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'Convergent' traits of mediterranean woody plants belong to pre-mediterranean lineages

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The evergreen-sclerophyllous vegetation associated to the mediterranean-type ecosystems shares common characteristics that have been explained invoking an evolutionary convergence driven by the mediterranean climate. Mediterranean climate originated in the Quaternary but the plant 'convergent' characteristics are also present in tropical-like lineages that evolved along the Tertiary, before the mediterranean climate appeared. Because evergreen-sclerophyllous vegetation was broadly distributed across the world in the Tertiary, current trait similarities among the mediterranean taxa may be due to historical and phylogenetical constraints and not to evolutionary convergence. We tested historical and phylogenetical vs. convergence hypotheses to explain present ecological attributes found in woody plant species in mediterranean areas. Multivariate analyses were performed on the matrix of genera × life-history reproductive characteristics in three mediterranean-type ecosystems and a tropical system as an outgroup, the Mexical shrubland. These analyses indicate that character syndromes in mediterranean plants may largely be explained in relation to the age of the lineage (Tertiary vs. Quaternary). We also found that the similarities shown among mediterranean vegetations are due to Tertiary (pre-mediterranean-) and not to Quaternary (true mediterranean-) taxa. Furthermore, the similarities among mediterranean taxa are due to phylogenetical inertia because similarities in the character syndromes disappear when common genera are excluded from the analysis. © 2003 The Linnean Society of London*, Biological Journal of the Linnean Society*, 2003, **78,** 415–427.

ADDITIONAL KEYWORDS: evolutionary convergence – historical effects – mediterranean climate.

INTRODUCTION

The identification of common morphological, life-history and reproductive traits found among different plant species assemblages living under similar environmental conditions, have often been interpreted as a consequence of adaptive processes. However, with the inclusion of biogeographic and palaeontological thought into our understanding of the ways that different plant assemblages have been formed, ecologists are now aware that ecological patterns can also be the result of historical process derived from the dynamics of regional taxonomic assemblage, and/or from differential representation in regional species assemblages caused by differences in diversification rates of lineages (Herrera, 1992).

Vegetation from distant areas under a mediterranean climate shares common characteristics, such as sclerophylly, evergreeness and the ability to resprout after fire (Barbour & Minnich, 1990). These similarities in the characteristics of plant species living in such distant areas have been explained invoking an evolutionary convergence driven by the mediterranean climate, and by the high frequency of periodic fires (Mooney & Dunn, 1969; Cody & Mooney, 1978;

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but see Lloret *et al*., 1999; Verdú, 2000; Bond & Midgley, 2001).

However, the 'convergent' characteristics are paradoxically presented in tropical-like lineages that evolved in the Tertiary, before mediterranean climates appeared (Herrera, 1992; Verdú, 2000). These characters are associated with each other in the pre-mediterranean syndrome of Herrera (1992) which corresponds to sclerophyllous, vertebrate-dispersed, fleshy-fruited, large-seeded taxa that evolved in the Tertiary under a tropical climate. The other syndrome corresponds to taxa evolved in the Quaternary, under a mediterranean climate and corresponds to non-sclerophyllous, anemochorous, dry-fruited and small-seeded taxa.

Climates with summer rain and supporting tropical-like vegetation were broadly distributed in the Tertiary in many parts of the world, including the current mediterranean areas. With the general palaeoclimatic trend towards greater aridity, the mediterranean climate appeared in the Quaternary when summer precipitation decreased because the oceans became colder and the lands hotter (Axelrod, 1973; Suc, 1984). The change from tropical to mediterranean climate lead surviving taxa to seek refuge in today's current mediterranean areas (Axelrod, 1975). However, these areas were not the only zones where the tropical-like vegetation found refuge; tropical areas of Mexico were also suitable (Axelrod, 1973, 1975; Valiente-Banuet *et al*., 1998). Thus, sclerophyllous vegetation under tropical climate in Mexico (Mexical) has been recently described and has been considered as a relict of the Madro-Tertiary Geoflora with a patchy distribution along the different mountain chains of Mexico. The species that comprise this vegetation type have many similar characters to vegetation from mediterranean areas (Valiente-Banuet *et al*., 1998; Lloret *et al*., 1999). Mexical has not experienced a climatic transition from tropical to mediterranean climates because it has always been in a tropical climate. Mexical shares a tropical, Tertiary climatic history with mediterranean areas but not a Quaternary, mediterranean one (Raven, 1973; Rzedowski, 1978). Therefore, comparative analysis of vegetation across mediterranean regions may benefit from the inclusion of an outgroup like Mexical, that allows a comparison to be made between historical and convergence hypotheses (i.e. common history of Tertiary taxa vs. adaptations evolved under mediterranean climates in Quaternary taxa).

In this paper we test if the same syndromes described in a local flora from south-western Spain by Herrera (1992) are found in other mediterranean areas (California, Chile and another local Spanish flora), and if they can also be explained by the age of the lineages. Even though similar syndromes can be found among taxa from distant mediterranean areas, this similarity could represent historical processes, and may not be the result of mediterranean climates leading to evolutionary convergence. To test this possibility, Mexical was included as an outgroup to differentiate between historical and convergence hypotheses. If a mediterranean climate has been the selective process leading to evolutionary convergence, it is expected that Quaternary taxa from mediterranean areas will show a high degree of similarity, and be distinct from taxa of Mexical vegetation. If a common Tertiary climatic history is responsible of similarity among taxa from mediterranean areas, it is expected that Mexical Tertiary taxa will also display the same traits.

METHODS

Character syndromes were analysed for woody plants of three mediterranean-type ecosystems (California, Chile and Eastern Spain in the Mediterranean Basin), and the tropical ecosystem of Mexical as an outgroup. The other two mediterranean areas (Australia and South Africa) were excluded from this comparison because large differences between these two regions and other areas with mediterranean climates have previously been shown (i.e. soil nutrient status, evolutionary histories of the taxa and fire regime. Cowling & Witkowski, 1994).

Native genera with more than 50% of woody species living under a mediterranean climate were selected for the analyses. The number of genera selected in this way was 53 for California, 69 for Chile and 92 for Mediterranean Basin. The bibliographic sources used to do this selection were the CalFlora Database (http://www.calflora.org/) for California; Navas (1973–79) and Hoffmann (1985) for Chile; and Mateo & Crespo (1990) for Eastern Spain in the Mediterranean Basin. The same criterion, except that of living under a mediterranean climate, was used to select 64 genera from Mexical according to Flores-Hernández (1996) and Valiente-Banuet *et al*. (1998).

