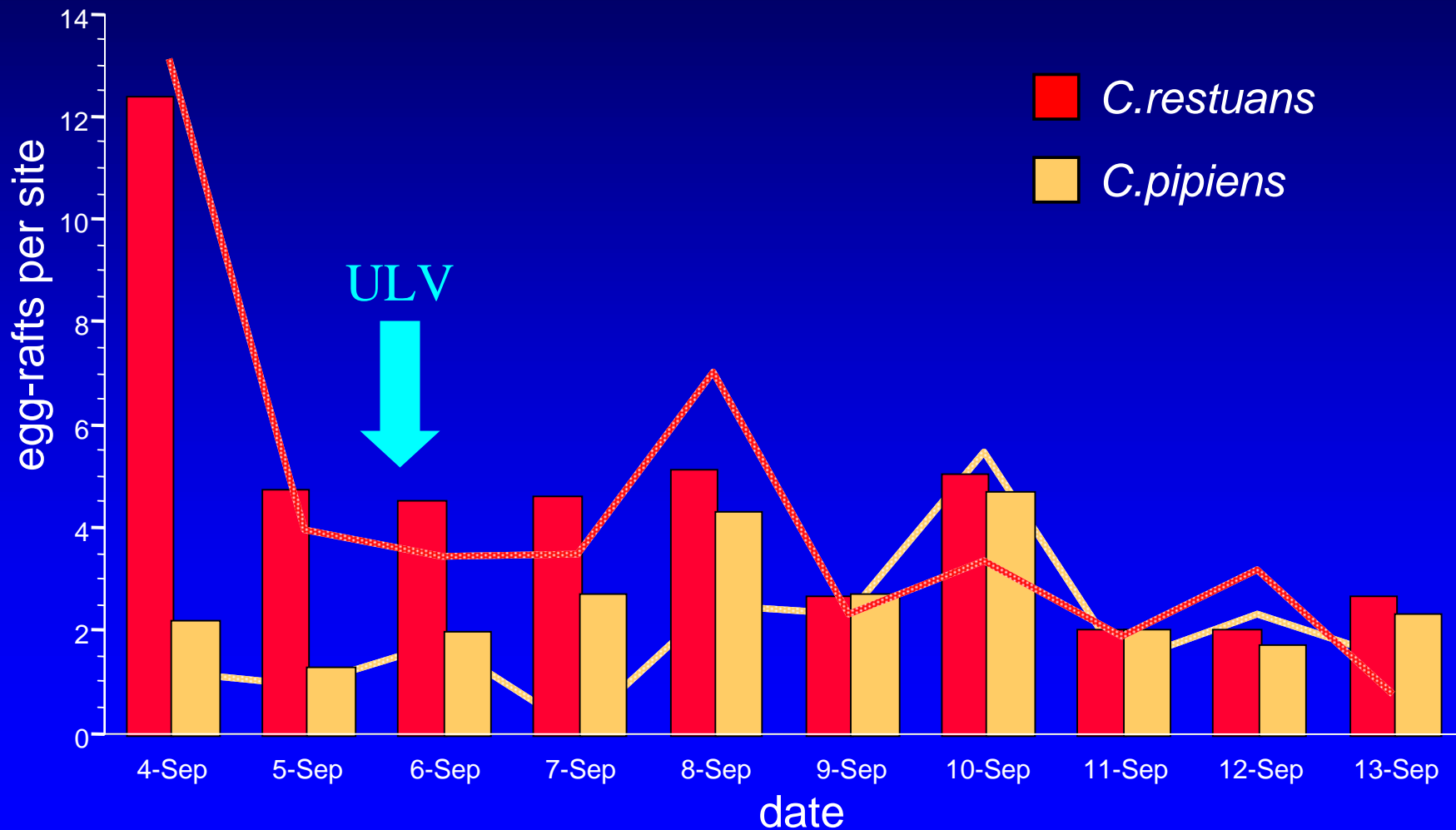
# Burlington, resmethrin, 0.001 lb/acre



# Framingham, Resmethrin, 0.00175 lb/acre



# Tewksbury, Resmethrin, 0.007 lb/acre



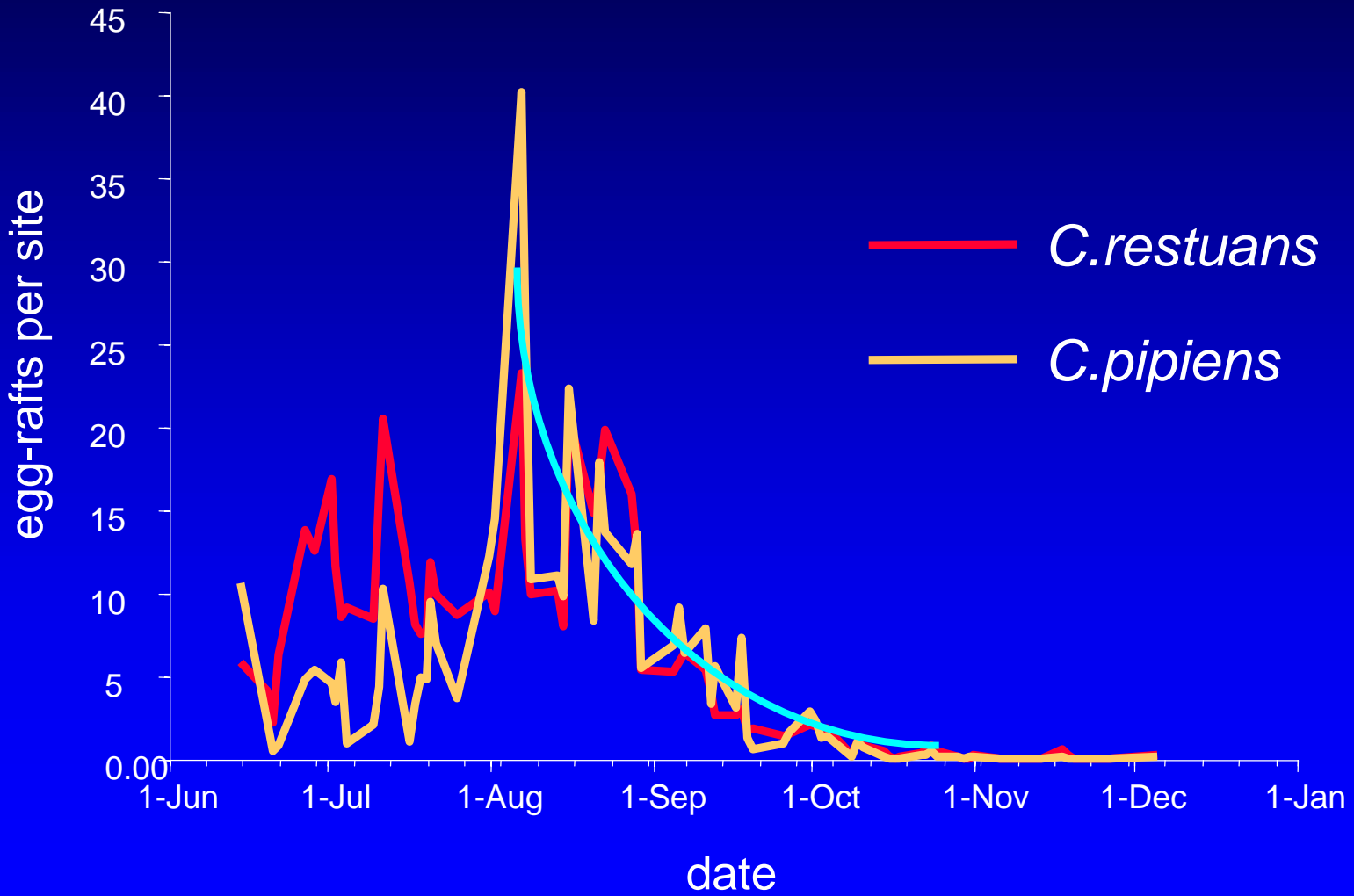
