



A Resting Box Design and Strategy for *Culiseta*, *Culex* and *Anopheles* Surveillance

By Adam Canady,
Brunswick County
Vector Control

Surveillance techniques in vector control programs are typically considered to be a critical aspect in mosquito population analysis. Data from devices such as CDC light traps, New Jersey traps, gravid traps and resting boxes aide in population evaluation, as well as arbovirus pooling. We have noticed through on-site data collection records and from the literature that isolating potential arbovirus vectors such as *Culiseta*, *Culex* and *Anopheles* present a challenge. Our team is developing a resting box strategy for potential long-term monitoring of arbovirus species weekly.

CDC Arbovirus guidelines, with respect to resting devices, suggests:

"Many different types of artificial shelters have been used, including the nail keg resting station, red boxes, red cloth shelters, and privy-type shelters. These shelters should be placed in shaded, humid locations near suspected breeding places or in other known congregation sites. Most species probably enter such shelters around dawn, probably in response to changes in light intensity and humidity, and ordinarily do not leave until dusk (Moore et al 1993)."

Based on CDC guidelines, our strategy utilizing resting boxes was driven from the concept of prefabricated resting boxes. These can be found through vector control suppliers such as BioQuip. The prefab models provide a small surface area for aspiration decreasing the potential for larger sample size. Secondly, the prefab models are considerably more expensive. A standard black 20-gallon trash can, purchased from Lowes, provided us with the capability to increase aspiration volume at a relatively low cost. We determined that 4 standard t-posts would allow for

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*North Carolina
Mosquito & Vector Control
Association*



Save The Date!

54th Annual North Carolina Mosquito and Vector Control Association *Virtual* Meeting

**Featuring keynote speaker Stanton E. Cope, PhD presenting
Yellow Fever, the Scourge Revealed**

Thursday, November 5th:

Opening at 12:45 p.m.

Adjourning at 5:25 p.m.

Friday, November 6th:

Opening at 7:45 a.m.

Business meeting at 11:30 a.m.

More details and full agenda coming soon.

Stanton E. Cope, PhD

Vice President, Technical Products and Services, Catchmaster

Past President, American Mosquito Control Association

Captain (Retired), Medical Service Corps, United States Navy

Yellow Fever – The Scourge Revealed

This non-technical, historical presentation focuses on yellow fever and some of the events by which the veil of this terrible scourge was lifted. There are four main parts to the talk:

- A brief history of the disease and its impact on society in the U.S.;
- Discussion of the experiments done in Cuba by the Walter Reed Commission, using human volunteers, that elucidated the mode of transmission;
- Global impact of the findings, aftermath of the experiments, and fate of the members of the Reed Commission and some of the volunteers.
- The story of Clara Maass, who gave her life during yellow fever experiments in Cuba.

Throughout the story, the biology and control of the yellow fever mosquito, *Aedes aegypti*, will be highlighted.





Innovation
through
formulation



Save the Date!

Virtual Educational Event

Please join us for a Virtual Educational Event geared towards professional mosquito control. Stay up to date with the latest information on mosquito surveillance, resistance monitoring, equipment maintenance and more. Agenda and registration will be posted soon. CEU's* will be offered, please continue to check the ADAPCO [events page](#) to see details.

Wednesday, October 7th, 2020

9:00am - 4:00pm EST

ADAPCO East

A Resting Box Design and Strategy for *Culiseta*, *Culex* and *Anopheles* Surveillance (Cont.)

By Adam Canady,
Brunswick County
Vector Control

stability of our trash can resting device. It also aided in adjusting the angle if deemed necessary (fig 1).



Figure 1 Resting Boxsetup



Figure 2 Modified DeWalt Aspirator

In efforts to maximize resting box collections, we have outlined several variables: resting site placement, collection frequency, temperature, humidity and seasonal variability. These factors may provide trends that can aide in collecting larger quantities of arbovirus species. The most critical factor was site selection for testing (fig 3).

Have something to share in the next issue of Biting Times? Contact Kyle Godbey at Godbeynk@forsyth.cc



Figure 3 Original resting box placement

Our study site is heavily forested with *Nyssa sylvatica*, *Liquidambar styraciflua*, *Acer rubrum* and *Acers accharinum*. A cluster of woodland pools, approximately 4-5 acres, are imbedded within the hardwood complex. To our advantage, woodland pools are considered optimal sites for *Culiseta*, *Culex* and *Anopheles*. However, interior topography and proximity to the pool must be accounted for. Initial runs in the original site location were interrupted due to high water. We chose a slightly higher elevation, along the slope 10 meters from the pool edge as our current resting site (fig 4). Another consideration has been highlighted by Nathan Burkett-Cadena:

"Habitat influences the availability of suitable larval development sites, and to some extent, distribution of hosts. Our analysis, however, shows that within the landscape the distribution of host animals is a crucial factor in determining the spatial distribution of vectors (Burkett-Cadena et al 2013)."

