2. Discovery and Observations of a Stem-Boring Weevil (*Myrmex* sp.) a Potentially Useful Biocontrol of Mistletoe

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Abstract. A stem-boring weevil obtained from infested clusters of mistletoe was subsequently reared and identified as *Myrmex* sp. To our knowledge its discovery in Mississippi is the easternmost record of mistletoe-feeding *Myrmex*, previously recorded only from the West and Southwest. Based on current studies, the weevil overwinters as larvae in tunnels within mistletoe stems. Pupation occurs during spring and lasts 23 to 31 days. Adults emerge from mid-May through early June. There appears to be one generation per year. Larvae tunnel in mistletoe stems 4 to 12 mm in diameter and produce galleries 12 to 40 mm long and 1.5 to 3 mm in diameter. Damage to mistletoe shoots by the weevil suggests that the insect may be useful as a biological control for mistletoe.

Introduction. Leafy or true mistletoes, *Phoradendron* spp., are evergreen, parasitic plants primarily of hardwood trees throughout the lower two-thirds of the United States (Scharpf and Hawksworth 1974). Most people are largely unaware that these parasitic plants can cause considerable injury and sometimes death of individual trees (Torngren *et al.* 1980, Tattar 1978). True mistletoes attack nearly all broadleaved trees, but show strong species preference within regions. In the Delta of Missisippi water oak is a preferred host; the elms are favored in western Arkansas; hackberry is preferred in central and south Texas (Haller 1978); and the ashes are most susceptible in California (Torngren 1980). Mistletoe seldom causes widespread decline and mortality, but typically causes substantial damage in scattered small locales. Affected trees suffer from nutrient drain and shading out of individual twigs, branches, and sometimes the entire crown (Haller 1978, Tattar 1978). While there is much folklore about mistletoe, particularly during the Christmas season, the plant does present forest management problems. We report here observations on a stem-boring weevil that shows promise as a biological tool to control mistletoe.

Discovery. In 1979 near Duncan in Bolivar Co., Mississippi, clusters of mistletoe, *Phoradendron serotinum* (Raf.) M. C. Johnson, suffering from insect damage and in a declining condition, were observed in several trees (Fig. 1). Sprigs examined from three weakened clusters of mistletoe revealed immature

stages of a stem-boring insect. Subsequently, portions of ten additional mistletoe clusters were collected with a pole pruner from crowns of water oak in Washington County near Stoneville, Mississippi. Larvae were found in stems of three of the ten clusters.

Identification. The larvae were dirty white to yellowish, legless, nearly cylindrical, and slightly crescent shaped with amber to yellowish-brown heads (Fig. 2). Mature larvae reached a length of about 7 to 9 mm. Larval specimens submitted to taxonomists were identified by D. M. Anderson[1] as *Myrmex* sp. in the family Curculionidae.

During 1980 small samples of mistletoe were collected periodically from trees at Stoneville and caged to recover adults for species identification. The adults subsequently reared from the infested mistletoe stems were black weevils, somewhat elongate, subcylindrical, shining, and densely clothed with long erect black setae, and with shorter more robust, recumbent, white setae (Fig. 3). The head is coarsely, densely punctate with a well-developed polished rostrum about as long as the pronotum. The pronotum is somewhat convex and slightly longer than broad. The elytra are wider at base than base of pronotum, sides subparallel, and about twice as long as wide. The adults measured 5 to 6 mm long and 2 mm wide. Adults were identified by D. R. Whitehead[1] as *Myrmex* sp., confirming Anderson's earlier larval identification. Voucher specimens have been deposited with the U.S. National Museum, Washington, D.C.

Systematics. Kissinger (1964) states that 32 species of *Myrmex* occur in America north of Mexico. But recent taxonomic problems indicate that the genus *Myrmex* is in poor condition and badly in need of revision. For example, D. R. Whitehead (pers. comm.[1]) stated that the weevil (*Myrmex* sp.) found in Mississippi was probably *M. arizonicus* (Schaeffer), but that it was possibly an undescribed, closely related species. Previously, *M. arizonicus* was known only to exist in western United States. Van Dyke (1930) reported that *M. arizonicus* was beaten from and later reared from another leafy mistletoe, *P. villosum* Nutt., on an oak, *Quercus lobata* in Sequoia National Park, California. Later, Sleeper (1953) described a very closely related species, *Myrmex algerti* Sleeper, that was also reared from "mistletoe" in California. Sleeper hinted that his newly described species, *M. algerti*, might be conspecific with *M. arizonicus*, but he didn't pursue the issue. Whitehead (pers. comm.[1]) pointed out that if *M. algerti* was indeed distinct from *M. arizonicus*, then the Mississippi weevil was probably a separate new species also. Whatever the taxonomic outcome, the mistletoe-feeding weevils obviously belong to a closely-related complex distinct from all other *Myrmex* species.