Following Herrera (1992), each genus was scored for 10 qualitative life history–reproductive traits: spinescence (spiny vs. non-spiny), leaf type (sclerophyllous leaves vs. leaves of different characteristics), habit (evergreen vs. winter or summer facultative deciduous), flower size (perianth depth × width <25 mm^2 vs. >25 mm^2), flower sexuality (hermaphroditic vs. unisexual flowers), perianth colour (brownish or greenish vs. a different colour), perianth reduction (perianth with at least one verticil absent or much reduced vs. complete perianth), pollinator type (wind pollination vs. insect pollination), seed size (seed length × width <2.25 mm^2 vs. >2.25 mm^2), and seed dispersal (animal dispersed vs. otherwise). Most of these characteristics, such as evergreeness, sclerophylly and spinescence, have been used as diagnostics of 'mediterraneity' (Specht, 1988; Cowling & Witkowski, 1994; Lloret *et al.*, 1999) and have been shown to be associated to other traits such as flower and seed size, seed dispersal and pollination systems (Herrera J., 1987; Herrera C.M., 1992; Hoffmann & Armesto 1995; Zedler, 1995; Keeley, 1998; Verdú, 2000).

The characteristics were scored for each genera according to Munz & Keck (1973), Thrower & Bradbury (1977), Rundel (1981), Arroyo, Armesto & Primack (1983), Rodriguez, Matthei, & Quezada (1983), Montenegro (1984), Herrera (1985, 1992), Hoffmann (1985), Specht (1988), Castroviejo, (1989–93), Hoffmann, Teillier & Fuentes (1989), Orshan (1989), Hoffmann & Armesto (1995), Montenegro & Ginocchio (1995), and also to field observations in Chile, Spain and Mexico, and herbarium inspections at MEXU (the Herbario Nacional de México). In cases in which the species within a genus had different traits, the genus was classified according to the trait presented in the greatest number of the congeneric species.

The age of the lineage of the taxa was determined as Tertiary or Quaternary on the basis of (1) the presence/absence of pre-Pliocene fossils of the genus, and/or (2) the presence/absence of geographical disjunction (Herrera, 1992). This palaentological and biogeographical information provide two independent lines of evidence regarding the age of the lineage (Herrera, 1992). Fossil presence data were obtained from Menendez (1971), Axelrod (1975, 1979), Romero (1978, 1986), Anzotegui & Lutz (1987), Palamarev (1989), Mai (1989), Van Campo (1989), Zhilin (1989), Axelrod, Arroyo & Raven (1991), Troncoso (1991), Herrera (1992), Arroyo *et al*. (1995), Villagrán (1995), Hinojosa & Villagrán (1997) and Villagrán & Hinojosa, (1997), and from palaeobotanical databases on the web (Plant Fossil Record Database from the International Organization of Palaeobotany at http://ibs.uel.ac.uk/palaeo/pfr2; The Museum of Palaeontology from University of California at http://www.ucmp.berkeley.edu/collections/plant.html; The Yale Peabody Museum collections at http://www.peabody.yale.edu/collections/pb; The gopher of the Smithsonian Natural Museum of Natural History at gopher://nmnhgoph.si.edu:70/77/.index/palaeotypes. The list of genera, character states, and the age of lineage is shown in the Appendix.

To test if similar life history–reproductive syndromes exists in each area, the same multivariate analysis as used by Herrera (1992) (a non-metric multidimensional scaling on a symmetrical similarity matrix with the Kruskal algorithm and a monotonic regression) was performed on the matrix of genera × characters for each area. The scores from the first dimension of this analysis were compared between Tertiary and Quaternary taxa to test if the age of the lineage significantly influenced the life history–reproductive syndromes. This was done using a *t*-test, with separate estimation of the variances when needed because of heterocedasticity.

To test if similarities among mediterranean taxa were due to a common Tertiary history, a discriminant analysis was performed on the matrix of the character syndromes of all the Tertiary taxa from mediterranean ecosystems (California, Chile, and Mediterranean Basin) and, subsequently, the analysis was repeated with the inclusion of the Tertiary taxa of the outgroup (Mexical). To test if similarities among mediterranean taxa were due to mediterranean climates leading to evolutionary convergence, a discriminant analysis was performed on the matrix containing all the Quaternary taxa from mediterranean ecosystems (California, Chile, and Mediterranean Basin) and, subsequently, the analysis was repeated with the inclusion of the Quaternary taxa of the outgroup (Mexical). To exclude the phylogenetic effect of common genera inhabiting several areas, the discriminant analyses were re-run without these genera.

RESULTS

CHARACTER SYNDROMES AND LINEAGE AGE

The first dimension of the non-metric multidimensional scaling (DIM1 in the Appendix) explained more than 81% of the variance in all the biogeographical areas. Genera were scored in a similar life-history reproductive gradient not only in the three mediterranean areas (CAL, CHI and MED) but also in the tropical area (MEX). At one end of this gradient were genera with evergreen sclerophyllous leaves, small, unisexual greenish or brownish wind pollinated flowers with a reduced perianth and large, endozoochorous seeds, and at the other were genera with the opposite characteristics.

The age of lineage significantly explained the score of the first dimension of the non-metric multidimensional scaling in the three mediterranean areas but not in the tropical area (Table 1). In the mediterranean areas, the evergreen sclerophyllous group was associated with lineages originated along the Tertiary, whereas the other group was associated to Quaternary origins.

SIMILARITIES AMONG TERTIARY TAXA

The discriminant analysis failed to discriminate the Tertiary taxa as a function of their biogeographical origin because no discriminant functions were significant (Wilks's lambda for the first discriminant

Table 1. Mean ± SE of the DIM1 (see Appendix) scores of genera originated in different ages. The last row shows the results of the *t*-test, degrees of freedom and *P* value associated to the null hypothesis that DIM1 does not differ between Tertiary and Quaternary taxa within each geographical area

	Geographical area			
Lineage age	California	Chile	Mediterranean	Mexical
Tertiary	−0.17 ± 0.15	0.18 ± 0.09	−0.24 ± 0.10	−0.05 ± 0.13
Quaternary	0.34 ± 0.09	−0.28 ± 0.17	−0.50 ± 0.09	0.13 ± 0.15
t; d.f; *P* value	2.8; 50.7; 0.007	−2.4; 41; 0.02	5.3; 83.8; <0.001	0.75; 62; 0.45

function $\lambda = 0.80$; $\chi^2 = 29.3$; d.f. = 20; $P > 0.05$). This analysis correctly classified about 52% of the Tertiary species from mediterranean areas (Table 2a). By including Tertiary taxa from the Mexical outgroup area, discrimination was not improved ($\lambda = 0.81$; $\chi^2 = 36.1$; d.f. = 30; $P > 0.05$) and, in contrast, the correctly classified cases decreased to 40% (Table 2b, Fig. 1a).

