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SCIENTIFIC NOTE

THREE NEW MOSQUITO RECORDS FOR NORTH CAROLINA

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ABSTRACT. Recently enhanced mosquito surveillance programs in northeastern North Carolina have resulted in the collection of *Ochlerotatus aurifer, Oc. cantator,* and *Oc. grossbecki.* These specimens represent the 1st confirmed North Carolina records of these species. Collection-site and species distribution data are included.

KEY WORDS *Ochlerotatus aurifer, Ochlerotatus cantator, Ochlerotatus grossbecki,* new records, North Carolina

The 2001 initial Centers for Disease Control and Prevention (CDC) West Nile grant to North Carolina provided a welcome stimulus for training and support for mosquito surveillance and control programs. Accordingly, since these events there has been an increase at county and local levels in surveillance-driven mosquito control programs in North Carolina. This is particularly true for Camden, Chowan, Currituck, Pasquotank, and Perquimans counties in extreme northeastern North Carolina, which are designated as the Albemarle Regional Health Services (ARHS). This area is bounded on the north by Virginia, on the south by the Albemarle Sound, on the west by the Chowan River, and on the east by the Currituck Sound and part of the North Carolina outer banks.

The northern portion of the ARHS was part of an area surveyed for mosquitoes in 1998 by Harrison et al. (2002). Major collection and pooling efforts by W.H.R., B.A.H., and J.E.A. were conducted in this area after a human eastern equine encephalomyelitis (EEE) case in 2000. In 2002, the ARHS established season-long mosquito surveillance to determine spatial and temporal distributions of species for directing mosquito management and control efforts. Most of the specimens reported here resulted from this surveillance program.

Further west, in northeastern North Carolina, a mosquito control program in the city of Rocky Mount, Edgecombe County, reestablished adult and larval surveillance programs since Hurricane Floyd (September 1999). Also in Edgecombe County, the town of Princeville lacks a mosquito control program, but has received periodic mosquito surveillance efforts since the Hurricane Floyd floods. Additional specimens reported here are from these efforts.

Full-season mosquito light-trap surveillance began in the ARHS region in the spring of 2002. Trap sites were selected at the edge of cypress–black gum swamps near populated areas to monitor *Culiseta melanura* (Coquillett), the enzootic vector of EEE virus. In ARHS, modified CDC light traps were set once a week and baited with compressed CO_2 by using a Flow set 2 regulator (Clark Environmental Mosquito Control, Inc., Roselle, IL). Dry ice was used in Edgecombe County. Traps were set between 1530 and 1730 h and retrieved the following morning between 0700 and 0800 h. Mosquitoes were identified by using the key of Slaff and Apperson (1989). A total of 64,594 specimens of 31 species were processed and identified in the ARHS area during 2002.

The use of the genus name *Ochlerotatus* and its abbreviation, *Oc.,* follow Reinert (2000). The specimens on which the new records are based were originally identified by the collectors and sent to Winston-Salem, NC, for confirmation by B.A.H., where they are preserved in the North Carolina Public Health Pest Management collection.

One female *Ochlerotatus aurifer* (Coq.) was collected at 1414 Tull's Creek Road, southeast of Moyock in Currituck County, on April 18, 2002, by W.H.R. and J.E.A. A 2nd female of this species was collected by W.H.R. at the same site on May 9, 2002. This site is a shrubby swamp adjacent to a cattail marsh near the mouth of Tull's Creek at Currituck Sound, about 6.5 km south of the Virginia state line. This represents the 1st confirmed collection of this species in North Carolina, and the farthest confirmed southern extension of this species along the Atlantic seaboard. The location of the site is east of the Great Dismal Swamp (GDS). Harrison et al. (2002) 1st reported *Oc. aurifer* from Virginia based on collections in Suffolk, VA, on the west side of the GDS, and only 3.9 km from the North Carolina state line. Finding *Oc. aurifer* on both sides of the GDS approximately 50 km

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apart widens its likely distribution in this area to a sizeable area that encompasses the entire GDS and adjacent wetlands in both Virginia and North Carolina. The North Carolina females were collected on April 18 and May 9, which agrees with the April 28–29, May 19, and June 3 dates on which the Virginia females were collected (Harrison et al. 2002). Carpenter and LaCasse (1955) and Means (1979) listed this northern species as univoltine, with larvae that were more common away from the edge of a pool and found around grass tufts and floating vegetation in water up to a foot deep. Larvae of this species have not been collected in either North Carolina or Virginia.

