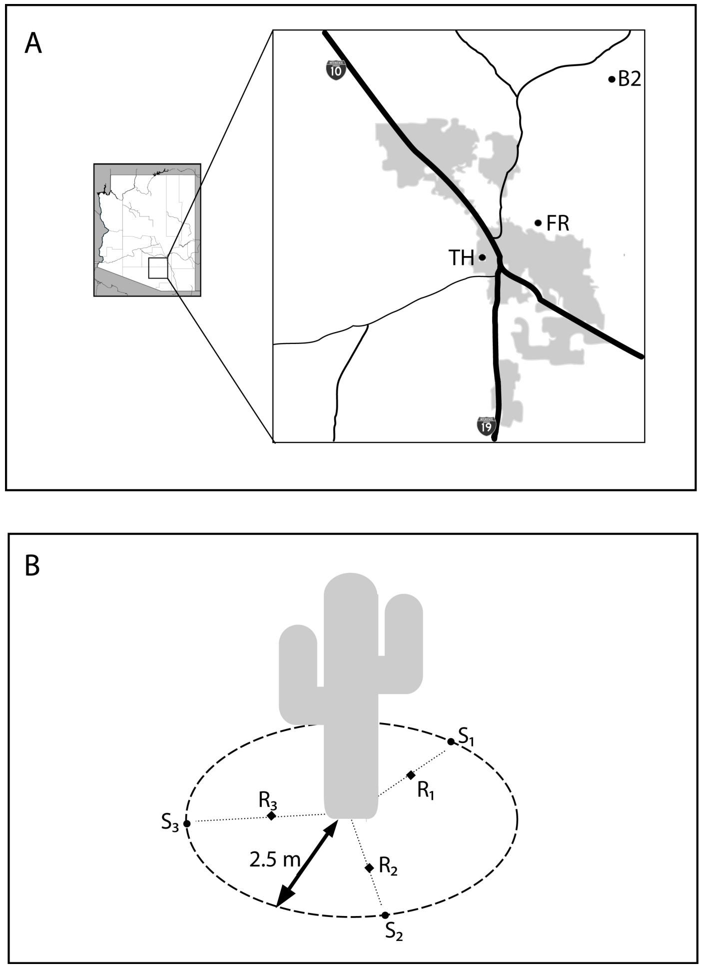
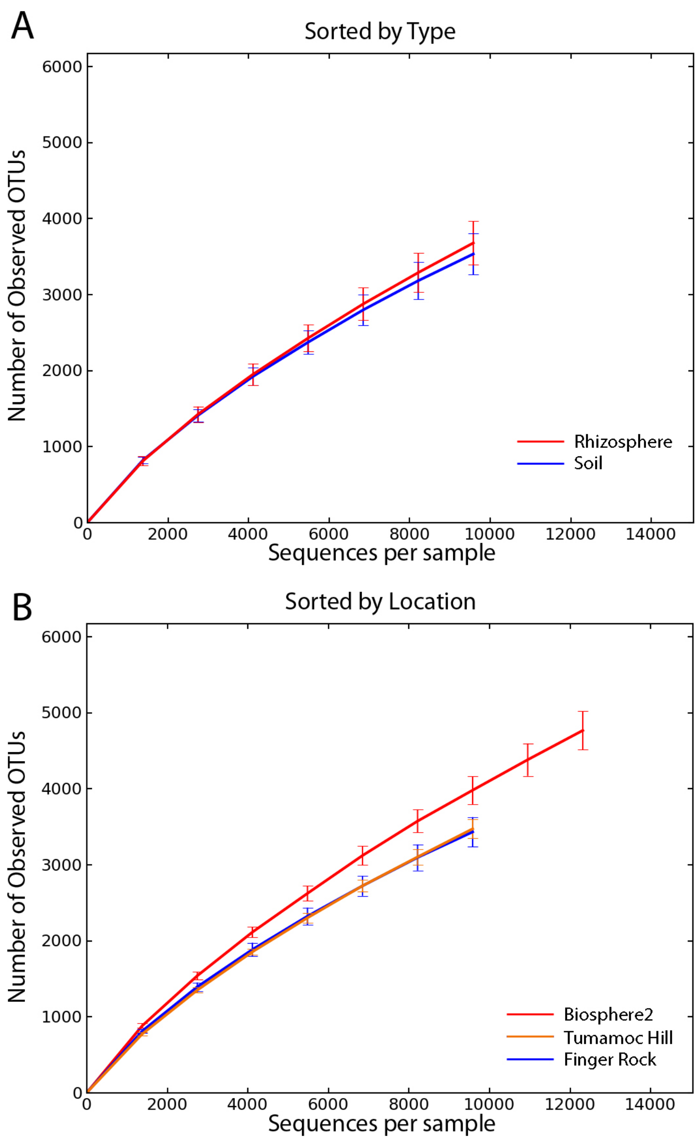
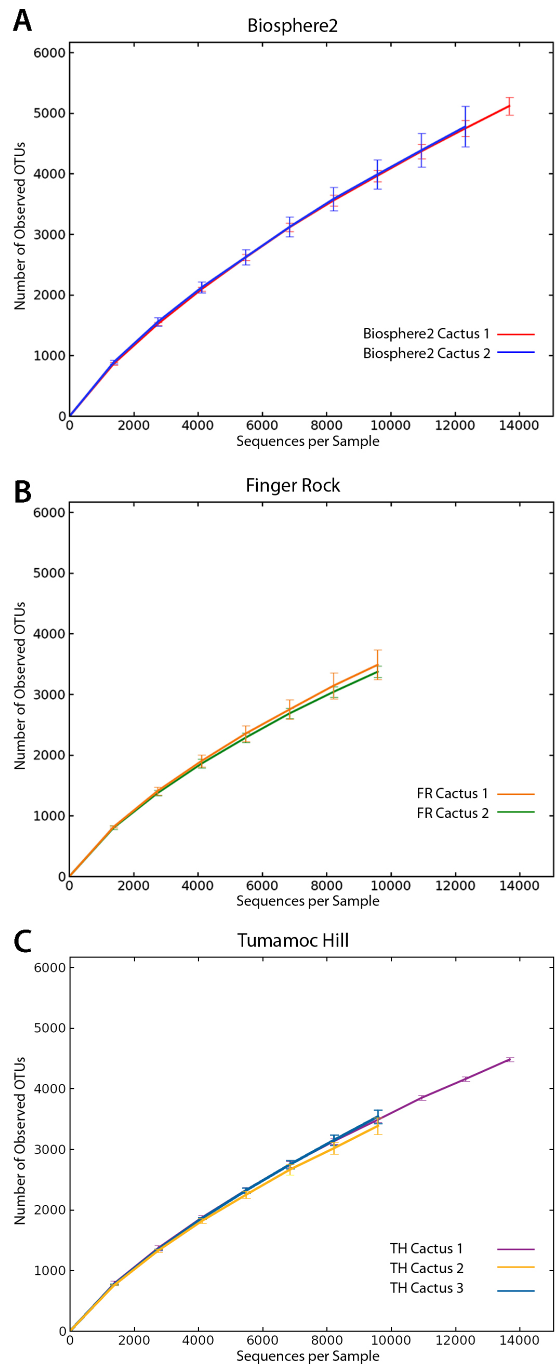
SUPPLEMENTARY MATERIAL



