

Supplementary Table 1. List of specimens with the classification, collection locality, and voucher numbers. GenBank accession numbers are also given, some of which in bold were previously published.

| Strain designation | Collection locality | Species | GenBank accession number (18S) |
|--------------------|--|-----------------------|--------------------------------|
| | | <i>Scenedesmus</i> | |
| SM7-1 | Lake Hulunbeier, Neimeng, China, N 101.03°, E 45.98° | <i>S. deserticola</i> | KX495003 |
| SM7-3 | Lake Hulunbeier, Neimeng, China, N 101.03°, E 45.98° | <i>S. deserticola</i> | KX495004 |
| SM7-4 | Soil from Shihezi, Xinjiang, China, N 86.04°, E 46.25° | <i>S. deserticola</i> | KX495008 |
| SM1_3 | Lake Hulunbeier, Neimeng, China, N 101.03°, E 45.98° | <i>S. deserticola</i> | KX494997 |
| SM3_3 | Lake Hulunbeier, Neimeng, China, N 101.03°, E 45.98° | <i>S. deserticola</i> | KX494986 |
| SM5_4 | Changsha, Hunan, China, N 112.14°, E 28.07° | <i>S. deserticola</i> | KX495009 |
| BJ29-1 | Lake Zixia, Nanjing, Jiangsu, China, N 118.82°, E 32.05° | <i>S. deserticola</i> | KX495013 |
| SM5_2 | Lake Taihu, China, N 120.01°, E 31.33° | <i>S. deserticola</i> | KX495002 |
| BJ29-5 | Glacier in Arctic pole | <i>S. deserticola</i> | KX495012 |
| SM4_1 | Lake Donghu, Wuhan, China, N 114.40°, E 30.55° | <i>S. deserticola</i> | KX494998 |
| SM1_2 | Lake Donghu, Wuhan, China, N 114.40°, E 30.55° | <i>S. deserticola</i> | KX494996 |
| SM4_2 | Lake Donghu, Wuhan, China, N 114.40°, E 30.55° | <i>S. deserticola</i> | KX494999 |
| SM2_3 | Lake Donghu, Wuhan, China, N 114.40°, E 30.55° | <i>S. deserticola</i> | KX494988 |
| 6JQ_2 | Lake Mochou, Nanjing, China, N 118.76°, E 32.03° | <i>S. deserticola</i> | KX494991 |
| BJ29-3 | Glacier in Arctic pole | <i>S. deserticola</i> | KX495014 |
| SM2_2 | Lake Mochou, Nanjing, China, N 118.76°, E 32.03° | <i>S. deserticola</i> | KX494987 |
| SM1_1 | Lake Zixia, Nanjing, Jiangsu, China, N 118.82°, E 32.05° | <i>S. deserticola</i> | KX494995 |
| DB5 | Glacier in Arctic pole | <i>S. deserticola</i> | KX495007 |
| 8XS1 | Soil from Shihezi, Xinjiang, China, N 86.04°, E 46.25° | <i>S. deserticola</i> | KX494992 |
| 8XS2 | Lake Hulunbeier, Neimeng, China, N 101.03°, E 45.98° | <i>S. deserticola</i> | KX494993 |
| SM6-4 | Soil from Shihezi, Xinjiang, China, N 86.04°, E 46.25° | <i>S. deserticola</i> | KX495000 |
| 8XS3 | Lake Zixia, Nanjing, Jiangsu, China, N 118.82°, E 32.05° | <i>S. deserticola</i> | KX494994 |
| SB44_2 | Soil from Shihezi, Xinjiang, China, N 86.04°, E 46.25° | <i>S. quadricauda</i> | KX495066 |
| SB44_4 | Lake Hulunbeier, Neimeng, China, N 101.03°, E 45.98° | <i>S. quadricauda</i> | KX495049 |
| SB40_3 | Lake Mochou, Nanjing, China, N 118.76°, E 32.03° | <i>S. quadricauda</i> | KX495048 |
| SB76_1 | Donghu, Wuhan, China, N 114.40°, E 30.55° | <i>S. bijuga</i> | KX495027 |
| SB76_2 | Lake Taihu, China, N 120.01°, E 31.33° | <i>S. bijuga</i> | KX495050 |
