**Table S3. Summary of biogeography, substrate and habitat affinity of *Chloridium* inferred from the GlobalFungi database.**

| Species | Abundance | | | | Geographical origin (% of samples) | | | | | | | | | Substrate (% of samples) | | | | | | | | | | | | | Biome (% of samples) | | | | | | | | | | | Other data[2] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Samples | Studies | Total reads | Freq. r.[1] | North America | South America | Europe | Africa | Asia | Australia | Antarctica | Pacific Ocean | Atlantic Ocean | bulk soil | rhizosphere soil | litter | deadwood | lichen | shoot | root | air | root & rhizosphere soil | sediment | topsoil | water | dust | cropland | forest | woodland | shrubland | grassland | desert | tundra | mangrove | anthropogenic | wetland | aquatic | polar desert | MAT | MAP | pH | pH (Stdev) |
| *Chl. bellum var. bellum* | 2 549 | 97 | 235 316 | 0.023 | 16.3 | 0.4 | 7.8 | 1.3 | 72.7 | 1.4 | 0.1 | 0.1 | 0.1 | 39.3 | 4.5 | 54.4 | 0.4 | 0.0 | 0.2 | 0.0 | 0.1 | 1.1 | 0.0 | 0.1 | 0.0 | 0.0 | 21.9 | 62.4 | 0.3 | 0.5 | 13.6 | 0.1 | 0.0 | 0.0 | 1.0 | 0.1 | 0.2 | 0.0 | 13.1 | 1 114 | 6.2 | 3.0 |
| *Chl. bellum var. luteum* | 842 | 33 | 22 253 | 0.009 | 5.2 | 1.5 | 0.1 | 1.4 | 90.5 | 0.6 | 0.0 | 0.4 | 0.4 | 34.4 | 4.2 | 59.9 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 | 1.1 | 0.0 | 0.1 | 0.0 | 0.0 | 30.9 | 63.7 | 0.5 | 1.5 | 2.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | 0.0 | 16.5 | 1 161 | 6.8 | 2.8 |
| *Chl. biforme* | 58 | 3 | 3 130 | 0.029 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 | 89.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.3 | 0.0 | 0.0 | 0.0 | 0.0 | 1.7 | 69.0 | 19.0 | 5.2 | 5.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.6 | 1 051 | 5.1 | 2.7 |
| *Chl. caesium* | 146 | 27 | 7 458 | 0.100 | 0.5 | 0.0 | 76.7 | 0.0 | 14.4 | 5.4 | 1.0 | 0.5 | 0.5 | 82.2 | 5.9 | 0.0 | 2.5 | 0.0 | 4.0 | 0.0 | 1.0 | 1.5 | 1.0 | 2.0 | 0.0 | 0.0 | 5.4 | 44.1 | 8.4 | 0.0 | 11.9 | 1.5 | 0.0 | 0.0 | 24.8 | 0.5 | 3.5 | 0.0 | 7.6 | 645 | 6.9 | 3.3 |
| *Chl. caudigerum* | 2 164 | 107 | 27 706 | 0.018 | 7.7 | 0.0 | 73.5 | 0.0 | 18.7 | 0.1 | 0.0 | 0.0 | 0.0 | 72.6 | 1.0 | 5.0 | 0.1 | 10.0 | 6.7 | 0.0 | 0.2 | 4.3 | 0.1 | 0.0 | 0.1 | 0.0 | 0.6 | 87.5 | 1.4 | 1.3 | 5.0 | 0.0 | 0.0 | 0.0 | 3.9 | 0.3 | 0.2 | 0.0 | 7.0 | 743 | 5.0 | 2.5 |
| *Chl. chlamydosporum* | 1 666 | 72 | 52 038 | 0.011 | 22.3 | 0.7 | 14.2 | 0.2 | 61.8 | 0.8 | 0.0 | 0.0 | 0.0 | 47.0 | 3.1 | 38.0 | 0.0 | 2.0 | 8.5 | 0.1 | 0.2 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | 92.0 | 2.9 | 2.0 | 2.0 | 0.1 | 0.0 | 0.0 | 0.2 | 0.1 | 0.0 | 0.0 | 12.6 | 1 242 | 4.8 | 2.6 |
| *Chl. chloridioidesvar. chloridioides* | 587 | 38 | 7 039 | 0.054 | 7.5 | 0.0 | 92.0 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 74.7 | 1.2 | 0.8 | 0.0 | 16.8 | 4.6 | 0.0 | 0.0 | 1.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 89.5 | 1.9 | 1.7 | 1.9 | 0.2 | 0.0 | 0.0 | 4.6 | 0.3 | 0.0 | 0.0 | 7.5 | 658 | 4.9 | 2.4 |