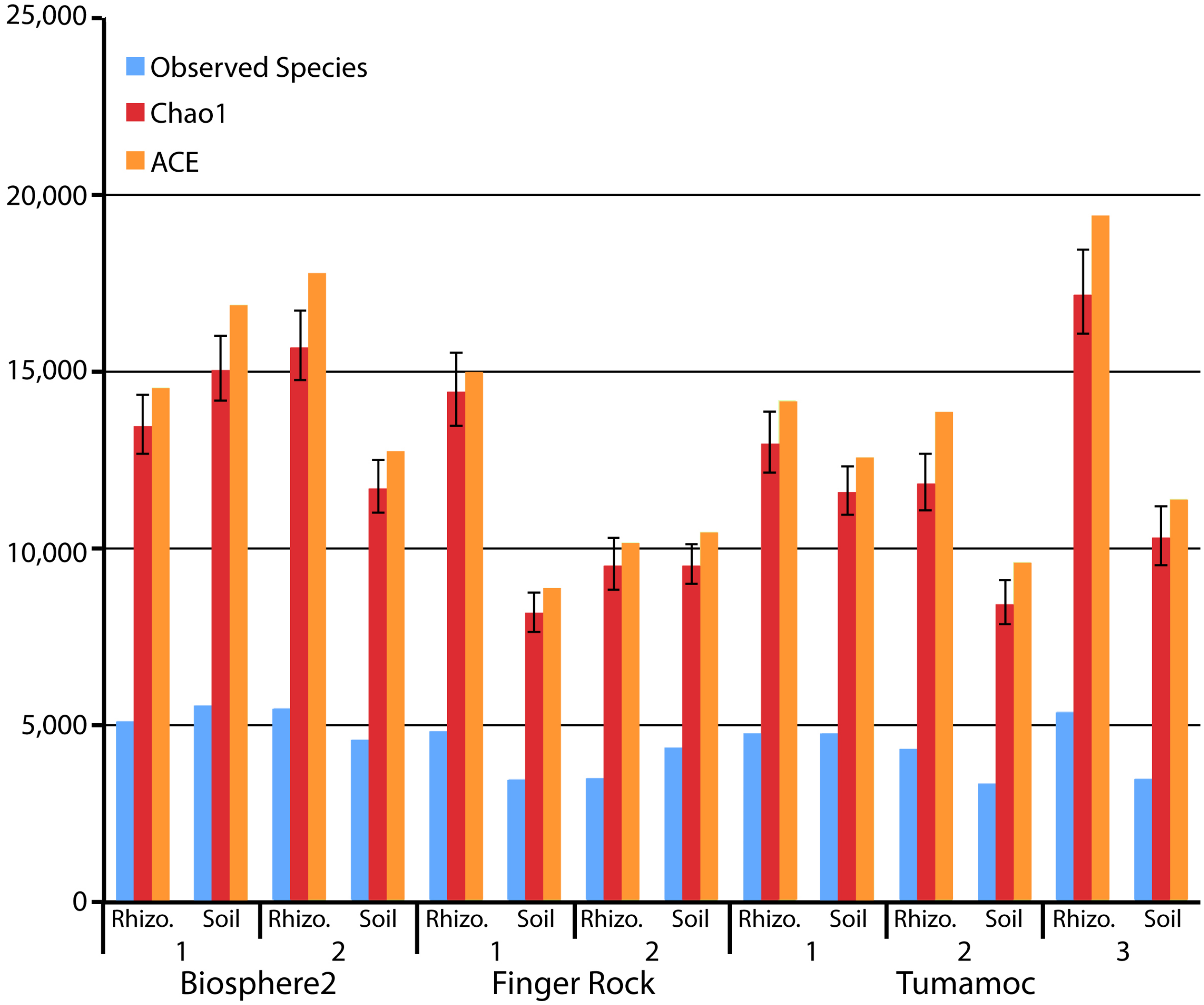
Supplementary Figure 1: Sample site locations (A) and biological replicates sampling scheme (B). A: The three Sonoran Desert samples sites were located in and around Tucson, AZ, USA. The Tumamoc Hill (TH) and Finger Rock (FR) samples were from native Sonoran Desert environments, while those from the Biosphere2 (B2) research facility represent an artificial desert ecosystem. B: Three soil (S_1–S_3) and three rhizosphere (R_1–R_3) samples were taken from around each of three cacti within each site approximately equidistantly sampled around the cactus. The rhizosphere samples were taken closer to the cactus to ensure we were sampling from the root of that particular cactus.