| SB76_4 | Lake Zixia, Nanjing, Jiangsu, China, N 118.82°, E 32.05° | <i>S. bijuga</i> | KX495068 |
| JS-1 | | <i>S. bijuga</i> | HQ900842 |

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| SB959_2 | Lake Donghu, Wuhan, China, N 114.40°, E 30.55° | <i>S. obliquus</i> | KX495033 |
| SM9_1 | River, Nanjing, China, N 118.71°, E 32.05° | <i>S. obliquus</i> | KX495080 |
| SB12_3 | Lake Xuanwu, Nanjing, China, N 118.78°, E 32.07° | <i>S. obliquus</i> | KX495024 |
| SB12_4 | Lake Xuanwu, Nanjing, China, N 118.78°, E 32.07° | <i>S. obliquus</i> | KX495047 |
| SM9_4 | Lake Hulunbeier, Neimeng, China, N 101.03°, E 45.98° | <i>S. obliquus</i> | KX495082 |
| SM17_1 | Soil from Shihezi, Xinjiang, China, N 86.04°, E 46.25° | <i>S. obliquus</i> | KX495073 |
| SM17_2 | Ningde, China, N 119.58°, E 26.63° | <i>S. obliquus</i> | KX495074 |
| SM17_3 | Lake Hulunbeier, Neimeng, China, N 101.03°, E 45.98° | <i>S. obliquus</i> | KX495075 |
| SB12_1 | Lake Hulunbeier, Neimeng, China, N 101.03°, E 45.98° | <i>S. bajacalifornicus</i> | KX495023 |
| SB12_2 | Zhoushan, Zhejiang, China, N 122.26°, E 30.03° | <i>S. bajacalifornicus</i> | KX495046 |
| SM14_3 | Soil from Shihezi, Xinjiang, China, N 86.04°, E 46.25° | <i>S. bajacalifornicus</i> | KX495091 |
| SM14_2 | Lake Hulunbeier, Neimeng, China, N 101.03°, E 45.98° | <i>S. bajacalifornicus</i> | KX495090 |
| SM8_1 | Lake Hulunbeier, Neimeng, China, N 101.03°, E 45.98° | <i>S. bajacalifornicus</i> | KX495078 |
| SM19_4 | Lake Hulunbeier, Neimeng, China, N 101.03°, E 45.98° | <i>S. bajacalifornicus</i> | KX495077 |
| SM8_3 | Lianyungang, China, N 118.71°, E 32.05° | <i>S. bajacalifornicus</i> | KX495079 |
| SM9_3 | Lake Hulunbeier, Neimeng, China, N 101.03°, E 45.98° | <i>S. bajacalifornicus</i> | KX495081 |
| SM13_3 | Soil from Shihezi, Xinjiang, China, N 86.04°, E 46.25° | <i>S. bajacalifornicus</i> | KX495089 |
| SM13_1 | Lake Taihu, China, N 120.01°, E 31.33° | <i>S. bajacalifornicus</i> | KX495087 |
| SM13_2 | Lake Xuanwu, Jiangsu, China, N 118.78°, E 32.07° | <i>S. bajacalifornicus</i> | KX495088 |
| SB1221_1 | River, Lianyungang, China, N 118.71°, E 32.05° | <i>S. acuminatus</i> | KX495056 |
| SB1221_4 | River, Nanjing, China, N 118.71°, E 32.05° | <i>S. acuminatus</i> | KX495035 |
| SM3-1 | Lake Taihu, China, N 120.01°, E 31.33° | <i>S. armatus</i> | KX494985 |
| SM5_1 | Lake Taihu, China, N 120.01°, E 31.33° | <i>S. armatus</i> | KX495006 |
| SM6_1 | Lake Mochou, Nanjing, China, N 118.76°, E 32.03° | <i>S. armatus</i> | KX495005 |
| M1.5 | | <i>S. armatus</i> | KC505541 |
| FW005 | | <i>S. armatus</i> | KC699545 |
| | | <i>S. armatus</i> | KC701521 |
| | | <i>S. obtusu</i> | AB037091 |
| SM15_1 | Lake Taihu, China, N 120.01°, E 31.33° | <i>S. sp</i> | KX495092 |
| SM15_4 | Lake Donghu, Wuhan, China, N 114.40°, E 30.55° | <i>S. sp</i> | KX495093 |
| | | <i>Chlorella</i> | |
| SB275_4 | Lake Xuanwu, Nanjing, China, N 118.78°, E 32.07° | <i>C. sorokiniana</i> | KX495032 |
| SB275_1 | Qingdao, China, N 118.71°, E 32.05° | <i>C. sorokiniana</i> | KX495030 |