Our current surveillance plan includes two collection days per week, typically Tuesday and Friday, however this may change. Nathan Burkett-Cadena emphasized that collection times should be consistent between the hours of 0800 and 1100 (see notes). This leaves temperature and humidity, which we suspect has the potential to be as important as habitat when choosing resting sites. We are planning to run this trial for at least 24 months, hoping to identify seasonal variation patterns. Currently, specimen counts have been low in yield, which is consistent with New Jersey traps we have set out in various locales within the county. This is most likely due to increased water levels which has led to increased

Guess That Skeeter!



"For all you humans, I pose
little danger,

When coming for blood, my
tastes are.... stranger

Shiny, tiny, with blue along my
back,

It's slimy annelids that I attack!

Photo: by: Josh Emm

Answer on pg. 6

predation. Our most promising results, however, have been from the number of *Culex* and *Culiseta* specimens that have been collected from the resting boxes. It is our goal to modify based on data and eventually consider this design in our permanent surveillance program and to provide weekly arbovirus pooling.



Figure 4 current resting box site

References Cited

Burkett-Cadena, N.D, McClure, C.J, Estep, L.K, Eubanks, M.D. 2013. Hosts or habitats: What drives the spatial distribution of mosquitoes? *Ecosphere* 4(2):30. <http://dx.doi.org/10.1890/ES13-00009.1>

Moore, C.G, McLean, R.G, Mitchell, C.J, Nasci, R.S, Tsai, T.F, Calisher, C.H., Marfin, A.A, Moore P.S, Gubler D.J. 1993. Guidelines for arbovirus surveillance programs in the United States. U.S. Department of Health and Human Services, Fort Collins, CO. https://www.cdc.gov/ncezid/dvbd/pdf/arboguid_508.pdf

Notes

Personal correspondence from Nathan D. Burkett-Cadena PhD, Sampling resting traps via aspiration. 28 July 2020. Courtesy Jeff Brown of Brunswick County Vector Control.

No membership dues for 2021!

The NCMVCA Board recently voted to suspend membership dues for the next year. If you register and attend the NCMVCA virtual meeting (November 5-6, 2020) your membership will automatically be renewed or initiated for first time meeting attendees. If you are unable to attend the virtual meeting this year, please complete a membership form. **Invite your colleagues to join our association for free this next year.** You can find the membership form at: <https://www.ncmvca.org/take-action>

Guess That Skeeter!



longitudinal stripe
of iridescent
sapphire blue
scales on scutum

Uranotaenia sapphirina

By Michael S. Doyle, NC DHHS

Uranotaenia sapphirina is one of two species in the genus *Uranotaenia* found in North Carolina. Like its sister species *Ur. lowii*, it sports a sharp iridescent coat of blue scales that jump out under the scope. Both are tiny, but some differences are that *Ur. sapphirina* has a blue line of iridescent scales on its scutum and its legs are all dark, while *Ur. lowii*'s scutum is all dark and it has "white boots" similar to *Ps. ferox* (i.e., the tarsal segments are white-scaled).

Photo Credit: Florida Medical Entomology Laboratory

For a detailed look at this mosquito's strange gustatory preferences, read this fascinating article by Lawrence Reeves

<https://naturemicrobiologycommunity.nature.com/posts/36338-at-the-river-styx-mosquitoes-feed-on-worm-blood>



Photo by: JoshEmm

To the membership: The Constitution and Bylaws Committee was requested by the Executive Committee to review the current Constitution and recommend changes. The goal is to separate the offices of Secretary and Treasurer while leaving the option for one person to serve in both roles. All additions are in bold and blue while deletions are in red strike-through. Please review, as these changes will be voted on during the business meeting at the annual conference in November.

CONSTITUTION

North Carolina Mosquito & Vector Control Association, Inc.

Article I

Section A

Name

The name of the organization shall be the North Carolina Mosquito and Vector Control Association, Inc. which is hereafter referred to as the "NCMVCA" or "Association".

