

# Phylogenetic Distance

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### 0.1 Phylogenetic Distance/Separation

This code contains the functions for calculating the phylogenetic separation as counts of nodes from any given taxon to a target taxon in a phylogenetic tree. The resulting output is a matrix that contains a column with the node count from the target taxon. This is very useful when comparing how closely related any given taxon is to the target taxon in the tree.

### 0.2 Descendant List Function

First define a function to recursively collect descendants of a node. This is used by the 'degreeofsep' function later on.

```
1 # function to recursively collect descendants of node; is used by degreeofsep
  ↪ function
2
3 descendantlist <- function(thistree, thisnode)
4 {
5   if (thisnode <= length(thistree$tip.label))
6   {
7     return (thisnode)
8   }
9   else
10  {
11    wherenext <- which(thistree$edge[,1]==thisnode) # get immediate descendants
12    thislist <- NULL
13    for (x in 1:length(wherenext))
14    {
15      thislist <- c(thislist, descendantlist(thistree,
  ↪    thistree$edge[wherenext[x],2]))
```

```

16     }
17     return(thislist)
18   }
19 }

```

### 0.3 Degree Of Separation Function

```

1  # function to calculate degrees of phylogenetic separation between tree tips
2  # results are in contrast to phylogenetic distances, asymmetric
3  # read resulting matrix line-wise: line shows degrees of separation of taxa in
   ↪ columns, from the target taxon
4
5  degreesofsep <- function(thistree)
6  {
7    dosmatrix <- matrix(0, nrow=length(thistree$tip.label),
   ↪ ncol=length(thistree$tip.label))
8    colnames(dosmatrix) <- thistree$tip.label
9    rownames(dosmatrix) <- thistree$tip.label
10   for (x in 1:length(thistree$tip.label))
11   {
12     prior_y <- x           # start at present terminal
13     y <- thistree$edge[which(thistree$edge[,2]==x),1] # get immediately ancestral
   ↪ node
14     currentdist <- 0
15     while (y != (length(thistree$tip.label)+1)) # move downtree until root node is
   ↪ found
16     {
17       currentdesc <- which(thistree$edge[,1]==y)
18       for (z in 1:length(currentdesc))
19       {
20         if (thistree$edge[currentdesc[z],2]!=prior_y)
21         {
22           dosmatrix[x,descendantlist(thistree,thistree$edge[currentdesc[z],2])] <-
   ↪ currentdist
23         }
24       }
25       prior_y <- y
26       y <- thistree$edge[which(thistree$edge[,2]==y),1] # get immediately
   ↪ ancestral node
27       currentdist <- currentdist + 1
28     }
29     currentdesc <- which(thistree$edge[,1]==y)
30     for (z in 1:length(currentdesc))
31     {
32       if (thistree$edge[currentdesc[z],2]!=prior_y)
33       {
34         dosmatrix[x,descendantlist(thistree,thistree$edge[currentdesc[z],2])] <-
   ↪ currentdist

```

```

35     }
36   }
37 }
38 return(dosmatrix)
39 }

```

## 0.4 User Input Variables

Specify the inputs and outputs for use in the script

```

1 # the tree to use
2 treeFileName <- "astereae_concatenated.tre"
3 # a list of taxa in the outgroup
4 taxonListForOutgroup <- c("Dimorphotheca_pluvialis", "Ewartia_nubigena",
5   ↪ "Abrotanella_nivigena", "Cotula_coronopifolia")
6 # the target taxon to calculate the distances/separation from
7 myTargetTaxon <- "Erigeron_bonariensis"
8 # the output file name to use
9 outputFile <- "phylodists_Erigeron_bonariensis.tsv"

