Supplementary Materials: In Situ Collection and Preservation of Intact *Microcystis* Colonies to Assess Population Diversity and Microcystin Quotas

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Table 1. Image analysis information to determine colony volume.

| Image ID | Colony ID | Ice Sheet ID | Ice Sheet Thickness (mm) | Pixel Area | Pixel Volume | Pixels per mm | Volume (mm³) | Analysis Conducted |
|----------|-----------|--------------|--------------------------|------------|--------------|---------------|--------------|-------------------|
| 1        | 3         | 1D           | 1.5                      | 20225      | 6008         | 96            | 0.66         | LCMS, qPCR         |
| 2        | 6         | 1B           | 2                        | 19098      | 14797        | 103           | 1.40         | LCMS, qPCR         |
| 3        | 7         | 1B           | 2                        | 3265       | 2579         | 105           | 0.23         | LCMS, qPCR         |
| 4        | 12        | 2B           | 2                        | 43362      | 40788        | 51            | 15.46        | LCMS, qPCR, HTS    |
| 5        | 14        | 2B           | 2                        | 9778       | 13537        | 140           | 0.69         | LCMS, qPCR         |
| 6        | 15        | 2B           | 2                        | 5758       | 3801         | 140           | 0.19         | LCMS, qPCR         |
| 7        | 23        | 4A           | 3                        | 36921      | 42670        | 40            | 26.76        | LCMS, qPCR         |
| 8        | 25        | 5E           | 3                        | 27883      | 30095        | 61            | 8.13         | LCMS, qPCR, HTS    |
| 9        | 27        | 5H           | 3.5                      | 72181      | 116723       | 63            | 29.43        | LCMS, qPCR, HTS    |
| 10       | 29        | 5H           | 3.5                      | 56869      | 52628        | 85            | 7.28         | LCMS, qPCR         |
| 11       | 30        | 5G           | 3.5                      | 13707      | 10973        | 61            | 2.97         | LCMS, qPCR, HTS    |
| 12       | 31        | 5G           | 3.5                      | 40847      | 43036        | 54            | 14.92        | HTS                |
| 13       | 32        | 4B           | 3.5                      | 15514      | 20666        | 56            | 6.58         | LCMS, qPCR, HTS    |
| 14       | 33        | 2D           | 2.5                      | 60212      | 56489        | 38            | 39.93        | LCMS, qPCR, HTS    |
| 15       | 34        | 2D           | 2.5                      | 34732      | 30711        | 89            | 3.90         | HTS                |
| 16       | 37        | 2C           | 2.5                      | 26685      | 19192        | 84            | 2.72         | HTS                |
| 17       | 49        | 5D           | 3                        | 35915      | 53138        | 40            | 33.79        | LCMS, qPCR, HTS    |
| 18       | 50        | 5D           | 3                        | 26036      | 23349        | 37            | 16.70        | LCMS, qPCR, HTS    |
| 19       | 51        | 5D           | 3                        | 41374      | 60700        | 93            | 6.97         | HTS                |
| 20       | 52        | 5D           | 3                        | 29528      | 34669        | 75            | 6.20         | HTS                |
| 21       | 53        | 5D           | 3                        | 19141      | 32120        | 135           | 1.75         | HTS                |
| 22       | 55        | 5D           | 3                        | 9215       | 7507         | 135           | 0.41         | LCMS, qPCR         |
| 23       | 56        | 5D           | 3                        | 24775      | 24115        | 110           | 2.01         | LCMS, qPCR         |
| 24       | 58        | 5F           | 3                        | 17122      | 13718        | 58            | 4.03         | LCMS, qPCR, HTS    |
| 25       | 59        | 5F           | 3                        | 12437      | 13243        | 107           | 1.15         | LCMS, qPCR, HTS    |
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LCMS = liquid chromatography mass spectrometry analysis for microcystin concentration; qPCR = quantitative polymerase chain analysis for concentration of microcystin-producing *Microcystis*; HTS = high-throughput sequencing of the cyanobacterial internal transcribed spacer gene to assess *Microcystis* population diversity.