Section B

Organization and Purpose

The NCMVCA is organized and operated in North Carolina to promote public health through the implementation of environmentally compatible vector control practices, to keep abreast of the latest developments in control methods, to disseminate information concerning mosquitoes and other vectors to its membership and the general public, and to coordinate common interests and vector control efforts among its membership.

Article II

Objectives

The objectives of the NCMVCA are: (1) to promote and foster the professional status and skill of its members; (2) to conduct meetings for the discussion and study of problems in the field of vector control; (3) to act as a clearing house among its members for the receipt,

exchange and dissemination of information on vector control policies and procedures; (4) to foster and promote uniform standards for vector control practices; (5) to cooperate with public health agencies and all other organizations and groups interested in improving public health through the control of vectors; (6) to develop cooperative relationships with local, state, and federal agencies, professional organizations, and accredited colleges and universities in North Carolina; (7) and to provide an opportunity for and to promote congenial and harmonious social and professional relationships within the membership of the Association.

Article III

Membership

The term of membership shall be January 1 through December 31. All persons who wish to become members or renew their memberships shall submit their applications in writing to the Association each year, pay the established dues, or pay through the registration process at each annual meeting.

Membership shall be in one of the following categories:

Active members: Individuals (government, academic, industry, organizations, and other interested persons) interested in the biology, control, and disease potential of mosquitoes and other public health vectors who are not student, sustaining, or life members.

Student Members: Individuals who are full-time high school or college students at the time of membership.

Sustaining Members: Memberships of commercial entities such as companies, firms, and corporations. This membership shall be represented by one individual and have one vote.

Life Members: Life membership may be conferred upon any person whose membership is presently in good standing with the Association or whose membership was in good standing at the time of his/her retirement. A life membership is exempt from meeting registration and dues payment, but carries the same rights and privileges as an active membership.

Any active, student, or sustaining member may submit to the Membership and Communications Committee the name of any active or sustaining member who they wish to have considered for life membership. A written statement of justification must accompany each nomination. After receipt, the Membership and Communications Committee shall consider each nomination at its next regular meeting and convey its recommendation to the Executive Committee via the Secretary-Treasurer. If a nomination is rejected by the Executive Committee, the Secretary-Treasurer shall promptly inform the active member who submitted the nomination. All life memberships conveyed will be announced by the President at the next regular meeting of the Association.

Article IV

Provision of Funds

Section A

Dues

The annual membership dues shall be set by the Executive Committee. The membership shall be notified of any proposed changes to the dues at least 30 days prior to the annual meeting and a simple majority of the membership must approve any changes in membership dues. In order to be eligible to vote at the annual meeting, dues must be paid no later than the first day of the annual meeting.

Section B

Donations

Donations of funds may be solicited and accepted by the Executive Committee as deemed necessary for the operation of the Association.

Article V

Officers

The officers shall consist of a President, a Vice-President, ~~and a Secretary-Treasurer~~

Secretary, and a Treasurer to be elected at each annual meeting. The Immediate Past-President also serves as an officer. **The position of Secretary and Treasurer may be held by the same individual.**

Article VI

Election of Officers and Terms

A slate of officers shall be submitted by the Awards and Nominating Committee to the President at the final business meeting at the annual meeting of the Association. Additional nominations may also be made from the floor by an active, student, sustaining, or life member during the election of officers. A motion to close the nominations shall require a second and an affirmative vote of at least three-fourths of the active members present for the motion to be carried. A slate of officers, which shall include a President, Vice-President, **Secretary** and ~~Secretary~~-Treasurer, shall be elected by an affirmative vote of a majority of the members present at the annual meeting.

Elected officers shall assume their duties after the final business meeting of the annual meeting, and they shall continue to hold their respective offices until their successors are duly elected and installed at the next annual meeting. If any office is vacated for any reason, the Executive Committee may appoint another member to the office for the remainder of the term.

The term of office of the President and the Vice President is for a period of one year, with the officers serving from the annual meeting which they were elected, to the following annual meeting. The Secretary **and the** Treasurer shall serve a two year term. Any exceptions to the terms of office must be approved by the Executive Committee.

Article VII

Duties of Officers

Section A

President

The President shall preside over the meetings of the Association, act as Chairperson of the Executive Committee and the Membership and Communications Committee, serve as a member of the Finance Committee, appoint a Chairperson of each standing committee where not already defined herein, and serve as an ex-officio member of other committees upon request whenever ~~he/she is~~ **they are** able ~~to~~. The President shall perform the general administrative duties of the Association, and ~~he/she~~ **they** shall have authority and power after consultation with the Executive Committee to call special meetings of the Association.

