Ecography

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Supplementary material

Appendix 1

Table A1

The complete list of 128 ant species collected from tree crowns in the Barro Colorado Natural Monument, Panama. Values are collection frequencies (percent occurrence in independent collections) from trees with lianas (n = 118) and trees without lianas (n = 35). Morphospecies which could not be identified are listed as "sp#".

Subfamily	Species	Lianas Present	Lianas Absent
Dolichoderinae	*Azteca brevis* Forel 1899	0	2.86
	Azteca flavigaster Longino 2007	3.39	0
	Azteca forelii Emery 1893	11.02	8.57
	Azteca instabilis (F. Smith 1862)	30.51	25.71
	Azteca nigricans Forel 1899	5.93	2.86
	Azteca pilosula Forel 1899	1.69	0
	Azteca trigona Emery 1893	31.36	22.86
	Dolichoderus bispinosus (Olivier 1792)	19.49	25.71
	Dolichoderus debilis Emery 1890	7.63	0
	Dolichoderus lamellosus (Mayr 1870)	0	0
	Dolichoderus laminatus (Mayr 1870)	8.47	14.29
	Dolichoderus lutosus (F. Smith 1858)	0	0
	Tapinoma litorale Wheeler 1905	0	0
	Tapinoma melanocephalum (Fabricius 1793)	6.78	0
	Tapinoma sp1	0	0
	Technomyrmex fulvus Wheeler 1934	0.85	0
Ecitoninae	*Eciton hamatum* (Fabricius 1781)	0.85	0
	Neivamyrmex pilosus mexicanus (Fr. Smith 1859)	0	0
Ectatomminae	*Ectatomma ruidum* (Roger 1861)	3.39	0
	Ectatomma tuberculatum (Olivier 1792)	5.93	2.86
	Gnamptogenys concinna (Fr. Smith 1858)	1.69	0
	Gnamptogenys regularis Mayr 1870	0	0
Formicinae	*Brachymyrmex coactus* Mayr 1887	4.24	0
	Brachymyrmex longicornis Forel 1907	0	0
	Brachymyrmex pictus balboae Wheeler 1942	10.17	11.43
	Camponotus atriceps	3.39	2.86
	Camponotus brevis Forel 1899	5.08	5.71
	Camponotus cameroni Forel 1892	21.19	37.14
	Camponotus canescens Mayer 1870	11.02	2.86
	Camponotus claviscapus Forel 1899	6.78	0

	Camponotus curviscapus Emery 1896	0	0
	Camponotus linnaei Forel 1886	57.63	48.57
	Camponotus mucronatus Emery 1890	12.71	11.43
	Camponotus novogranadensis Mayr 1870	27.97	34.29
	Camponotus pittieri Forel 1899	2.54	0
	Camponotus planatus Roger 1863	0	0
	Camponotus sanctaefidei Dalla Torre 1892	5.93	0
	Camponotus senex (Smith 1858)	24.58	31.43
	Camponotus sericeiventris (Guérin-Méneville 1838)	10.17	8.57
	Camponotus sp1	1.69	2.86
	Camponotus sp2	0	0
	Camponotus sp3	0	2.86
	Camponotus sp4	0	0
	Camponotus textor Forel 1899	0	0
	Nylandaria caeciliae (Forel 1899)	0.85	0
	Nylandaria guatemalensis (Forel 1885)	0	0
	Nylandaria sp1	0	0
	Nylandaria steinheili (Forel 1893)	4.24	2.86
	Paratrechina longicornis (Latreille 1802)	0	0
Myrmicinae	*Acromyrmex octospinosus* (Reich 1793)	0.85	2.86
	Acromyrmex volcanus Wheeler 1937	6.78	0
	Cephalotes atratus (Linnaeus 1758)	34.75	14.29
	Cephalotes basalis (F. Smith 1876)	39.83	34.29
	Cephalotes christopherseni (Forel 1912)	31.36	11.43
	Cephalotes cordiventris (Santschi 1931)	0	2.86
	Cephalotes foliaceus (Emery 1906)	4.24	2.86
	Cephalotes grandinosus (F. Smith 1860)	0	0
	Cephalotes maculatus (F. Smith 1876)	13.56	17.14
	Cephalotes minutus (Fabricius 1804)	2.54	0
	Cephalotes porrasi (Wheeler 1942)	1.69	0
	Cephalotes setulifer (Emery 1894)	0.85	0
	Cephalotes umbraculatus (Fabricius 1804)	21.19	20
	Crematogaster acuta (Fabricius 1804)	3.39	0
	Crematogaster brasiliensis Mayr 1878	6.78	2.86
	Crematogaster carinata Mayr 1862	16.1	0
	Crematogaster crinosa Mayr 1862	5.08	17.14
	Crematogaster crucis Forel 1912	3.39	0
	Crematogaster curvispinosa Mayr 1862	27.97	22.86
	Crematogaster limata F. Smith 1858	3.39	0
	Crematogaster longispina Emery 1890	0	2.86
	Crematogaster raptor Longino 2003	0.85	0
	Crematogaster rochai Forel 1903	0	2.86
	Crematogaster stollii Forel 1885	4.24	0