| *Chl. chloridioides var. convolutum* | 1 107 | 13 | 133 893 | 0.022 | 0.0 | 0.0 | 3.5 | 0.0 | 96.5 | 0.0 | 0.0 | 0.0 | 0.0 | 8.6 | 3.3 | 85.2 | 0.0 | 1.3 | 0.0 | 0.0 | 0.0 | 1.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 99.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 10.3 | 1 343 | 5.6 | 1.8 |
| *Chl. chloroconium* | 1 848 | 82 | 91 680 | 0.022 | 5.7 | 0.9 | 45.7 | 0.2 | 46.8 | 0.7 | 0.0 | 0.0 | 0.0 | 50.2 | 4.2 | 33.6 | 0.4 | 7.2 | 2.3 | 0.0 | 0.1 | 1.8 | 0.0 | 0.1 | 0.0 | 0.0 | 1.8 | 82.7 | 0.8 | 1.4 | 8.8 | 0.0 | 0.0 | 0.0 | 4.1 | 0.3 | 0.2 | 0.0 | 9.9 | 974 | 5.6 | 2.9 |
| *Chl. crousii* | 5 | 2 | 5 | 0.001 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 19.7 | 1 452 | 4.3 | 2.3 |
| *Chl. culmicola* | 178 | 6 | 15 499 | 0.014 | 0.0 | 0.0 | 0.6 | 0.0 | 99.4 | 0.0 | 0.0 | 0.0 | 0.0 | 5.6 | 0.0 | 93.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 2.8 | 97.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 15.5 | 1 364 | 7.0 | 1.5 |
| *Chl. cylindrosporellum* | 2 529 | 47 | 162 706 | 0.013 | 0.9 | 1.8 | 6.3 | 0.0 | 89.2 | 1.7 | 0.0 | 0.0 | 0.0 | 19.1 | 0.8 | 79.0 | 0.0 | 0.9 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 97.0 | 0.0 | 1.1 | 1.1 | 0.1 | 0.0 | 0.1 | 0.4 | 0.0 | 0.0 | 0.0 | 7.8 | 1 256 | 4.9 | 1.9 |
| *Chl. detriticola var. detriticola* | 7 903 | 132 | 3 344 560 | 0.153 | 3.7 | 0.7 | 33.7 | 0.0 | 58.9 | 3.0 | 0.0 | 0.0 | 0.0 | 37.9 | 0.4 | 52.9 | 0.0 | 3.4 | 2.9 | 0.0 | 0.2 | 2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 95.0 | 0.4 | 1.1 | 1.9 | 0.1 | 0.4 | 0.0 | 0.7 | 0.1 | 0.0 | 0.0 | 8.4 | 1 115 | 4.4 | 2.2 |
| *Chl. detriticola var. effusum* | 524 | 32 | 20 491 | 0.009 | 2.3 | 2.1 | 24.8 | 0.0 | 42.3 | 28.0 | 0.6 | 0.0 | 0.0 | 45.7 | 0.0 | 40.4 | 0.0 | 0.4 | 0.8 | 0.0 | 0.0 | 12.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | 78.3 | 3.0 | 7.2 | 9.9 | 0.6 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 9.6 | 1 318 | 4.3 | 2.4 |
| *Chl. elongatum* | 886 | 43 | 33 933 | 0.018 | 3.2 | 0.0 | 49.9 | 0.2 | 46.7 | 0.0 | 0.0 | 0.0 | 0.0 | 61.1 | 3.1 | 27.8 | 0.1 | 0.1 | 3.0 | 0.0 | 0.0 | 4.7 | 0.0 | 0.0 | 0.0 | 0.0 | 2.1 | 82.1 | 0.5 | 1.7 | 12.5 | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 0.0 | 10.5 | 1 181 | 4.8 | 2.5 |
| *Chl. fuscum* | 7 246 | 186 | 1 891 025 | 0.064 | 13.8 | 1.6 | 4.0 | 1.4 | 72.4 | 6.2 | 0.2 | 0.1 | 0.1 | 40.2 | 3.7 | 52.2 | 0.3 | 0.3 | 0.3 | 0.0 | 0.1 | 2.4 | 0.1 | 0.4 | 0.0 | 0.0 | 18.6 | 62.2 | 3.2 | 0.8 | 13.9 | 0.3 | 0.0 | 0.0 | 0.4 | 0.1 | 0.6 | 0.0 | 13.7 | 1 208 | 6.0 | 2.9 |
