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Ants of North Carolina: an updated list (Hymenoptera: Formicidae)

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Abstract

We document the distribution of ants present in North Carolina. We revisit the list of North Carolina ants for the first time since 1962, based on literature records, museum collection and new sampling events across the state. Our results show 53 new species records, including 16 exotic and 4 undescribed species, for a total of 192 species found in North Carolina. Based on our current knowledge, North Carolina possesses the highest species diversity of native ants of any state or territory in eastern North America. Here, we discuss some of the biogeographical explanations for this remarkable diversity. In addition to presenting county-level species distributions in North Carolina, we also offer brief comparisons to species lists for surrounding states. By highlighting species expected to occur in North Carolina, but not yet recorded in the state, we hope to encourage new discoveries and increase the general knowledge of the ant fauna of North Carolina.

Introduction

North Carolina lies in the central eastern coast of the United States. Spanning only 300 kilometers from north to south, the latitudinal variation of North Carolina is relatively slight (from 34°N to 36.5°N). However, it is the state's varied terrain, stretching longitudinally over 800 kilometers, that enriches North Carolina's flora and fauna with remarkable diversity. The elevation gradient from the eastern coastline to the western mountainous border of the state culminates with Mount Mitchell (2037m), the highest peak on the East Coast of North America. Moreover, North Carolina has a range of climates leading to the formation of numerous local and specific climatic conditions (Boyles and Raman 2003). Such geographic and climatic features have favored the formation of diverse ecosystems and plant communities (Shafale and Weakley 1990).

The rich diversity of North Carolina attracted the attention of several early ant biologists at the end of the 19th and the beginning of the 20th century. The ant fauna was first explored by the prolific Swiss myrmecologist August Forel who described with enthusiasm his discoveries in several articles (1899, 1900, 1901a,b). On a trip to the Appalachian Mountains and coastal plain of the state, Forel collected specimens, recorded natural history observations, and described seven species from North Carolina (Forel 1901, 1922). Just a few years later, in 1904, the first list of the ants of North Carolina was published by William Morton Wheeler, who recorded 61 species (Wheeler 1904a). Previous and subsequent work on species distribution and ecology includes the work of Atkinson (1887), Brimley (1938), Ramsey (1941), Pearson (1946), Wray (1950), Carter (1962a), Van Pelt (1962, 1963), Wray (1967), Nuhn and Wright (1979), Banks *et al*. (1990), Nuhn *et al*. (1992), Campbell (1996), Peck *et al*. (1998), Mitchell *et al*. (2002), Guénard and Dunn (2010), and Rowles and Silverman (2010). The most complete work on distribution and diversity of ants in North Carolina was published fifty years ago by Carter (1962b), who recorded 151 species in the state. Fourteen species have their type localities in North Carolina (Table 1).

Since Carter's last revision of the ants of North Carolina (1962b), several generic revisions have been published, each increasing our understanding of the ant fauna and further rendering the previous species checklists obsolete. Major revisions include treatments of the genera *Aphaenogaster* (Umphrey 1996), *Camponotus* (Snelling 1988), *Crematogaster* (Johnson 1988), *Dolichoderus* (Johnson 1989a), *Dorymyrmex* (Trager 1988, Johnson 1989b, Snelling 1995), *Formica* (Francoeur 1973, Trager *et al*. 2007), *Lasius* (Wing 1968), *Monomorium* (Dubois 1986),

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