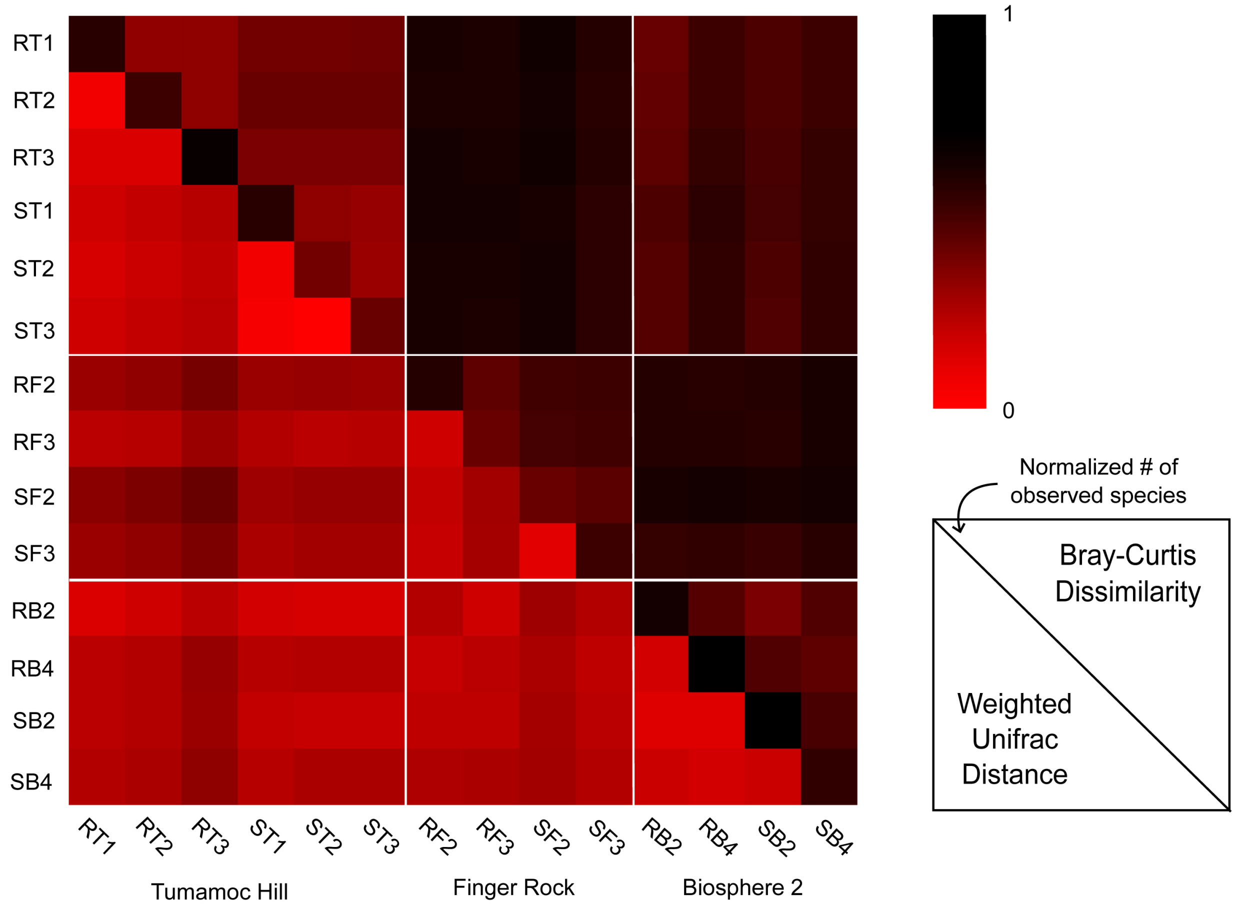
Supplementary Figure 2: Rarefaction curves of pooled samples showing relatively even sampling of rhizosphere and soil samples (A) and those pooled by location (B). The Biosphere2 samples were more thoroughly sampled than those of the other sites and contained a richer compliment of OTUs.