The wrong classification of Tertiary taxa across biogeographical regions may be the result of common genera inhabiting in all the areas because 22 genera are common to at least two mediterranean regions (3 to the three mediterranean regions, 13 to CAL and MED, 3 to CAL and CHI, and 3 to CHI and MED). After excluding these common genera, the discriminant analysis became significant ($\lambda = 0.67$; $\chi^2 = 34.1$; d.f. = 20; $P < 0.05$), and 59% of the taxa were correctly classified (Table 2a). When Mexical was subsequently included as an outgroup after excluding 31 genera common to MEX and any of the mediterranean regions, discrimination remained significant ($\lambda = 0.47$; $\chi^2 = 60.6$; d.f. = 30; $P < 0.01$) and the percentage of corrected classified cases was 56% (Table 2b).

SIMILARITIES AMONG QUARTERNARY TAXA

The discriminant analysis significantly discriminated the Quaternary taxa as a function of their biogeographical origin because the first discriminant function was significant ($\lambda = 0.48$; $\chi^2 = 48.9$; d.f. = 20; $P < 0.001$). The percentage of correctly classified Quaternary species from mediterranean areas was about 65% (Table 2c). By including Mexical Quaternary taxa, discrimination remained significant ($\lambda = 0.39$; $\chi^2 = 79.9$; d.f. = 30; $P < 0.001$) although the correctly classified cases decreased to 59% (Table 2d, Fig. 1b).

No Quaternary genus was present in more than one mediterranean area, and only three genera (*Yucca*, *Ageratina*, and *Krameria*) were common to MEX and other mediterranean areas. Therefore, taxonomic relatedness did not influence the results of the discriminant analyses described in the previous paragraph.

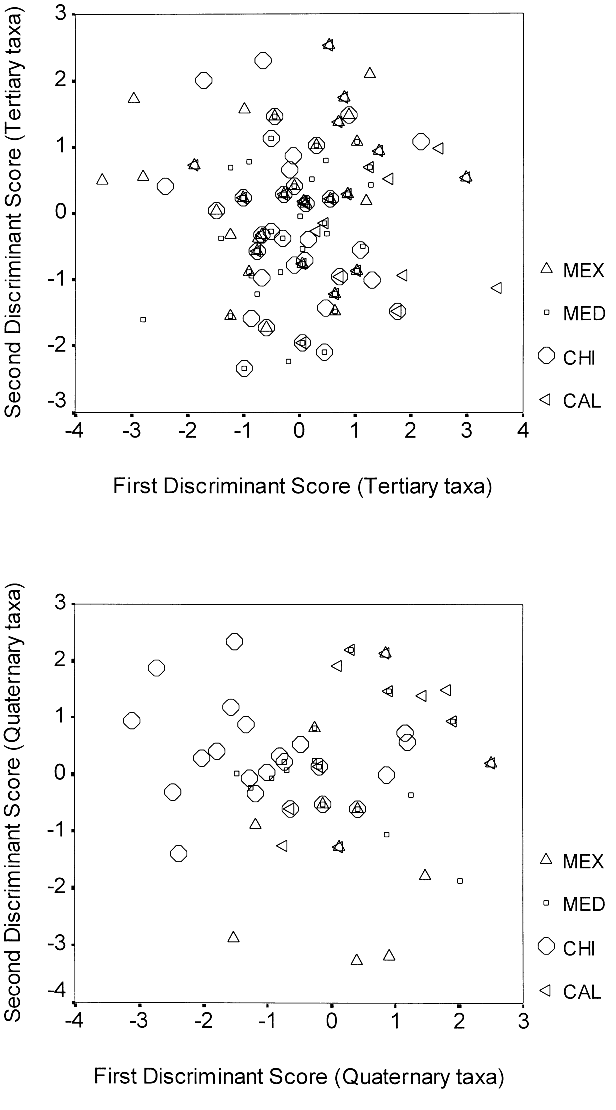

Figure 1. Ordination of the woody plant genera on the plane defined by the discriminant analysis on the matrix of character syndromes for (a) Tertiary and (b) Quaternary taxa from mediterranean and Mexical ecosystems.

Table 2. Results of the discriminant analysis that predicts the membership of taxa from different biogeographical origins on the basis of their character syndromes. The tables show the results for (a) Tertiary taxa from mediterranean ecosystems, (b) Tertiary taxa from mediterranean plus the outgroup (Mexical) ecosystems, (c) Quaternary taxa from mediterranean ecosystems, and (d) Quaternary taxa from mediterranean plus the outgroup (Mexical) ecosystems

(a) Predicted group membership for Tertiary taxa

		All genera included			Common genera excluded		
		CAL	CHI	MED	CAL	CHI	MED
Original	CAL	13	3	19	11	2	3
	CHI	4	10	28	2	14	17
	MED	4	8	50	3	11	29
		Correctly classified cases: 52%			Correctly classified cases: 59%		

(b) Predicted group membership for Tertiary taxa

		All genera included				Common genera excluded			
		CAL	CHI	MED	MEX	CAL	CHI	MED	MEX
Original	CAL	9	3	18	5	6	2	1	0
	CHI	3	8	22	9	1	10	13	2
	MED	4	8	41	9	2	6	26	4
	MEX	4	4	22	17	0	0	8	8
		Correctly classified cases: 40%				Correctly classified cases: 56%			

(c) Predicted group membership for Quaternary taxa

		All genera included		
		CAL	CHI	MED
Original	CAL	14	0	4
	CHI	2	13	12
	MED	3	5	22
		Correctly classified cases: 65%		

(d) Predicted group membership for Quaternary taxa

		All genera included			
		CAL	CHI	MED	MEX
Original	CAL	14	0	3	1
	CHI	3	12	12	0
	MED	3	5	19	3
	MEX	2	1	5	9
		Correctly classified cases: 59%			

DISCUSSION

Herrera (1992) analysed the covariation of life history–reproductive traits across woody genera of the south-western Spanish flora and found that the first axis of the multivariate analysis (DIM1) segregated two groups of genera with associated syndromes. The first group predominantly included genera with sclerophyllous, evergreen leaves, small, unisexual greenish or brownish flowers with a reduced perianth, and large seeds dispersed by animals. The second group included genera with the complementary character states.

Results of this study show that woody plants from other mediterranean floras (Eastern Spain, California and Chile) may also be classified following the same pattern described by Herrera (1992). However this similarity is not exclusive of mediterranean-type ecosystems because the same pattern has been found in a tropical, non-mediterranean community, the Mexical.

Historical processes may explain the existence of these syndromes in the south-western Spanish flora because the age of the lineage accounts for a significant amount of the intergeneric variation found in DIM1 (Herrera, 1992). The first group in DIM1 correspond predominantly to Tertiary (Pre-pliocene) taxa, evolved under a tropical-like climate, whereas the second group correspond to Quaternary (post-Pliocene) taxa evolved under a mediterranean climate. Results of this study show that the same correspondence between the age of the lineage and the DIM1 occurs in other mediterranean floras (Eastern Spain, California and Chile) but not in the Mexical. This feature agrees with the general model for explaining diversity of the mediterranean-climate regions based on the re-shuffling of genetic material in response to climatic change, the importance of refugia, and the coexistence of persistent lineages derived from Tertiary woody assemblages with neoendemics (Cowling *et al*., 1996). In the absence of climatic change from tropical to mediterranean climates, as is the case with the Tertiary–Quaternary transition in Mexical (Rzedowski, 1978), lineage age is not expected to be associated which plant character syndromes. This is the result found in this study. Similarly, Verdú *et al*. (2002) have shown that flowering phenology is associated to lineage age in the mediterranean floras but not in the Mexical.

