

Georgia Southern University

Tick Identification

NEON SOP, 2015/2016

Taxonomic Keys Used

Keirans, J. E., & Litwak, T. R. (1989). Pictorial key to the adults of hard ticks, family Ixodidae (Ixodoidea), east of the Mississippi River. *Journal of Medical Entomology*, 26(5), 435-448.

Cooley, R. A., & Kohls, G. M. (1944). The genus *Amblyomma* (Ixodidae) in the United States. *The Journal of Parasitology*, 30(2), 77-111.

KEIRANS, J. E., & DURDEN, L. A. (1998). Illustrated key to nymphs of the tick genus *Amblyomma* (Acari: Ixodidae) found in the United States. *Journal of Medical Entomology*, 35(4), 489-495.

Yunker, C. E., Keirans, J. E., Clifford, C. M., & Easton, E. R. (1986). Dermacentor ticks (Acari: Ixodoidea: Ixodidae) of the New World: a scanning electron microscope atlas. *Proc. Entomol. Soc. Wash*, 88(4), 609-627.

Cooley, R. A. (1938). The genera *Dermacentor* and *Otocentor* (Ixodidae) in the United States, with studies in variation. US Government Printing Office.

Cooley, R. A., & Kohls, G. M. (1945). The genus *Ixodes* in North America. *National Institute of Health Bulletin*, (184).

Keirans, J. E., & Clifford, C. M. (1978). The genus *Ixodes* in the United States: a scanning electron microscope study and key to the adults. *Journal of Medical Entomology*, 15(Supplement 2), 1-38.

Data Workflow

The NEON datasets are generated by the collectors. These datasets are emailed to Colleen Evans and Lorenza Beati prior to a package being shipped to the USNTC.

The NEON collectors assign a vialID to each of the vials sent to the USNTC. The vialID is equivalent to the Collecting Event Number (also known as RML number) used by the USNTC to identify Collecting Events. Colleen will assign a CEN to all of the vials. The CENs will be listed on the Google Doc 'RML 125XXX'.

Colleen will upload the dataset from NEON to the shared Google folder 'NEON'. The student worker will download that file and save it with "_working" added to the end of the original file name.

Example:

original version- NEON site char ticks 29Oct14.xlsx

working version- NEON site char ticks 29Oct14_working.xlsx

The second file will be the student's working file to be used while counting the ticks from that shipment.

When the shipment arrives, the student workers will be emailed notifying them of the shipment. Upon arrival, all samples should be transferred into archival vials and preserved in 90% ethanol. During this process, the student worker will match the CEN to the correct vialID in their working file. Colleen will print out the CEN/RML on cotton paper and give them to the student workers along with the shipment. These should be placed into the correct vials.

Student workers will count the ticks and add new information to their working file. At this point, the ticks from that lot should be given to Dr. Beati for identification.

When a vial is fully identified USNMENT numbers can be assigned. USNMENT numbers will be provided to the students by Colleen. The numbers are found on barcodes sent to the USNTC by the Smithsonian. Colleen will assign a roll of barcodes to the project. If that roll is depleted, it is the student's responsibility to obtain a new roll from Colleen.

Each species from a specimen lot will be placed in individual vials. Each of these vials will get their own USNMENT number. If there are multiple vials for an original collection lot, the information will need to be duplicated in the Excel file. These duplicated rows will KEEP their CEN and will be assigned a different USNMENT number. The USNMENT number is recorded as internalLabID1.

Once the Excel file is completed, the student will save a third copy of the file with "_identified" replacing "_working" at the end of the file name.

Example:

working version- NEON site char ticks 29Oct14_working.xlsx
completed version- NEON site char ticks 29Oct14_identified.xlsx

This file should be uploaded to the shared Google Folder 'NEON'.

The last step of this process is to upload the records to Specify. For the Specify upload, some of the fields from the file will be deleted and a couple of extra fields will be added. See Table 1 for the list of fields to be discarded and new fields to be added. Once the file is edited and ready for Specify, the file should be saved as an .xls (Excel 97-2003) document and have "_Specify" added to the end of the file name.

Example:

completed version- NEON site char ticks 29Oct14_identified.xlsx
Specify version- NEON site char ticks 29Oct14_identified_Specify.xls

At this point there should be four files total: original, working, identified, and Specify versions.