Why was ULV resmethrin  
effective against *Culex* spp in  
**Memphis** ... but not in  
**Massachusetts** ... ?



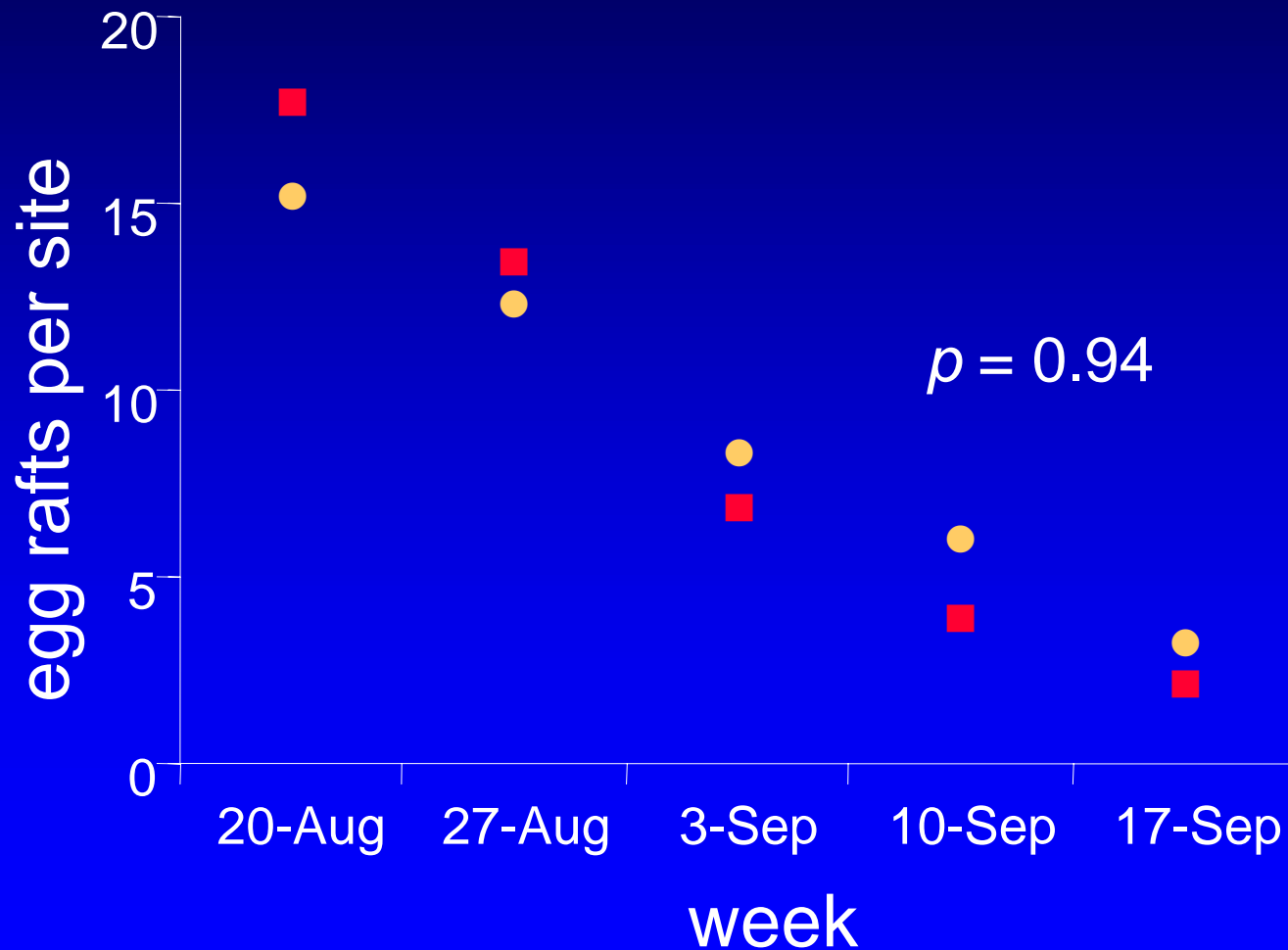
# Possible reasons?

