A rapid survey of ground-dwelling ants (Hymenoptera: Formicidae) in an urban park from state of São Paulo, Brazil

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The growing urbanization process has led to significant changes in natural environments (Kamura et al., 2007; Guimarães et al., 2013). Thus, it becomes necessary to search for alternatives aiming at conservation and improvement in environmental quality. The creation of forest reserves and ecological parks in urban regions (Kowarik, 2011) can be an effective strategy to conserve biodiversity. The maintenance of these areas benefits many organisms, mainly by providing refuges for many animal species, including ants (Souza-Campana et al., 2016).

Ants play a key role in different ecosystems, acting in nutrient cycling (Hölldobler and Wilson, 1990), soil structuring, and interacting with other organisms (Folgarait, 1998; Sanders and Van Veen, 2011). Due to their high diversity, wide world distribution, and sensitivity to environmental changes, they are important organisms for biodiversity studies (Alonso and Agosti, 2000). Here, we describe a rapid survey of ground-dwelling ants.

The area comprises a fragment of Atlantic Forest of 48.4 hectares located on the urban perimeter of Águas da Prata, state of São Paulo, Brazil (21° 55′ S; 46°42′W). It is influenced by the proximity to the Governador Adhemar Pereira de Barros Highway (SP-342) and by trails accessed by visitors.

Ants were collected once in June 2016 (dry season), along a 400m transect (into the fragment), within the fragment of about 100 m from the border region. In total, 20 sample points 20 m distance were evaluated. At each point, we collected two samples of 1 m² leaf litter, one to the left and one to the right of the transect, 20 m apart. Each sample was submitted to a mini-Winkler extractor for 48 hours. The ground-dwelling ants were identified following taxonomic key from Baccaro et al. (2015), and had their species/morphospecies named according to Suguituru et al. (2015). Voucher specimens were deposited at Universidade de Mogi das Cruzes, in São Paulo, Brazil.

We collected a total of 6,361 ants with representatives of six subfamilies, 19 genera, and 24 species/morphospecies (Table 1). The taxa are characteristic of the litter stratum (Delabie et al., 2000) and represent a mosaic composed of species found in forests and urban environments.

Pheidole Westwood, 1839 (4) and Solenopsis Westwood, 1840 (3), both with generalists feeding habits, were the richness genus (Table 1). That is an expected finding, since they are common taxa in urban environments (Morini et al., 2007; Souza et al., 2012a; Guimarães et al., 2013; Souza-Campana et al., 2016), fed on diversified resources (Baccaro et al., 2015).

The fungus-grower ants Acromyrmex coronatus (Fabricius, 1804), Cyphomyrmex rimosus (Spinola, 1851), and Apterostigma sp. were also collected. With the exception of Acromyrmex Mayr, 1865, Cyphomyrmex Mayr, 1862 and Apterostigma Mayr, 1865 are peculiar to the choice of food sources (Leaf and Oliveira, 2000), and although present in urban parks, they present low frequency of occurrence when compared to the other taxa (Morini et al., 2007; Souza et al., 2012a; Souza-Campana et al., 2016).

The following genera were present: Basiceros Schulz, 1906 and Oxyepoeus Santschi, 1926, characterized as cryptic taxa; Strumigenys Smith, 1860 and Rhopalothrix Mayr, 1870, which are specialized predators; and Hypoponera Santschi, 1938, Pachycondyla Smith, 1858, and Odontomachus Latreille, 1804, characterized as generalist predators (Baccaro et al., 2015). In fact, a generalist predatory morphospecies (Hypoponera sp.4, Table 1) had the highest occurrence (11.11%).

Moreover, as the poorly studied Discothyrea Roger, 1863, Heteroponera Mayr, 1887, and Typhlomyrmex Mayr, 1862 occurred in the study site, which has been reported from preserved other than urban areas (Baccaro et al., 2015; Suguituru et al., 2015). The finding of Discothyrea sexarticulata Borgmeier, 1954, Heteroponera dolo (Roger, 1860) and Typhlomyrmex cf. pusillus suggest food availability and refuge sites for these species in the area, which have specialized life style. Discothyrea fed on arthropod eggs (Delabie et al., 2000; Brandão et al., 2015; Baccaro et al., 2015). H. dolo nestings on fallen tree trunks and branches (Suguituru et al., 2015), where as for...
Typhlomyrmex feeding habit is still incipient (Weiser and Kaspari, 2006; Brandão et al., 2015; Suguituru et al., 2015). Data on ant diversity in fragments and urban parks of São Paulo State have been described by Morini et al. (2007), Souza et al. (2012a, b), Tachira et al. (2012), and Souza-Campana et al. (2016). Although further research is necessary to ensure that the ant fauna is sufficiently represented, this rapid assessment provides information about ants living in the leaf litter of the Águas da Prata State Park, improving data for the region. In addition, information will be important for monitoring these populations over time, thus contributes in decision-making for biodiversity conservation programs.

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### Table 1. List of ant species collected in the Águas da Prata State Park, state of São Paulo, Brazil.

| Taxa                      | Frequency occurrence | Abundance |
|---------------------------|----------------------|-----------|
| Myrmicinae                |                      |           |
| Acromyrmex coronatus      | 3.33                 | 35        |
| Apterosigma               | 0.56                 | 1         |
| Basiceros disciger        | 6.11                 | 80        |
| Crematogaster sp.         | 0.56                 | 22        |
| Cyphomyrmex rimosus       | 10.00                | 394       |
| Hylocemyrmia reitteri     | 0.56                 | 1         |
| Octotruma stenognatha     | 1.11                 | 5         |
| Oxyepoecus myops          | 0.56                 | 1         |
| Pheidole (gr flavens)     | 2.22                 | 9         |
| Pheidole sp.14            | 8.33                 | 485       |
| Pheidole sp.16            | 0.56                 | 1         |
| Pheidole sp.36            | 1.67                 | 4         |
| Rhopalothrix sp.          | 0.56                 | 1         |
| Solenopsis sp.2           | 10.56                | 2.619     |
| Solenopsis sp.3           | 7.78                 | 618       |
| Strumigenys eggersi       | 5.56                 | 150       |
| Wasmannia affinis         | 8.33                 | 244       |
| Ponerinae                 |                      |           |
| Hypoponera sp.4           | 11.11                | 1.018     |
| Odontomachus meinerti     | 7.22                 | 42        |
| Pachycondyla striata      | 0.56                 | 1         |
| Dolichoderinae            |                      |           |
| Linepithema cf pulex      | 10.00                | 610       |
| Ectatomminae              |                      |           |
| Typhlomyrmex cf pusillus  | 1.11                 | 17        |
| Proceratiinae             |                      |           |
| Discothyrea sexarticulata | 1.11                 | 2         |
| Heteroponera dolo         | 0.56                 | 1         |
| Heteroponera dolo         | 11.11                | 1.018     |
| Richness total            | 24                   |           |
| Abundance total           | 6,361                |           |

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