Additional distribution records for the mistletoe weevil complex based on U.S. National Museum specimens include Catalina Springs, Palmertree, and Hauchuca Mountains in Arizona, and Victoria, Dallas, and Davis Mountains in Texas. Although no live specimens were found, evidence of tunneling and

[1] Systematic Entomology Laboratory, U.S. Dep. Agric. Washington, D.C.

healed exit holes were observed in mistletoe stems in Scott and Montgomery Counties, Arkansas, during current studies. To our knowledge, its discovery in Mississippi is the easternmost record of a mistletoe-feeding *Myrmex*.

Biology. Pierce (1916) provided information on the biology of *Myrmex carinicollis* (Horn), which feeds in twigs of *Bumalia lanuginosa* (Michx.) Pers.; and Burke *et al.* (1975) studied the bionomics of *Myrmex laevicollis* (Horn) which develops in galls on live oak. But little or nothing is known of the life and seasonal histories of the mistletoe-feeding *Myrmex*. To study the general biology and habits of *Myrmex* sp., we collected and dissected samples of infested mistletoe periodically during 1980 and 1981. Findings show that it overwintered in the larval stage in galleries within the mistletoe stems. Pupation occurred during spring from mid-April to mid-May and lasted 23 to 31 days. Adult weevils emerged over a 3-1/2-week period from May 15 to June 8. Weevils were observed to take water, but none were observed to feed on mistletoe provided in the cages. Nine caged weevils lived for an average of 14 days with a range of 9 to 17 days. Based on seasonal life stages there appears to be one generation per year.

Although little has been recorded on parasites and predators of the *Myrmex* weevils, we reared 4 specimens of a braconid parasite, *Urosigalphus* (*Neurosigalphus*) *otidocephali* Cushman, from a cage containing 30 *Myrmex*-infested mistletoe stems. Also a single clerid predator, *Placopterus thoracicus* (Olivier), was reared from a weevil-infested stem.

Injury. Mistletoe stems 4 to 12 mm in diameter were infested. Tiny entrance holes and frass ejection ports were sometimes found, but very little frass was ever observed adhering to the stems. Weakened clusters in a declining condition with dieback were good indicators of infestation. The most positive external evidence of weevil infestation was the presence of round exit holes about 2 mm in diameter in the stems (Fig. 4). Sometimes infested stems were found broken, with the larval galleries exposed. Dissection of infested stems revealed light to dark brown larval galleries 12 to 40 mm long and 1.5 to 3 mm in diameter (Fig. 2). Galleries were always partly filled with brown, finely pulverized frass. Only a single larva was found per gallery, but up to 3 larvae were found in separate galleries in a single stem. Dieback was more common when multiple infestation occurred.

To study weevil abundance 4 mistletoe clusters were collected from 25 infested trees in Washington County, Mississippi, during the autumns of 1980 and 1981. Sampling showed that 21 percent of the clusters on 8 (32%) of the infested trees exhibited evidence typical of either current or previous weevil infestation.

Myrmex sp. was reared only from mistletoe clusters growing on water oak, but evidence typical of the weevil was also observed in mistletoe on Nuttall oak and American elm. Although mistletoe was sampled also from a few trees of pecan, green ash, and honeylocust, no evidence of stem borer was found.

Figures 1-4. Weevil (*Myrmex* sp.) injury to mistletoe. 1) Tree infested by mistletoe with several weakened clusters. 2) Larva in stem gallery partly filled with frass. 3) Adult weevil. 4) Weevil exit holes in mistletoe stem.

Conclusions. Mistletoe, a parasite of hardwood trees, is only minimally controlled by selective planting, pruning or cluster removal, polyethylene wrap, and dormant herbicide treatment (Haller 1978, Scharpf and Hawksworth 1974, Torngren *et al.* 1980). The stem-boring weevil, *Myrmex* sp., reported upon here, can kill mistletoe shoots and offers a possible means of biocontrol for mistletoe. A taxonomic study should be made to identify the stem-boring weevil to species. Additional work is needed to explore its potential as a biocontrol agent.

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