

No evidence for dominance-discovery tradeoffs in *Pheidole* (Hymenoptera: Formicidae) assemblages

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1 **Abstract**

2 Understanding the mechanisms that allow species coexistence across spatial scales is of great interest to
3 ecologists. Many such proposed mechanisms involve tradeoffs between species in different life-history traits, with
4 distinct tradeoffs being expected to be prevalent at varying temporal and spatial scales. The dominance-discovery
5 tradeoff posits that species differ in their ability to find and use resources quickly, in contraposition to their ability to
6 monopolize those resources, a mechanism analogous to the competition-colonization tradeoff. We investigated the
7 occurrence of this structuring mechanism in *Pheidole* (Hymenoptera: Formicidae) assemblages in Atlantic Forest
8 remnants. According to the dominance-discovery tradeoff, we should observe a consistent interspecific variation along
9 the axis of discovery and dominance. We established 55 sampling units across two sites, with each unit consisting of
10 a sardine bait monitored for three hours. There was no distinction among *Pheidole* species in their ability to find or
11 dominate food sources, suggesting that the dominance-discovery tradeoff does not explain their coexistence. The low
12 levels of aggression between *Pheidole* species could prevent the establishment of dominance hierarchies, whereas the
13 species order of arrival at food sources could allow for resource partitioning through priority effects.

14

15 **Keywords:** Aggressiveness; Ants; Dominance-discovery tradeoff; *Pheidole*; Priority effects; Species
16 interactions.

17

18 **Introduction**

19 Species coexistence is a fundamental theme in community ecology. How some regions are able to harbor
20 high levels of diversity is still far from being understood, despite a long history of investigation (Hutchinson 1959).
21 Also challenging is to understand how closely related species, which share many aspects of their niches, are able to
22 coexist at fine spatial scales (Hutchinson 1961). Many ecological mechanisms proposed to date to explain species
23 coexistence consider the occurrence of tradeoffs in the performance of species in some life-history traits, which affect
24 their spatial distribution and interspecific interactions (Kneitel and Chase 2004). Species can differ in their competitive
25 and colonization abilities, the levels of abiotic stresses and predation pressures they tolerate, their degree of habitat
26 specialization, among other characteristics, and those differences could explain species coexistence across distinct
27 spatial scales (Kneitel and Chase 2004). Given that diversity translates to ecosystem functioning, the study of species
28 coexistence is essential to understand and manage ecosystem services.

29 The competition-colonization tradeoff is one of the most classical tradeoff mechanisms proposed to explain
30 species coexistence by suggesting that some species are better at dispersing and colonizing new habitat patches,
31 whereas others are better at displacing incumbent species once they finally colonize the patch (Kneitel and Chase
32 2004). Although the spatial scale considered under this mechanism can vary, that tradeoff purports to explain
33 coexistence in long temporal scales. Likewise, the competition-colonization tradeoff inspired the proposition of an
34 analogous mechanism that operates in a reduced time range, the dominance-discovery tradeoff (Parr and Gibb 2012).
35 This mechanism proposes that species can differ in their ability to find and dominate resources, and was suggested to
36 explain the coexistence of bees (Hubbell and Johnson 1978; Nagamitsu and Inoue 1997), rodents (Brown et al. 1994)
37 and ants (Fellers 1987; Lebrun and Feener 2007; Feener et al. 2008; Perfecto and Vandermeer 2001; Bertelsmeier et
38 al. 2015a).