| *Chl. gamsii* | 753 | 48 | 13 732 | 0.037 | 5.5 | 0.0 | 71.5 | 0.0 | 0.0 | 22.8 | 0.1 | 0.0 | 0.0 | 84.2 | 0.2 | 2.0 | 0.0 | 3.5 | 1.6 | 0.0 | 0.0 | 8.4 | 0.0 | 0.0 | 0.0 | 0.0 | 1.2 | 73.7 | 4.3 | 6.4 | 11.2 | 0.1 | 0.0 | 0.0 | 2.1 | 0.9 | 0.0 | 0.0 | 8.7 | 846 | 4.3 | 2.0 |
| *Chl. guttiferum* | 237 | 36 | 3 811 | 0.030 | 13.5 | 16.0 | 3.8 | 7.6 | 51.1 | 7.6 | 0.0 | 0.0 | 0.0 | 71.3 | 3.8 | 3.0 | 0.0 | 5.5 | 0.0 | 0.0 | 0.4 | 13.5 | 0.0 | 1.3 | 1.3 | 0.0 | 3.0 | 74.3 | 2.1 | 1.3 | 12.7 | 0.4 | 0.0 | 0.0 | 2.5 | 0.8 | 3.0 | 0.0 | 17.9 | 1 801 | 4.3 | 2.4 |
| *Chl. humicola* | 3 287 | 174 | 162 069 | 0.026 | 11.3 | 2.4 | 22.1 | 0.9 | 57.5 | 5.3 | 0.1 | 0.0 | 0.0 | 61.1 | 4.9 | 24.4 | 0.3 | 2.9 | 2.0 | 0.0 | 0.3 | 3.0 | 0.1 | 0.9 | 0.2 | 0.0 | 20.2 | 58.8 | 3.9 | 2.0 | 12.6 | 0.2 | 0.0 | 0.0 | 0.8 | 0.3 | 1.2 | 0.0 | 13.1 | 1 151 | 5.6 | 3.0 |
| *Chl. jilinense* | 30 | 10 | 47 | 0.005 | 6.7 | 0.0 | 56.7 | 0.0 | 36.7 | 0.0 | 0.0 | 0.0 | 0.0 | 73.3 | 0.0 | 3.3 | 0.0 | 3.3 | 20.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.7 | 881 | 5.3 | 1.4 |
| *Chl. kirkii* | 351 | 29 | 9 618 | 0.014 | 19.4 | 0.0 | 1.1 | 0.0 | 79.5 | 0.0 | 0.0 | 0.0 | 0.0 | 65.5 | 1.4 | 27.1 | 0.0 | 0.0 | 6.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 98.9 | 0.6 | 0.3 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.5 | 1 550 | 4.8 | 2.4 |
| *Chl. mirabile* | 417 | 21 | 31 178 | 0.148 | 23.7 | 4.6 | 0.2 | 0.2 | 68.8 | 1.9 | 0.5 | 0.0 | 0.0 | 87.8 | 2.9 | 0.0 | 0.0 | 0.5 | 0.0 | 0.0 | 0.2 | 8.6 | 0.0 | 0.0 | 0.0 | 0.0 | 25.2 | 72.9 | 1.0 | 0.0 | 0.2 | 0.5 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 12.3 | 1 100 | 6.8 | 3.0 |
| *Chl. moratum* | 4 405 | 57 | 1 568 921 | 0.079 | 2.1 | 0.5 | 8.0 | 0.0 | 89.3 | 0.1 | 0.0 | 0.0 | 0.0 | 13.3 | 0.3 | 84.0 | 0.0 | 1.2 | 0.3 | 0.0 | 0.0 | 0.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 99.2 | 0.1 | 0.2 | 0.4 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 10.8 | 1 355 | 4.6 | 1.6 |
| *Chl. novae-zelandiae* | 2 | 1 | 2 | 0.004 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 14.8 | 1 117 | 4.9 | 0.1 |
| *Chl. peruense* | 697 | 33 | 28 058 | 0.012 | 9.6 | 17.1 | 1.0 | 1.4 | 69.2 | 1.7 | 0.0 | 0.0 | 0.0 | 17.0 | 0.1 | 68.4 | 0.0 | 4.7 | 0.8 | 0.0 | 0.1 | 8.5 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 96.2 | 0.8 | 2.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | 0.0 | 20.1 | 1 685 | 4.5 | 1.8 |
| *Chl. proliferatum* | 9 | 2 | 20 | 0.004 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 88.9 | 11.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.1 | 88.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 23.1 | 1 848 | n.a. | n.a. |
| *Chl. setosum* | 745 | 50 | 24 532 | 0.016 | 14.6 | 1.3 | 5.1 | 8.2 | 61.7 | 7.2 | 0.0 | 0.0 | 0.0 | 63.8 | 3.9 | 25.2 | 0.0 | 0.0 | 0.7 | 0.0 | 0.0 | 4.5 | 0.0 | 1.8 | 0.0 | 0.0 | 1.6 | 87.5 | 1.3 | 0.5 | 7.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 1.7 | 0.0 | 12.9 | 1 417 | 4.6 | 2.4 |