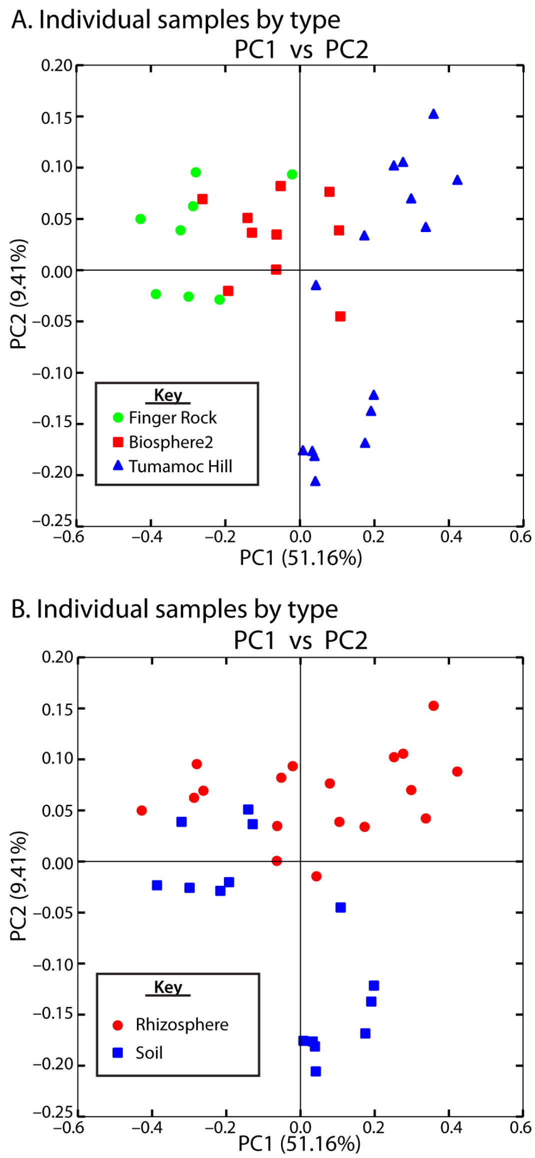
Supplementary Figure 3: Rarefaction curves of samples pooled by individual cactus (Rhizosphere and Soil samples combined) at the Biosphere2 (A), Finger Rock (B), and Tumamoc Hill (C) sites. These curves indicate even sampling efforts between the different cacti at each site.



