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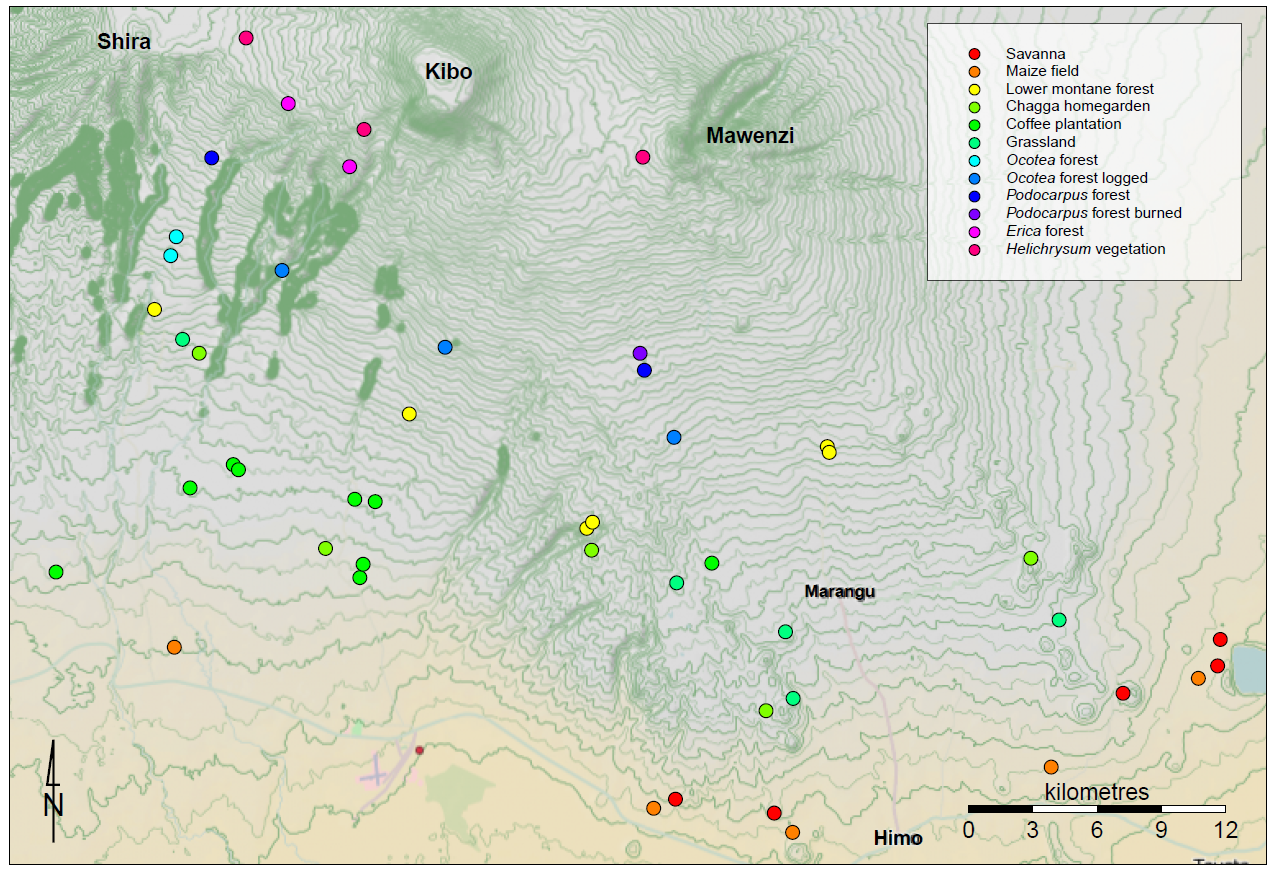
**SUPPORTING INFORMATION**

**Variation in nutrient use in ant assemblages along an extensive elevational gradient on Mt Kilimanjaro**

Marcell K. Peters, Antonia Mayr, Juliane Röder, Nathan J. Sanders and Ingolf Steffan-Dewenter

**Appendix S1** Map of the study area at the southern slopes of Mt Kilimanjaro, Tanzania, indicating the sites at which nutrient use of ant assemblages was studied. Shira, Mawenzi and Kibo are the three peaks of Mt Kilimanjaro, with the latter being the highest (5895 m a.s.l.).