39 Ants are important components of terrestrial ecosystems worldwide, particularly in the tropics, where they
40 account for a substantial portion of the animal biomass (Fittkau and Klinge 1973), show considerable species diversity
41 (Economio et al. 2018) and are essential to sustain many ecosystem services (Del Toro et al. 2012). Most ant species
42 are food generalists (Kaspari 2001), because of the marked differences in brood and adult nutritional requirements
43 (Blüthgen and Feldaar 2010). Therefore, if several ant species co-occur and share common resources, one would

44 expect that they might show some level of competition, which suggests the existence of mechanisms of coexistence
45 to sustain high levels of diversity. However, the role of competition in ant community structure is far from settled
46 (Parr and Gibb 2010), despite having traditionally been considered as a “hallmark” of ant communities (Hölldobler
47 and Wilson 1990). Competition in ant communities can be manifested in two ways. Through interference, some ant
48 species exclude competitors from resources by direct aggression or territoriality, whereas by exploitative behaviors
49 some species are specialized in finding and removing resources before other species arrive (Davidson 1998). This
50 leads to dominance hierarchies, in which some species (dominants) are capable of monopolizing resources, whereas
51 others are better at finding resources quickly and removing them before the arrival of the dominants (subordinates)
52 (Fellers 1987; Feener et al. 2008; Arnan et al. 2012; Yitbarek and Philpott 2019).

53 Ant species are considered as dominant, in the context of those hierarchies, either by the outcomes of pairwise
54 interactions with other species, where the winners are considered dominants (behavioral dominance), or by a large
55 recruitment of workers on food sources (numerical dominance), preventing the use of the resource by other species
56 (Davidson 1998). The dominance-discovery tradeoff is an interesting mechanism to explain coexistence between
57 subordinate and dominant ant species. To find resources at faster rates, an ant colony needs to optimize the number of
58 scout workers (Pearce-Duvet and Feener 2010) that search for food, as opposed to dominant species that invest more
59 in recruiters (Fellers 1987). This tradeoff was tested in several situations, including in intraspecific interactions (Jordan
60 and Blüthgen 2007), between invasive species (Bertelsmeier et al. 2015a) and within guilds (Fellers 1987). Although
61 some studies demonstrated the importance of this mechanism in warranting ant species coexistence (Fellers 1987;
62 Lebrun and Feener 2007; Feener et al. 2008; Bertelsmeier et al. 2015a), others questioned its ubiquity (Adler et al.
63 2007; Jordan and Blüthgen 2007; Parr and Gibb 2012; Stuble et al. 2013; Castracani et al. 2014; Camarota et al. 2018;
64 Antoniazzi et al. 2021; Dáttilo and MacGregor-Fors 2021). Some authors also stressed factors that can modify the
65 outcome of dominance-discovery tradeoffs (Davidson 1998; Feener 2000; Adler et al. 2007; Parr and Gibb 2012).

66 The genus *Pheidole* is one of the most diverse ant lineages, with more than 1000 species described to date
67 (Bolton 2021), showing high levels of diversity in the subtropical and tropical regions (Economio et al. 2015; 2019).
68 The combination of high levels of local diversity and the fact that most *Pheidole* species are food generalists and
69 consequently share many resources (Wilson 2003), raise the question of what mechanisms could explain such high
70 levels of species co-occurrence. Here we test, through bait experiments, the possibility that *Pheidole* species co-exist

71 at local spatial scales by sharing resources according to the predictions of the dominance-discovery tradeoff. If the
72 dominance-discovery tradeoff explains the coexistence of *Pheidole* species, we expect to observe a consistent
73 interspecific variation along the axis of discovery (order of arrival) and dominance (number of workers recruited)
74 (Fellers 1987). Alternatively, a lack of evidence for the dominance-discovery tradeoff could be the result of *Pheidole*
75 species being more spatially segregated than the expected by chance (Connor and Simberloff 1979; Gotelli 2000), so
76 they would rarely interact directly to dispute resources. We therefore test whether *Pheidole* species are spatially
77 segregated, and expect that they are not more segregated than expected by chance.