- Application rate?
- Street plan?
- Vegetation?
- Weather variables?
- Mosquitoes behavior?

# Egg-raft collections, after August 1



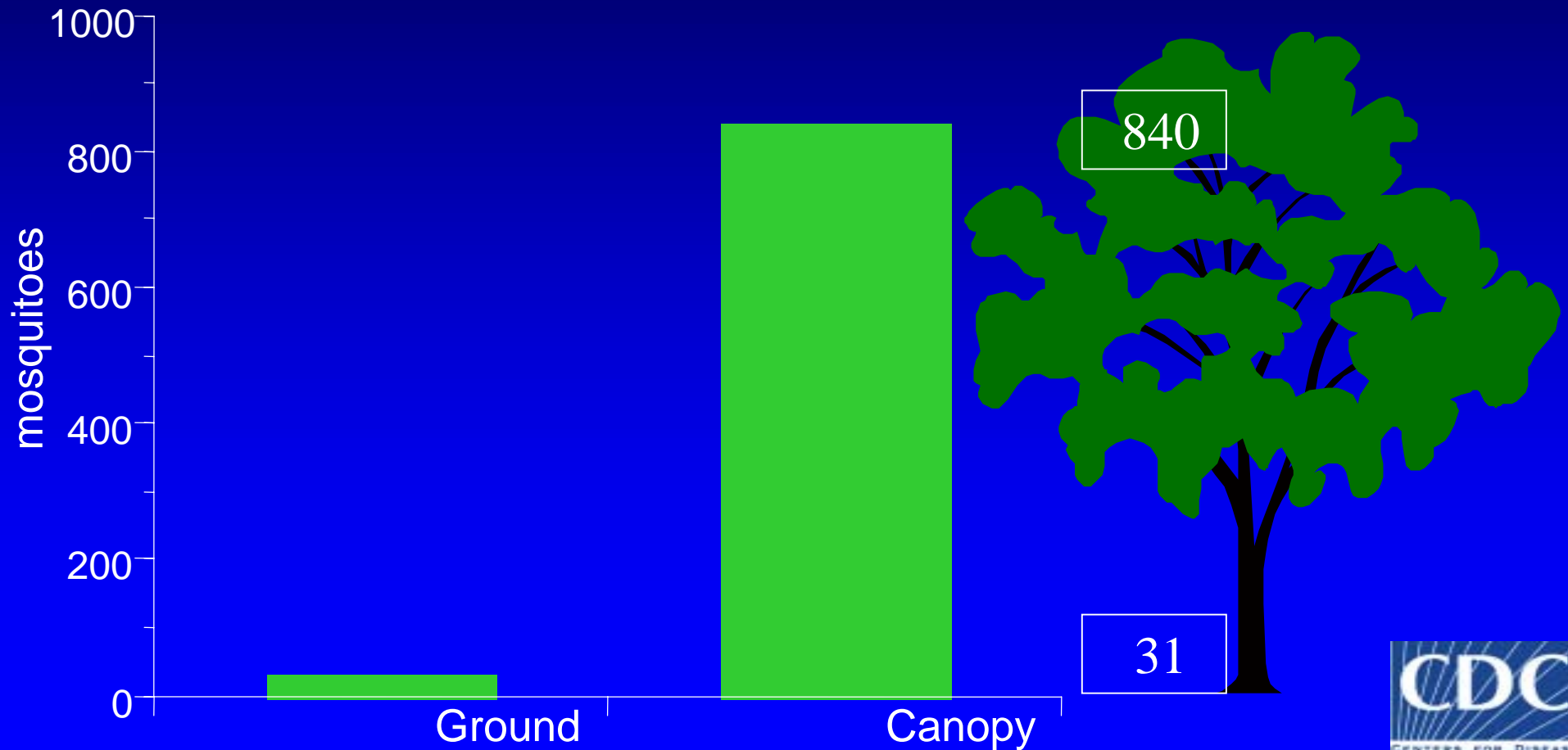
# Egg-raft collections in fall



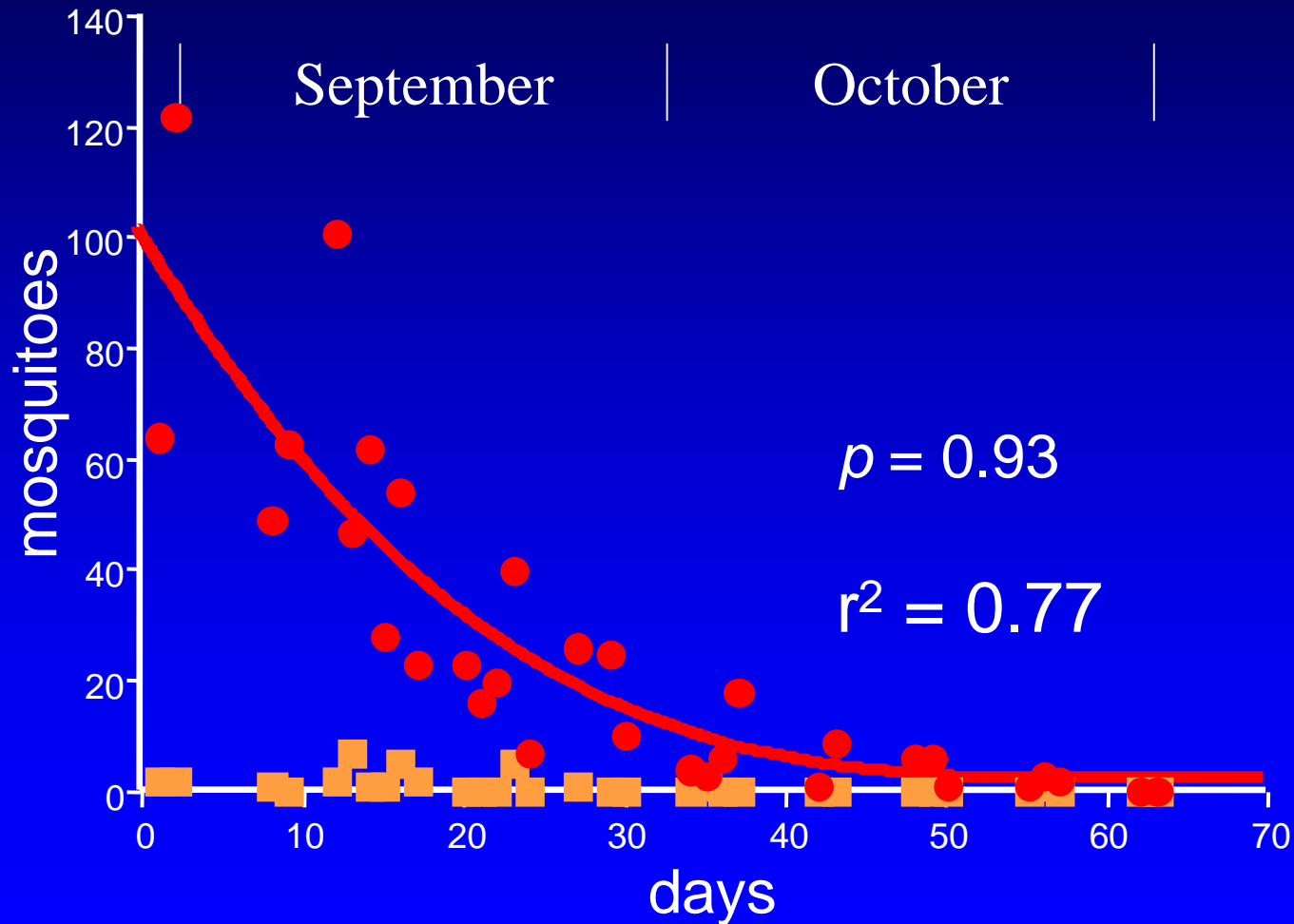