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**Appendix S2** (a) Data on the ecosystems studied on Mt Kilimanjaro, Tanzania. The 48 study sites were located in 12 different ecosystem types of variable elevation and climate. Ants were not found at baits placed above 2270 m a.s.l. For temperature, ranges represent the mean temperatures measured among sites. (b) Weather conditions and time of sampling (rainy/cloudy/sunny) at the study sites.

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| **(a)** |  |  |  |  |  |  |
| **Ecosystem type** | **Land-use category** | **No. study sites** | **Elevation (m a.s.l.)** | **Temperature (°C)** | **No. ant species** | **No. ant occurences** |
| Savanna | Natural | 5 | 871–1130 | 22–25 | 5–12 | 16–27 |
| Maize field | Managed/disturbed | 5 | 860–1020 | 23–25 | 2–7 | 3–21 |
| Sub/lower montane rainforest | Natural | 6 | 1620–2040 | 15–17 | 2–5 | 2–26 |
| Chagga homegardens | Managed/disturbed | 5 | 1150–1840 | 15–21 | 1–7 | 6–19 |
| Coffee plantations | Managed/disturbed | 9 | 1120–1931 | 18–23 | 1–7 | 7–25 |
| Grasslands | Managed/disturbed | 5 | 1300–1750 | 17–21 | 3–9 | 5–22 |
| *Ocotea* forest | Natural | 2 | 2120–2260 | 11–12 | 0 | 0 |
| *Ocotea* forest logged | Managed/disturbed | 3 | 2220–2470 | 12–13 | 0–1 | 0–1 |
| *Podocarpus* forest | Natural | 2 | 2720–2850 | 10–11 | 0 | 0 |
| *Podocarpus* forest burned | Managed/disturbed | 1 | 2820 | 10 | 0 | 0 |
| *Erica* forest and bushland | Natural | 2 | 3830–3849 | 5\* | 0 | 0 |
| Alpine *Helichrysum* vegetation | Natural | 3 | 3880–4390 | 3\* | 0 | 0 |
| \*Measured outside study sites of similar elevation. | |  |  |  |  |  |

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| **(b)** |  |  |  |  |  |
| **Study site** | **Habitat** | **Date** | **Weather conditions** | **Start time** | **Elevation (m a.s.l.)** |
| sav1 | Savanna | 11.02.2011 | Sunny | 9:00 | 871 |
| sav2 | Savanna | 09.11.2011 | Sunny | 16:00 | 906 |
| sav3 | Savanna | 02.02.2012 | Sunny | 7:30 | 1153 |
| sav4 | Savanna | 09.03.2011 | Sunny | 7:00 | 984 |
| sav5 | Savanna | 08.03.2011 | Sunny | 7:00 | 951 |
| mai1 | Maize field | 27.10.2011 | Sunny | 16:00 | 1009 |
| mai2 | Maize field | 02.11.2011 | Sunny | 16:15 | 866 |
| mai4 | Maize field | 31.10.2011 | Sunny | 16:00 | 886 |
| mai5 | Maize field | 29.10.2011 | Sunny | 16:30 | 960 |
| mai3 | Maize field | 16.12.2011 | Sunny | 16:45 | 920 |
| flm1 | Sub/lower montane rainforest | 21.10.2011 | Sunny | 12:00 | 1920 |
| flm2 | Sub/lower montane rainforest | 30.05.2012 | Sunny | 10:30 | 1800 |
| flm3 | Sub/lower montane rainforest | 12.03.2011 | Sunny | 10:30 | 1560 |