78 **Material and Methods**

79 We carried out field experiments in two neighboring urban forest fragments located in the campus of the
80 Universidade Federal do Paraná in Curitiba, Paraná, southern Brazil (Site A - approximately 5.5 ha; 25°26'45.9"S;
81 49°13'55.5"W and site B - approximately 15 ha; 25°26'52.06"S; 49°14'19.24"W). The vegetation in these sites is
82 classified as mixed ombrophylous forest (Reginato et al. 2008), which is part of the Atlantic Forest biome (IBGE
83 2012). The climate in the study region is subtropical humid with temperate summers, categorized as *Cfb* according to
84 Köppen's system (Alvares et al. 2013). Experiments were carried out between the end of February and the beginning
85 of April of 2018, during the warm season, always in the morning, to minimize the effects of climatic differences
86 between sampling days. We established 55 sampling units along three transects in each of the two sampling sites (25
87 and 30 in sites A and B, respectively). In each transect, sampling units were set 10 meters apart from each other to
88 avoid resampling individuals from the same colony in different sampling units (Bestelmeyer et al. 2000). To properly
89 follow the behavior of ant workers at each sampling unit during each experiment, only five sampling units were
90 established each day, for a total of 11 sampling dates over the course of the study. Each sampling unit consisted of a
91 bait including 2-mL mixture of sardine and wheat flour, placed on a Petri dish (9 cm in diameter) that prevented ants
92 from having access to the bait from below, which could hamper direct observation and potentially underestimate their
93 presence on the baits. We offered a large amount of sardine to avoid quick removal of the resource before the end of
94 the experimentation time. There was no evidence that Petri dishes prevented workers to access the sardine. *Pheidole*
95 species are heavily attracted to sardine baits, which represent a rich source of proteins, sodium and lipids, and it has
96 been demonstrated that protein resources are more attractive to ants in forest remains at earlier successional stages

97 (Bihn et al. 2008). Each experiment lasted for three hours, such that each sampling unit was checked every 20 min,
98 for a total of nine time intervals, and the same person led all experiments.

99 We estimated the number of major and minor workers of *Pheidole* species at the sampling units with the aid
100 of a manual counter, and recorded the occurrence of negative interactions with other *Pheidole* species and with non-
101 *Pheidole* species (defined as interactions where a direct contact between workers leads them to get away from each
102 other, without necessarily a physical injury). In the case of interactions between *Pheidole* species, the same interaction
103 was counted twice, one for each species, given that we were not always able to define which species led the attack
104 against the other. For later species identification, we collected one individual per subcaste and morphospecies at each
105 sampling unit and deposited them in micro tubes filled with 95% ethanol. Voucher specimens were deposited at the
106 “Coleção Entomológica Padre Jesus Santiago Moure”, Zoology Department, UFPR. Identifications followed the
107 *Pheidole* taxonomic key available in Wilson (2003). No permits were required for fieldwork, and collections of
108 specimens followed Brazilian legal provisions.

109 Analysis

110 If species were spatially segregated due to competitive interactions (Connor and Simberloff 1979; Gotelli
111 2000), we would rarely see more than one *Pheidole* species in the same sampling unit, which would necessarily lead
112 to a pattern in which the species that discovered the bait will remain alone until the end of the experiment. To test if
113 species are more spatially segregated than expected by chance, we calculated the C-score (Stone and Roberts 1990)
114 based on presence-absence matrices considering all sampling units. The observed C-score was then tested for
115 significance against an estimated C-score obtained from null models. We generated 5000 random matrices with fixed
116 row and fixed column sums (Gotelli 2000). We estimate the C-score for the combined data as well as the data for each
117 sampling site independently and for the common species (defined as the species that occurred in more than one
118 sampling unit). The C-score analysis were carried out in EcoSim7.0 (Gotelli and Entsminger 2001) and the presence-
119 absence matrices are available as supplementary file (see Supplementary File S1)¹.

120 To assess species discovery ability, we defined a discovery ability index (DAI), which ranges from 0 to 1 and
121 is defined as the number of sampling units a species arrived first, divided by the total number of sampling units that
122 the species occurred at. If two or more *Pheidole* species occurred together in the same sampling unit at the first time