```

## 0.5 Example Usage

```

1 # load libraries
2 library(ape)
3 library(ade4)

```

Loading required package: ade4

```

1 # read phylogenetic tree
2 mytree <- ape::read.tree(treeFileName)
3
4 # call the get Most Recent Common Ancestors (MRCA)
5 myOG <- getMRCA(mytree, taxonListForOutgroup)
6 #root the tree based on the MRCA results
7 mytree <- root(mytree, node = myOG)
8
9 # infer matrix of pairwise patristic distances between all terminals
10 # this takes quite some time for larger trees
11
12 myPatristic <- distTips(mytree)
13 myPatristicM <- as.matrix(myPatristic)
14 myPatristicMordered <- myPatristicM[order(rownames(myPatristicM)),
15   ↪ order(rownames(myPatristicM))]
16 #write.matrix(myPatristicMordered, file="patristicdists.tsv", sep="\t")

```

```

17 # now calculate degrees of separation, i.e. counting nodes between any terminal and
    ↳ its ancestral lineage splits
18 # this will take quite some time for larger trees
19
20 myDegsep <- degreesofsep(mytree)
21 myDegsep <- myDegsep[order(row.names(myDegsep)),order(row.names(myDegsep))]
22 #write.matrix(myDegsep, file="degsep.tsv", sep="\t")
23
24 # make data frame for one target species with both its degrees of separation and
    ↳ patristic distances
25 targetTaxon <- myTargetTaxon
26
27 Terminal <- row.names(myDegsep)
28
29 Degsep <- myDegsep[which(row.names(myDegsep)==targetTaxon),]
30
31 PatristicDist <- myPatristicMordered[which(row.names(myPatristicMordered) ==
    targetTaxon),]
32
33
34 PhyloDists <- data.frame(Terminal[order(PatristicDist)],
    Degsep[order(PatristicDist)],
    PatristicDist[order(PatristicDist)])
35
36
37
38 write.table(PhyloDists, file=outputFileName, sep="\t")
39
40 knitr::kable(PhyloDists)

```

	Terminal.order.PatristicDist.Degsep.order.PatristicDistPatristicDist.order.PatristicDist..		
Erigeron_bonariensis	Erigeron_bonariensis	0	0.0000000
Erigeron_sumatrensis	Erigeron_sumatrensis	0	0.0261555
Erigeron_bilbaoanus	Erigeron_bilbaoanus	1	0.0291839
Erigeron_canadensis	Erigeron_canadensis	1	0.0330095
Erigeron_primulifolius	Erigeron_primulifolius	3	0.0375416
Erigeron_conyzoides	Erigeron_conyzoides	2	0.0404355
Erigeron_karvinskianus	Erigeron_karvinskianus	2	0.0408097
Olearia_imbricata	Olearia_imbricata	7	0.0543982
Calotis_squamigera	Calotis_squamigera	7	0.0550798
Pappochroma_setosus	Pappochroma_setosus	7	0.0555396
Olearia_laciniifolia	Olearia_laciniifolia	7	0.0559845
Baccharis_pingraea	Baccharis_pingraea	5	0.0562133
Iotasperma_sessilifolium	Iotasperma_sessilifolium	7	0.0564643
Baccharis_halimifolia	Baccharis_halimifolia	5	0.0567125
Tetramolopium_sp_Mt_Bowen	Tetramolopium_sp_Mt_Bowen	7	0.0576629
Dichromochlamys_dentatifolia	Dichromochlamys_dentatifolia	7	0.0583778
Pappochroma_paludicola	Pappochroma_paludicola	7	0.0588579
Lagenophora_stipitata	Lagenophora_stipitata	7	0.0590056
Olearia_elaeophila	Olearia_elaeophila	7	0.0590869
Solidago_canadensis	Solidago_canadensis	4	0.0592591
Olearia_ramulosa	Olearia_ramulosa	7	0.0592983

