

Table S1. Location, network size (total species richness), specialization ($\langle d \rangle$), SRS (the proportion of smaller-ranged species) of the hummingbird-plant networks and null model corrected SRS (SRSz; see material and method section for algorithmic details).

Network ID	Site	Latitude	Longitude	Network Size	Specialization	SRS	SRSz
1	Atlantic forest, SE Brazil	-20.75	-42.92	22	0.43	0.00	-0.45
2	Montane meadow, SW USA	34.22	-116.95	6	0.00	0.00	0.00
3	Sub-alpine meadow, Central USA	38.98	-106.97	4	0.01	0.00	-0.12
4	Atlantic forest, SE Brazil	-23.35	-44.83	54	0.49	0.08	0.84
5	Tropical dry deciduous forest, W Mexico	19.5	-105.05	20	0.35	0.00	-0.58
6	Pampa, S Brazil	-31.8	-52.42	35	0.23	0.00	-0.48
7	Highland Atlantic forest, SE Brazil	-22.5	-44.83	37	0.46	0.00	-0.34
8	Caatinga, NE Brazil	-7.87	-36.4	36	0.07	0.00	-0.41
9	Altitudinal caatinga, NE Brazil	-11.48	-41.32	35	0.35	0.13	1.47
10	Amazonas riverine, SE Colombia	-3.82	-70.27	46	0.50	0.00	-0.64
11	High andean forest, Colombia	1.25	-77.43	40	0.49	0.44	1.62
12	Atlantic Forest, low elevation	-27.27	-49.01	24	0.67	0.17	2.99
13	Atlantic Forest, mid elevation	-27.26	-49.02	14	0.29	0.00	-0.30
14	Atlantic Forest, high elevation	-27.26	-49.02	11	0.38	0.00	-0.19
15	Highland temperate mosaic forest, Central Mexico	19.23	-98.97	21	0.15	0.00	-0.95

Network	Site	Latitude	Longitude	Network	Specialization	SRS	SRSz
ID				Size			
16	Suburban forest, Central Mexico	19.28	-98.23	10	0.07	0.00	-0.64
17	Protected cloud forest, Central Mexico	19.5	-96.95	15	0.19	0.00	-1.37
18	Rainforest, Colombia	0.07	-72.45	52	0.52	0.13	1.54
19	Caatinga forest, NE Brazil	-8.6	-38.57	11	0.18	0.00	-0.25
20	Highland caatinga, NE Brazil	-13.12	-41.58	35	0.41	0.14	1.67
21	Open cerrado, NE Brazil	-13.12	-41.57	19	0.58	0.13	1.30
22	Campos rupestres, NE Brazil	-12.98	-41.33	42	0.44	0.14	1.32
23	Tropical pre-montane forest, Costa Rica	10.27	-84.08	33	0.66	0.38	1.21
24	Lower montane wet forest, Costa Rica	10.18	-84.11	28	0.48	0.44	2.17
25	Tropical wet forest, Costa Rica	10.44	-84.01	29	0.51	0.13	0.10
26	Cerrado, Central Brazil	-18.99	-48.3	25	0.28	0.00	-0.41
27	Cerrado, Central Brazil	-19.16	-48.39	43	0.46	0.00	-0.40
28	Cerrado, Central Brazil	-17.78	-48.68	21	0.33	0.00	-0.44
29	Protected cloud forest, Central Mexico	19.5	-96.95	21	0.27	0.00	-1.52
30	Pantanal wetland, SW Brazil	-19.52	-56.98	17	0.47	0.00	-0.24
31	Campos rupestres, SE Brazil	-19.25	-43.52	56	0.70	0.17	2.37
32	Cerrado, W Brazil	-20.44	-54.65	20	0.14	0.00	-0.40

