Social wasps are excellent predators (Elisei et al., 2010; Raveret Richter, 2000), however, are prey of other insects too as considerable resources are stored in their nests. There are many parasitoids of *Polistes* species, including Lepidoptera (Gelechiidae, Crambidae, Cosmopterigidae, Tineidae, and Pyralidae (Strassmann, 1981; Yamane, 1996)), Strepsiptera (Xenidae), Diptera (Phoridae, Sarcophagidae, and Tachinidae (Somavilla et al., 2015; Zeegers et al., 2014; Benadé et al., 2014)), and Hymenoptera (Pteromalidae, Chalcididae, Eulophidae, Torymidae, Ichneumonidae, Trigonalidae, Mutillidae, and even Vespidae itself (Benadé et al., 2014; Somavilla et al., 2015; Hodges, 2003; Whiteman & Landwer, 2000; Gomovsky 2007; Silva-Filho 2007; Kozyra et al., 2014; Kudo et al., 2014; Madden et al., 2010; de Souza Tavares et al. 2013)).

*Polistes myersi* Bequaert, 1934 is found from Panamá to Venezuela (Richards, 1978). Their nests, of up to 100 cells, are found in perturbed habitats (Cubillos & Sarmiento, 1996; London & Jeanne, 2000), however, little is known about its biology and its relationships with predators and parasitoids. Here we report several parasitoid species of this wasp.

A total of 43 colonies with either late instar wasp larvae or pupae were collected from Fusagasugá, Cundinamarca, Colombia (4°18′996″ N, 74°26′475″ W, 1309 m) in May and October 2017, and in August 2019. Each colony was established in transparent PVC cages (25 x 16 x 16 cm) and stored in a rearing chamber (28 °C, 44% RH, 12/12 h photoperiod). Colonies had access to water and a mixture of water, honey, and pollen ad libitum. Depending on the colony size either one or two late instar larvae of *Galleria mellonella* Linnaeus, 1758 (Pyralidae) were offered every other day. Colonies increased their size and their larvae reached adulthood or even started new colonies.

Colonies were checked daily and emergent parasitoids were preserved in ethanol 96%; these were identified using appropriate keys and help from specialists: For Hymenoptera the following references: Fernandez and Sharkey (2006), Burks (2019), Subba Rao (1974), Carmean and Kimsey (1998), and the following contacted specialists: D. Carmean, R. Burks, J. Wooley, and A. Dal Molin. For Strepsiptera the specialist Jerry Cook, (Sam Houston Natural History Collections). And
for Diptera the specialist Juan Manuel Perilla (Wright State University). Parasitoids of a single incidental colony of Polistes erythrocephalus Latreille, 1813 are also reported. Specimens were deposited in the Instituto de Ciencias Naturales (ICN), Universidad Nacional de Colombia, Bogotá (Catalogue numbers Table 1).

A total of 19 colonies were infected by parasitoids; parasitism ranged from 35 % to 57 %. Parasitized nests were larger than non-parasitized ones (average cell number 64 vs 38 respectively, Table 1). However, the mean number of adult females did not differ between parasitized and non-parasitized colonies (8.2 vs. 8.1 respectively, Table 1).

The following parasitoid species of P. myersi colonies are reported: Xenos n. sp. (Strepsiptera, Xenidae); Elasmus polistis Burks, 1971 (Hymenoptera, Eulophidae); Signiphora polistomyiella Richards, 1935 (Hymenoptera, Signiphoridae); Seminota laeviceps (Cresson, 1879) (Hymenoptera, Trigonalidae), and an unknown fly (Diptera, Tachinidae, Blondeliini) (Fig 1). Except for Xenos n. sp. all other parasitoids were collected during two or the three field trips.

Table 1. Characteristics of the parasitized nest of Polistes myersi where these parasitoids emerged (Mean ± SD). *As some nests harbor more than one parasitoid species, the number of nests will not add up. ^Museum collection number.

<table>
<thead>
<tr>
<th>Parasitoid species</th>
<th>Infected nests*</th>
<th>Nests characteristics</th>
<th># Cells</th>
<th># Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signiphora polistomyiella (ICN 101081)^</td>
<td>9</td>
<td>54.3 ± 57.8</td>
<td>7.6 ± 3.8</td>
<td></td>
</tr>
<tr>
<td>Elasmus polistis (ICN 101078)</td>
<td>8</td>
<td>71.3 ± 57.0</td>
<td>9.1 ± 9.2</td>
<td></td>
</tr>
<tr>
<td>Blondeliini sp. (ICN 101079)</td>
<td>7</td>
<td>45.1 ± 16.3</td>
<td>6.0 ± 3.7</td>
<td></td>
</tr>
<tr>
<td>Seminota laeviceps (ICN 101080)</td>
<td>3</td>
<td>60.3 ± 51.9</td>
<td>11.3 ± 16.3</td>
<td></td>
</tr>
<tr>
<td>Xenos n. sp. (ICN 101082)</td>
<td>1</td>
<td>72</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Non-Parasitized</td>
<td>24</td>
<td>38.0 ± 23.7</td>
<td>8.2 ± 5.9</td>
<td></td>
</tr>
</tbody>
</table>

Fig 1. Habitus of the parasitoids reported in the colonies of Polistes myersi and Polistes erythrocephalus. (A) Seminota laeviceps, (B) Elasmus polistis, (C) Signiphora polistomyiella, (D) Xenos n. sp, and (E) Blondeliini.
From most of the colonies a single parasitoid species was obtained, with the following exceptions: two colonies with *S. polistomyiella* and *E. polistis*, one colony with *E. polistis* and a Blondeliini fly, and one colony with *S. polistomyiella* and a Blondeliini fly, one colony with *S. polistomyiella*, *E. polistis* and a Blondeliini fly, and one colony with *S. polistomyiella*, *E. polistis*, *Xenos* n. sp. and a Blondeliini fly. The number of parasitized colonies of *S. polistomyiella* was obtained, with the following exceptions: two colonies with *S. polistomyiella* and *E. polistis*, one colony with *E. polistis* and a Blondeliini fly, and one colony with *S. polistomyiella* and a Blondeliini fly. The number of parasitized colonies of *S. polistomyiella* was higher than the present study was found in a small study with seven out of ten sampled colonies of *Polistes dorsalis*; these were parasitized by *Elasmus polistis* in the USA (Macom & Landolt, 1995). The location of *P. myersi* in a highly disturbed area could explain these numbers.

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**Authors Contribution**

Daniela Mayorga-Ch: Field work, data collection and analysis, writing paper. Carlos E. Sarmiento: Project design, field work, writing paper.

**References**


Cook, J.L. (2019). Annotated catalog of the order Strepsiptera in South Africa. The only higher record of parasitism rate than the present study was found in a small study with seven out of ten sampled colonies of *Polistes dorsalis*; these were parasitized by *Elasmus polistis* in the USA (Macom & Landolt, 1995). The location of *P. myersi* in a highly disturbed area could explain these numbers.