Section B

Vice-President

The Vice-President shall preside over the annual meeting of the Association and the Executive Committee in the absence or disability of the President. The Vice-President shall be the Chairperson of the Program Committee and a member of the Executive Committee.

Section C

Secretary

The Secretary shall keep the records of the Association. The Secretary shall be responsible for taking minutes at all business meetings. The Secretary shall be a member of the Executive Committee and they shall record the minutes of all meetings of the Executive Committee. The Secretary shall submit all meeting records to the Executive Committee. Any other relevant records shall be made available to the Executive Committee upon the request of the Executive Committee.

~~Section C~~

~~**Secretary-Treasurer**~~

~~The Secretary-Treasurer shall keep the records of the Association and he/she shall receive and issue receipts for funds received by the Association. The Secretary-Treasurer shall safely keep and/or disburse such funds and other property as directed by the Executive Committee acting under its limitations in this Constitution. The Secretary-Treasurer shall submit the records of the Association when requested by the Executive Committee for examination, and turn over to his/her successor in office all funds and property of the~~

~~Association which shall have been under his/her management.~~

~~The Secretary-Treasurer shall be responsible for taking minutes at all business meetings. He/she shall keep the members of the Association apprised of pertinent business matters as deemed necessary by the Executive Committee. The Secretary-Treasurer shall correspond with various vendors, organizations, and individuals as deemed necessary by the Association.~~

~~The Secretary-Treasurer shall be a member of the Executive Committee and he/she shall record the minutes of all meetings of the Executive Committee. The Secretary-Treasurer shall also serve as Chairperson of the Finance Committee.~~

Section D

Treasurer

The Treasurer shall receive and issue receipts for funds received by the Association. The Treasurer shall safely keep and/or disburse such funds and other property as directed by the Executive Committee acting under its limitations in this Constitution. The Treasurer shall submit the financial records of the Association when requested by the Executive Committee for examination, and turn over to his/her successor in office all funds and property of the Association which shall have been under his/her management. The Treasurer shall keep the members of the Association apprised of pertinent business matters as deemed necessary by the Executive Committee. The Treasurer shall correspond with various vendors, organizations, and individuals as deemed necessary by the Association. Treasurer shall be a member of the Executive Committee. The Treasurer shall also serve as Chairperson of the Finance Committee.

Section E

Immediate Past-President

The Immediate Past-President serves as a member of the Executive Committee, a member of the Membership and Communications Committee, and serves as a valuable resource to the incoming officers of the Association.

Article VIII

Committees

Section A

Standing Committees

The standing committees of the Association shall be the Executive Committee, Awards and Nominating Committee, Constitution and Bylaws Committee, Finance Committee, Legislative Committee, Membership and Communications Committee, and Program Committee. The Chairperson of each committee is responsible for recruiting respective committee members in good standing.

Section B

Special committees may be appointed by the President to perform special duties for the Association. All such special committees shall be dissolved when their duties have been completed.

Section C

Before any person shall serve as an officer or on any committee, ~~he/she~~ **they** must be a member in good standing of the Association.

Article IX

Constitution and Duties of Committees

Section A

Executive Committee

An Executive Committee shall consist of the officers, the Chairperson of each standing committee, and two members at large appointed by the President with one at large member being an industry representative. The President may call an annual planning

meeting with the Executive Committee at a convenient time and place. The President, at his/her discretion will call Executive Committee meetings during the calendar year.

The Executive Committee shall have the administrative authority and powers of the Association to consider and act upon business matters that cannot await action until the next annual meeting of the Association. At each annual meeting of the Association, the Executive Committee shall make a report of all matters considered and actions taken since the last annual meeting.

The Executive Committee shall have authority and power to elect or reject applications for membership to the Association and to solicit donations of funds to support the operation of the Association.

Section B

Awards and Nominating Committee

The Awards and Nominating Committee shall be composed of a Chairperson, a previous recipient of the Hamilton Stevens Award, and up to two other members in good standing. This Committee shall be responsible for nominating from the membership individuals for the offices of President, Vice-President, **Secretary**, and ~~Secretary~~-Treasurer. In addition, the Awards and Nominating Committee shall determine if an award is to be presented for the year and if so, to select a recipient for the award from nominations made by the members in good standing of the Association. This Committee shall determine that a nominee is a member in good standing before the nominee may be considered for an award. This Committee shall review incoming resolutions for consideration by the membership and prepare and present resolutions as directed by the President, Executive Committee, and/or the membership.

