Eastern Equine Encephalitis Virus in Massachusetts

Doug Bidlack
East Middlesex Mosquito Control Project
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>1831</td>
<td>Epidemic of brain disease in horses in Massachusetts</td>
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<tr>
<td>1931</td>
<td>Differentiated from other equine encephalitides</td>
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<tr>
<td>1933</td>
<td>Virus isolated from a horse in New Jersey</td>
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<td>1933-36</td>
<td>Birds implicated as reservoir of virus</td>
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<tr>
<td>1938</td>
<td>Outbreak of brain disease in horses in Massachusetts (ca. 300 cases)</td>
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<tr>
<td>1938-39</td>
<td>Outbreak of human EEE in Massachusetts (35 cases)</td>
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<tr>
<td>1947</td>
<td>Louisiana and Texas outbreaks</td>
</tr>
<tr>
<td>1955-56</td>
<td>Second Massachusetts outbreak (16 cases), aerial spraying, DDT</td>
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<tr>
<td>1957</td>
<td>Taunton Field Station of the USPHS</td>
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<tr>
<td>1969</td>
<td>Taunton Field Station closed, State Laboratory continues surveillance</td>
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<tr>
<td>1973</td>
<td>Equine vaccine</td>
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Eastern Equine Encephalitis

Clinical Course

- Abrupt onset fever, chills, headache, muscle aches, nausea and vomiting

- Progressive disorientation, discoordination

- Seizures, coma

- ca. 30-50% mortality

- ca. 80% residual neurological deficits
Distribution of Atlantic White Cedar

Map adapted from: (Little, 1971)
EEE Transmission Cycle

- **Potential Bridge Vector**
  - Cs. melanura

- **Passerine Birds** serve as reservoirs for the virus. Examples include: Wood thrushes, American robins, and Song sparrows.

- **Main amplification vector** in the EEE cycle: Cs. melanura

- **Potential Bridge Vector**
  - Cq. perturbans

- **Humans** serve as dead-end host and are unable to pass the virus on

- **Horses** serve as dead-end host and are unable to pass the virus on

Adapted from: PC Matton, W Andrews, Bristol County Mosquito Control Project
• DPH maintains network of traps located in sites with historic EEE activity.
• MCP’s maintain own network of traps.
• All testing is done at DPH’s lab.
Monitoring EEE (continued)

- Mosquitoes are submitted once a week from the MCPs to DPH.
- Results within 48hrs of submission.
- DPH calls BOH with positive results.
- Results posted on DPH’s web page http://mass.gov/dph/wnv/wnv1.htm
Massachusetts EEE

Year

Human Cases


35

16

6

10

3

13

11
Atlantic White Cedar Swamp Acreage

Greater than 25% Cedar Cover (Motzkin 1991)
2000-2012 EEE Massachusetts
Human Cases

- 0 cases
- 1-3 cases
- 4-9 cases
- 10-27 cases
## Mosquito Species Composition

### Plymouth MCP

<table>
<thead>
<tr>
<th>#</th>
<th>Species</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>#1</td>
<td><em>Oc. canadensis</em></td>
<td>34.2%</td>
</tr>
<tr>
<td>#2</td>
<td><em>Cq. perturbans</em></td>
<td>27.7%</td>
</tr>
<tr>
<td>#3</td>
<td><em>Cs. melanura</em></td>
<td>18.3%</td>
</tr>
<tr>
<td>#5</td>
<td><em>Ae. vexans</em></td>
<td>3.6%</td>
</tr>
</tbody>
</table>

### Middlesex MCP

| #3 | *Oc. canadensis*    | 12.4%      |
| #1 | *Cq. perturbans*    | 37.2%      |
| #11| *Cs. melanura*      | 1.4%       |
| #2 | *Ae. vexans*        | 24.5%      |
Precipitation 2011-12

Deviation from Normal (Inches)

Month

- Jun
- Jul
- Aug
- Sep
- Oct
- Nov
- Dec
- Jan
- Feb
- Mar
- Apr
- May
- Jun
- Jul
- Aug
Adults/trap/night

Cq. perturbans

Epi Week

2007-11

2012
How does EEE persist in the North?

Overwinters in local foci

Brought in via northward bird migration in Spring
Eastern Equine Encephalitis Perpetuation

Young et al. (2008) and Armstrong et al. (2008)