# Bird-baited trap



# Urban *Culex* are canopy feeders?



# Decline of *Culex* adults in autumn

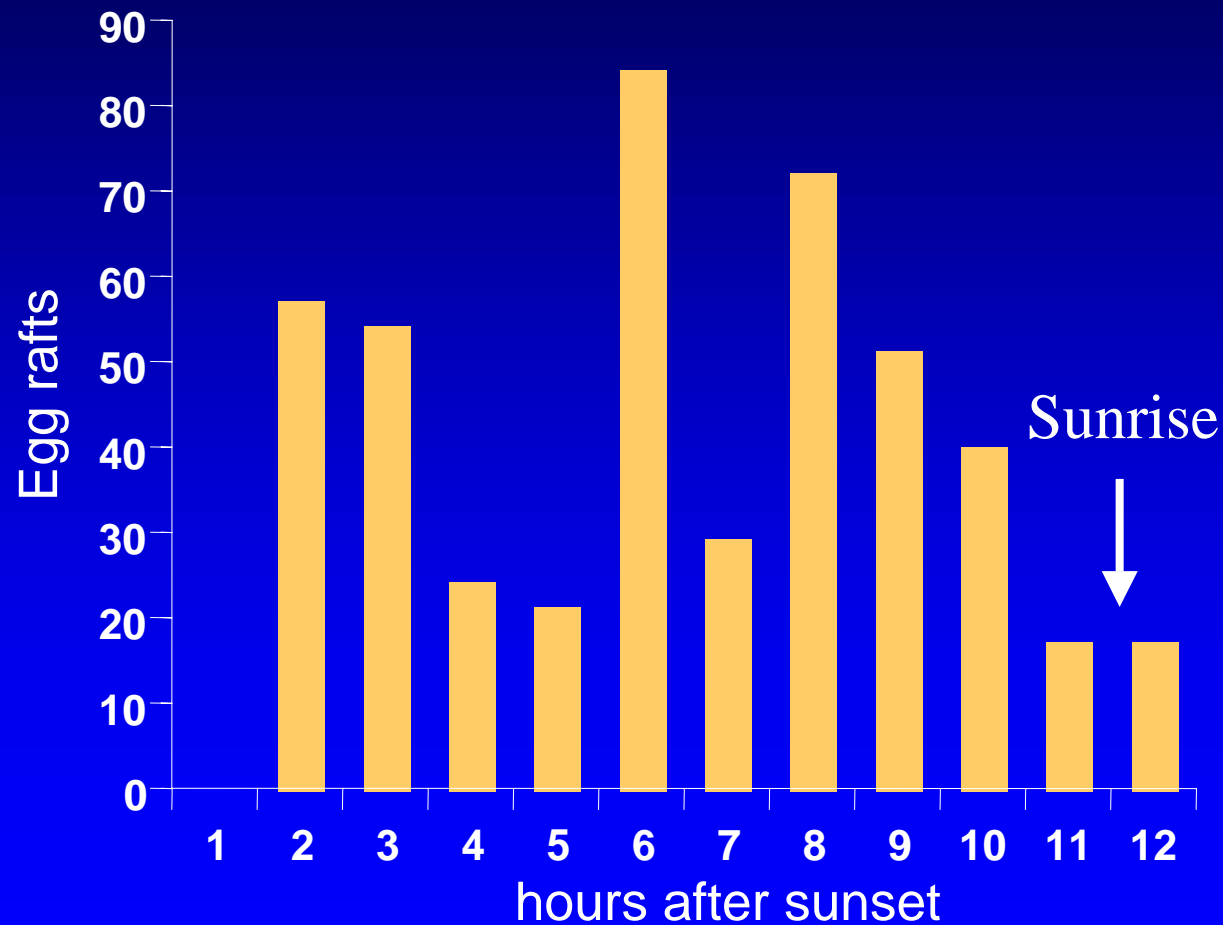


# Parous rate of blood-feeding *Culex*

	Mosq.	Parous	%
Sep 20	9	7	77.8
Sep 25	10	10	100.0
Sep 26	23	22	95.7
Sep 27	11	11	100.0
Oct 4	4	4	100.0
Oct 10	4	4	100.0