123 interval, both were treated as discoverers. Although observations started after 20 minutes, which prevent us from
124 ascertaining the exact order of arrival in a few instances in which two *Pheidole* species were presented in the first time
125 interval (four sampling units), there was no evidence that this time was enough for a species to discover the bait and
126 be completely removed by another *Pheidole* species, a process that tends to demand a greater amount of time (Perfecto
127 and Vandermeer 2011). To determine dominance ability as a proxy for numerical dominance (Davidson 1998), we
128 defined a dominance index (DI), which also ranges from 0 to 1 as the number of sampling units that a *Pheidole* species
129 dominated, divided by the total number of sampling units in which that species occurred. A species dominated the
130 sampling unit if it recruited more minor workers at the final time interval than the median number of minors recruited
131 across all baits and time intervals in which it occurred (Table 1), which resembles the monopolization index proposed
132 in Castracani et al. (2014) and Antoniazzi et al. (2021), based on the original proposition of Santini et al. (2007). In
133 considering the median number of minors recruited by each species to the baits as a threshold to define numerical
134 dominance, instead of a pre-defined specific number of workers for all species, we avoid the issues associated with
135 interspecific differences in recruitment behavior.

136 We calculated species occurrence, the frequency of negative interactions among *Pheidole* species and
137 between *Pheidole* and non-*Pheidole* species. The details of these calculations are provided in Fig. 2, Tables 1 and S3.
138 To test if the occurrence of negative interactions influences the number of workers being recruited to the sampling
139 units, we estimated the median number of minor workers being recruited at sampling units where negative interactions
140 occurred among *Pheidole* species and between *Pheidole* and non-*Pheidole* species. We applied a paired Wilcoxon test
141 (Zar 2010a) to compare if these numbers are different from the median number of minors recruited at all sampling
142 units, which is the number considered to define the DI. To test if the dominance-discovery tradeoff influences the
143 coexistence of *Pheidole* species, we applied a Spearman rank correlation test (Zar 2010b) between the DI and DAI,
144 with a negative correlation being considered as support for the dominance-discovery tradeoff (Fellers 1987). We
145 combined the data of both study areas but also considered them independently, as well as the data from only the
146 common species. Analyses were carried out in R 4.0-2 (R Core Team 2020) and the raw data and R script are available
147 as supplementary files (see Supplementary File S2² and S3³).

148 Results

149 We recorded 12 *Pheidole* species across our two sampling sites (Table 1). Two morphospecies were
150 indistinguishable in the field, so to avoid any under or overestimation of each morphospecies worker numbers we
151 combined their data under a unique species cluster, the *P. flavens* complex. *Pheidole* species visited 48 out of 55
152 sampling units during our field experiments. Of all sampling units, 47% were discovered by only one species, 24%
153 by two species and 16% by three species. The most frequent species was *P. flavens* complex (45.45%), followed by
154 *P. hetschkoi* Emery, 1896 (32.73%) and *P. risii* Forel, 1892 (20%) (Table 1). *Pheidole* aff. *susannae*, *P. cf. lucretii*
155 and *P. sp. 1* recruited the highest number of minor workers, whereas *P. aff. bucculenta* and *P. sp. 2* recruited the
156 lowest numbers (Table 1). Four species never recruited major workers (*P. aff. bucculenta*, *P. aff. rosae*, *P. risii* and
157 *P. sp. 2*), and only *P. aff. susannae* and *P. cf. lucretii* recruited more than five majors at any sampling unit and time
158 interval (Table 1).