Network	Site	Latitude	Longitude	Network	Specialization	SRS	SRSz
ID				Size			
33	Montane Forest, SE Brazil	-22.73	-45.58	31	0.49	0.00	-0.40
34	Andean forest, Colombia	4.53	-73.85	22	0.36	0.33	0.93
35	Andean forest, Colombia	5.9	-73.42	34	0.60	0.17	-0.21
36	Andean forest, Colombia	5.92	-73.53	19	0.36	0.17	0.76
37	Coastal cloud forest, SE Brazil	-23.63	-45.85	31	0.41	0.00	-0.35
38	Primary forest, Bolivia	-17.51	-63.64	9	0.54	0.17	1.86
39	Primary forest, Bolivia	-16.96	-65.41	9	0.51	0.00	-0.25
40	Campo rupestre, W Brazil	-19.95	-43.9	16	0.12	0.00	-0.43
41	Atlantic forest, SE Brazil	-23.28	-45.05	56	0.51	0.00	-0.39
42	Subtropical humid montane forest, Perú	-13.22	-72.12	12	0.39	0.33	0.90
43	Lowland primary forest, Perú	-12.85	-69.37	15	0.17	0.00	-0.48
44	Andean rainforest, mid-elevation, Ecuador.	-0.02	-78.77	84	0.32	0.37	1.99
45	Elfin forest, Costa Rica	9.57	-83.73	22	0.62	0.50	2.10
46	Undisturbed highland páramo, Costa Rica	9.48	-83.48	30	0.78	0.60	2.45

Source references

- 1 Abreu, CRM & Vieira, MF. 2004. Os beija-flores e seus recursos florais em um fragmento florestal de Viçosa, sudeste brasileiro. *Lundiana* 5: 129-134.
 - 2 Alarcón, R., N. M. Waser & J. Ollerton. 2008. Year-to-year variation in the topology of a plant-pollinator interaction network. *Oikos* 117:1796-1807.
 - 3 Ollerton, J., R. Alarcón, N. M. Waser, M. V. Price, S. Watts, L. Cranmer, A. Hingston, C. Peter, & J. Rotenberry. 2009. A global test of the pollination syndrome hypothesis. *Annals of Botany*: 103: 1471-1480.
 - 4 Araujo, AC 1996. Beija-flores e seus recursos florais numa área de planicie costeira do litoral norte de São Paulo, sudeste do Brasil. MSc dissertation. UNICAMP. 69p.
 - 5 Arizmendi, MC & Ornelas, JF. 1990. Hummingbirds and their floral resources in a tropical dry forest in Mexico. *Biotropica* 22: 172-180.
-

- 6 Vizentin-Bugoni, J & Rui, AM. Unpublished data.
- 7 Canela, M.B.F. 2006. Interações entre plantas e beija-flores numa comunidade de floresta atlântica montana em itatiaia, RJ. Ph.D thesis, Universidade Estadual de Campinas.
- 8 Las Casas, FMG, Azevedo Júnior, SM & Dias Filho, MM. 2012. The community of hummingbirds (Aves: Trochilidae) and the assemblage of flowers in a Caatinga vegetation. *Brazilian Journal of Biology*, 72: 51-58.
- 9 Moura, AC & Machado, CG. Hummingbirds and their flowers at altitudinal dryland vegetation in Chapada Diamantina, northeast Brazil. *In preparation*.
- 10 Cotton, P.A. 1998 The hummingbird community of a lowland Amazonian rainforest. *Ibis*, 140: 512-521.
- 11 Gutierrez Zamora, EA & Rojas Nossa, SV. 2001. Dinámica anual de la interacción colibrí-flor en ecosistemas altoandinos del volcán

Galeras, Sur de Colombia. MSc dissertation, Universidad Nacional de Colombia.