Supplementary Figure 4: The number of observed operational taxonomic units (OTUs) and alpha diversity estimates of pooled rhizosphere (Rhizo.) and soil samples at each of the cacti in this study. Chao1 estimates (red bars) are given with 95% confidence intervals. There is good agreement between Chao1 and ACE (orange bars) estimates at each pooled sample.



Supplementary Figure 5: Heatmap image of β-diversity distances between samples and the normalized number of OTUs (along the indicated diagonal). There is generally good agreement between the weighted UniFrac distances (lower, left portion) and Bray-Curtis dissimilarity (upper, right portion), although UniFrac distances are generally lower overall. Of note is the fact that distances are greater for both measures between areas with little taxonomic overlap, such as between Finger Rock and Tumamoc Hill samples.



Supplementary Figure 6: Principal coordinate analysis of individual, un-pooled biological replicates organized by location (A) and soil sample type (B). Although these un-pooled samples do not cluster as strongly as those pooled by location or cactus (i.e. main text Figure 2), of note is the fact that un-pooled samples themselves are separated primarily by location along the axis of the first principal coordinate (PC1). For instance, those samples from Finger Rock all occurring to the left side of the x-axis. The second principal coordinate (PC2) then generally separates the samples based on soil or rhizosphere association, with some mixing of samples near the lower levels of the axis.

Supplementary Table 1: Adaptors, multiplex identification tags (MID), and reverse primer (1392R) for individual biological replicates. The sample names indicate, in order, soil or rhizosphere association (R, S), the location from which samples were taken (B = Biosphere2, F = Finger Rock, T = Tumamoc Hill), the cactus number, and finally replicate number. Below is the adaptor and forward (926F) primer.

Sample name	A adaptor	Key	MID	1392R primer
RB11	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	TAGCGC	acgggcggtgtgtRc
RB12	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	TAGTAC	acgggcggtgtgtRc
RB13	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	TATAGC	acgggcggtgtgtRc
RB21	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	TATGAC	acgggcggtgtgtRc
RB22	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	TCATAC	acgggcggtgtgtRc
RB23	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	ACACTGC	acgggcggtgtgtRc
RB41	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	ACAGTAT	acgggcggtgtgtRc
RB42	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	ACATAGT	acgggcggtgtgtRc
RB43	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	ACATGAC	acgggcggtgtgtRc
RF11	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	ATGTGT	acgggcggtgtgtRc
RF12	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	CACAGT	acgggcggtgtgtRc
RF13	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	CACGAT	acgggcggtgtgtRc
RF21	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	CACTAC	acgggcggtgtgtRc
RF22	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	CAGAGC	acgggcggtgtgtRc
RF23	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	CAGCAT	acgggcggtgtgtRc
RF31	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	CTGCGC	acgggcggtgtgtRc
RF32	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	CTGTAC	acgggcggtgtgtRc
RF33	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	TACTGC	acgggcggtgtgtRc
RT11	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	ACAGAC	acgggcggtgtgtRc
RT12	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	ACATGT	acgggcggtgtgtRc
RT13	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	ACGAGT	acgggcggtgtgtRc
RT21	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	ACGCAC	acgggcggtgtgtRc
RT22	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	ACGTAT	acgggcggtgtgtRc
RT23	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	ACGTGC	acgggcggtgtgtRc
RT31	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	ACTAGC	acgggcggtgtgtRc
RT32	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	ACTCGT	acgggcggtgtgtRc
RT33	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	ACTGAT	acgggcggtgtgtRc
SB11	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	TACAT	acgggcggtgtgtRc
SB12	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	TACGC	acgggcggtgtgtRc
SB13	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	TAGAC	acgggcggtgtgtRc
SB21	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	TATGT	acgggcggtgtgtRc
SB22	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	TCAGT	acgggcggtgtgtRc
SB23	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	TCGAT	acgggcggtgtgtRc