Table 2. Microcystin quota information for relevant colony samples.

| Colony ID | Ice Sheet ID | Colony Volume (mm$^3$) | MC Concentration (ng/mL) | mcyE Concentration (Copies/mL) | MC Quota (fg/Toxic Cell) |
|-----------|--------------|------------------------|--------------------------|-------------------------------|--------------------------|
| 3         | 1D           | 0.66                   | 1,943                    | 833,724,153                   | 2.3                      |
| 6         | 1B           | 1.40                   | 3,378                    | 348,986,248                   | 9.7                      |
| 7         | 1B           | 0.23                   | 201                      | 3,270,700                     | 61.4                     |
| 12        | 2B           | 15.46                  | 13,802                   | 1,767,185,139                 | 7.8                      |
| 14        | 2B           | 0.69                   | 1,358                    | 129,226,089                   | 10.5                     |
| 15        | 2B           | 0.19                   | 572                      | 43,086,887                    | 13.3                     |
| 23        | 4A           | 26.76                  | 36,946                   | 189,632,051                   | 194.8                    |
| 25        | 5E           | 8.13                   | 5,764                    | 342,795,027                   | 16.8                     |
| 27        | 5H           | 29.43                  | 28,615                   | 917,401,710                   | 31.2                     |
| 29        | 5H           | 7.28                   | 8,509                    | 903,981,200                   | 9.4                      |
| 30        | 5G           | 2.97                   | 5,970                    | 937,765,820                   | 6.4                      |
| 32        | 4B           | 6.58                   | 8,428                    | 386,074,613                   | 21.8                     |
| 33        | 2D           | 39.93                  | 33,404                   | 389,392,555                   | 85.8                     |
| 49        | 5D           | 33.79                  | 35,691                   | 653,422,733                   | 54.6                     |
| 50        | 5D           | 16.70                  | 24,015                   | 225,007,350                   | 106.7                    |
| 55        | 5D           | 0.41                   | 1,295                    | 135,094,427                   | 9.6                      |
| 56        | 5D           | 2.01                   | 3,710                    | 51,860,037                    | 71.5                     |
| 58        | 5F           | 4.03                   | 16,211                   | 544,497,945                   | 29.8                     |
| 59        | 5F           | 1.15                   | 4,510                    | 128,839,838                   | 35.0                     |
| 61        | 2E           | 2.88                   | 4,861                    | 239,371,820                   | 20.3                     |
| 62        | 2E           | 0.74                   | 4,359                    | 164,464,003                   | 26.5                     |
| 65        | 3C           | 1.30                   | 2,550                    | 430,531,930                   | 5.9                      |
| 72        | 3C           | 0.98                   | 2,444                    | 152,240,662                   | 16.1                     |
| 73        | 3C           | 0.66                   | 1,685                    | 279,687,773                   | 6.0                      |

*a* The ice sheet number corresponds to the collection site/time (see Supplementary Table S4 for more information).

MC = microcystin; mcyE = microcystin synthase gene E.
Table S3: Sample information for high-throughput sequencing of the cyanobacterial internal transcribed spacer (ITS) gene for relevant colony samples.