- 12 Kohler, G. 2011. Redes de interação planta-beija-flor em um gradiente altitudinal de Floresta Atlântica no Sul do Brasil. MSc dissertation, Universidade Federal do Paraná, Curitiba, Brazil.
 - 13 Kohler, G. 2011. Redes de interação planta-beija-flor em um gradiente altitudinal de Floresta Atlântica no Sul do Brasil. MSc dissertation, Universidade Federal do Paraná, Curitiba, Brazil.
 - 14 Kohler, G. 2011. Redes de interação planta-beija-flor em um gradiente altitudinal de Floresta Atlântica no Sul do Brasil. MSc dissertation, Universidade Federal do Paraná, Curitiba, Brazil.
 - 15 Lara, C. 2006. Temporal dynamics of flower use by hummingbirds in a highland temperate forest in México. *Ecoscience*, 13: 23-29.
 - 16 Lara, C. Unpublished data.
 - 17 Lara, C. Unpublished data.
-

- 18 Rosero, L. 2003. Interações planta/beija-flor em três comunidades vegetais da parte sul do Parque Nacional Natural Chiribiquete, Amazonas (Colombia).
- Rosero-Lasprilla, L & Sazima, M. 2004. Interacciones planta-colibrí en tres comunidades Vegetales de la parte suroriental del Parque Nacional Natural Chiribiquete, Colombia. *Ornitología Neotropical* 15, 183–190.
- 19 Leal, FC, Lopes, AV & Machado, IC. 2006. Polinização por beija-flores em uma área de caatinga no Município de Floresta, Pernambuco, Nordeste do Brasil. *Revista Brasil. Bot.* 29: 379-389.
- 20 Machado, C.G. 2009. Hummingbirds (Aves: Trochilidae) and their floral resources in an area of caatinga vegetation in the Chapada Diamantina, Bahia State, Northeast Brazil. *Zoologia*, 26: 55-65.
- 21 Machado, C. G. 2014. The hummingbird community and the plants which they visit at a savannah in the Chapada Diamantina, Bahia, Brazil, *Bioscience Journal*, 2014, 30: 1578-1587

- 22 Machado, C.G., Coelho, A.G., Santana, C.S., Rodrigues, M. 2007.
Hummingbirds and their flowers in the ‘campos rupestres’ of Chapada
Diamantina, Bahia, northeastern Brazil. *Revista Brasileira de
Ornitologia*, 15: 215-227
- 23 Maglianesi, MA, N Blüthgen, K Böhning-Gaese and M Schleuning.
2014. Morphological traits determine specialization and resource use
in plant–hummingbird networks in the Neotropics Ecology 95:3325-
3334.
- 24 Maglianesi, MA, N Blüthgen, K Böhning-Gaese and M Schleuning.
2014. Morphological traits determine specialization and resource use
in plant–hummingbird networks in the Neotropics Ecology 95:3325-
3334.
- 25 Maglianesi, MA, N Blüthgen, K Böhning-Gaese and M Schleuning.
2014. Morphological traits determine specialization and resource use
in plant–hummingbird networks in the Neotropics Ecology 95:3325-
3334.

- 26 Araújo, FP, Sazima, M & Oliveira, PE. 2013. The assembly of plants used as nectar sources by hummingbirds in a Cerrado area of Central Brazil. *Plant Systematics and Evolution*, 299: 1119-1133.
- Machado, AO. 2012. Diversidade de recursos florais para beija-flores nos cerrados do Triângulo mineiro e região. Ph.D thesis. Universidade Federal de Uberlândia.
- Maruyama, PK, Oliveira, GM, Ferreira, C, Dalsgaard, B & Oliveira, PE. 2013. Pollination syndromes ignored: importance of non-ornithophilous flowers to Neotropical savanna hummingbirds. *Naturwissenschaften*, 100: 1061-1068.
- 27 Araújo, FP, Sazima, M & Oliveira, PE. 2013. The assembly of plants used as nectar sources by hummingbirds in a Cerrado area of Central Brazil. *Plant Systematics and Evolution*, 299: 1119-1133.
- Machado, AO. 2012. Diversidade de recursos florais para beija-flores nos cerrados do Triângulo mineiro e região. Ph.D Thesis. Universidade Federal de Uberlândia.