For the mediterranean climate to be considered a selective pressure leading to convergent evolution in woody plants living in geographically disjunct places, it is expected that Quaternary taxa (those that evolved under a mediterranean climate) display structural and functional similarities. However, a discriminant analysis based on life history–reproductive traits significantly segregated the Quaternary taxa across California, Chile and the Mediterranean Basin. It suggests that evolution led to different association of characters in each mediterranean area. Other contemporary factors, such as regional processes (microclimatic differences, fire regimes and soil nutrient status), historical effects (phytogeographical relationships) and different diversification patterns of unique lineages, should be investigated to explain the divergence of the Quaternary mediterranean taxa (Cowling & Witkowski, 1994).

In contrast, the discriminant analysis failed to segregate Tertiary taxa from the mediterranean areas. These findings reveal that the similarities of the vegetation across mediterranean-type ecosystems are due to the long-term survival of old lineages which evolved under a tropical-like climate but not to the 'true-mediterranean' Quaternary taxa. This supports the hypothesis of Axelrod (1973, p. 273), who stated that 'inasmuch as mediterranean climate did not appear until after the Tertiary, the similarities in structure and function displayed by taxa of divergent origins in areas of mediterranean climate were not shaped by it.' Furthermore, when Tertiary taxa from Mexical were included in the discriminant analysis, they were not segregated from the rest of the mediterranean taxa, reinforcing the hypothesis that convergent traits of the sclerophyllous taxa were not shaped by a mediterranean climate but were already present when the mediterranean climate appeared.

Interestingly, the character similarities among the mediterranean Tertiary taxa disappear when common genera are excluded form the discriminant analysis, suggesting that a historical, non-adaptive process, like phylogenetic inertia, may also explain these similarities.

In summary, because similarities between taxa from different mediterranean areas arise in pre-mediterranean congeneric species and not in Quaternary 'true-mediterranean' species, we conclude that historical processes rather than the evolutionary convergence driven by the climate explain the similarities in the ecological attributes of the mediterranean floras.

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APPENDIX

Taxa from California (CAL), Chile (CHI), Mediterranean Basin (MED), and Mexical (MEX) considered in this study and their character states. SP, spinescence (1, spiny; 0, non-spiny); LT, leaf type (1, sclerophyllous; 0, non-sclerophyllous); HA, habit (1, winter or summer facultative deciduous; 0, evergreen); FS, flower size (1, perianth depth × width < 25 mm^2, 0, perianth depth × width > 25 mm^2); FSE, flower sexuality (1, unisexual flowers; 0, hermaphroditic flowers); PC, perianth colour (1, coloured; 0, brownish or greenish); PR, perianth reduction (1, perianth complete; 0, perianth with at least one verticil absent or much reduced); PT, pollinator type (1, insect pollination; 0, wind pollination); SS, seed size (1, seed length × width > 2.25 mm^2; 0, seed length × width < 2.25 mm^2); SD, seed dispersal (1, endozoochorous; 0, nonendozoochorous); AGE, occurrence of pre-Pliocene records and/or biogeographical disjunctions (1, occurrence; 0, absence); DIM1 and DIM2, coordinates on the first and second dimensions of the non-metric multidimensional scaling of the similarity matrix of life-history and reproductive characters.

Area	Genus	SP	LT	HA	FS	FSE	PC	PR	PT	SS	SD	AGE	DIM1	DIM2
CAL	*Acer*	0	0	1	0	1	1	1	1	1	0	1	0.204	–0.347
CAL	*Adenostoma*	0	1	0	1	0	1	1	1	0	0	0	–0.049	0.378
CAL	*Amelanchier*	0	0	1	0	0	1	1	1	0	1	1	0.938	–0.075
CAL	*Arctostaphylos*	0	1	0	0	0	1	1	1	1	1	1	0.183	0.508
CAL	*Atriplex*	0	0	1	1	1	0	0	0	0	0	1	–1.191	–1.792
CAL	*Baccharis*	0	0	0	1	1	1	1	0	0	0	1	–0.59	–0.874
CAL	*Berberis*	1	1	0	0	0	1	1	1	1	1	1	0.216	0.416
CAL	*Brickellia*	0	0	1	1	0	1	1	1	0	0	0	0.533	–0.385
CAL	*Ceanothus*	0	1	0	1	0	1	1	1	1	0	1	–0.029	0.188
CAL	*Cercis*	0	0	1	0	0	1	0	1	1	0	1	0.638	–0.913
CAL	*Cercocarpus*	0	1	0	1	0	1	1	1	0	0	1	–0.08	0.315
CAL	*Chamaebatia*	0	0	0	1	0	1	1	1	1	0	0	0.157	–0.067
CAL	*Chrysolepis*	0	1	0	1	1	0	0	0	1	0	1	–1.599	0.419