| flm4 | Sub/lower montane rainforest | 10.03.2011 | Sunny | 13:00 | 1623 |
| flm5 | Sub/lower montane rainforest | 09.06.2011 | Sunny | 11:30 | 2020 |
| flm6 | Sub/lower montane rainforest | 10.11.2011 | Cloudy | 10:30 | 2040 |
| cof1 | Coffee plantation (shade) | 24.02.2011 | Sunny | 9:10 | 1306 |
| cof2 | Coffee plantation (shade) | 03.11.2011 | Sunny | 16:00 | 1345 |
| cof3 | Coffee plantation (shade) | 23.02.2011 | Sunny | 12:10 | 1305 |
| cof4 | Coffee plantation (shade) | 23.02.2011 | Cloudy | 9:45 | 1124 |
| cof5 | Coffee plantation (shade) | 24.02.2011 | Sunny | 12:00 | 1648 |
| sun1 | Coffee plantation (sun) | 25.10.2011 | Sunny | 16:10 | 1150 |
| sun2 | Coffee plantation (sun) | 14.10.2011 | Cloudy | 11:00 | 1360 |
| sun3 | Coffee plantation (sun) | 04.01.2012 | Sunny | 9:00 | 1330 |
| sun4 | Coffee plantation (sun) | 19.10.2011 | Sunny | 10:30 | 1160 |
| gra1 | Grassland | 27.02.2011 | Cloudy | 12:00 | 1660 |
| gra2 | Grassland | 08.12.2011 | Sunny | 15:45 | 1748 |
| gra3 | Grassland | 16.02.2011 | Cloudy | 12:30 | 1485 |
| gra4 | Grassland | 30.11.2011 | Sunny | 15:30 | 1312 |
| gra5 | Grassland | 13.12.2011 | Cloudy | 16:45 | 1303 |
| hom1 | Chagga homegarden | 22.02.2011 | Sunny | 10:30 | 1647 |
| hom2 | Chagga homegarden | 28.02.2011 | Sunny | 11:00 | 1169 |
| hom3 | Chagga homegarden | 31.01.2012 | Sunny | 10:30 | 1788 |
| hom4 | Chagga homegarden | 17.10.2011 | Sunny | 12:00 | 1275 |
| hom5 | Chagga homegarden | 20.10.2011 | Sunny | 14:30 | 1560 |
| foc1 | *Ocotea* forest | 05.11.2011 | Sunny | 11:00 | 2120 |
| foc2 | *Ocotea* forest | 05.11.2011 | Sunny | 10:00 | 2260 |
| fod1 | *Ocotea* forest | 02.11.2012 | Sunny | 10:00 | 2220 |
| fod3 | *Ocotea* forest | 24.10.2012 | Sunny | 11:00 | 2270 |
| fpo1 | *Podocarpus* forest | 07.11.2012 | Sunny | 10:00 | 2850 |
| fpo4 | *Podocarpus* forest | 24.10.2012 | Sunny | 15:00 | 2720 |
| fpd4 | *Podocarpus* forest burned | 24.10.2012 | Sunny | 14:30 | 2820 |
| fer1 | *Erica* forest and bushland | 31.10.2012 | Cloudy | 12:00 | 3849 |
| fer3 | *Erica* forest and bushland | 30.10.2012 | Cloudy | 14:00 | 3830 |
| hel1 | Alpine *Helichrysum* vegetation | 07.11.2011 | Sunny | 10:00 | 3880 |
| hel2 | Alpine *Helichrysum* vegetation | 01.11.2012 | Sunny | 10:00 | 4190 |
| hel4 | Alpine *Helichrysum* vegetation | 25.10.2012 | Sunny | 10:00 | 4390 |
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**Appendix S3** List of morphospecies of ants collected at nutrient bait sites on Mt Kilimanjaro, Tanzania. Genus and morphospecies level identification followed Bolton (1994) and http://www.antweb.org/ (accessed 16 January 2013).

