

**Appendix S12.** Estimates of global species richness in *Trebouxia* clades A, C, D, I, and S: the Muggia et al. (2020) classification scheme as updated in this paper (dataset A); OTU clustering of dataset B at 97%; and the ASAP “barcode gap” method with dataset B. Ranges provided for the *Trebouxia* classification scheme account for (a) uncertainty in the delimitation of some “sensu lato” species in clades C, I, and S, and (b) two species in clade A recognized by Muggia et al. (2020) but omitted from our phylogenetic analysis because their ITS sequences were missing part of ITS2. For ASAP, the number of species per the top five best scoring delimitations are listed by increasing ASAP score, where the lowest-scoring (i.e., putative best) delimitation is listed first.

| Clade | Classification scheme | 97% OTU clustering | ASAP                    |
|-------|-----------------------|--------------------|-------------------------|
| A     | 52–54                 | 100                | 856, 859, 97, 97, 854   |
| C     | 42–45                 | 65                 | 329, 35, 328, 43, 27    |
| D     | 6                     | 7                  | Not performed           |
| I     | 24–31                 | 73                 | 473, 121, 244, 472, 176 |
| S     | 16–20                 | 39                 | 44, 455, 454, 456, 51   |