APPENDIX *Continued*

Area	Genus	SP	LT	HA	FS	FSE	PC	PR	PT	SS	SD	AGE	DIM1	DIM2
CAL	*Cneoridium*	0	0	0	0	0	1	1	1	1	1	0	0.6	0.522
CAL	*Cupressus*	0	1	0	1	1	0	0	0	1	1	1	–1.31	0.438
CAL	*Dendromecon*	0	1	0	1	0	1	1	1	1	0	0	–0.029	0.188
CAL	*Encelia*	0	0	1	1	0	1	1	1	1	0	0	0.283	–0.168
CAL	*Ephedra*	0	1	0	0	1	0	0	0	1	1	1	–1.561	0.994
CAL	*Ericameria*	0	0	1	0	0	0	1	1	0	0	0	1.273	–1.343
CAL	*Eriodictyon*	0	1	0	1	0	1	1	1	0	0	0	–0.043	0.337
CAL	*Forestiera*	1	1	1	0	0	0	1	1	1	1	1	0.29	0.563
CAL	*Fraxinus*	0	0	1	0	1	0	0	0	1	0	1	–1.682	–1.111
CAL	*Fremontia*	0	0	0	0	0	1	0	1	1	0	1	1.012	1.163
CAL	*Garrya*	0	1	0	1	1	1	0	0	1	1	1	–0.769	0.369
CAL	*Hazardia*	0	1	0	1	0	1	1	1	1	0	0	–0.029	0.188
CAL	*Helianthemum*	0	0	1	0	0	1	1	1	0	0	1	1.033	–0.65
CAL	*Heteromeles*	0	1	0	1	0	1	1	1	1	1	1	–0.023	0.239
CAL	*Holodiscus*	0	0	1	1	1	1	1	1	0	0	1	0.101	–0.527
CAL	*Hymenoclea*	0	1	0	1	0	1	1	0	1	0	0	–0.249	0.649
CAL	*Keckiella*	0	0	1	0	0	1	1	1	0	0	0	1.12	–0.511
CAL	*Lepechinia*	0	1	0	1	0	1	1	1	0	0	0	–0.1	0.113
CAL	*Leptodactylon*	0	0	1	1	0	1	1	1	0	0	0	0.572	–0.337
CAL	*Lonicera*	0	1	0	0	0	1	1	1	1	1	1	0.183	0.508
CAL	*Lycium*	1	0	1	0	0	1	1	1	1	1	1	0.49	0.102
CAL	*Lyonothamnus*	0	1	0	1	0	1	1	1	0	0	1	–0.061	0.283
CAL	*Malacothamnus*	0	0	0	1	0	1	1	1	0	0	0	0.818	–0.205
CAL	*Pickeringia*	1	0	1	1	0	1	1	1	1	0	0	0.307	–0.063
CAL	*Pinus*	0	1	0	1	1	0	0	0	1	0	1	–1.612	0.299
CAL	*Platanus*	0	0	1	1	1	0	0	0	0	0	1	–0.937	–1.905
CAL	*Prunus*	0	0	1	1	0	1	1	1	1	1	1	0.263	–0.002
CAL	*Pseudotsuga*	0	1	0	1	1	0	0	0	1	0	1	–1.581	0.182
CAL	*Purshia*	0	0	1	1	0	1	1	1	1	0	0	0.283	–0.168
CAL	*Quercus*	0	1	0	1	1	0	0	0	1	0	1	–1.601	0.067
CAL	*Rhamnus*	1	1	0	1	1	0	0	1	1	1	1	–0.655	0.382
CAL	*Rhus*	0	1	0	1	1	1	0	1	1	1	1	–0.451	0.281
CAL	*Ribes*	0	0	0	1	0	1	1	1	1	1	1	0.255	0.225
CAL	*Rosa*	1	0	1	0	0	1	1	1	1	1	1	0.49	0.102
CAL	*Rubus*	1	0	1	0	0	1	1	1	1	1	1	0.49	0.102
CAL	*Salvia*	0	0	0	0	0	1	1	1	0	0	1	1.544	0.04
CAL	*Tetradymia*	0	0	1	1	0	1	1	1	1	0	0	0.283	–0.168
CAL	*Viburnum*	0	0	1	0	0	1	1	1	1	1	1	0.521	0.064
CAL	*Viguiera*	0	0	0	0	0	1	1	1	1	0	1	0.829	0.44
CAL	*Yucca*	1	1	0	0	0	1	1	1	1	0	0	0.322	0.544
CHI	*Abutilon*	0	0	0	0	0	1	1	1	1	0	1	–0.447	0.579
CHI	*Acacia*	1	0	1	1	0	1	1	1	1	0	1	0.045	–0.022
CHI	*Ageratina*	0	0	1	0	0	1	1	1	0	0	0	–1.098	–0.503
CHI	*Anisomeria*	0	0	0	1	0	0	0	1	1	1	0	1.137	–0.678
CHI	*Aristeguietia*	0	0	1	0	0	1	1	1	0	0	1	–0.681	–0.202
CHI	*Aristotelia*	0	0	1	1	1	0	1	1	1	1	1	0.386	0.041
CHI	*Avellanita*	0	0	0	0	1	0	0	1	0	0	0	0.158	–2.324
CHI	*Azara*	0	1	0	0	0	1	0	1	0	1	1	0.382	0.753
CHI	*Baccharis*	0	0	0	1	1	1	1	0	0	0	1	0.124	1.017
CHI	*Beilschmiedia*	0	1	0	1	0	0	0	1	1	0	1	0.797	0.562
CHI	*Berberis*	1	1	0	0	0	1	1	1	1	1	1	0.119	0.209
CHI	*Buddleja*	0	0	0	0	0	1	1	1	0	1	1	–0.514	0.39
CHI	*Cestrum*	0	0	0	0	0	1	1	1	1	1	0	–0.352	–0.165
CHI	*Cissus*	0	0	0	1	0	0	1	1	1	1	1	0.47	0.134