Oct 11	4	4	100.0
Oct 16	6	6	100.0
Oct 17	18	16	88.9
Oct 18	1	1	100.0
Oct 22	9	9	100.0
Oct 23	13	13	100.0
Oct 24	6	6	100.0
Oct 29	6	6	100.0
	<b>124</b>	<b>119</b>	<b>97.3</b>

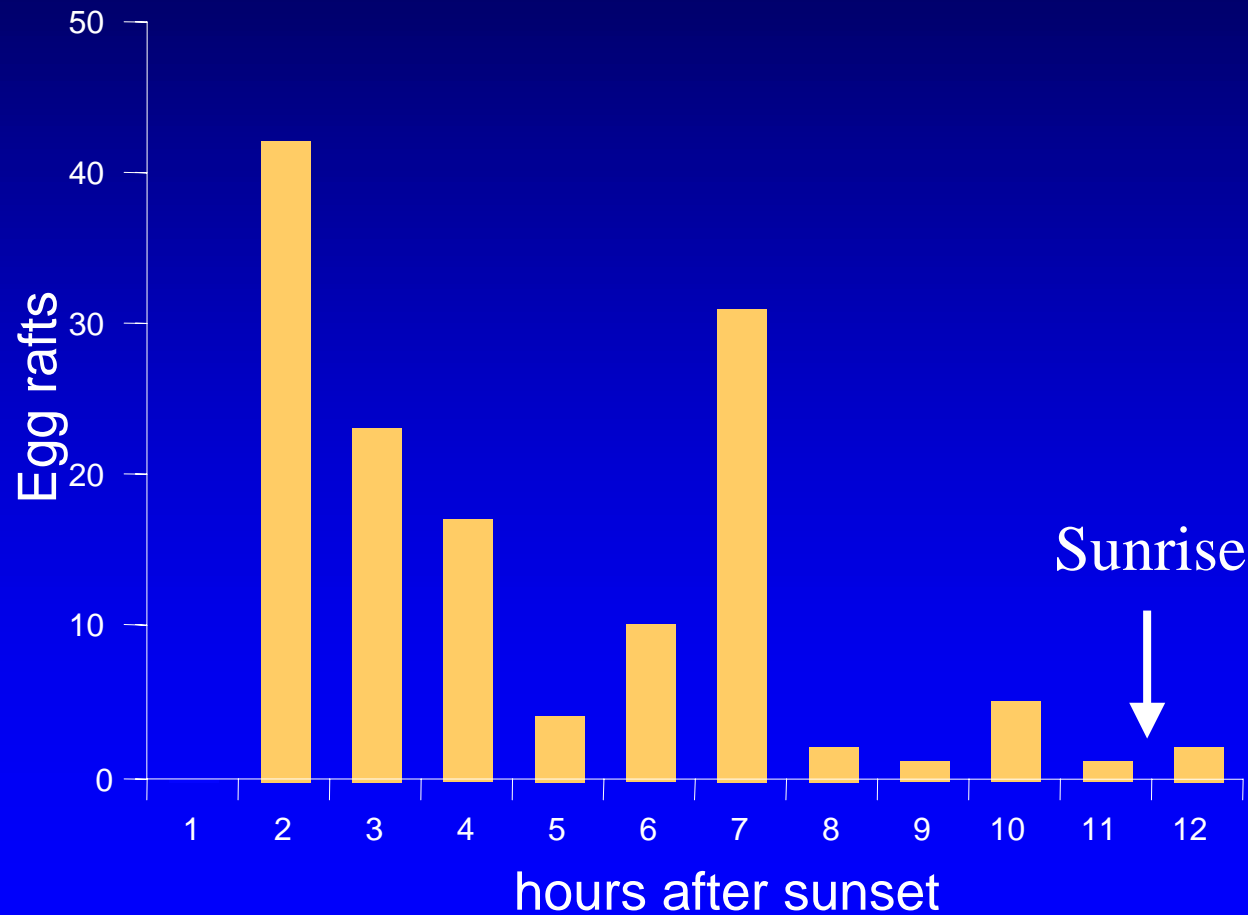
These  
mosquitoes  
eclosed  
before  
August  
10th?

