Scientific Note

The spread of Culex coronator (Diptera: Culicidae) throughout Florida

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Since 2005, there have been numerous reports of Culex coronator Dyar and Knab well outside of small geographic areas in Arizona, New Mexico and Texas, the range reported by Darsie and Ward (2005). Debboun et al. (2005) collected Cx. coronator in southwestern Louisiana at Fort Polk from several sites from spring to fall of 2004. Culex coronator was reported to be well-established in ten central and southern Mississippi counties (Varnado et al. 2005, Goddard et al. 2006). Smith et al. (2006) reported the species from four Florida counties and two additional Florida counties in 2008 (Smith 2008). McNelly et al. (2007) and Gray et al. (2008) reported collections of this species from south Alabama. Moulis et al. (2008) found this species in South Carolina and Georgia in 2007 and additional sites in three Georgia counties were reported in 2008 (Kelly et al. 2008).

Carpenter and LaCasse (1955) reported that Cx. coronator larvae occur in rain-filled pools and artificial containers. Recent collections of Cx. coronator larvae have been reported from a variety of habitats including roadside ditches, spring-fed and rain-filled pools (Goddard et al. 2006), containers (Gray et al. 2008), a seepage pool near brackish marshland in South Carolina (Moulis et al. 2008), storm sewers (Manrique-Saide et al. 2012), and tires (Yee et al. 2012).

The most recently published taxonomic keys used in Florida do not show Cx. coronator as occurring in the state (Darsie and Morris 2003, Darsie and Ward 2005) and Darsie and Morris (2003) do not include Cx. coronator in the Keys to the Adult Females and Fourth Instar Larvae of the Mosquitoes of Florida. Working with specimens of Cx. coronator, and following the current version of Darsie and Morris (2003), one would be faced with a choice between Culex tarsalis Coquillett and Culex bahamensis Dyar and Knab. Both species in the key and Cx. coronator have hind tarsomeres with basal and apical rings of pale scales, so Cx. coronator might be misidentified as either Cx. bahamensis or Cx. tarsalis. The extent of misidentification of Cx. coronator in Florida is unknown. Once it was recognized that this species was being misidentified, O’Meara and Connelly provided a list of characters and a comparison chart for distinguishing Cx. tarsalis from Cx. coronator for anyone attempting to identify Florida mosquitoes.

Host-feeding patterns suggest that Cx. coronator feeds primarily on mammals but birds may also be a source for blood (reviewed by Mackay et al. 2010). To our knowledge, Cx. coronator has not yet been incriminated as a vector of arthropod-borne viruses in Florida, but West Nile virus (WNV) has been detected in this species in nature from Louisiana (Mackay et al. 2008, Unlu et al. 2010), underscoring the importance of properly identifying this species and its distribution. Also, Cx. coronator has been found to be naturally infected with St. Louis encephalitis virus (Anderson et al. 1957) and Venezuelan equine encephalitis virus (Scherer et al. 1971, Sudia and Newhouse 1975).

During an investigation of the vector potential of Cx. coronator in Florida, Alto et al. (2014) reported Cx. coronator to be a competent vector of WNV under some conditions. An assessment of vector competence was made by exposing adult females to WNV-infected blood with viral titers comparable to viremia profiles in avian hosts (Komar et al. 2003, Guerrero-Sánchez et al. 2011). This species was highly susceptible to infection and dissemination of WNV. At 28°C, the transmission rate was 28 – 67%; and up to 17% at 25°C. Post-blood feeding, this species can delay oviposition for weeks and will lay more eggs when the source of blood is from birds, factors that may facilitate its role as a vector of WNV (Shaman et al. 2005) and St. Louis encephalitis virus (Day and Curtis 1999, Shaman et al. 2002). The geographic expansion of the range of Cx. coronator in Florida is reported here.

Survey of the Florida mosquito control districts

Notice of collections of mosquitoes that have not been previously reported from Florida counties are routinely sent to the author (RC) for confirmation of the identification. Along with the reports, voucher specimens are provided and curated to remain at the Florida Medical Entomology Laboratory (FMEL). For specimens that were submitted by Florida identifiers and verified at the FMEL as Cx. coronator, collection data are included in Table 1 and indicate the county, the collector, and the date of the collection. Also included in Table 1 are records of Cx. coronator reported elsewhere by others prior to the current study.

Field survey

Mosquito collection outings were organized based on counties where Cx. coronator had not been reported either through research or from mosquito control agency surveillance programs. Google Earth was used with filters to help locate businesses that dealt in used tires. The images from Google Earth were scanned to determine the location of piles of tires and to estimate how much sun the tires were exposed to daily. Sites with motor vehicle tires, sizes 11R22.5 and larger, and those with tire piles that were not shaded throughout the day were chosen as the first sites to visit because Cx. coronator larvae tend to be more prevalent in open, sunlit aquatic habitats than those in shaded locations (O’Meara, personal observation). If mosquitoes were not collected at the first choice site, or if the property owner did not allow access, other sites were selected by doing a visual inspection of the area. Landfills were also located using Google Maps and those with tire piles that were segregated from other trash piles were inspected in many counties.