Section C

Constitution and Bylaws Committee

The Constitution and Bylaws Committee shall be composed of a Chairperson and up to two other members at large. The ~~Secretary~~-~~Treasurer~~ shall be an ex-officio member of this Committee. The purpose of this Committee is to present in writing, recommended changes to the Constitution.

Section D

Finance Committee

The Finance Committee shall be composed of the ~~Secretary~~-Treasurer as Chairperson, the President, and up to two other members at large. This Committee shall appoint an auditor who is not a member of the Finance Committee to audit the accounts and books of the Association within 90 days of the annual meeting. This audit may be completed at the Executive Committee meeting before the next annual meeting. The auditor's report must be submitted to the Membership and Communications Committee for dissemination to the membership at large and presented at the annual meeting.

Section E

Legislative Committee

The Legislative Committee shall consist of a Chairperson and up to two other members at large. The Chairperson shall serve a two year term and all other members shall serve for one year. The Committee shall meet and act upon matters as directed by the President. A report of all matters considered and actions taken shall be given at the next annual meeting.

Section F

Membership and Communications Committee

The Membership and Communications Committee shall be composed of the President as Chairperson, the Newsletter Editor, the Webmaster, the Vice- President, and the industry representative. The purpose of this Committee is to communicate effectively with existing and potential members, increase membership, and secure attendance at the annual meeting. This Committee also shall manage the information presented on the website and keep the site updated and current with information pertinent to the members of the Association.

Section G

Program Committee

The Program Committee shall be composed of the Vice-President as Chairperson, and up to three other members at large. The Student Competition Chair appointed by the

Vice-President, also serves on this Committee. This Committee shall have the responsibility and authority to plan an educational/business meeting(s) for the benefit of the Association.

Article X

Disciplinary Action

Section A

Only members in good standing of the Association shall have the right to participate in any of the activities of the Association. Guests of members at the annual meetings shall have the same privileges as the active, student, sustaining, or life member with the exception of participating in the business sessions of the annual meetings or meetings of any standing committee. A Sergeant At Arms may be appointed as needed by the President to maintain order at all annual meetings or meetings of the Executive Committee.

Section B

All disciplinary actions concerning members shall be left to the discretion of the Executive Committee and is hereby made a part of the duty of said committee. A member shall have the right to appeal a decision made by the Executive Committee in any disciplinary action at the next regular meeting of the Association.

Article XI

Quorums

Section A

For the transaction of business of the Association, a quorum of the membership shall be at least one-fourth of the total membership in good standing present and voting at the annual meeting.

Section B

A quorum of the membership of any standing committee, including the Executive Committee, shall be a simple majority provided written notice has been given to all members of the committees, giving them reasonable time to reach the meeting place.

Article XII

Parliamentary Practice

A Parliamentarian shall be appointed by the President. This person shall have sufficient knowledge of the most current edition of "Robert's Rules of Order Revised for Deliberate Assemblies". In the absence of the rules prescribed in the Constitution and the Manual of Procedures for this Association, "Robert's Rules of Order Revised for Deliberate Assemblies" shall be utilized to conduct regular and special meetings.

Article XIII

Amendments

Amendments to this Constitution of the Association will be enacted, after being submitted in writing to the Executive Committee, by an affirmative vote of a simple majority of those members present and voting on the question of adoption of the amendment(s) at the annual meeting. The membership shall be notified, in writing, of any proposed amendments (changes) at least 30 days prior to the annual meeting.

Article XIV

Dissolution

The Association may be dissolved at any time by a written consent of not less than two thirds (2/3) of the members in good standing. In the event of dissolution of the NCMVCA, whether voluntary or involuntary or by operation of law, none of the property of the Association, nor the proceeds thereof, nor any assets of the Association shall be distributed to any members of the Association, but after all debts have been settled, its properties shall be donated to a charitable organization selected by the Executive Committee.

To date there has been no information nor evidence to suggest that the new coronavirus could be transmitted by mosquitoes.

The new coronavirus is a respiratory virus which spreads primarily through droplets generated when an infected person coughs or sneezes, or through droplets of saliva or discharge from the nose.

To protect yourself, clean your hands frequently with an alcohol-based hand rub or wash them with soap and water. Also, avoid close contact with anyone who is coughing and sneezing.



World Health
Organization

#Coronavirus

#COVID19

FACT:
**The new coronavirus
CANNOT
be transmitted through
mosquito bites**



The Biting Times, Sept 2020

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