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|  |  |  | | **Ecosystem types†** | | | | | | | | | | | | | |  | |
| **Morphospecies** | **Subfamily** | **Trophic group\*** | | **SAV** | | **MAI** | | **FLM** | | **HOM** | | **COF** | | **GRA** | | **FOD** | | **Elevational range (m a.s.l.)‡** | |
| *Axinidris* sp. 1 | Dolichoderinae | Generalist | |  | |  | |  | | X | |  | |  | |  | | 1260–1260 | |
| *Tapinoma* sp. 1 | Dolichoderinae | Generalist | |  | |  | |  | |  | |  | | X | |  | | 1300–1300 | |
| *Lepisiota* sp. 1 | Formicinae | Generalist | | X | |  | |  | | X | |  | | X | |  | | 993–1310 | |
| *Lepisiota* sp. 2 | Formicinae | Generalist | | X | |  | |  | |  | |  | | X | |  | | 1130–1310 | |
| *Lepisiota* sp. 3 | Formicinae | Generalist | |  | |  | |  | |  | |  | | X | |  | | 1660–1660 | |
| *Plagiolepis* sp. 1 | Formicinae | Generalist | |  | |  | |  | | X | |  | | X | |  | | 1260–1660 | |
| *Cardiocondyla* sp. 1 | Myrmicinae | Generalist | | X | |  | |  | |  | | X | |  | |  | | 871–1330 | |
| *Cardiocondyla* sp. 2 | Myrmicinae | Generalist | |  | |  | |  | |  | | X | |  | |  | | 1160–1160 | |
| *Crematogaster* sp. 1 | Myrmicinae | Generalist | |  | |  | |  | |  | |  | | X | |  | | 1310–1480 | |
| *Crematogaster* sp. 2 | Myrmicinae | Generalist | |  | |  | | X | |  | |  | |  | |  | | 1650–1650 | |
| *Crematogaster* sp. 3 | Myrmicinae | Generalist | |  | |  | |  | | X | |  | |  | |  | | 1640–1640 | |
| *Crematogaster* sp. 4 | Myrmicinae | Generalist | | X | |  | |  | |  | |  | |  | |  | | 993–993 | |
| *Crematogaster* sp. 5 | Myrmicinae | Generalist | |  | |  | | X | |  | |  | |  | | X | | 1800–2270 | |
| *Monomorium* sp. 1 | Myrmicinae | Generalist | | X | | X | |  | |  | | X | |  | |  | | 860–1130 | |
| *Monomorium* sp. 2 | Myrmicinae | Generalist | |  | | X | |  | |  | |  | |  | |  | | 860–860 | |
| *Monomorium* sp. 3 | Myrmicinae | Generalist | |  | |  | |  | | X | |  | |  | |  | | 1260–1260 | |
| *Monomorium* sp. 4 | Myrmicinae | Generalist | |  | |  | | X | |  | |  | |  | |  | | 1920–2040 | |
| *Monomorium* sp. 5 | Myrmicinae | Generalist | |  | |  | | X | | X | |  | |  | |  | | 1260–2020 | |
| *Monomorium* sp. 6 | Myrmicinae | Generalist | | X | | X | |  | |  | |  | |  | |  | | 962–1130 | |
| *Monomorium* sp. 7 | Myrmicinae | Generalist | |  | |  | | X | |  | |  | |  | |  | | 1650–1650 | |
| *Myrmicaria* sp. 1 | Myrmicinae | Generalist | | X | |  | |  | |  | |  | |  | |  | | 912–950 | |
| *Myrmicaria* sp. 2 | Myrmicinae | Generalist | |  | |  | |  | |  | | X | |  | |  | | 1360–1360 | |
| *Pheidole* sp. 1 | Myrmicinae | Generalist | | X | |  | |  | |  | |  | |  | |  | | 950–950 | |
| *Pheidole* sp. 10 | Myrmicinae | Generalist | |  | | X | |  | |  | |  | |  | |  | | 962–962 | |
| *Pheidole* sp. 11 | Myrmicinae | Generalist | |  | |  | |  | |  | | X | |  | |  | | 1307–1307 | |
| *Pheidole* sp. 12 | Myrmicinae | Generalist | |  | |  | |  | |  | | X | |  | |  | | 1120–1300 | |