APPENDIX *Continued*

Area	Genus	SP	LT	HA	FS	FSE	PC	PR	PT	SS	SD	AGE	DIM1	DIM2
CHI	*Colletia*	1	0	1	1	0	1	0	1	0	0	0	–0.18	–1.139
CHI	*Colliguaja*	0	1	1	1	1	0	0	0	1	0	1	1.446	0.187
CHI	*Crinodendron*	0	1	0	0	0	1	1	1	1	0	1	0.015	0.455
CHI	*Cryptocarya*	0	1	0	1	0	0	0	1	1	1	1	0.717	0.199
CHI	*Cynanchum*	0	0	0	0	0	1	1	1	0	0	1	–0.811	0.842
CHI	*Discaria*	1	0	1	1	0	0	0	1	0	1	1	0.586	–0.757
CHI	*Drimys*	0	1	0	0	0	1	1	1	1	1	1	0.11	0.345
CHI	*Eccremocarpus*	0	0	0	0	0	1	1	1	1	0	0	–0.874	0.259
CHI	*Ephedra*	0	1	0	0	1	0	0	0	1	1	1	1.031	0.861
CHI	*Ercilla*	0	0	0	1	0	0	0	1	0	1	0	1.213	–1.377
CHI	*Escallonia*	0	1	0	0	0	1	1	1	0	0	1	–0.189	0.693
CHI	*Fabiana*	0	0	0	0	0	1	1	1	0	0	0	–1.524	0.275
CHI	*Flourensia*	0	0	1	0	0	1	1	1	1	0	0	–0.551	–0.374
CHI	*Fuchsia*	0	0	1	0	0	1	1	1	0	1	1	–0.404	–0.019
CHI	*Gochnatia*	0	1	0	1	0	0	1	1	0	0	1	0.626	–0.229
CHI	*Guindilia*	0	0	1	1	0	0	1	1	1	0	0	0.25	–0.662
CHI	*Haplopappus*	0	0	0	0	0	1	1	1	0	0	0	–1.504	–0.202
CHI	*Kageneckia*	0	1	0	0	1	1	1	0	1	0	1	0.238	0.811
CHI	*Krameria*	0	0	0	0	0	1	1	1	1	0	0	–0.815	0.53
CHI	*Lapageria*	0	0	0	0	0	1	0	1	1	1	1	0.326	0.606
CHI	*Larrea*	1	0	1	0	0	1	1	0	0	1	0	–0.756	–0.843
CHI	*Lithraea*	0	1	0	1	1	0	1	0	1	1	1	0.704	0.393
CHI	*Llagunoa*	0	1	0	0	1	0	0	0	1	0	1	1.561	1.142
CHI	*Luma*	0	1	0	0	0	1	1	1	1	1	1	0.088	0.342
CHI	*Lycium*	1	0	0	0	0	1	1	1	0	1	1	–0.085	0.151
CHI	*Margyricarpus*	1	0	0	1	0	0	0	1	0	1	0	0.806	–1.403
CHI	*Maytenus*	0	0	0	1	1	0	1	0	1	1	1	0.77	0.35
CHI	*Muehlenbeckia*	0	0	0	1	1	0	0	0	1	1	1	1.181	0.508
CHI	*Mutisia*	1	0	1	0	1	1	1	1	1	0	0	–0.262	–0.351
CHI	*Myoschilos*	0	0	1	1	0	0	0	0	1	1	0	1.728	–0.649
CHI	*Ophryosporus*	0	0	0	0	0	1	1	1	0	0	0	–1.428	–0.222
CHI	*Otholobium*	0	0	0	0	0	1	1	1	1	0	1	–0.882	0.434
CHI	*Persea*	0	1	0	0	0	0	0	1	1	1	1	0.71	0.607
CHI	*Peumus*	0	1	0	0	1	0	0	1	1	1	1	1.012	0.331
CHI	*Podanthus*	0	0	1	0	1	1	0	1	0	0	0	–0.977	–1.147
CHI	*Porlieria*	1	1	0	1	0	1	1	1	1	0	0	0.137	0.014
CHI	*Prosopis*	1	0	1	0	0	1	1	1	1	0	1	–0.09	0.027
CHI	*Proustia*	1	0	1	0	0	1	1	1	0	0	1	–0.207	0.031
CHI	*Puya*	1	0	0	0	0	1	0	1	1	0	0	–0.432	–1.076
CHI	*Quillaja*	0	1	0	0	0	1	1	1	1	0	1	0.018	0.444
CHI	*Retanilla*	1	1	1	1	0	1	1	1	1	1	0	0.11	–0.202
CHI	*Ribes*	0	0	0	1	0	1	1	1	1	1	1	0.162	0.172
CHI	*Satureja*	0	0	1	0	0	1	1	1	0	0	1	–0.773	–0.152
CHI	*Schinus*	1	1	0	1	1	0	1	0	1	1	1	0.61	0.235
CHI	*Senna*	0	0	1	0	0	1	1	1	1	0	1	–0.154	0.2
CHI	*Solanum*	0	0	0	0	0	1	1	1	0	1	1	–0.181	0.433
CHI	*Sophora*	0	0	0	0	0	1	1	1	1	0	1	–0.152	0.494
CHI	*Sphaeralcea*	0	0	0	0	0	1	1	1	0	0	0	–1.528	0.054
CHI	*Talguenea*	1	0	1	1	0	0	1	1	1	0	0	0.117	–0.688
CHI	*Tessaria*	0	0	0	0	1	1	1	1	0	0	0	–1.286	0.378
CHI	*Tetraglochin*	1	0	0	1	0	0	0	1	1	0	0	0.804	–1.076
CHI	*Teucrium*	0	0	1	0	0	1	1	1	0	0	1	–0.775	–0.075
CHI	*Trevoa*	1	0	1	1	0	0	1	1	0	1	0	0.275	–0.808
CHI	*Viguiera*	0	0	0	0	0	1	1	1	1	0	1	–0.145	0.526

APPENDIX *Continued*

Area	Genus	SP	LT	HA	FS	FSE	PC	PR	PT	SS	SD	AGE	DIM1	DIM2
CHI	*Viviania*	0	0	0	0	0	1	1	1	1	0	0	–0.909	0.33
MED	*Acer*	0	0	1	0	1	1	1	1	1	0	1	0.205	0.249
MED	*Amelanchier*	0	0	1	0	0	1	1	1	1	1	1	0.165	0.34
MED	*Andrachne*	0	0	0	1	1	0	0	1	0	0	1	–0.967	–1.456
MED	*Anthyllis*	0	0	1	0	0	1	1	1	1	0	0	0.393	0.491
MED	*Arbutus*	0	1	0	0	0	1	1	1	1	1	1	–0.082	0.016
MED	*Arctostaphylos*	0	1	0	0	0	1	1	1	1	1	1	–0.081	0.006
MED	*Argyrolobium*	0	0	0	0	0	1	1	1	0	0	0	1.407	–0.059
MED	*Artemisia*	0	0	0	1	1	0	1	0	0	0	1	–0.572	–1.759
MED	*Asparagus*	1	0	0	0	1	0	1	1	1	1	1	–0.414	0.206
MED	*Berberis*	1	0	1	0	0	1	1	1	1	1	1	0.099	0.253
MED	*Buxus*	0	1	0	1	1	0	0	0	0	0	1	–1.826	–1.275
MED	*Calicotome*	1	0	0	0	0	1	1	1	1	0	0	0.336	0.147
MED	*Calluna*	0	0	0	0	0	1	1	0	0	0	1	1.363	–1.371
MED	*Capparis*	1	0	0	0	0	1	1	1	0	1	1	0.377	–0.328
MED	*Chamaerops*	1	1	0	1	1	0	0	1	1	1	1	–0.821	–0.067
MED	*Cistus*	0	0	1	0	0	1	1	1	0	0	0	1	0.395
MED	*Clematis*	0	0	1	0	0	0	0	1	1	0	1	–0.053	1.419
MED	*Colutea*	0	0	1	0	0	1	1	1	1	0	1	0.47	0.456
MED	*Corema*	0	0	0	1	1	0	0	0	1	1	1	–1.702	–0.139
MED	*Coriaria*	0	1	0	1	1	0	1	0	1	1	1	–0.863	–0.267
MED	*Coris*	1	0	0	0	0	1	1	1	1	0	1	0.345	0.122
MED	*Coronilla*	0	0	0	0	0	1	1	1	1	0	0	0.599	–0.035
MED	*Crataegus*	1	0	1	0	0	1	1	1	1	1	1	0.098	0.249
MED	*Cynanchum*	0	1	0	0	0	1	1	1	1	0	1	0.127	–0.081
MED	*Cytisus*	0	0	1	0	0	1	1	1	1	0	1	0.418	0.453
MED	*Daphne*	0	1	0	0	0	1	1	1	1	1	1	–0.087	0.025
MED	*Dianthus*	0	0	0	0	0	1	1	1	0	0	0	1.297	–0.469
MED	*Dictamnus*	0	0	0	0	0	1	1	1	1	0	1	0.63	0.231
MED	*Digitalis*	0	1	0	0	0	1	1	1	0	0	0	0.536	–0.544
MED	*Dorycnium*	0	0	0	0	0	1	1	1	1	0	0	0.592	0.18
MED	*Ephedra*	0	1	0	0	1	0	0	0	1	1	1	–1.509	0.302
MED	*Erica*	0	0	0	0	0	1	1	1	0	0	1	1.095	–0.716
MED	*Erinacea*	1	0	1	0	0	1	1	1	1	0	0	0.299	0.384
MED	*Fagonia*	1	0	1	0	0	1	1	1	1	0	1	0.299	0.384
MED	*Fraxinus*	0	0	1	0	1	0	0	0	1	0	1	–1.364	1.313
MED	*Fumana*	0	0	1	0	0	1	1	1	1	0	0	0.435	0.483
MED	*Genista*	1	0	1	0	0	1	1	1	1	0	1	0.293	0.398
MED	*Globularia*	0	1	0	1	0	1	1	1	0	0	0	0.104	–0.66
MED	*Gypsofila*	0	0	0	0	0	1	1	1	0	0	0	1.363	–0.274
MED	*Halimium*	0	0	1	0	0	1	1	1	0	0	0	0.968	0.461
MED	*Haplophyllum*	0	0	0	0	0	1	1	1	1	0	0	0.692	–0.071
MED	*Hedera*	0	1	0	1	0	0	0	1	1	1	1	–0.928	–0.073
MED	*Helianthemum*	0	0	1	0	0	1	1	1	0	0	1	0.927	0.526
MED	*Helichrysum*	0	0	0	1	0	1	1	1	0	0	0	0.489	–0.917
MED	*Ilex*	1	1	0	0	1	0	0	1	1	1	1	–0.821	0.17
MED	*Jasminum*	0	0	0	0	0	1	1	1	1	1	1	0.091	0.127
MED	*Juniperus*	1	1	0	1	1	0	0	0	1	1	1	–1.283	–0.044
MED	*Laurus*	0	1	0	0	1	0	0	1	1	1	1	–0.939	0.151
MED	*Lavandula*	0	0	1	0	0	1	1	1	0	0	0	1.02	0.331
MED	*Lavatera*	0	0	0	0	0	1	1	1	1	0	1	0.691	0.051
MED	*Ligustrum*	0	1	1	0	0	1	1	1	1	1	1	0.013	0.175
MED	*Lithodora*	0	0	0	0	0	1	1	1	1	0	0	0.495	–0.096
MED	*Lonicera*	0	0	1	0	0	1	1	1	1	1	1	0.177	0.335