	Terminal.order.PatristicDist.Degsep.order.PatristicDist	PatristicDist.order.PatristicDist..
Olearia_muricata	Olearia_muricata	7 0.0593151
Pappochroma_nitidus	Pappochroma_nitidus	7 0.0593572
Olearia_phlogopappa	Olearia_phlogopappa	7 0.0595578
Olearia_lirata	Olearia_lirata	7 0.0595767
Achnophora_tatei	Achnophora_tatei	7 0.0596219
Pappochroma_tasmanicum	Pappochroma_tasmanicum	7 0.0596471
Erodiophyllum_acanthocephalum	Erodiophyllum_acanthocephalum	7 0.0596626
Olearia_iodochroa	Olearia_iodochroa	7 0.0597435
Olearia_canescens	Olearia_canescens	7 0.0599336
Solidago_chilensis	Solidago_chilensis	4 0.0600133
Lagenophora_huegelii	Lagenophora_huegelii	7 0.0600429
Camptacra_barbata	Camptacra_barbata	7 0.0603631
Pilbara_trudgenii	Pilbara_trudgenii	7 0.0603928
Olearia_astroloba	Olearia_astroloba	7 0.0604746
Vittadinia_muelleri	Vittadinia_muelleri	7 0.0606977
Olearia_rudis	Olearia_rudis	7 0.0608804
Olearia_ericoides	Olearia_ericoides	7 0.0608955
Solidago_sempervirens	Solidago_sempervirens	4 0.0609066
Solidago_altissima	Solidago_altissima	4 0.0609625
Pappochroma_bellidioides	Pappochroma_bellidioides	7 0.0609645
Olearia_algida	Olearia_algida	7 0.0609823
Calotis_pubescens	Calotis_pubescens	7 0.0610436
Calotis_cuneifolia	Calotis_cuneifolia	7 0.0612126
Calotis_plumulifera	Calotis_plumulifera	7 0.0612460
Lagenophora_gracilis	Lagenophora_gracilis	7 0.0612657
Ixiochlamys_nana	Ixiochlamys_nana	7 0.0612743
Olearia_picridifolia	Olearia_picridifolia	7 0.0613071
Olearia_muelleri	Olearia_muelleri	7 0.0613912
Calotis_lappulacea	Calotis_lappulacea	7 0.0614783
Pappochroma_gunnii	Pappochroma_gunnii	7 0.0614913
Vittadinia_tenuissima	Vittadinia_tenuissima	7 0.0614996
Olearia_gordonii	Olearia_gordonii	7 0.0615324
Olearia_eremaea	Olearia_eremaea	7 0.0615434
Callistephus_chinensis	Callistephus_chinensis	7 0.0615576
Lagenophora_montana	Lagenophora_montana	7 0.0615746
Olearia_dampieri	Olearia_dampieri	7 0.0616293
Olearia_arida	Olearia_arida	7 0.0617296
Olearia_frostii	Olearia_frostii	7 0.0617338
Olearia_stellulata	Olearia_stellulata	7 0.0617574
Olearia_lanuginosa	Olearia_lanuginosa	7 0.0618187
Olearia_brachyphylla	Olearia_brachyphylla	7 0.0618603
Ceratogyne_obionoides	Ceratogyne_obionoides	7 0.0619580
Solenogyne_gunnii	Solenogyne_gunnii	7 0.0620782
Vittadinia_eremaea	Vittadinia_eremaea	7 0.0621175
Olearia_heterocarpa	Olearia_heterocarpa	7 0.0622672
Olearia_cordata	Olearia_cordata	7 0.0624459
Olearia_burgessii	Olearia_burgessii	7 0.0625578
Vittadinia_humerata	Vittadinia_humerata	7 0.0625778
Calotis_erinacea	Calotis_erinacea	7 0.0626284