| *Pheidole* sp. 13 | Myrmicinae | Generalist | |  | |  | |  | | X | | X | |  | |  | | 1150–1660 | |
| *Pheidole* sp. 14 | Myrmicinae | Generalist | | X | | X | |  | |  | |  | |  | |  | | 860–871 | |
| *Pheidole* sp. 15 | Myrmicinae | Generalist | | X | | X | |  | |  | |  | | X | |  | | 912–1310 | |
| *Pheidole* sp. 16 | Myrmicinae | Generalist | | X | | X | |  | | X | | X | | X | |  | | 860–1750 | |
| *Pheidole* sp. 17 | Myrmicinae | Generalist | | X | | X | |  | | X | | X | | X | |  | | 860–1750 | |
| *Pheidole* sp. 18 | Myrmicinae | Generalist | |  | |  | |  | |  | |  | | X | |  | | 1300–1300 | |
| *Pheidole* sp. 19 | Myrmicinae | Generalist | | X | |  | |  | |  | |  | |  | |  | | 950–950 | |
| *Pheidole* sp. 2 | Myrmicinae | Generalist | | X | |  | |  | |  | |  | |  | |  | | 950–950 | |
| *Pheidole* sp. 20 | Myrmicinae | Generalist | |  | |  | |  | |  | |  | | X | |  | | 1750–1750 | |
| *Pheidole* sp. 3 | Myrmicinae | Generalist | |  | |  | |  | | X | |  | | X | |  | | 1640–1840 | |
| *Pheidole* sp. 4 | Myrmicinae | Generalist | | X | |  | |  | |  | |  | | X | |  | | 950–1750 | |
| *Pheidole* sp. 5 | Myrmicinae | Generalist | | X | |  | |  | |  | |  | | X | |  | | 871–1750 | |
| *Pheidole* sp. 6 | Myrmicinae | Generalist | |  | | X | |  | |  | |  | |  | |  | | 962–962 | |
| *Pheidole* sp. 7 | Myrmicinae | Generalist | | X | |  | |  | |  | |  | |  | |  | | 950–950 | |
| *Pheidole* sp. 8 | Myrmicinae | Generalist | | X | |  | |  | |  | |  | |  | |  | | 950–950 | |
| *Pheidole* sp. 9 | Myrmicinae | Generalist | |  | |  | |  | | X | |  | |  | |  | | 1640–1640 | |
| *Calyptomyrmex* sp. 1 | Myrmicinae | Pred/Scav | |  | |  | | X | |  | |  | |  | |  | | 1800–2040 | |
| *Carebara* sp. 1 | Myrmicinae | Pred/Scav | |  | |  | |  | | X | |  | |  | |  | | 1560–1640 | |
| *Carebara* sp. 2 | Myrmicinae | Pred/Scav | |  | |  | | X | |  | |  | |  | |  | | 1620–1620 | |
| *Carebara* sp. 3 | Myrmicinae | Pred/Scav | |  | |  | | X | | X | |  | |  | |  | | 1560–1920 | |
| *Carebara* sp. 4 | Myrmicinae | Pred/Scav | |  | |  | |  | | X | |  | |  | |  | | 1260–1260 | |
| *Pyramica* sp. 1 | Myrmicinae | Pred/Scav | |  | |  | | X | |  | |  | |  | |  | | 1920–2040 | |
| *Pyramica* sp. 2 | Myrmicinae | Pred/Scav | |  | |  | | X | |  | |  | |  | |  | | 1920–1920 | |
| *Tetramorium* sp. 1 | Myrmicinae | Pred/Scav | |  | |  | |  | |  | | X | | X | |  | | 1310–1750 | |
| *Tetramorium* sp. 10 | Myrmicinae | Pred/Scav | |  | |  | | X | | X | |  | |  | |  | | 1620–1920 | |
| *Tetramorium* sp. 11 | Myrmicinae | Pred/Scav | |  | |  | |  | |  | | X | |  | |  | | 1300–1360 | |
| *Tetramorium* sp. 12 | Myrmicinae | Pred/Scav | |  | |  | |  | |  | |  | | X | |  | | 1480–1480 | |
| *Tetramorium* sp. 13 | Myrmicinae | Pred/Scav | |  | |  | |  | |  | |  | | X | |  | | 1300–1310 | |
| *Tetramorium* sp. 14 | Myrmicinae | Pred/Scav | |  | |  | |  | |  | | X | |  | |  | | 1120–1360 | |