APPENDIX *Continued*

Area	Genus	SP	LT	HA	FS	FSE	PC	PR	PT	SS	SD	AGE	DIM1	DIM2
MED	*Lycium*	1	0	1	0	0	1	1	1	1	1	1	0.101	0.241
MED	*Myrtus*	0	1	0	0	0	1	1	1	1	1	1	–0.085	0.04
MED	*Nerium*	0	1	0	0	0	1	1	1	1	0	1	0.088	–0.06
MED	*Olea*	0	1	0	1	0	0	0	0	1	1	1	–1.564	0.029
MED	*Osyris*	0	1	0	1	1	0	0	1	1	1	1	–0.89	–0.174
MED	*Peganum*	0	0	0	0	0	1	1	1	0	0	1	1.312	–0.005
MED	*Phagnalon*	0	0	0	1	0	0	1	1	0	0	0	0.092	–1.431
MED	*Phillyrea*	0	1	0	1	1	0	0	0	1	1	1	–1.376	–0.227
MED	*Phlomis*	0	0	0	0	0	1	1	1	1	0	0	0.464	0.002
MED	*Pinus*	0	1	0	1	1	0	0	0	1	0	1	–1.597	–0.53
MED	*Pistacia*	0	1	0	1	1	0	0	0	1	1	1	–1.387	–0.166
MED	*Prunus*	0	0	1	0	0	1	1	1	1	1	1	0.174	0.349
MED	*Quercus*	1	1	0	1	1	0	0	0	1	0	1	–1.406	–0.446
MED	*Retama*	0	1	1	0	0	1	1	1	1	0	0	0.23	0.264
MED	*Rhamnus*	1	1	0	1	1	0	0	1	1	1	1	–0.82	–0.072
MED	*Rosa*	1	0	1	0	0	1	1	1	1	1	1	0.102	0.245
MED	*Rosmarinus*	0	0	0	0	0	1	1	1	1	0	0	0.482	0.118
MED	*Rubia*	0	1	0	1	0	0	0	1	1	1	1	–0.911	–0.134
MED	*Rubus*	1	0	0	0	0	1	1	1	1	1	1	–0.009	0.165
MED	*Ruscus*	1	1	0	1	1	0	1	1	1	1	1	–0.561	–0.065
MED	*Ruta*	0	0	0	0	0	1	1	1	1	0	1	0.517	0.192
MED	*Salsola*	0	0	1	0	0	0	0	0	1	0	1	–0.95	1.907
MED	*Santolina*	0	0	0	1	0	1	1	1	0	0	1	0.403	–0.913
MED	*Satureja*	0	0	0	0	0	1	1	1	0	0	1	1.128	–0.29
MED	*Sideritis*	0	0	0	0	0	1	1	1	0	0	0	0.953	–0.827
MED	*Smilax*	1	1	0	1	1	1	1	1	1	1	1	–0.291	–0.053
MED	*Sorbus*	0	0	1	0	0	1	1	1	1	1	1	0.169	0.325
MED	*Spartium*	0	0	1	0	0	1	1	1	1	0	0	0.466	0.426
MED	*Staehelina*	0	0	0	1	0	1	1	1	1	0	0	0.138	–0.263
MED	*Tamus*	0	0	0	1	1	0	0	1	1	1	0	–1.083	–0.172
MED	*Taxus*	1	1	0	1	1	0	0	0	1	1	1	–1.282	–0.06
MED	*Teucrium*	0	0	0	0	0	1	1	1	0	0	1	1.096	–0.63
MED	*Thymelea*	0	1	0	1	1	0	1	1	0	0	0	–0.577	–0.803
MED	*Thymus*	0	0	1	0	1	1	1	1	0	0	0	0.697	–0.283
MED	*Ulex*	1	0	1	0	0	1	1	1	1	0	0	0.305	0.368
MED	*Ulmus*	0	0	1	0	0	0	0	0	1	0	1	–0.517	2.122
MED	*Vella*	1	0	0	0	0	1	1	1	1	0	0	0.331	0.057
MED	*Viburnum*	0	1	0	0	0	1	1	1	1	1	1	–0.08	0.03
MED	*Withania*	0	0	1	0	0	1	1	1	0	1	0	0.545	0.596
MEX	*Acacia*	1	0	1	1	0	1	1	1	1	0	1	0.252	–0.292
MEX	*Actinocheita*	0	0	1	0	1	1	0	1	1	1	0	–0.366	–0.633
MEX	*Ageratina*	0	0	1	1	0	1	1	1	0	0	0	0.823	–0.699
MEX	*Amelanchier*	0	1	1	0	0	1	1	1	1	1	1	0.006	–0.059
MEX	*Arbutus*	0	1	0	0	0	1	1	1	1	1	1	–0.015	0.140
MEX	*Arctostaphylos*	0	1	0	0	0	1	1	1	1	1	1	–0.015	0.140
MEX	*Baccharis*	0	0	0	1	1	1	1	1	0	0	1	0.466	–0.909
MEX	*Berberis*	1	1	0	0	0	1	1	1	1	1	1	–0.12	0.032
MEX	*Bouvardia*	0	0	1	0	0	1	1	1	1	0	0	0.568	–0.339
MEX	*Brahea*	0	1	0	0	0	0	1	1	1	1	0	–0.484	0.381
MEX	*Buddleja*	0	0	0	0	0	1	1	1	0	1	1	0.958	0.577
MEX	*Bumelia*	0	1	0	0	0	0	1	1	1	0	1	–0.195	1.052
MEX	*Bursera*	0	0	1	0	0	0	0	1	1	1	1	–0.499	–1.259
MEX	*Ceanothus*	0	1	0	1	0	1	1	1	1	0	1	–0.02	0.202
MEX	*Cercocarpus*	0	1	0	1	0	1	1	1	0	0	1	0.411	0.619