| SB275_2 | Xiamen, Fujian, China, N 118.13°, E 24.41° | <i>C. sorokiniana</i> | KX495053 |
| SB275_3_2 | Danjiang River, Henan, China, N 111.50°, E 32.53° | <i>C. sorokiniana</i> | KX495054 |
| SM11_2 | Soil from Shihezi, Xinjiang, China, N 86.04°, E 46.25° | <i>C. sorokiniana</i> | KX495083 |
| SM11_4 | Soil from Shihezi, Xinjiang, China, N 86.04°, E 46.25° | <i>C. sorokiniana</i> | KX495084 |

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| SM12_4 | Soil from Shihezi, Xinjiang, China, N 86.04°, E 46.25° | <i>C. sorokiniana</i> | KX495086 |
| SM12_2 | Soil from Shihezi, Xinjiang, China, N 86.04°, E 46.25° | <i>C. sorokiniana</i> | KX495085 |
| BJ1_2_1 | Glacier in Arctic pole | <i>C. sorokiniana</i> | KX495058 |
| SM21_2 | Lake Hulunbeier, Neimeng, China, N 101.03°, E 45.98° | <i>C. sorokiniana</i> | KX495094 |
| SM18_2 | Lake Taihu, China, N 120.01°, E 31.33° | <i>C. sorokiniana</i> | KX495076 |
| NIES-2167 | | <i>C. sorokiniana</i> | AB488789 |
| NIES-2169 | | <i>C. sorokiniana</i> | AB488573 |
| UTEX 2805 | | <i>C. sorokiniana</i> | AM423162 |
| SAG 211-8k | | <i>C. sorokiniana</i> | FM205834 |
| | | <i>C. sorokiniana</i> | AB080307 |
| GXNN 01 | | <i>C. sorokiniana</i> | EU402596 |
| XJ02 | | <i>C. sorokiniana</i> | KC416208 |
| FC6 IITG | | <i>C. sorokiniana</i> | JX453208 |
| | | <i>C. sorokiniana</i> | KF209342 |
| RP1 | | <i>C. sorokiniana</i> | KF569750 |
| SB1_1 | Qingdao, Shandong, China, N 118.71°, E 32.05° | <i>C. vulgaris</i> | KX495060 |
| SB1_4 | Jinan, Shandong, China, N 117.08°, E 36.62° | <i>C. vulgaris</i> | KX495061 |
| SB2_2 | Lake Taihu, China, N 120.01°, E 31.33° | <i>C. vulgaris</i> | KX495015 |
| SB2_3 | Shihezi, Xinjiang, China, N 86.04°, E 46.25° | <i>C. vulgaris</i> | KX495062 |
| SB2_4 | Lake Xuanwuhu, Jiangsu, China, N 118.78°, E 32.07° | <i>C. vulgaris</i> | KX495038 |
| SB5_2 | Lake Chaohu, Anhui, China, N 117.59°, E 31.58° | <i>C. vulgaris</i> | KX495042 |
| SB5_3 | Lake Donghu, Wuhan, China, N 114.40°, E 30.55° | <i>C. vulgaris</i> | KX495020 |
| SB5_4 | Soil from Shihezi, Xinjiang, China, N 86.04°, E 46.25° | <i>C. vulgaris</i> | KX495043 |
| SB8_1 | Fuzhou, Fujian, China, N 117.59°, E 31.58° | <i>C. vulgaris</i> | KX495021 |
| SB8_3 | Lake Xuanwuhu, Jiangsu, China, N 118.78°, E 32.07° | <i>C. vulgaris</i> | KX495044 |
| SB8_4 | Lake Taihu, China, N 120.01°, E 31.33° | <i>C. vulgaris</i> | KX495022 |
| SB40_2 | Lake Hulunbeier, Neimeng, China, N 101.03°, E 45.98° | <i>C. vulgaris</i> | KX495025 |
| SB40_4 | Lake Donghu, Wuhan, China, N 114.40°, E 30.55° | <i>C. vulgaris</i> | KX495026 |
| SB962_3 | Qingdao, China, N 118.71°, E 32.05° | <i>C. vulgaris</i> | KX495055 |
| SB962_4 | Qingdao, China, N 118.71°, E 32.05° | <i>C. vulgaris</i> | KX495034 |
| SB231_1 | Pond, Wuhan, China, N 114.32°, E 30.42° | <i>C. vulgaris</i> | KX495028 |
| SB231_2 | Pond, Wuhan, China, N 114.32°, E 30.42° | <i>C. vulgaris</i> | KX495051 |