	Terminal.order.PatristicDist.Degsep.order.PatristicDist	PatristicDist.order.PatristicDist..
Olearia_humilis	Olearia_humilis	7 0.0626831
Calotis_inermis	Calotis_inermis	7 0.0627982
Olearia_lepidophylla	Olearia_lepidophylla	7 0.0628116
Ixiochlamys_cuneifolia	Ixiochlamys_cuneifolia	7 0.0629836
Olearia_heloderma	Olearia_heloderma	7 0.0629884
Olearia_decurrens	Olearia_decurrens	7 0.0630876
Calotis_porphyriglossa	Calotis_porphyriglossa	7 0.0631434
Calotis_hispidula	Calotis_hispidula	7 0.0631677
Olearia_exiguifolia	Olearia_exiguifolia	7 0.0632015
Olearia_microdisca	Olearia_microdisca	7 0.0632349
Olearia_adenolasia	Olearia_adenolasia	7 0.0632539
Olearia_revoluta	Olearia_revoluta	7 0.0632651
Olearia_lasiophylla	Olearia_lasiophylla	7 0.0632988
Olearia_amosissima	Olearia_amosissima	7 0.0633501
Olearia_stuartii	Olearia_stuartii	7 0.0634107
Dimorphocoma_minutula	Dimorphocoma_minutula	7 0.0635802
Olearia_suffruticosa	Olearia_suffruticosa	7 0.0635967
Olearia_adenophora	Olearia_adenophora	7 0.0636735
Vittadinia_gracilis	Vittadinia_gracilis	7 0.0637866
Olearia_asterotricha	Olearia_asterotricha	7 0.0638010
Olearia_calcareae	Olearia_calcareae	7 0.0638715
Vittadinia_sulcata	Vittadinia_sulcata	7 0.0639150
Symphotrichum_novi-belgii	Symphotrichum_novi-belgii	4 0.0641152
Olearia_glandulosa	Olearia_glandulosa	7 0.0641304
Vittadinia_sericea	Vittadinia_sericea	7 0.0641346
Vittadinia_obovata	Vittadinia_obovata	7 0.0641518
Calotis_glandulosa	Calotis_glandulosa	7 0.0641648
Heterotheca_grandiflora	Heterotheca_grandiflora	4 0.0642155
Vittadinia_scabra	Vittadinia_scabra	7 0.0642202
Vittadinia_nallarboensis	Vittadinia_nallarboensis	7 0.0642270
Olearia_tenuifolia	Olearia_tenuifolia	7 0.0642515
Calotis_spec	Calotis_spec	7 0.0643719
Olearia_ballii	Olearia_ballii	7 0.0643862
Olearia_passerinoidea	Olearia_passerinoidea	7 0.0643986
Vittadinia_bicolor	Vittadinia_bicolor	7 0.0644209
Vittadinia_cuneata	Vittadinia_cuneata	7 0.0645438
Olearia_rotundifolia	Olearia_rotundifolia	7 0.0645679
Olearia_sp_Mt_Edward	Olearia_sp_Mt_Edward	7 0.0646577
Olearia_sp_Waterhouse_Range	Olearia_sp_Waterhouse_Range	7 0.0647168
Olearia_incana	Olearia_incana	7 0.0647630
Olearia_subspicata	Olearia_subspicata	7 0.0647790
Vittadinia_blackii	Vittadinia_blackii	7 0.0648817
Olearia_magniflora	Olearia_magniflora	7 0.0649962
Calotis_cuneata	Calotis_cuneata	7 0.0650201
Calotis_breviradiata	Calotis_breviradiata	7 0.0650778
Olearia_montana	Olearia_montana	7 0.0651623
Calotis_cymbacantha	Calotis_cymbacantha	7 0.0651632
Olearia_stenophylla	Olearia_stenophylla	7 0.0651938