APPENDIX *Continued*

Area	Genus	SP	LT	HA	FS	FSE	PC	PR	PT	SS	SD	AGE	DIM1	DIM2
MEX	*Choisya*	0	1	0	0	0	1	1	1	1	0	0	0.059	0.420
MEX	*Citharexylum*	0	1	0	0	0	0	1	1	1	1	0	–0.487	0.428
MEX	*Coutaportla*	0	1	0	0	0	1	1	1	1	0	0	0.061	0.358
MEX	*Croton*	0	0	0	0	1	0	0	1	1	0	1	–1.354	–1.125
MEX	*Dalea*	0	0	0	0	0	1	1	1	1	0	1	0.789	0.006
MEX	*Dasylirion*	1	1	0	0	1	0	0	1	1	0	0	–1.213	–0.249
MEX	*Dodonaea*	0	0	0	0	0	0	1	1	1	0	1	1.284	0.515
MEX	*Forestiera*	1	1	1	0	0	0	1	1	1	1	1	–0.295	–0.075
MEX	*Fraxinus*	0	0	1	0	1	0	0	0	1	0	1	–1.142	–2.174
MEX	*Garrya*	0	1	0	1	1	0	0	0	1	1	1	–1.618	0.233
MEX	*Gochnatia*	0	1	0	1	0	1	1	1	0	0	1	0.398	0.634
MEX	*Gymnosperma*	0	0	0	1	0	0	1	1	0	0	0	1.23	1.271
MEX	*Havardia*	1	0	1	0	0	1	1	1	1	1	1	0.119	–0.242
MEX	*Helianthemum*	0	0	1	0	0	1	1	1	0	0	1	1.257	–0.76
MEX	*Heteromeles*	0	1	0	1	0	1	1	1	1	1	1	–0.152	0.075
MEX	*Ilex*	1	1	0	0	1	0	0	1	1	1	1	–0.992	0.072
MEX	*Juniperus*	1	1	0	1	1	0	0	0	1	1	1	–1.508	0.138
MEX	*Karwinskia*	0	1	0	0	0	0	1	1	1	1	1	–0.453	0.437
MEX	*Krameria*	0	0	0	0	0	1	1	1	1	0	0	0.895	–0.124
MEX	*Lamourouxia*	0	0	1	0	0	1	1	1	1	0	0	0.565	–0.383
MEX	*Leucaena*	0	0	1	1	0	1	1	1	1	0	1	0.349	–0.317
MEX	*Leucophyllum*	0	0	0	0	0	1	1	1	1	0	0	0.596	0.055
MEX	*Lindleya*	0	1	0	0	0	1	1	1	1	0	0	0.147	0.331
MEX	*Litsea*	0	1	0	0	0	0	1	1	1	0	1	–0.304	1.007
MEX	*Mimosa*	1	0	1	0	0	1	1	1	1	0	1	0.401	–0.315
MEX	*Mortonia*	0	1	0	0	0	1	1	1	1	0	0	0.114	0.366
MEX	*Myrtus*	0	1	0	0	0	1	1	1	1	1	1	–0.015	0.14
MEX	*Nolina*	0	1	0	0	0	0	1	1	1	0	0	–0.343	0.907
MEX	*Persea*	0	1	0	0	0	0	0	1	1	1	1	–0.943	0.697
MEX	*Phyllantus*	0	0	1	0	0	1	1	1	1	0	1	0.536	–0.400
MEX	*Pinus*	0	1	0	1	1	0	0	0	1	0	1	–1.992	0.032
MEX	*Pistacia*	0	1	0	1	1	0	0	0	1	1	1	–1.611	0.28
MEX	*Prosopis*	1	0	1	0	0	1	1	1	1	0	1	0	–0.315
MEX	*Prunus*	0	0	1	1	0	1	1	1	1	1	1	0.133	–0.24
MEX	*Pterostemon*	0	1	0	1	0	1	1	1	1	0	0	–0.02	0.202
MEX	*Quercus*	0	1	0	1	1	0	0	0	1	0	1	–1.991	0.240
MEX	*Randia*	1	0	0	0	0	1	1	1	1	1	1	0.093	–0.141
MEX	*Rhamnus*	1	1	0	1	1	0	0	1	1	1	1	–0.917	0.064
MEX	*Rhus*	0	1	0	1	1	1	0	1	1	1	1	–0.638	0.017
MEX	*Ribes*	0	0	0	1	0	1	1	1	1	1	1	0.082	–0.054
MEX	*Salvia*	0	0	0	0	0	1	1	1	0	0	1	1.655	–0.242
MEX	*Satureja*	0	0	0	0	0	1	1	1	0	0	1	1.702	0.159
MEX	*Senna*	0	0	1	0	0	1	1	1	1	0	1	0.621	–0.347
MEX	*Sophora*	0	1	0	0	0	1	1	1	1	0	1	0.127	0.442
MEX	*Stevia*	0	0	1	1	0	0	1	1	0	0	1	0.907	–1.237
MEX	*Tecoma*	0	0	1	0	0	1	1	1	1	0	1	0.608	–0.380
MEX	*Vauquelinia*	0	1	0	0	0	1	1	1	1	0	1	0.088	0.455
MEX	*Xerospirea*	0	0	0	0	0	1	1	1	1	0	1	0.945	–0.037
MEX	*Yucca*	1	1	0	0	0	1	1	1	1	0	0	0.053	0.223