Female *Ochlerotatus cantator* (Coq.) were collected in 3 traps at 2 widely separated locations in Perquimans County. These are clearly the southernmost confirmed records for this species in the United States. The 1st specimen was collected April 30, 2002, in a trap baited with CO_2, set in a sheep pasture surrounded by young pine trees. Three additional specimens were collected on May 14 (n = 1) and May 27 (n = 2) in an unbaited (no CO_2) light trap set adjacent to a chicken coop, about 100 m from the sheep pasture. This site is 5 mi southeast of Hertford, NC, near a small cypress–gum swamp adjacent to Yeopim Creek. A 5th female was collected May 30, 2002, at a cemetery located on Godfrey Lane in Woodville, adjacent to the Little River cypress–gum swamp and just across the river from Pasquotank County. This last site is about 14 km northeast of the other 2 sites. In 2003, additional specimens of *Oc. cantator* were collected by W.H.R. at the sheep pasture and chicken coop trap sites at a rate of approximately 1 per week during April and May. These collection sites are in the southern half of Perquimans County and about 50 km from the Virginia border. The nearest collection site for *Oc. cantator* in Virginia is in Chesapeake (based on 2 specimens provided in 2002 by Jason Williams, Chesapeake Mosquito Control) and about 60–70 km from the North Carolina sites. The Virginia and North Carolina sites are separated by countless interspersed freshwater swamp habitats, but since 1998 a number of light trap collections made between these 2 areas failed to collect *Oc. cantator*. Larvae of *Oc. cantator* typically are found in coastal marshes, including both freshwater and salt water, but less brackish water seems to be preferred (Carpenter and LaCasse 1955). To date, we have been unable to locate the larval habitat for the North Carolina population of *Oc. cantator*. *Ochlerotatus cantator* can be very common from May and summer months along the Atlantic coast in the northeastern USA and southeastern Canada (Carpenter and LaCasse 1955, Wood et al. 1979). One explanation for the occurrence of *Oc. cantator* in Perquimans County may be the increased salinity of Currituck and Albemarle sounds and the associated rivers during the drought years of 2000–02. A site monitored by the North Carolina Division of Marine Fisheries showed increased salinity at the mouth of Yeopim Creek during this period (Sara Winslow, North Carolina Division of Marine Fisheries, personal communication).

Ochlerotatus grossbecki (Dyar and Knab) was reported from states adjacent to North Carolina (Carpenter and LaCasse 1955, King et al. 1960), and in North Carolina (Darsie and Ward 1981, Slaff and Apperson 1989), but the last 2 publications had no specimens upon which to base their records. Also, there are no previous collection records of this species from North Carolina and no specimens were found that would confirm its presence in this state (Harrison et al. 1998). Accordingly, the 3 specimens reported here represent the 1st confirmed specimens of *Oc. grossbecki* from North Carolina. The 1st female was collected in a light trap set in downtown Princeville, Edgecombe County, on May 24, 2001, by B.M.P. The trap was set in mixed hardwood forest adjacent to 2004 Greenwood Boulevard. This specimen was brought to the attention of B.A.H. in early 2003. A 2nd female was collected in a light trap set by W.H.R. off Paradise Road, about 2 km north of Edenton, Chowan County, on April 22, 2003. The 3rd female was collected in a light trap set by R.F.C. at 1112 Johnson Street, Rocky Mount, Edgecombe County, on May 24, 2003. Likely reasons that *Oc. grossbecki* has not been collected previously in North Carolina are because it is univoltine, and the adults emerge in early spring before most mosquito surveillance programs begin.

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REFERENCES CITED

Carpenter SJ, LaCasse WJ. 1955. *Mosquitoes of North America (north of Mexico).* Berkeley, CA: Univ. Calif. Press.

Darsie RF Jr, Ward, RA. 1981. Identification and geographical distribution of the Mosquitoes of North America, north of Mexico. *Mosq Syst* Suppl 1:1–313.

Harrison BA, Whitt PB, Cope SE, Payne GR, Rankin SE, Bohn LJ, Stell FM, Neely CJ. 2002. Mosquitoes (Diptera: Culicidae) collected near the Great Dismal Swamp: new state records, notes on certain species, and a revised checklist for Virginia. *Proc Entomol Soc Wash* 104:655–662.

Harrison BA, Whitt PB, Powell EE, Hickman EY Jr. 1998.

North Carolina mosquito records: 1. Uncommon *Aedes* and *Anopheles* (Diptera: Culicidae). *J Am Mosq Control Assoc* 14:165–172.

King WV, Bradley GH, Smith CN, McDuffie WC. 1960. A handbook of the mosquitoes of the southeastern United States. *US Dep Agric Handb* 173:1–188.

Means RG. 1979. Mosquitoes of New York. Part 1. The genus *Aedes* Meigen with identification keys to genera of Culicidae. *NY State Mus Bull* 430a:1–221.

Reinert JF. 2000. New classification for the composite genus *Aedes* (Diptera: Culicidae: Aedini), elevation of subgenus *Ochlerotatus* to generic rank, reclassification of the other subgenera, and notes on certain subgenera and species. *J Am Mosq Control Assoc* 16:175–188.

Slaff M, Apperson CS. 1989. A key to the mosquitoes of North Carolina and the Mid-Atlantic states. *NC State Univ Agric Ext Serv Publ* AG-412:1–38.

Wood DM, Dang PT, Ellis RA. 1979. The insects and arachnids of Canada part 6. The mosquitoes of Canada, Diptera: Culicidae. *Res Branch Agric Can Publ* 1686: 1–390.