See the Specify Guide for instructions on using Workbench. Do not attempt to do this without being trained by Colleen first. If issues arise while using Specify, contact Colleen. See Table 1 for mapping instructions

Once the data have been uploaded to Specify, the students will print locality and identification labels for each vial. A report called 'NEON Labels' has been prepared in Specify to create these labels. It can be found by clicking on the 'Reports' icon in Specify and will be in the list under 'Labels'.

Click on 'NEON labels'. In the window that appears, type the RML range (you will need to use the *Between* operator) for the shipment you are printing labels for and click 'OK'. This will run the report and create the labels. Save the file as a .pdf. Open the .pdf and print the labels on an Ink-Jet printer. Put the labels in the appropriate vials with the locality label facing out and the identification label facing in.

QA/QC

Adult ticks are initially identified to at least the genus level by the student workers. The students prepared a spreadsheet with their identifications/questions and the spreadsheet was verified and corrected by Lorenza Beati. Lorenza verified not only the identification, but also number of ticks in vials, and labeling. All nymphs were identified by Lorenza at this time. Copies of the hand-written notes and excel spreadsheets prepared by the students are kept.

Site ID	Material Picked up from Lab	Vials changed	RML/CEN put in all vials	Counted	Given to Dr. Beati	Material Identified	Barcodes assigned	Excel files complete	Files uploaded to Drive	Uploaded to Specify
Domain 1										
Domain 2										
Domain 3										
Domain 4										
Domain 5										
Domain 6										
Domain 7										
Domain 8										
Domain 9										
Domain 10										
Domain 11										
Domain 12										
Domain 13										
Domain 14										
Domain 15										
Domain 16										
Domain 17										

Domain 18										
Domain 19										

Table 1: NEON to Specify Mapping

NEON Field Name		Specify Table	Specify Field	Comments and Formatting
vialID	Discard			
siteID	Discard			
boutNumber	Discard			
senderID	Discard			
sentDate	Discard			
storageContainerID	Discard			
storageContainerLocation	Discard			
laboratoryName	Discard			
receivedDate	Discard			
shipmentCondition	Discard			
identifiedBy	Keep	Determination	Determiner first name 1 and Determiner last name 1	Separate into two fields. Normal capitalization rules apply
identifiedDate	Keep	Determination	Determined Date 1	MM/DD/YYYY
Family	Keep	Determination or Taxon	Family 1	Use Determination only if there is a specimen in the file that is only identified to the Family/Subfamily level
Subfamily	Keep	Determination or Taxon	Subfamily 1	Use Determination only if there is a specimen in the file that is only identified to the Family/Subfamily level
Genus	Keep	Determination	Genus 1	
Subgenus	Discard			
specificEpithet	Keep	Determination	Species 1	
InfraspecificEpithet	Keep	Determination	Subspecies 1	
speciesGroup	Discard			
scientificNameAuthorship	Discard			
taxonRank	Keep	Determination	Taxon Rank 1	
identificationQualifier	Keep	Determination	Qualifier 1	
nameAccordingTo	Keep	Determination	nameAccordingto	
identificationRemarks	Keep	Determination	Remarks 1	
numAdultMale	Keep	CollObjAtt	#males	
numAdultFemale	Keep	CollObjAtt	#females	
numAdultUnk	Keep	CollObjAtt	#unknownAdults	
numNymphs	Keep	CollObjAtt	#nymphs	
numLarvae	Keep	CollObjAtt	#larvae	
numUnknown	Keep	CollObjAtt	#unknown	
internalLabID1	Keep	Collection Object	Catalog Number	USNMENT#####
internalLabID2	Keep	Collecting Information	CEN/RML	#####
archiveVialID	Keep	Collection Object	archiveVialID	DELA_000.20140730.SC.1.Amblyomma maculatum (vialID plus identification. A period separates the terms, a space between Genus and species)
sentTo	Keep	CollObjAtt	Sent To	
sentDate	Keep	CollObjAtt	Sent Date	
Remarks	Keep	CollObjAtt	Remarks	

	New	Collection Object	Cataloger first name	
	New	Collection Object	Cataloger last name	
	New	Collection Object	Cataloged Date	MM/DD/YYYY
	New	Preparation	Prep Type 1	Always 'Ethanol'
	New	Preparation	Count 1	Always '1'