159 Regarding negative interactions, *Pheidole* sp.2 did not exhibit negative interactions against other *Pheidole*
160 species and *P. aff. susannae* never co-occurred with another *Pheidole* species (Table 1). The remaining ten species
161 showed aggressive behaviors against other *Pheidole* species (Table S1)⁴, with *P. aff. rosae* showing negative
162 interactions in 52.63% of the time intervals in which it occurred, followed by *P. nesiota* Wilson, 2003 (40%) and *P.*
163 *hetschkoi* (36.84%). However, aggressive behaviors between *Pheidole* species were observed in only 26.07% of time
164 intervals in which at least two *Pheidole* species co-occurred. During the experiments, some non-*Pheidole* species
165 (*Brachymyrmex* sp., *Camponotus rufipes* (Fabricius, 1775), *Gnamptogenys* sp., *Linepithema* sp., *Nylanderia* sp.,
166 *Odontomachus chelifer* (Latreille, 1802), *Pachycondyla striata* Smith, 1858, and *Solenopsis* sp.) were recorded and
167 showed agonistic interactions with *Pheidole* species (Table 1). *Pheidole* sp. 2 interacted negatively against a non-
168 *Pheidole* species in 28.57% of time intervals where it was recorded, followed by *P. cf. lucretii* (20%) and *P. aff.*
169 *longiseta* (15.38%). Negative interactions had no effect on the number of minor workers being recruited at sampling
170 units, given that the median number of minors of each *Pheidole* species along the entire experimentation time was not
171 different from the median number of minors being recruited at baits that registered negative interactions among
172 *Pheidole* species ($V = 4$; $p = 0.42$) and where negative interactions happened between *Pheidole* and non-*Pheidole*
173 species ($V = 7.5$; p -value = 0.46). Consequently, there was no evidence that negative interactions influenced the DI.

174 By comparing the spatial distribution of *Pheidole* species with random distributions generated by null models,
175 we did not find any evidence that species are more aggregated than expected by chance (Table S2⁴; observed \leq

176 expected, $p = 0.314$) or less aggregated than expected by chance (Table S2⁴; observed \geq expected, $p = 0.694$) for the
177 combined data. When looking at site A individually the same patterns were found (Table S2⁴; observed \leq expected, p
178 = 0.106; observed \geq expected, $p = 0.919$), but the results from site B suggest otherwise that *Pheidole* species are
179 spatially segregated (Table S2⁴; observed \leq expected, $p = 0.967$; observed \geq expected, $p = 0.038$). However, when we
180 considered only the most common species, the co-occurrence patterns of all sites are not different from what is
181 expected by chance (Table S2)⁴. We did not find any negative correlation between DI and DAI (Figure 1), considering
182 both the combined data (Figure 1a) and the independent data from sites A (Figure 1b) and B (Figure 1c). The
183 conclusions remain the same when we considered just the common species (Figure S1)⁴. In general, most *Pheidole*
184 species stay on the sampling units throughout the entire duration of the experiment (Table S3⁴; Figure 2). Even rarely
185 recorded species, like *P. aff. tijuana* and *P. aff. susannae*, which occurred just at one sampling unit, were never
186 replaced for those baits (Table S3)⁴.

187 Discussion

188 Despite the relatively high number of co-occurring *Pheidole* species at our sampling sites, we did not find
189 any evidence for dominance-discovery tradeoffs promoting species coexistence, suggesting that *Pheidole* species
190 show similar strategies to invest in resource discovery and dominance. Specifically, we found no negative correlation
191 between the discovery and dominance indices, contrary to the expectation for the occurrence of the tradeoff (Fellers
192 1987). By reviewing the literature on dominance-discovery tradeoff, some authors suggested that the tradeoff might
193 be context dependent (Davidson 1998; Parr and Gibb 2012), as also proposed under a simulation approach (Adler et
194 al. 2007). The levels of aggressiveness between pairwise species interactions can contribute to establish dominance
195 hierarchies (Savolainen and Vepsäläinen 1988). However, here we recorded negative interactions between *Pheidole*
196 species in only 26.07% of the encounters between at least two *Pheidole* species, and we found no evidence that
197 *Pheidole* species changed their recruitment behavior due to the occurrence of any kind of negative interaction.
198 Although commonly recorded in ant interactions, aggressiveness need not be the norm in interspecific encounters,
199 even among dominant and highly invasive ants (Bertelsmeier et al. 2015b). Neutral interactions between coexisting
200 species at bait experiments represent a great portion of the observed outcomes (Blüthgen et al. 2004; Stuble et al.
201 2017; Gray et al. 2018), yet they are mainly neglected, with emphasis in studies granted preferentially to true agonistic
202 behaviors (Stuble et al. 2017). In *Pheidole* species, the increased proportion of major workers recruited to food sources

203 could be an important trait to enhance the probability of resource dominance (Mertl et al. 2010). Although the species
204 considered here were markedly distinct with respect to the number of majors recruited at baits, this difference was not
205 enough to be translated into a dominance hierarchy, and majors were rarely observed engaging in negative interactions.