# Questing at caged starling, Sept 10-11

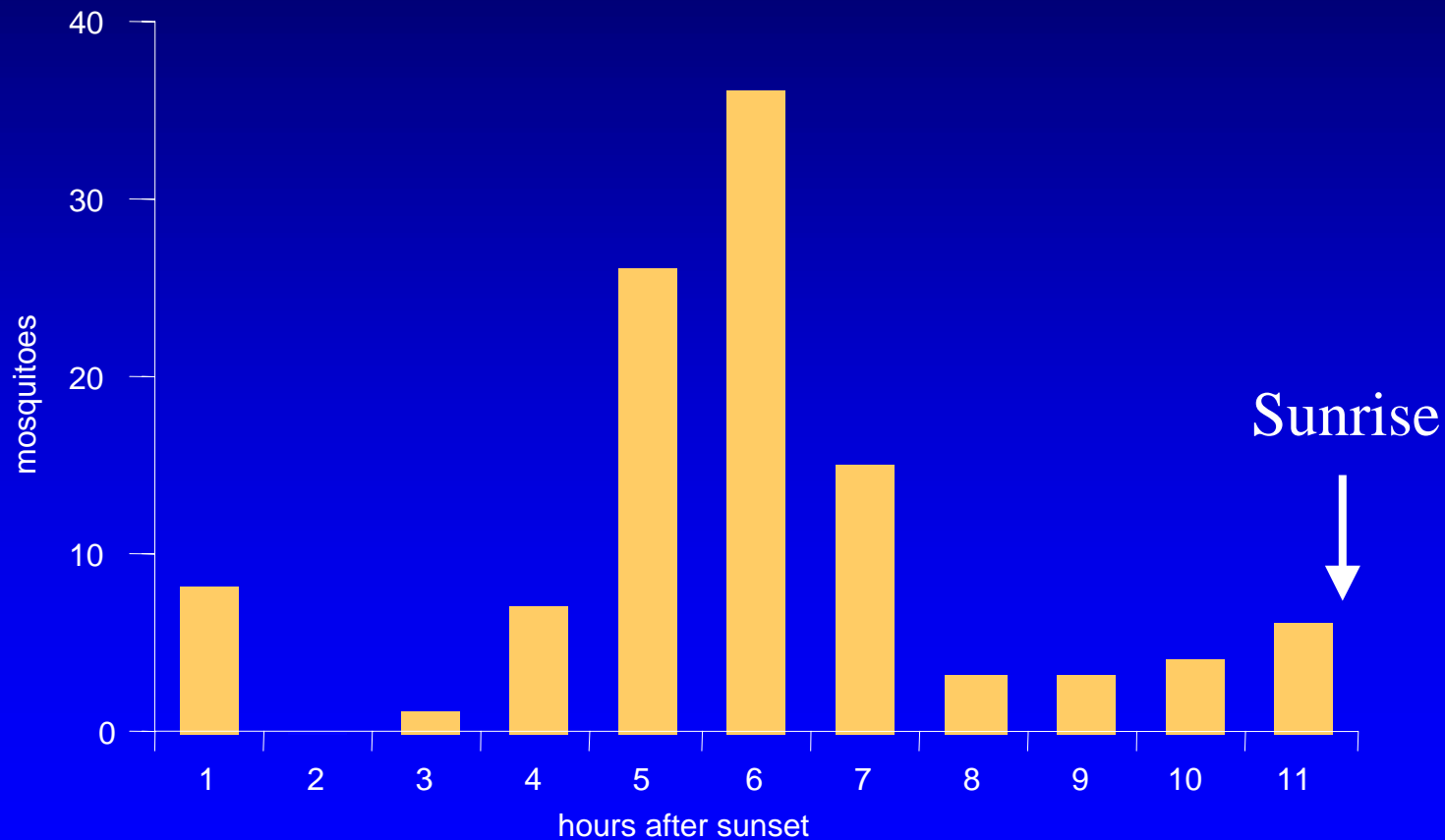




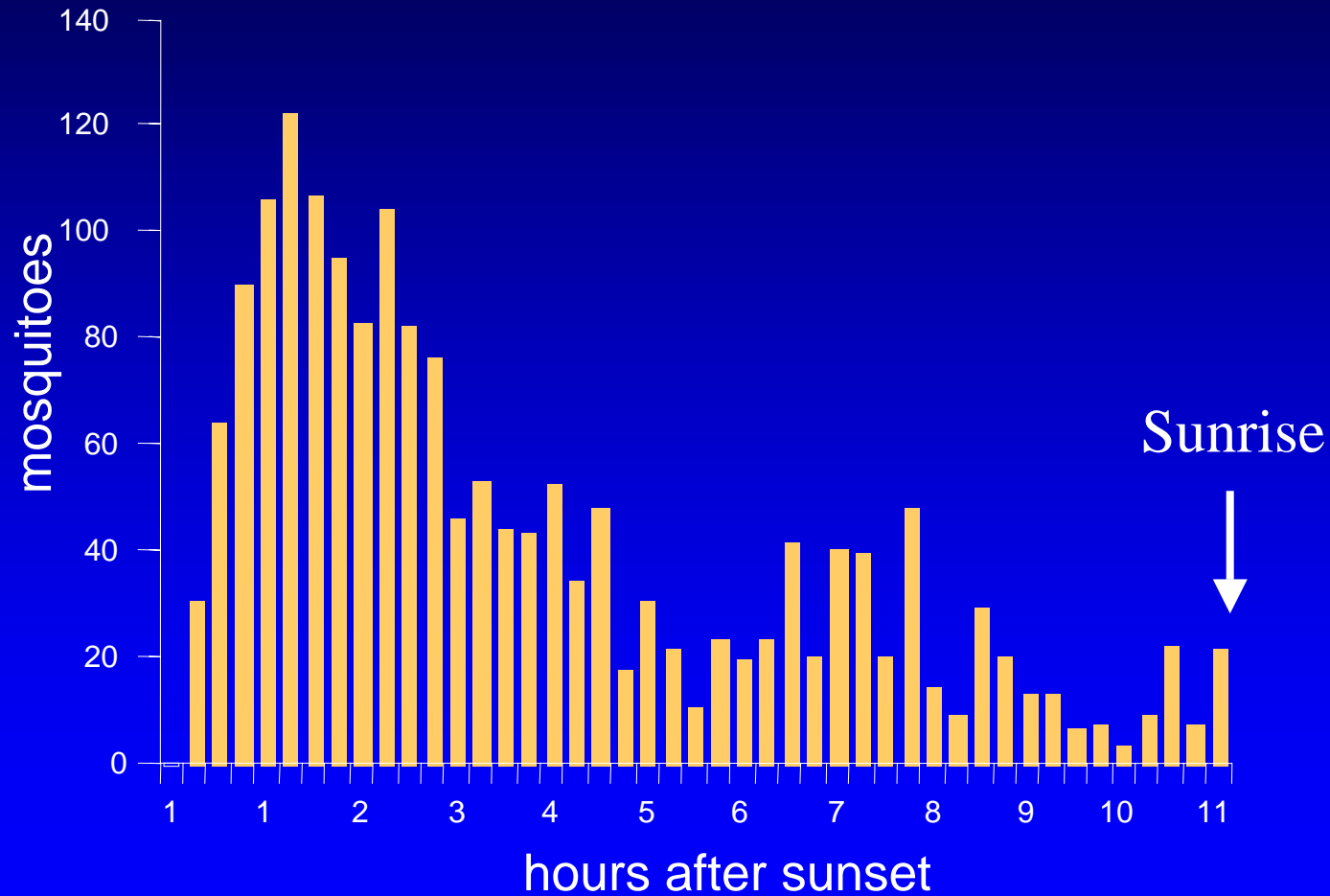
# Questing at caged starling, Sept 11-12