| *Chl. shangsiense* | 3 314 | 71 | 348 000 | 0.022 | 2.5 | 0.7 | 9.0 | 0.1 | 87.0 | 0.6 | 0.0 | 0.0 | 0.0 | 16.4 | 0.1 | 78.5 | 0.0 | 1.1 | 3.3 | 0.0 | 0.1 | 0.4 | 0.0 | 0.1 | 0.1 | 0.0 | 0.1 | 98.8 | 0.1 | 0.4 | 0.3 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.2 | 0.0 | 10.3 | 1 344 | 4.4 | 1.7 |
| *Chl. sinense* | 1 050 | 16 | 146 221 | 0.026 | 0.0 | 0.0 | 0.0 | 0.0 | 99.3 | 0.7 | 0.0 | 0.0 | 0.0 | 6.7 | 6.1 | 87.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 99.1 | 0.8 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 14.6 | 1 385 | 5.4 | 1.7 |
| *Chl. subglobosum* | 499 | 35 | 7 852 | 0.064 | 1.5 | 0.0 | 91.3 | 0.0 | 7.2 | 0.0 | 0.0 | 0.0 | 0.0 | 67.3 | 2.4 | 0.3 | 0.0 | 12.2 | 14.4 | 0.0 | 0.0 | 3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 95.2 | 1.5 | 0.0 | 0.7 | 0.0 | 0.0 | 0.0 | 2.6 | 0.0 | 0.0 | 0.0 | 8.3 | 639 | 5.3 | 2.6 |
| *Chl. virescens* | 619 | 39 | 7 816 | 0.032 | 0.0 | 0.2 | 94.3 | 0.3 | 4.5 | 0.8 | 0.0 | 0.0 | 0.0 | 75.6 | 1.4 | 0.0 | 0.3 | 8.6 | 5.7 | 0.0 | 0.0 | 8.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 90.5 | 0.3 | 0.6 | 6.9 | 0.0 | 0.0 | 0.0 | 1.5 | 0.0 | 0.0 | 0.0 | 9.1 | 743 | 5.1 | 2.2 |
| *Chl. volubile* | 3 559 | 81 | 355 257 | 0.022 | 2.7 | 0.6 | 10.5 | 0.1 | 85.0 | 0.9 | 0.0 | 0.0 | 0.0 | 20.6 | 0.1 | 72.8 | 0.0 | 1.0 | 3.1 | 0.0 | 0.1 | 2.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 97.8 | 0.1 | 0.8 | 0.8 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.2 | 0.0 | 10.1 | 1 349 | 4.4 | 1.8 |
| *Chl. xishuangbannaense* | 1 | 1 | 1 | 0.002 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 22.0 | 1 944 | 4.9 | n.a. |
| *Chl. ypsilosporum* | 305 | 23 | 14 296 | 0.012 | 6.5 | 7.2 | 0.7 | 1.6 | 83.7 | 0.3 | 0.0 | 0.0 | 0.0 | 27.5 | 0.0 | 71.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.3 | 89.9 | 1.3 | 2.9 | 3.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 16.5 | 1 313 | 5.7 | 2.5 |
| all *Chloridium* species | | | 8 770 163 | 0.298 | 6.1 | 1.8 | 23.8 | 0.7 | 58.6 | 8.8 | 0.1 | 0.0 | 0.0 | 51.4 | 2.2 | 34.4 | 0.1 | 2.6 | 2.7 | 0.0 | 0.1 | 6.2 | 0.0 | 0.2 | 0.1 | 0.0 | 4.5 | 86.0 | 1.8 | 1.3 | 4.3 | 0.1 | 0.0 | 0.0 | 1.5 | 0.1 | 0.3 | 0.0 | | | | |
| Global fungi (all data in the database) | 57 184 | 515 | 2 938 997 390 | n.a. | 21.6 | 2.7 | 31.5 | 0.7 | 34.2 | 5.0 | 2.1 | 0.9 | 1.1 | 41.5 | 2.7 | 11.2 | 0.7 | 2.4 | 3.3 | 0.5 | 13.2 | 18.7 | 1.6 | 2.1 | 1.9 | 0.1 | 6.1 | 58.2 | 2.6 | 2.6 | 0.2 | 4.1 | 3.4 | 0.1 | 1.4 | 1.0 | 7.0 | 0.0 | n.a. | n.a. | n.a. | n.a. |

**Notes:**

[1] Frequency of reads (%) of the particular taxon across samples where the taxon was found.

[2] Average values across all samples are presented for MAT and MAP. The median value is presented for pH. MAT: Mean Annual Temperature (°C), MAP: Mean Annual Precipitation (mm), pH (AVG).