

## Research Note

### THE STATUS OF THE FUNGI-GROWER ANTS (HYMENOPTERA: FORMICIDAE) IN PUERTO RICO AND ADJACENT ISLANDS<sup>1</sup>

Ants of the tribe Attini (fungus grower) collect different organic materials that are used to grow a fungus. It was thought that the fungus mycelium was the only source of nutrition for these ants, but Quinlan and Cherrett<sup>2</sup> found that *Atta cephalotes* (L.) squeezes oils from fresh leaves and uses them as food. These oils supplement the fungus material eaten by this species. Members of the genus *Atta* are considered pests in some agricultural crops, pasture land, and forest seedling plantations.<sup>3</sup> There are no *Atta* ants in Puerto Rico and adjacent islands, but four species of the attine tribe have been reported.<sup>4</sup> Here I discuss the present distribution, abundance, and ecology of these species.

Wheeler<sup>5</sup> reported *Trachymyrmex jamaicensis* (André) only from the island of Culebra. Ramos<sup>6</sup> found it on Mona Island. Nor did Smith<sup>4</sup> and Culver<sup>7</sup> find it in Puerto Rico. This species has been reported from Jamaica, Haiti, the Bahamas, and Cuba.<sup>4,8</sup>

During the past 10 years I have collected ants by using tuna fish baits, pitfall traps, berlese funnels, sifting litter, and searching for nests on 46 islands of the Puerto Rican bank. I have found *Trachymyrmex jamaicensis* on the following islands: Piñero (near Ceiba) - 1 March 1983; Culebra - 26 August 1982; Mona - 29 June to 5 July 1982; Inner Brass (near St. Thomas) - 19 April 1983; Congo Key (near St. Thomas) - 20 May 1983; Cayo Conejo (near Vieques) - 24 March 1983; and Puerto Rico. *Trachymyrmex jamaicensis* was found at Cambalache Forest on 24 June 1982. *Trachymyrmex jamaicensis* invaded the dry Guánica Forest in 1983. I did not find it during research visits to the forest in mid-September 1980, and 8 March 1982. Since 1983, it has become abundant in the forest.

*Mycetophylax conformis* (Mayr) was reported from the Santurce area by Wheeler.<sup>5</sup> Smith<sup>4</sup> did not find it and Wolcott<sup>9</sup> stated that the ant had not been collected since the

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<sup>2</sup>Quinlan, R. J. and J. M. Cherrett, 1979. The role of fungus in the diet of the leaf-cutting ant *Atta cephalotes* (L.) *Ecol. Entomol.*, 4: 151-60.

<sup>3</sup>Lofgren, C. S. and R. K. Van der Meer (Eds.). 1986. Fire Ants and Leaf-Cutting Ants. Westview Press, Inc., Boulder.

<sup>4</sup>Smith, M. R., The ants of Puerto Rico. 1936. *J. Agric. Univ. P. R.*, 20: 819-75.

<sup>5</sup>Wheeler, W. M., 1908. The ants of Porto Rico and the Virgin Islands. *Bul. Am. Mus. Nat. His.*, 24: 117-58.

<sup>6</sup>Ramos, J. A., 1946. The insects of Mona Island. *J. Agric. Univ. P. R.*, 30: 1-74.

<sup>7</sup>Culver, D. C., 1974. Species packing in Caribbean and north temperate ant communities. *Ecology*, 55: 974-88.

<sup>8</sup>Wheeler, W. M. and W. M. Mann, The ants of Haiti. *Bul. Am. Mus. Nat. His.*, 33: 1-61.

<sup>9</sup>Wolcott, G. M., The insects of Puerto Rico (Hymenoptera). *J. Agric. Univ. P. R.* 32: 749-975.

report by Wheeler, Levins et al.<sup>10</sup> and Culver<sup>7</sup> did not mention this ant in their studies.

I found a nest of this ant in Cayo Ratones (near Icacos) on 17 July 1982. Also, a small population of the ant was discovered on the sandy beaches of the Piñones Forest (11 June 1986).

I have found *Cyphomyrmex minutus* (Mayr) in Puerto Rico, Palominos, Piñerito, Cabeza de Perro, Culebra, Culebrita, Cayo Norte, Cayo Luis Peña, Vieques, Inner Brass, Cayo Congo, Cayo de Afuera, María Langa, Caja de Muertos, Mona, and Islote Juan Pérez. I have found *Mycocepurus smithi* (Forel) only in Puerto Rico.

In Guánica Forest I have observed *Trachymyrmex jamaicensis* carrying fruits of the following species to their nests: *Crossopetalum rhacoma*, *Erithalis fruticosa*, *Guettarda elliptica*, *Coccoloba microstachya*, and *Bouyeria succulenta*. The flesh of the fruit is used to grow their fungus gardens. The seeds are discarded near the entrances of their nests. Also, it is common to see piles of intact fruits near nest entrances. It appears that these fruits are somehow unfit for growing the fungus and are put together with seeds in the waste dumps. The concentration of seeds near ant nests is so large that the pattern of seed establishment in this forest could be affected. Also, there is the possibility that interactions between seedlings will be altered because of increase in crowding and by changes in the nutrient concentration around nests.<sup>11</sup> Castilleja<sup>12</sup> has reported low seedling density and recruitment rates for the whole forest. In the case of relatively large fruits like *Coccoloba diversifolia*, the ants removed the flesh of the fruit and left the seeds in place, similar to species in the fungus

grower genus *Atta*, which collect fresh leaves to grow their gardens. *T. jamaicensis* is a generalist in its use of fruits as a substrate.