	Terminal.order.PatristicDist.Degsep.order.PatristicDist	PatristicDist.order.PatristicDist..
Calotis_moorei	Calotis_moorei	7 0.0652256
Calotis_breviseta	Calotis_breviseta	7 0.0652447
Olearia_hygrophila	Olearia_hygrophila	7 0.0652709
Vittadinia_pterochaeta	Vittadinia_pterochaeta	7 0.0653444
Vittadinia_dissecta	Vittadinia_dissecta	7 0.0653483
Olearia_brevipedunculata	Olearia_brevipedunculata	7 0.0653766
Solenogyne_dominii	Solenogyne_dominii	7 0.0655776
Olearia_hookeri	Olearia_hookeri	7 0.0655927
Olearia_homolepis	Olearia_homolepis	7 0.0656471
Calotis_anthemoides	Calotis_anthemoides	7 0.0656992
Calotis_latiuscula	Calotis_latiuscula	7 0.0657039
Olearia_paucidentata	Olearia_paucidentata	7 0.0659540
Ixioclamys_filicifolia	Ixioclamys_filicifolia	7 0.0659836
Vittadinia_australasica	Vittadinia_australasica	7 0.0660363
Vittadinia_constricta	Vittadinia_constricta	7 0.0660453
Olearia_tubuliflora	Olearia_tubuliflora	7 0.0660838
Calotis_scabiosifolia	Calotis_scabiosifolia	7 0.0661289
Calotis_multicaulis	Calotis_multicaulis	7 0.0661511
Olearia_axillaris	Olearia_axillaris	7 0.0661861
Olearia_quercifolia	Olearia_quercifolia	7 0.0662368
Calotis_dentex	Calotis_dentex	7 0.0662432
Olearia_minor	Olearia_minor	7 0.0663110
Olearia_nernstii	Olearia_nernstii	7 0.0664234
Calotis_scapigera	Calotis_scapigera	7 0.0664831
Vittadinia_burbidgeae	Vittadinia_burbidgeae	7 0.0664915
Vittadinia_cervicularis	Vittadinia_cervicularis	7 0.0665686
Vittadinia_hispidula	Vittadinia_hispidula	7 0.0667640
Olearia_plucheacea	Olearia_plucheacea	7 0.0668257
Olearia_cassiniae	Olearia_cassiniae	7 0.0671698
Olearia_ciliata	Olearia_ciliata	7 0.0672107
Olearia_tomentosa	Olearia_tomentosa	7 0.0672827
Vittadinia_pustulata	Vittadinia_pustulata	7 0.0673213
Olearia_propinqua	Olearia_propinqua	7 0.0674967
Isoetopsis_graminifolia	Isoetopsis_graminifolia	7 0.0676389
Olearia_gravis	Olearia_gravis	7 0.0677839
Solenogyne_bellioides	Solenogyne_bellioides	7 0.0678598
Minuria_multisetia	Minuria_multisetia	7 0.0679362
Olearia_pimeleoides	Olearia_pimeleoides	7 0.0679892
Kippistia_suaedifolia	Kippistia_suaedifolia	7 0.0680246
Calotis_xanthosioidea	Calotis_xanthosioidea	7 0.0680945
Olearia_microphylla	Olearia_microphylla	7 0.0684939
Olearia_rugosa	Olearia_rugosa	7 0.0685557
Olearia_floribunda	Olearia_floribunda	7 0.0688581
Calotis_ancyrocarpa	Calotis_ancyrocarpa	7 0.0689911
Vittadinia_condyloides	Vittadinia_condyloides	7 0.0690272
Olearia_ferresii	Olearia_ferresii	7 0.0704175
Calotis_suffruticosa	Calotis_suffruticosa	7 0.0704827
Minuria_cunninghamii	Minuria_cunninghamii	7 0.0705773
Elachanthus_pusillus	Elachanthus_pusillus	7 0.0706080