| *Tetramorium* sp. 15 | Myrmicinae | Pred/Scav | |  | |  | |  | |  | |  | | X | |  | | 1750–1750 | |
| *Tetramorium* sp. 16 | Myrmicinae | Pred/Scav | |  | |  | |  | |  | |  | | X | |  | | 1310–1310 | |
| *Tetramorium* sp. 2 | Myrmicinae | Pred/Scav | |  | |  | |  | |  | | X | |  | |  | | 1120–1160 | |
| *Tetramorium* sp. 3 | Myrmicinae | Pred/Scav | |  | |  | |  | |  | |  | | X | |  | | 1480–1480 | |
| *Tetramorium* sp. 4 | Myrmicinae | Pred/Scav | |  | |  | |  | |  | | X | |  | |  | | 1300–1300 | |
| *Tetramorium* sp. 5 | Myrmicinae | Pred/Scav | |  | | X | |  | |  | |  | |  | |  | | 962–962 | |
| *Tetramorium* sp. 6 | Myrmicinae | Pred/Scav | |  | |  | |  | |  | | X | |  | |  | | 1360–1360 | |
| *Tetramorium* sp. 7 | Myrmicinae | Pred/Scav | |  | |  | |  | | X | |  | |  | |  | | 1640–1640 | |
| *Tetramorium* sp. 8 | Myrmicinae | Pred/Scav | |  | |  | |  | |  | | X | |  | |  | | 1360–1360 | |
| *Tetramorium* sp. 9 | Myrmicinae | Pred/Scav | |  | |  | | X | |  | |  | |  | |  | | 1620–1620 | |
| *Camponotus* sp. 1 | Formicinae | Trophobiotic | |  | |  | |  | |  | |  | | X | |  | | 1480–1750 | |
| *Camponotus* sp. 12 | Formicinae | Trophobiotic | | X | |  | |  | |  | |  | |  | |  | | 993 – 993 | |
| *Camponotus* sp. 13 | Formicinae | Trophobiotic | | X | |  | |  | |  | |  | |  | |  | | 1130 – 1130 | |
| *Camponotus* sp. 14 | Formicinae | Trophobiotic | |  | |  | |  | |  | |  | | X | |  | | 1750 – 1750 | |
| *Camponotus* sp. 2 | Formicinae | Trophobiotic | |  | |  | |  | |  | |  | | X | |  | | 1480 – 1480 | |
| *Camponotus* sp. 3 | Formicinae | Trophobiotic | | X | |  | |  | |  | |  | |  | |  | | 950 – 950 | |
| *Camponotus* sp. 4 | Formicinae | Trophobiotic | | X | |  | |  | |  | |  | |  | |  | | 950 – 950 | |
| *Camponotus* sp. 5 | Formicinae | Trophobiotic | | X | |  | |  | |  | |  | |  | |  | | 871 – 993 | |
| *Camponotus* sp. 6 | Formicinae | Trophobiotic | | X | |  | |  | |  | |  | |  | |  | | 912 – 993 | |
| *Camponotus* sp. 7 | Formicinae | Trophobiotic | | X | |  | |  | |  | |  | |  | |  | | 950 – 950 | |
| *Camponotus* sp. 8 | Formicinae | Trophobiotic | | X | | X | |  | |  | |  | |  | |  | | 860 – 1130 | |
| *Polyrhachis* sp. 1 | Formicinae | Trophobiotic | | X | |  | |  | |  | |  | | X | |  | | 993 – 1300 | |
|  |  |  | |  | |  | |  | |  | |  | |  | |  | |  | |
| \*Pred/Scav, predator or scavenger.  †COF, coffee plantation; FLM, lower montane forest; FOD, *Ocotea* forest; GRA, grassland; HOM, Chagga homegardens; MAI, maize field; SAV, savanna. | | | | | | | | | | | | | | | | | | | |
| ‡Elevational range: minimum and maximum elevation of study plots with species present; note that increases in sampling efficiency would probably strongly increase estimates of elevational ranges.  REFERENCE  Bolton, B. (1994) *Identification guide to the ant genera of the world.* Harvard University Press, Cambridge, MA. | | | | | | | | | | | | | | | | | | | |