	Cyphomyrmex salvini Forel 1899	0	0
	Monomorium pharaonis (Linnaeus 1758)	0	0
	Nesomyrmex anduzei (Weber 1943)	2.54	0
	Nesomyrmex pleuriticus (Kempf 1959)	0	0
	Pheidole bilimeki Mayr 1870	0.85	0
	Pheidole boliviana Wilson 2003	3.39	0
	Pheidole caltrop Wilson 2003	12.71	0
	Pheidole nr *excubitor*	0	0
	Pheidole flavens Wilson 2003	4.24	0
	Pheidole perpusilla Emery 1894	0.85	0
	Pheidole sp1	0.85	0
	Pheidole sp2	0	0
	Pheidole susannae Forel 1886	0	0
	Procryptocerus belti Forel 1899	22.03	8.57
	Solenopsis picea Emery 1896	1.69	20
	Solenopsis sp1	0.85	0
	Solenopsis sp2	0.85	0
	Solenopsis sp3	4.24	2.86
	Solenopsis zeteki Wheeler 1942	2.54	0
	Tetramorium bicarinatum (Nylander 1846)	0	0
	Wasmannia auropunctata (Roger 1863)	1.69	0
	Wasmannia rochai Forel 1912	11.86	8.57
	Xenomyrmex panamanus (Wheeler 1922)	4.24	8.57
Paraponerinae	*Paraponera clavata* (Fabricius 1775)	5.08	8.57
Ponerinae	*Anochetus bispinosus (Smith 1858)*	0	0
	*Neoponera antecurvata (*Mackay and Mackay 2010)	0.85	0
	Neoponera carinulata (Roger 1861)	15.25	5.71
	Neoponera crenata (Roger 1861)	1.69	0
	Neoponera curvinodis Forel 1899	0	0
	Neoponera foetida (Linnaeus 1758)	25.42	11.43
	Neoponera striatinodis Emery 1890	8.47	0
	Neoponera villosa (Fabricius 1804)	35.59	11.43
	Odontomachus bauri Emery 1892	0	0
	Odontomachus ruginodis M. R. Smith 1937	1.69	2.86
	Platythyrea pilosula (F. Smith 1858)	3.39	2.86
Pseudomyrmecinae	*Pseudomyrmex beccarii* (Menozzi 1935)	9.32	8.57
	Pseudomyrmex browni Kempf 1967	2.54	2.86
	Pseudomyrmex cretus Ward 1989	0	0
	Pseudomyrmex duckei (Forel 1906)	1.69	0
	Pseudomyrmex ejectus (F. Smith 1858)	0	2.86
	Pseudomyrmex elongatus (Mayr 1870)	39.83	51.43
	Pseudomyrmex euryblemma (Forel 1899)	0.85	0
	Pseudomyrmex gracilis (Fabricius 1804)	71.19	62.86

Pseudomyrmex ita (Forel 1906)	16.95	14.29
Pseudomyrmex kuenckeli (Emery 1890)	0	2.86
Pseudomyrmex laevivertex (Forel 1906)	0	0
Pseudomyrmex oculatus (F. Smith 1855)	55.08	40
Pseudomyrmex rochai (Forel 1912)	2.54	5.71
Pseudomyrmex simplex (F. Smith 1877)	6.78	22.86
Pseudomyrmex sp1	0.85	2.86
Pseudomyrmex sp2	2.54	0
Pseudomyrmex spiculus Ward 1989	11.86	2.86
Pseudomyrmex tenuis (Fabricius 1804)	0	2.86
Pseudomyrmex tenuissimus (Emery 1906)	42.37	71.43
Pseudomyrmex viduus (F. Smith 1858)	0	0

Table A2

The list 16 segregated species pairs of arboreal ants. The table includes both of the species within the pair, the observed C-score, the expected average C-score with standard deviation, and the p-value.