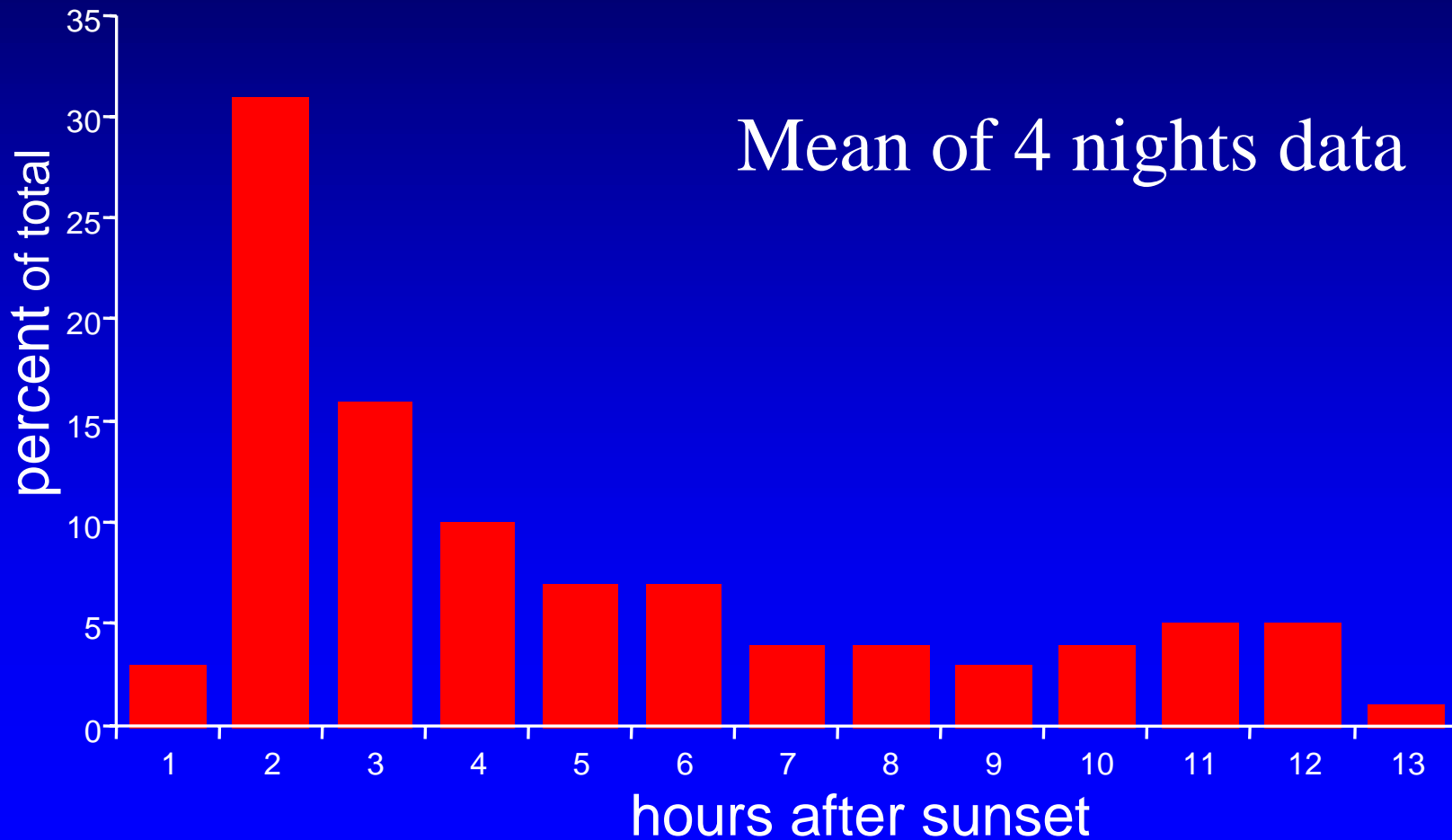
# Questing at caged starling, Sept 12-13