| Colony ID | Ice Sheet ID | Colony Volume (mm³) | OTU_8 | OTU_1 | OTU_2 | OTU_3 | OTU_7 | OTU_6 | OTU_13 | OTU_4 | OTU_436 | OTU_5 | Total |
|-----------|--------------|---------------------|-------|-------|-------|-------|-------|-------|--------|-------|--------|-------|-------|
| 12        | 2B           | 15.46               | 348   | 3     | 1     | 0     | 0     | 0     | 0      | 0     | 0      | 0     | 352   |
| 25        | 5E           | 8.13                | 1,496 | 53    | 1     | 1     | 2     | 0     | 0      | 0     | 0      | 0     | 1,553 |
| 27        | 5H           | 29.43               | 1,153 | 55    | 9     | 0     | 0     | 2     | 0      | 0     | 0      | 0     | 1,219 |
| 30        | 5G           | 2.97                | 444   | 153   | 19    | 1     | 0     | 0     | 0      | 2     | 0      | 0     | 619   |
| 31        | 5G           | 14.92               | 1,169 | 52    | 2     | 1     | 0     | 0     | 3      | 0     | 0      | 0     | 1,227 |
| 32        | 4B           | 6.58                | 1,195 | 48    | 2     | 0     | 0     | 0     | 0      | 0     | 2      | 0     | 1,247 |
| 33        | 2D           | 39.93               | 1,248 | 0     | 0     | 1     | 0     | 0     | 0      | 0     | 0      | 0     | 1,249 |
| 34        | 2D           | 3.90                | 1,230 | 0     | 0     | 0     | 0     | 1     | 0      | 0     | 0      | 0     | 1,231 |
| 37        | 2C           | 2.72                | 502   | 2     | 0     | 0     | 0     | 0     | 0      | 0     | 0      | 0     | 504   |
| 49        | 5D           | 33.79               | 613   | 15    | 1     | 1     | 0     | 0     | 0      | 0     | 0      | 0     | 630   |
| 50        | 5D           | 16.70               | 1,111 | 15    | 1     | 0     | 0     | 0     | 2      | 0     | 0      | 0     | 1,129 |
| 51        | 5D           | 6.97                | 341   | 5     | 1     | 0     | 0     | 0     | 0      | 0     | 0      | 0     | 347   |
| 52        | 5D           | 6.20                | 955   | 1     | 0     | 1     | 0     | 0     | 0      | 0     | 0      | 0     | 957   |
| 53        | 5D           | 1.75                | 668   | 42    | 2     | 0     | 0     | 0     | 0      | 0     | 0      | 0     | 712   |
| 58        | 5F           | 4.03                | 815   | 35    | 3     | 0     | 0     | 0     | 0      | 0     | 0      | 0     | 853   |
| 59        | 5F           | 1.15                | 787   | 86    | 4     | 0     | 0     | 0     | 0      | 0     | 0      | 2     | 879   |
| 61        | 2E           | 2.88                | 380   | 1     | 0     | 0     | 0     | 0     | 0      | 0     | 0      | 0     | 381   |
| 62        | 2E           | 0.74                | 367   | 0     | 0     | 0     | 0     | 0     | 0      | 0     | 0      | 0     | 367   |
| 66        | 3C           | 3.37                | 330   | 2     | 0     | 0     | 0     | 0     | 0      | 0     | 0      | 0     | 332   |
| 70        | 3C           | 2.38                | 375   | 0     | 0     | 0     | 0     | 0     | 0      | 0     | 0      | 0     | 375   |

* The ice sheet number corresponds to the collection site/time (see Supplementary Table S4 for more information).
Table S4: Information on sample collection time and location.

| Collection | Date       | Time   | Site Name | Latitude  | Longitude  |
|------------|------------|--------|-----------|-----------|------------|
| 1          | 12/04/2014 | 1:02 pm| Pontoon   | −41.27166 | 173.294077 |
| 2          | 13/04/2014 | 4:05 pm| Boat Bay  | −42.40908 | 173.582840 |
| 3          | 13/04/2014 | 4:47 pm| Pontoon   | −42.40874 | 173.583094 |
| 4          | 14/04/2014 | 11:04 am| Launch Bay| −42.40859 | 173.578876 |
| 5          | 14/04/2014 | 11:22 am| Launch Bay| −42.40871 | 173.578716 |

* Collection numbers correspond to the Ice Sheet ID.
Figure S1. Automated pixel selection for colony images where images alternate between the raw image and the selected area.