In Cayo Conejo (near Vieques). *T. jamaicensis* is the dominant ant in grassy areas. Huge seed piles of the grass *Sporobolus virginicus* were found bordering their nest entrances. *Trachymyrmex jamaicensis* was also abundant on Piñero island. On Mona I have observed *T. jamaicensis* collecting fallen flowers and dead leaves to culture their gardens. Wheeler and Mann reported<sup>8</sup> that *T. jamaicensis* collects small pieces of leaves, buds, and other vegetable substances.

*Mycetophylax conformis* is using the fallen needles of casuarina pines (*Casuarina equisetifolia*) for their fungus gardens on the sandy beaches of Piñones.

*Cyphomyrmex minutus* mostly uses caterpillar feces to grow its gardens. In addition, seeds, insect parts, and flowers are used as substrate.<sup>13</sup> It nests in rotten stumps, twigs, logs, and under stones.<sup>4,14</sup> *Cyphomyrmex minutus* is the fungus grower ant with the widest distribution in the Puerto Rican bank. It seems that the habit of nesting in twigs and logs facilitates the transport of this ant from island to island.

The substrate for *Mycocepurus smithi* gardens is almost identical with that used by *Cyphomyrmex minutus*.<sup>13</sup> Levins et al.<sup>10</sup> found *M. smithi* using bat dung to grow their fungus. Specimens of both species are of about the same size. One of the main differences between them is that *M. smithi* nests only in the ground. Ground nesting could be the reason for the restricted distribution of this species in the Puerto Rican bank. *Mycocepurus smithi* was abundant in

<sup>10</sup>Levins, R., M. L. Pressick and H. Heatwole, 1973. Coexistence patterns in insular ants. *Am. Sci.*, 61: 463-72.

<sup>11</sup>Beattie, A. J., 1985. The Evolutionary Ecology of Ant-Plant Mutualisms. Cambridge Univ. Press, Cambridge.

<sup>12</sup>Castilleja, G., 1988. Seed germination and seedling establishment in a tropical dry forest. *TRI News*, 5: 4-6.

<sup>13</sup>Torres, J. A., 1984. Niches and coexistence of ant communities in Puerto Rico: repeated patterns. *Biotropica*, 16: 284-95.

the Cambalache Forest, where it built nests with relatively large earth mounds (24 June 1982).

Another observation about these fungus grower ants is their tendency to become suddenly abundant. I studied the ants in San Lorenzo, P. R., from 1978 to 1980. During this time nest density for *M. smithi* was low. I visited the same area in 1984 and *M. smithi* nests were highly abundant. Torres and Canals<sup>14</sup> did not find *M. smithi* in the interior of El Yunque in 1979. Nonetheless, *M. smithi* was highly abundant, especially in the Colorado Forest area near El Verde Field Station, 11 July 1985. The apparent pattern of low and high abundance in these species needs an explanation.

I have observed similar increases in density with other ant species in Puerto Rico. Large fluctuations in abundance have also

been reported for the social wasps (*Polistes*) in several Caribbean Islands.<sup>15</sup> In Puerto Rico *Polistes major* (Beauvois) is exhibiting a reduction in abundance and geographical range. In addition, Segarra<sup>16</sup> reported large fluctuations in the abundance of the moth *Etiella zinckenella* (Treitschke) in Puerto Rico. Similarly there are other Lepidoptera species that exhibit fluctuations in Puerto Rico.<sup>17</sup> Since most of the Puerto Rican fungus growers utilize caterpillar feces to grow their gardens, it is possible that the fluctuations observed in the fungus grower ants could be related to the fluctuations in lepidopteran abundance.

Juan A. Torres  
Assistant Professor  
Technological University  
College of Bayamón

<sup>14</sup>Torres, J. A. and M. Canals, 1983. Components of ant diversity and other miscellaneous notes on ants. *Science-Ciencia*, 10: 38-43.

<sup>15</sup>Ballou, H. A., 1934. Notes on some insect pests in the Lesser Antilles. *Trop. Agric.*, 11: 210-12.

<sup>16</sup>Segarra, A. E., Studies on the Effect of Host Plant Population Variability in Time and Space on *Etiella zinckenella* (Treit.) with Notes on Hosts and Natural Enemies. Ph.D. thesis University of Maryland, 1985.

<sup>17</sup>Wolcott, G. N. and L. F. Martorell, 1943. The seasonal cycle of insect abundance in Puerto Rican cane fields. *J. Agric. Univ. P. R.*, 27 (85): 104.