Species 1	**Species 2**	**C-score**	**Expected**	**p-value**
Azteca trigona	*Azteca instabilis*	0.87	0.50±0.07	<0.0001
Azteca trigona	*Crematogaster curvispinosa*	0.74	0.51±0.08	0.0055
Azteca trigona	*Dolichoderus bispinosus*	0.80	0.54±0.09	0.0026
Azteca instabilis	*Azteca forelii*	1.00	0.63±0.11	0.0013
Azteca instabilis	*Brachymyrmex pictus*	1.00	0.65±0.12	0.0019
Camponotus cameroni	*Crematogaster carinata*	1.00	0.65±0.10	0.0004
Camponotus cameroni	*Neoponera carinulata*	0.93	0.67±0.12	0.0388
Camponotus linnaei	*Camponotus mucronatus*	0.64	0.39±0.10	0.0165
Camponotus novogranadensis	*Camponotus senex*	0.95	0.53±0.08	<0.0001
Camponotus senex	*Camponotus cameroni*	0.85	0.57±0.09	0.0014
Cephalotes christopherseni	*Camponotus cameroni*	0.81	0.57±0.10	0.0147
Cephalotes umbraculatus	*Azteca forelii*	1.00	0.70±0.13	0.0216
Crematogaster curvispinosa	*Neoponera foetida*	0.80	0.58±0.10	0.0229
Dolichoderus bispinosus	*Camponotus mucronatus*	0.93	0.66±0.12	0.0222
Neoponera foetida	*Brachymyrmex pictus*	1.00	0.71±0.13	0.0279
Neoponera villosa	*Camponotus mucronatus*	0.86	0.61±0.11	0.0186

Table A3

The list of 20 aggregated species pairs of arboreal ants. The table includes the two species in the pair, the observed C-score, the expected average C-score with standard deviation, and the p-value.

Species 1	Species 2	C-score	Expected	p-value
Azteca trigona	*Cephalotes maculatus*	0.21	0.59±0.11	0.0003
Azteca trigona	*Cephalotes umbraculatus*	0.35	0.55±0.08	0.0209
Azteca instabilis	*Camponotus mucronatus*	0.27	0.59±0.11	0.0037
Azteca instabilis	*Cephalotes umbraculatus*	0.32	0.56±0.09	0.0115
Azteca instabilis	*Procryptocerus belti*	0.32	0.56±0.09	0.0093
Brachymyrmex pictus	*Azteca forelii*	0.32	0.78±0.14	0.0005
Camponotus linnaei	*Dolichoderus bispinosus*	0.18	0.35±0.07	0.0121
Camponotus novogranadensis	*Wasmannia rochai*	0.38	0.63±0.11	0.0244
Cephalotes atratus	*Azteca trigona*	0.31	0.50±0.08	0.0135
Cephalotes basalis	*Azteca instabilis*	0.24	0.40±0.07	0.0116
Cephalotes basalis	*Camponotus mucronatus*	0.32	0.51±0.10	0.0475
Cephalotes umbraculatus	*Camponotus mucronatus*	0.28	0.67±0.12	0.0012
Cephalotes umbraculatus	*Procryptocerus belti*	0.37	0.61±0.11	0.0283
Cephalotes umbraculatus	*Pseudomyrmex ita*	0.33	0.65±0.11	0.0038
Crematogaster curvispinosa	*Brachymyrmex pictus*	0.40	0.63±0.11	0.0424
Neoponera foetida	*Neoponera carinulata*	0.40	0.67±0.11	0.0115
Pseudomyrmex elongatus	*Crematogaster curvispinosa*	0.22	0.41±0.07	0.0046
Pseudomyrmex elongatus	*Pseudomyrmex simplex*	0.32	0.53±0.11	0.0495
Pseudomyrmex tenuissimus	*Azteca trigona*	0.24	0.36±0.05	0.0177
Pseudomyrmex tenuissimus	*Camponotus mucronatus*	0.18	0.42±0.11	0.0266