206 Reacting aggressively or not against a potential competitor is context-dependent (Tanner and Adler 2009;
207 Barbieri et al. 2013). The “dear enemy” phenomenon posits that animals can recognize potential competitors that live
208 close to their own territory from others that are strangers, and react more aggressively against strangers (Langen et al.
209 2000; Tanner and Adler 2009). If the *Pheidole* species that approach the sampling units are neighbors that constantly
210 interact, this could explain the relative low levels of aggression in interspecific encounters. However, the opposite
211 trend was also recorded for ants (Gordon 1989), and to evaluate the importance of this phenomenon in the present
212 context would require a more detailed investigation of the nature of the interspecific encounters between the *Pheidole*
213 species. The type of resource being disputed and the nutritional demands of the colony can also influence the foraging
214 behavior of ant workers (Cornelius and Grace 1997; Kay 2004; Silberman et al. 2016). In general, proteins and lipids
215 are the main nutrients to feed larvae and the queens, whereas for adult workers carbohydrates are the main energy
216 sources to sustain their activities (Blüthgen and Feldhaar 2010). Although we used here a unique source of food to
217 attract *Pheidole* workers to baits, sardine baits are sources of both proteins and lipids (Lasmar et al. 2021), which are
218 commonly searched by *Pheidole* species in the field along with carbohydrate (Rosumek 2017). Further studies can
219 investigate if other food types can elicit more aggressive behaviors between *Pheidole* workers, which occasionally
220 can result in interactions that follow the predictions of the dominance-discovery tradeoff.

221 Coupled with the low number of agonistic interactions between ant species at baits, in nearly half of our
222 sampling units we recorded only one *Pheidole* species throughout the entire experimentation time. In some situations,
223 it was clear that the first species that arrived at baits had nests close to the baits (author’s pers. obs.), which represents
224 a clear advantage to find the resource and recruit workers to dominate it. The implication is that the crucial stage for
225 resource assurance could be the discovery event, a fact recently suggested for Neotropical arboreal ant communities
226 (Camarota et al. 2018; Antoniazzi et al. 2021) and a Neotropical urban gradient (Dáttillo and MacGregor-Fors), which
227 was defined as a discovery-defense strategy (Camarota et al. 2018). Although we did not find a positive relationship
228 between discovery and dominance abilities, there is a trend towards it in our results from both the combined data and
229 individual data from sites A and B, which was not confirmed due to the contrasting behavior of three species (*P. sp.1*,

230 *P. sp.2* and *P. aff. tijucana*). This pattern differs from the two step view whereby the resource used by ants is
231 partitioned between a food search phase, followed by a latter moment of competition displacement and species
232 turnover where other ants have greater success, the so called dominance-discovery tradeoff (Fellers 1987). This
233 suggests that other mechanisms can be involved in structuring this community, such as priority effects (Andersen
234 2008). Priority effects predict that the order of species arrival at empty patches determines the subsequent structuring
235 of the community (Fukami 2015; De Meester et al. 2016). The order of arrival into a resource patch can determine the
236 level of aggressiveness of dominant ant species (Barbieri et al. 2013), in a way that influences resource partitioning.
237 Order of arrival can also change the colony level of activity and survival (Barbieri et al. 2013), with important
238 consequences for species coexistence and community structure.