SB41	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	TCTAC	acgggcggtgtgtRc
SB42	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	ACACAT	acgggcggtgtgtRc
SB43	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	ACACGC	acgggcggtgtgtRc
SF11	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	CACGT	acgggcggtgtgtRc
SF12	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	CAGAT	acgggcggtgtgtRc
SF21	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	CGAGC	acgggcggtgtgtRc
SF22	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	CGCAT	acgggcggtgtgtRc
SF23	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	CGTAC	acgggcggtgtgtRc
SF31	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	CGTGT	acgggcggtgtgtRc
SF32	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	CTAGT	acgggcggtgtgtRc
SF33	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	CTGAC	acgggcggtgtgtRc
ST11	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	ACAGC	acgggcggtgtgtRc
ST12	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	ACGAC	acgggcggtgtgtRc
ST13	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	ACTAT	acgggcggtgtgtRc
ST21	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	AGAGT	acgggcggtgtgtRc
ST22	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	AGCAC	acgggcggtgtgtRc
ST23	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	AGTGC	acgggcggtgtgtRc
ST31	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	ATCAT	acgggcggtgtgtRc
ST32	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	ATCGC	acgggcggtgtgtRc
ST33	CCATCTCATCCCTGCGTGTCTCCGAC	TCAG	CACAC	acgggcggtgtgtRc

Forward primer

B adapter	**Key**	**Template specific**	**Primer Name**
CCTATCCCCTGTGTGCCTTGGCAGTC	TCAG	AAACTYAAAKGAATTGRCGG	pyroLSSU926F

Supplementary Table 2: Physical and chemical soil characteristics of the soil immediately surrounding the cacti sampled in this study.

Location	Sample ID	Water content [%]	pH	Electrical conductivity [µS cm−1]	Cation exchange capacity, CEC [meq/100g]	Total Carbon [(% dry soil]	Total Nitrogen [% dry soil]	% Clay [< 2 µm]	% Silt [2 - 50 µm]	% Sand [50 - 2000 µm]	% Stones [> 2mm by wt.]
Tumamoc	1	16.67 (0.15)	8.11 (0.08)	259.9 (22.06)	6.67 (0.04)	1.71 (0.01)	0.070 (0.004)	17.10 (0.81)	27.20 (1.25)	55.70 (2.03)	44.45
	2	10.01 (1.87)	8.20 (0.17)	234.8 (32.1)	6.61 (0.01)	1.44 (0.23)	0.044 (0.003)	12.53 (0.20)	26.77 (0.57)	60.70 (0.75)	48.50
	3	12.55 (4.64)	7.95 (0.10)	319.5 (3.54)	6.66 (0.01)	1.96 (0.06)	0.158 (0.007)	19.77 (0.12)	31.17 (0.58)	49.07 (0.49)	59.06
Finger Rock	1	7.09 (1.21)	5.09 (0.19)	65.1 (0.64)	2.72 (0.33)	0.49 (0.02)	0.046 (0.009)	7.44 (0.07)	19.49 (0.17)	73.07 (0.24)	41.08
	2	7.34 (0.08)	6.03 (0.13)	139.0 (4.95)	5.30 (0.69)	0.61 (0.05)	0.054 (0.001)	6.84 (0.06)	18.96 (0.15)	74.20 (0.15)	30.64
Biosphere2	1	11.11 (0.30)	7.99 (0.10)	315.5 (3.54)	6.65 (0.01)	1.35 (0.05)	0.085 (0.014)	14.37 (0.43)	28.97 (0.97)	56.67 (1.39)	56.24
	2	4.47 (0.78)	8.62 (0.11)	119.8 (8.06)	2.23 (0.34)	0.40 (0.01)	0.018 (0.001)	4.56 (0.31)	7.58 (0.07)	87.87 (0.38)	1.91

Table S2. Mean values of geochemical parameters of soils at each collection site. Standard deviations are given in parentheses.