	Terminal.order.PatristicDist.Degsep.order.PatristicDist	PatristicDist.order.PatristicDist..
Minuria_tridens	Minuria_tridens	7 0.0710899
Olearia_glutinosa	Olearia_glutinosa	7 0.0715413
Minuria_rigida	Minuria_rigida	7 0.0716783
Vittadinia_megacephala	Vittadinia_megacephala	7 0.0717702
Minuria_gardneri	Minuria_gardneri	7 0.0719858
Minuria_leptophylla	Minuria_leptophylla	7 0.0725579
Pembertonia_latisquamea	Pembertonia_latisquamea	7 0.0744824
Allittia_cardiocarpa	Allittia_cardiocarpa	7 0.0749899
Brachyscome_tesquorum	Brachyscome_tesquorum	7 0.0783672
Brachyscome_procumbens	Brachyscome_procumbens	7 0.0791969
Brachyscome_obovata	Brachyscome_obovata	7 0.0802079
Brachyscome_petrophila	Brachyscome_petrophila	7 0.0811156
Brachyscome_barkerae	Brachyscome_barkerae	7 0.0812040
Brachyscome_graminea	Brachyscome_graminea	7 0.0813418
Brachyscome_dichromosomata	Brachyscome_dichromosomata	7 0.0814912
Brachyscome_basaltica	Brachyscome_basaltica	7 0.0814979
Brachyscome_linearifolia	Brachyscome_linearifolia	7 0.0817175
Brachyscome_tamworthensis	Brachyscome_tamworthensis	7 0.0820061
Brachyscome_wingello	Brachyscome_wingello	7 0.0821678
Brachyscome_papillosa	Brachyscome_papillosa	7 0.0824993
Brachyscome_tetrapterocarpa	Brachyscome_tetrapterocarpa	7 0.0831951
Brachyscome_melanocarpa	Brachyscome_melanocarpa	7 0.0835014
Brachyscome_scapigera	Brachyscome_scapigera	7 0.0837817
Brachyscome_spathulata	Brachyscome_spathulata	7 0.0838394
Brachyscome_stolonifera	Brachyscome_stolonifera	7 0.0839217
Brachyscome_nova-anglica	Brachyscome_nova-anglica	7 0.0843874
Brachyscome_willisia	Brachyscome_willisia	7 0.0845908
Brachyscome_paludicola	Brachyscome_paludicola	7 0.0846877
Brachyscome_sinclairii	Brachyscome_sinclairii	7 0.0848743
Brachyscome_ptychocarpa	Brachyscome_ptychocarpa	7 0.0849860
Brachyscome_ascendens	Brachyscome_ascendens	7 0.0852916
Brachyscome_chrysoglossa	Brachyscome_chrysoglossa	7 0.0855822
Brachyscome_nodosa	Brachyscome_nodosa	7 0.0856969
Brachyscome_diversifolia	Brachyscome_diversifolia	7 0.0857456
Brachyscome_salkiniae	Brachyscome_salkiniae	7 0.0858459
Brachyscome_rara	Brachyscome_rara	7 0.0858727
Brachyscome_dissectifolia	Brachyscome_dissectifolia	7 0.0859569
Brachyscome_segmentosa	Brachyscome_segmentosa	7 0.0859746
Brachyscome_breviscapis	Brachyscome_breviscapis	7 0.0859940
Brachyscome_aculeata	Brachyscome_aculeata	7 0.0860449
Brachyscome_microcarpa	Brachyscome_microcarpa	7 0.0862575
Brachyscome_smithwhitei	Brachyscome_smithwhitei	7 0.0862758
Brachyscome_multifida	Brachyscome_multifida	7 0.0863625
Brachyscome_decipiens	Brachyscome_decipiens	7 0.0864810
Brachyscome_curvicarpa	Brachyscome_curvicarpa	7 0.0865544
Brachyscome_dentata	Brachyscome_dentata	7 0.0865845
Chondropyxis_halophila	Chondropyxis_halophila	8 0.0871172
Brachyscome_trachycarpa	Brachyscome_trachycarpa	7 0.0873506