239 By arriving first at baits, the *Pheidole* species in our study have more time to recruit nestmates and dominate
240 the resource before the arrival of other *Pheidole* species, and in the absence of successful takeovers in resource patches,
241 coexistence can be improved (Adler et al. 2007). If the *Pheidole* species investigated here are spatially segregated to
242 some degree, this could explain why so many sampling units were visited by only one species. Although our analysis
243 of spatial structure from site B suggests that those *Pheidole* species are spatially segregated, it seems that this result is
244 an effect of the rare species. When just common species are considered, the patterns of species co-occurrence agree
245 with what is expected by chance (Stone and Roberts 1990; Gotelli 2000). Another possibility is that the complexity
246 of the habitat delays the time to discover and recruit nestmates to the baits. More complex habitats affect the way that
247 ants sense the environment and influence its locomotion capacity (Kaspari and Weiser 1999), which consequently
248 affects the time to discover and recruit nestmates to the baits (Parr and Gibb 2012). The time to discover food sources
249 can vary because of several biological aspects of ant species, but there are cues that in more simple vegetation types
250 ants are able to find resources at faster rates (Gibb and Hochuli 2004) than in more complex habitats (Holway 1999).
251 Although our sampling sites conserve vegetation elements of secondary stages of succession (Reginato et al. 2008),
252 both sites are composed of arboreal species that provide a complex leaf-litter in which ants forage, which can hinder
253 ant locomotion and navigation.

254 We show here that a classical mechanism of species coexistence, the dominance-discovery tradeoff (Fellers
255 1987), was not able to explain *Pheidole* species co-occurrence in two assemblages of Atlantic Forest remains in south
256 Brazil. Similarly, coexistence of *Pheidole* species seems not to be related to tradeoffs between dominance and

257 environmental resistance (Tschá and Pie 2019), which suggests that evolutionary tradeoffs can have a secondary role
258 to structuring the *Pheidole* assemblages investigated. Although there are cues for the importance of priority effects
259 (Andersen 2008) to the resource partitioning between *Pheidole* species, this hypothesis remains to be tested in the
260 present community. Also important to advance our knowledge about *Pheidole* species coexistence is a deeper
261 understanding of their dietary preferences (Rosumek 2017; Rosumek et al. 2018) and the role of stochastic
262 mechanisms in promoting species coexistence (Andersen et al. 2013; Stuble et al. 2017). The importance of the
263 dominance-discovery tradeoff in structuring ant communities is highly context-dependent (Davidson 1998; Parr and
264 Gibb 2012), and the prevalence of ecological tradeoffs in general depend on the spatial scales being considered
265 (Kneitel and Chase 2004). Therefore, a lack of evidence for the occurrence of the dominance-discovery tradeoff in
266 many ant assemblages (Parr and Gibb 2012) should not be viewed as a definitive proof against the importance of such
267 mechanisms in the structuring of ant communities. The dominance-discovery tradeoff should be more broadly
268 explored, along different spatial scales and with different organisms, to provide a deeper understanding about the
269 range of its influence in ecological communities to ensure species coexistence.

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273 **Conflicts of interest/Competing interests**

274 The authors declare no competing interests.

275 **Authors' contributions**

276 CLK and MRP designed the study, CLK carried out field and lab work and data analysis, CLK and MRP
277 wrote the manuscript.

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281 **Data availability**

282 Raw data (Supplementary File S1 and Supplementary File S2) and R code (Supplementary File S3) are
283 provided in the Supplementary Material.

284 **Footnotes**

285 ¹Supplementary File S1 is available with the article at [cjz-2021-0074suppla](#);

286 ²Supplementary File S2 is available with the article at [cjz-2021-0074supplb](#);

287 ³Supplementary File S3 is available with the article at [cjz-2021-0074supplc](#);

288 ⁴Supplementary figures and tables are available with the article at [cjz-2021-0074suppld](#).

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453

Figures captions

454 **Fig. 1** Correlations between discovery and dominance indices from the combined (a), site A (b) and site B (c) data.

455 Insets display the results of the Spearman correlation tests. Plots were generated with the R package GGLOT2

456 (Wickham 2009).

457 **Fig. 2** Relative frequency of *Pheidole* species over the experiment time (a). Relative frequency considers the number

458 of records of each *Pheidole* species out of the total number of time intervals that a *Pheidole* species occurred (483).

459 In (b), the same relationship is visualized with the relative frequencies of each species standardized to a constant

460 height. Plots were generated with the R package “GGLOT2” (Wickham 2009) and “viridis” (Garnier 2018).

461