| SB231_3 | Lianyungang, Jiangsu, China, N 118.71°, E 32.05° | <i>C. vulgaris</i> | KX495029 |
| SB231_4 | Lake Zixia, Nanjing, Jiangsu, N 118.82°, E 32.05° | <i>C. vulgaris</i> | KX495052 |
| DB1 | Glacier in Arctic pole | <i>C. vulgaris</i> | KX494989 |
| SB1283_2 | Lake, Donghu, Wuhan, China, N 114.40°, E 30.55° | <i>C. vulgaris</i> | KX495057 |
| SB44_3 | Lake Taihu, China, N 120.01°, E 31.33° | <i>C. vulgaris</i> | KX495067 |
| DB2 | Glacier in Arctic pole | <i>C. vulgaris</i> | KX494990 |
| BJ4_4_3 | Glacier in Arctic pole | <i>C. vulgaris</i> | KX495041 |
| 729_2 | University of Texas, 1987 | <i>C. vulgaris</i> | KX495037 |

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| BJ30_3 | Glacier in Arctic pole | <i>C. vulgaris</i> | KX495001 |
| G41_3 | Soil from Shihezi, Xinjiang, China, N 86.04°, E 46.25° | <i>C. vulgaris</i> | KX495010 |
| SM7_2 | Soil from Shihezi, Xinjiang, China, N 86.04°, E 46.25° | <i>C. vulgaris</i> | KX495011 |
| BJ3_1_1 | Glacier in Arctic pole | <i>C. vulgaris</i> | KX495016 |
| BJ4_3_3 | Glacier in Arctic pole | <i>C. vulgaris</i> | KX495017 |
| BJ4_4_2 | Glacier in Arctic pole | <i>C. vulgaris</i> | KX495018 |
| BJ6_2_3 | Glacier in Arctic pole | <i>C. vulgaris</i> | KX495019 |
| BJ6_3_3 | Glacier in Arctic pole | <i>C. vulgaris</i> | KX495059 |
| BJ4_4_1 | Glacier in Arctic pole | <i>C. vulgaris</i> | KX495036 |
| SB1283_4 | Lake, Donghu, Wuhan, China, N 114.40°, E 30.55° | <i>C. vulgaris</i> | KX495036 |
| OW-01 | | <i>C. vulgaris</i> | JQ664295 |
| | | <i>C. vulgaris</i> | GU295219 |
| Prag A14 | | <i>C. vulgaris</i> | X74001 |
| SB4_1 | Lake Baiyangdian, Hebei, China, N 115.95°, E 38.80° | <i>C. saccharophila</i> | KX495039 |
| SB4_2 | Lake Hulunbeier, Neimeng, China, N 101.03°, E 45.98° | <i>C. saccharophila</i> | KX495063 |
| SB4_3 | Lake Zixia, Nanjing, Jiangsu, China, N 118.82°, E 32.05° | <i>C. saccharophila</i> | KX495064 |
| SB4_4 | Charles University in Prague | <i>C. saccharophila</i> | KX495065 |
| SB275_3_1 | Danjiang River, Henan, China, N 111.50°, E 32.53° | <i>C. saccharophila</i> | KX495031 |
| SB8_5 | Lake Taihu, China, N 120.01°, E 31.33° | <i>C. saccharophila</i> | KX495045 |
| SB729_1 | University of Texas, 1987 | <i>C. saccharophila</i> | KX495069 |
| SB962_1 | University of Texas, 1987 | <i>C. saccharophila</i> | KX495072 |
| SB729_3 | Pond at state New York, USA | <i>C. saccharophila</i> | KX495070 |
| SB959_4 | Pond at state New York, USA | <i>C. saccharophila</i> | KX495071 |
| UTEX 2219-4 | | <i>C. minutissima</i> | HQ218939 |
| C-1.1.9 | | <i>C. minutissima</i> | X56102 |
| | | <i>C. minutissima</i> | AB006046 |
| | | Out group | |
| VI8 | | Chlorococcales | FJ946903 |
| II4 | | Chlorococcales | FJ946902 |
| VI12 | | Chlorococcales | FJ946905 |
| VII3 | | Chlorococcales | FJ946904 |

Supplementary Figure 1. Automatic partition of tellinaceans based on 18S gene. The number of groups inside the partition (initial and recursive) of each given prior intraspecific divergence value were reported.