	Terminal.order.PatristicDist.Degsep.order.PatristicDist	PatristicDist.order.PatristicDist..
Brachyscome_radicans	Brachyscome_radicans	7 0.0875452
Brachyscome_sieberi	Brachyscome_sieberi	7 0.0880030
Brachyscome_stuartii	Brachyscome_stuartii	7 0.0880690
Brachyscome_kaputarensis	Brachyscome_kaputarensis	7 0.0883164
Brachyscome_perpusilla	Brachyscome_perpusilla	7 0.0888728
Brachyscome_readeri	Brachyscome_readeri	7 0.0888807
Brachyscome_tadgellii	Brachyscome_tadgellii	7 0.0897006
Bellis_perennis	Bellis_perennis	6 0.0898949
Brachyscome_cuneifolia	Brachyscome_cuneifolia	7 0.0899630
Brachyscome_rigidula	Brachyscome_rigidula	7 0.0906384
Brachyscome_dalbyensis	Brachyscome_dalbyensis	7 0.0913452
Brachyscome_casstiana	Brachyscome_casstiana	7 0.0916356
Brachyscome_eriogona	Brachyscome_eriogona	7 0.0925592
Brachyscome_ciliaris	Brachyscome_ciliaris	7 0.0926969
Brachyscome_debilis	Brachyscome_debilis	7 0.0928508
Brachyscome_tatei	Brachyscome_tatei	7 0.0931240
Brachyscome_iberidifolia	Brachyscome_iberidifolia	7 0.0942351
Celmisia_asteliifolia	Celmisia_asteliifolia	9 0.0944826
Brachyscome_exilis	Brachyscome_exilis	7 0.0945725
Celmisia_lyallii	Celmisia_lyallii	9 0.0948329
Brachyscome_parvula	Brachyscome_parvula	7 0.0951245
Brachyscome_ciliocarpa	Brachyscome_ciliocarpa	7 0.0954911
Brachyscome_cheilocarpa	Brachyscome_cheilocarpa	7 0.0960027
Olearia_speciosa	Olearia_speciosa	9 0.0970135
Brachyscome_billabongensis	Brachyscome_billabongensis	7 0.0974063
Olearia_avicenniaefolia	Olearia_avicenniaefolia	9 0.0984200
Olearia_lanceolata	Olearia_lanceolata	9 0.0987004
Allittia_uliginosa	Allittia_uliginosa	7 0.0987396
Brachyscome_gilesii	Brachyscome_gilesii	7 0.0989206
Celmisia_latifolia	Celmisia_latifolia	9 0.1004190
Olearia_tasmanica	Olearia_tasmanica	9 0.1007450
Celmisia_saxifraga	Celmisia_saxifraga	9 0.1008971
Olearia_viscosa	Olearia_viscosa	9 0.1012949
Olearia_arborescens	Olearia_arborescens	9 0.1013846
Celmisia_discolor	Celmisia_discolor	9 0.1015063
Pleurophyllum_hookeri	Pleurophyllum_hookeri	9 0.1021389
Celmisia_bellidioides	Celmisia_bellidioides	9 0.1025304
Olearia_archeri	Olearia_archeri	9 0.1027637
Celmisia_costiniana	Celmisia_costiniana	9 0.1031362
Celmisia_pugioniformis	Celmisia_pugioniformis	9 0.1033010
Celmisia_spectabilis	Celmisia_spectabilis	9 0.1033617
Olearia_nummularifolia	Olearia_nummularifolia	9 0.1033921
Olearia_rosmarinifolia	Olearia_rosmarinifolia	9 0.1035887
Celmisia_gracilentia	Celmisia_gracilentia	9 0.1038710
Olearia_argophylla	Olearia_argophylla	9 0.1039109
Celmisia_longifolia	Celmisia_longifolia	9 0.1046570
Olearia_cymbifolia	Olearia_cymbifolia	9 0.1049913
Olearia_pinifolia	Olearia_pinifolia	9 0.1051978
Olearia_oppositifolia	Olearia_oppositifolia	9 0.1053397

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Olearia_obcordata	Olearia_obcordata	9 0.1053607
Olearia_ledifolia	Olearia_ledifolia	9 0.1055517
Olearia_cydoniifolia	Olearia_cydoniifolia	9 0.1056628
Olearia_grandiflora	Olearia_grandiflora	9 0.1065992
Olearia_alpicola	Olearia_alpicola	9 0.1066653
Olearia_pannosa	Olearia_pannosa	9 0.1069035
Olearia_solandri	Olearia_solandri	9 0.1069250
Olearia_covenyi	Olearia_covenyi	9 0.1069403
Celmisia_tomentella	Celmisia_tomentella	9 0.1069634
Olearia_stilwelliae	Olearia_stilwelliae	9 0.1084522
Olearia_erubescens	Olearia_erubescens	9 0.1089169
Olearia_myrsinoides	Olearia_myrsinoides	9 0.1095844
Olearia_megalophylla	Olearia_megalophylla	9 0.1104366
Olearia_fimbriata	Olearia_fimbriata	9 0.1108652
Brachyscome_bellidioides	Brachyscome_bellidioides	7 0.1133181
Ewartia_nubigena	Ewartia_nubigena	10 0.1741899
Dimorphotheca_pluvialis	Dimorphotheca_pluvialis	10 0.1999102
Cotula_coronopifolia	Cotula_coronopifolia	10 0.2314641
Abrotanella_nivigena	Abrotanella_nivigena	10 0.2347103