- Maruyama, PK, Oliveira, GM, Ferreira, C, Dalsgaard, B & Oliveira, PE. 2013. Pollination syndromes ignored: importance of non-ornithophilous flowers to Neotropical savanna hummingbirds. *Naturwissenschaften*, 100: 1061-1068.
- 28 Machado, AO. 2012. Diversidade de recursos florais para beija-flores nos cerrados do Triângulo mineiro e região. Ph.D Thesis. Universidade Federal de Uberlândia.
- 29 Ornelas, JF. Unpublished data.
- 30 Araujo, AC & Sazima, M 2003. The assemblage of flowers visited by hummingbirds in the “capões” of Southern Pantanal, Mato Grosso do Sul, Brazil. *Flora* 198: 427-435.
- 31 Rodrigues, LC & Rodrigues, M. 2014. Flowers visited by hummingbirds in the open habitats of the southeastern Brazilian moutaintops: species composition and seasonality. *Brazilian Journal of Biology*, 74(3): 659-676.

- 32 Rodrigues, LC. & Araujo AC. 2011. The hummingbird community
and their floral resources in an urban forest remnant in Brazil.
Brazilian Journal of Biology, 71: 611-622.
- 33 Sazima, I, Buzato, S & Sazima, M. 1996. An assemblage of
hummingbird-pollinated flowers in a montane forest in southern
Brazil. *Botanica Acta* 109: 149-160.
- 34 Snow DW, & Snow BK. 1980. Relationships between hummingbirds
and flowers in the Andes of Colombia. *Bulletin of the British Museum*
of Natural History (Zoology) 38: 105-139.
- 35 Snow DW, & Snow BK. 1980. Relationships between hummingbirds
and flowers in the Andes of Colombia. *Bulletin of the British Museum*
of Natural History (Zoology) 38: 105-139.
- 36 Snow DW, & Snow BK. 1980. Relationships between hummingbirds
and flowers in the Andes of Colombia. *Bulletin of the British Museum*
of Natural History (Zoology) 38: 105-139.
-

- 37 Snow DW, & Snow BK. 1986. Feeding ecology of hummingbirds in the Serra do Mar, southeastern Brazil. Hornero 012: 286-296.
- 38 Abrahamczyk S, Kessler M 2010. Hummingbird diversity, food niche characters, and assemblage composition along a latitudinal precipitation gradient in the Bolivian lowlands. *J. Ornithol.*, 151:615 – 625.
- 39 Abrahamczyk S, Kessler M 2010. Hummingbird diversity, food niche characters, and assemblage composition along a latitudinal precipitation gradient in the Bolivian lowlands. *J. Ornithol.*, 151:615 – 625.
- 40 De Vasconcelos, MF & Lombardi, JA. 1999. Padrão sazonal na ocorrência de deis espécie de beija-flores (Apodiformes: Trochilidae) em uma localidade de campo rupestre na Serra do Curral, Minas Gerais. Ararajuba 7: 71-79.
- 41 Vizentin-Bugoni, J., P. K. Maruyama and M. Sazima. 2014. Processes entangling interactions in communities: forbidden links are more

- important than abundance in a hummingbird–plant network.
Proceedings of the Royal Society of London B 281:1–8.
- 42 Watts, S. 2008. Plant-flower visitor interaction in the Sacred Valley of Perú. PhD. thesis, University of Northampton, UK.
- 43 Watts, S. 2008. Plant-flower visitor interaction in the Sacred Valley of Perú. PhD. thesis, University of Northampton, UK.
- 44 Walther, BA & Brieschke, H. 2001. Hummingbird-flower relationships in a mid-elevation rainforest near Mindo, northwestern Ecuador. International Journal of Ornithology 4: 115-135.
- 45 Wolf, LL, Stiles, FG, & Hainsworth, FR. 1976. Ecological organization of a tropical, highland hummingbird community. The Journal of Animal Ecology, 45: 349-379.
- 46 Wolf, LL, Stiles, FG, & Hainsworth, FR. 1976. Ecological organization of a tropical, highland hummingbird community. The Journal of Animal Ecology, 45: 349-379.