# Flight at oviposition site, Aug 21-22



# Flight at oviposition site

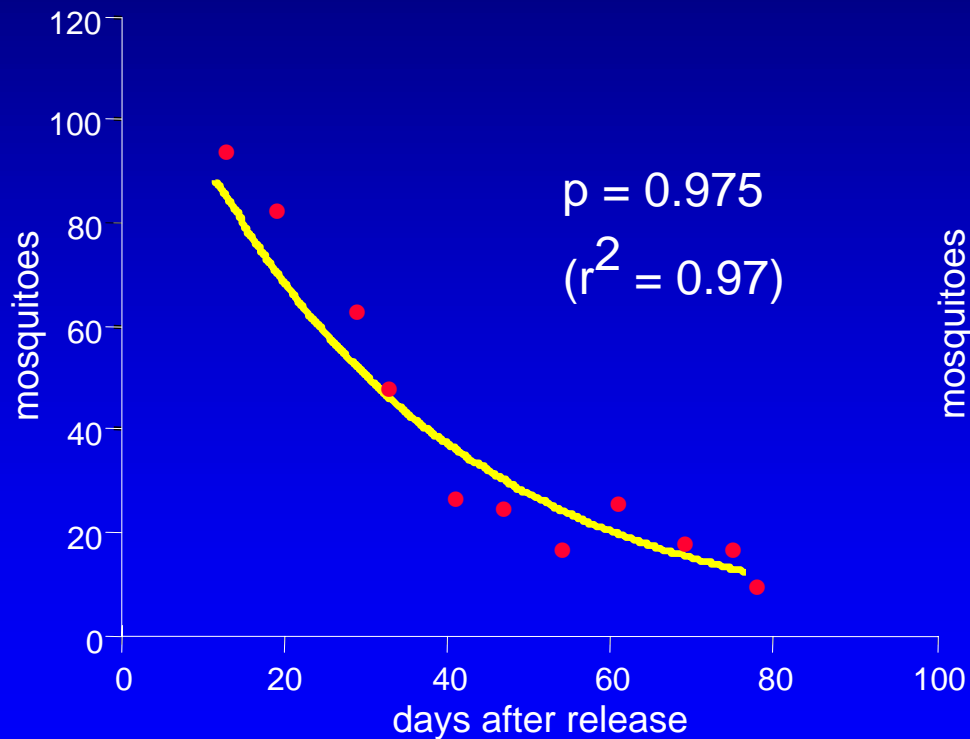


# Overwintering

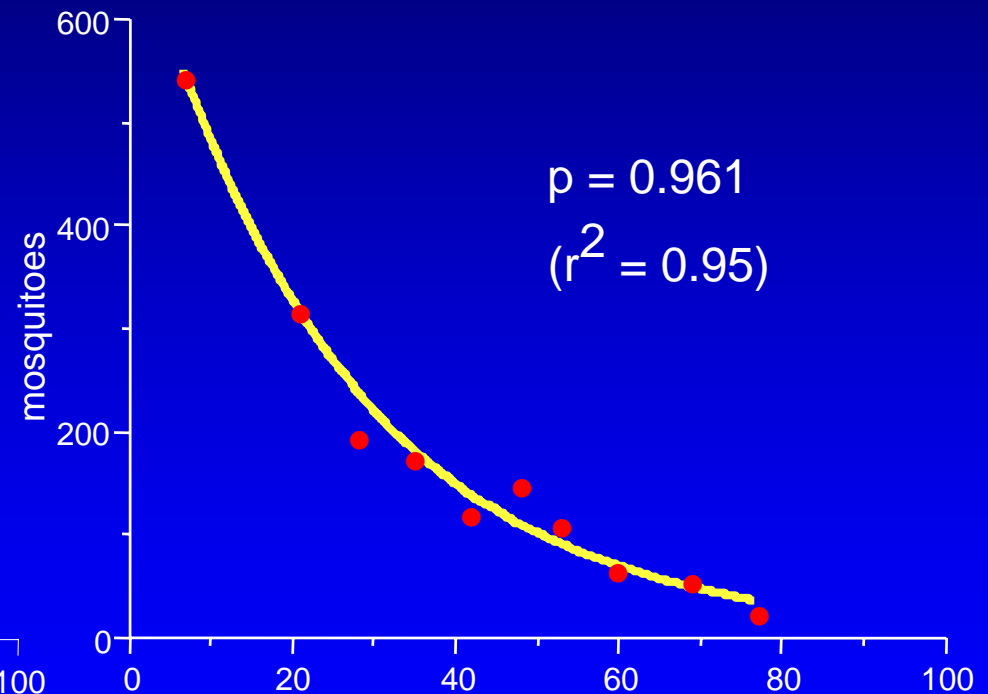


# Survival in overwintering *Culex*

## Cold winter



## *El Niño* winter



# Conclusions (Boston): background data

- *Cx restuans* and *Cx pipiens* are abundant
- Source is not clear
- Catch basins may not be significant as source

# Blood feeding

- *Cx. restuans* and *pipiens* feed in tree canopy
- Questing occurs throughout the night



# Oviposition

- Flight over sites mainly in early night
- Oviposition mainly late in night

## After early August ...

- Pre-diapause adults feed and oviposit
- Diapausing adults do not feed
- Survival rate of pre-diapause adults is high
- Adulticides: major impact on transmission?
- Survival of overwintering adults is high

# Acknowledgements

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Paul Meyvaert  
Curtis Brown & Diane Allen  
About 120 householders

