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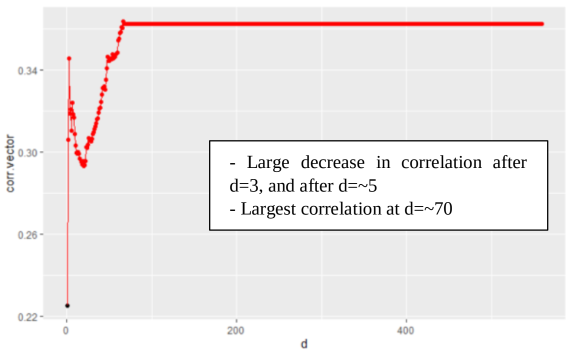
Investigating correlations between network dimensionality and phylogenetic signal in Galapagos food-metaweb

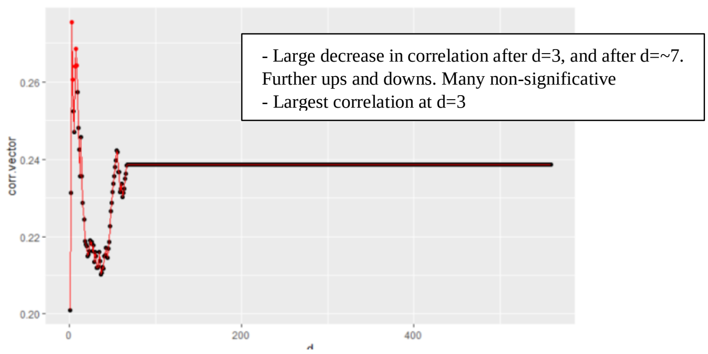
Plotting Procrustes correlations (between phylogenetic and foraging traits distances of predators) vs the number of dimensions (d) or latent traits considered for the foraging traits' distance matrix of predators. Dots in red or black indicate a significant (P <=0.05) or non-significant correlation, respectively. Axes: X is the correlation value from Procrustes test, and Y is the number of dimensions (d).

Uncalibrated Tree	**Time Calibrated Tree**

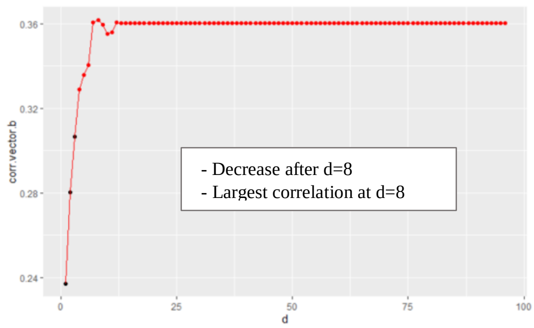
METAWEB All spp (n=559)



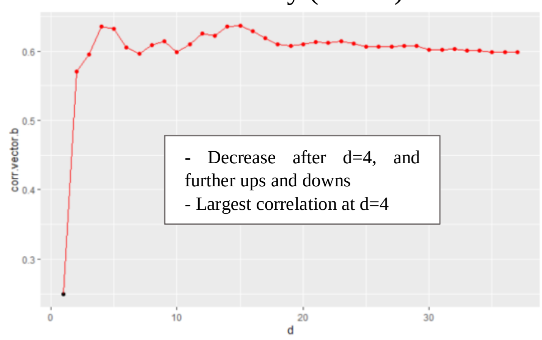
METAWEB All spp (n=559)



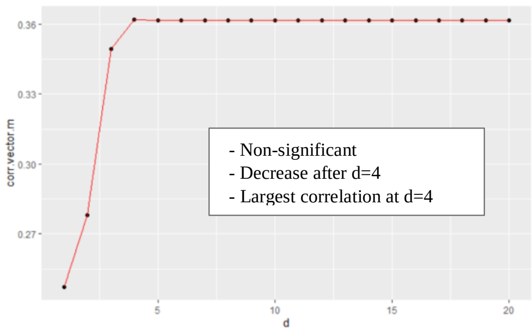
BIRDS only (n = 42)



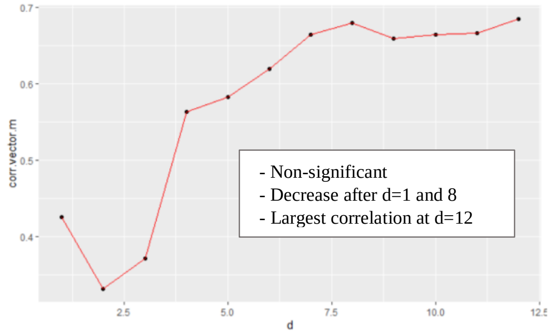
BIRDS only (n = 37)



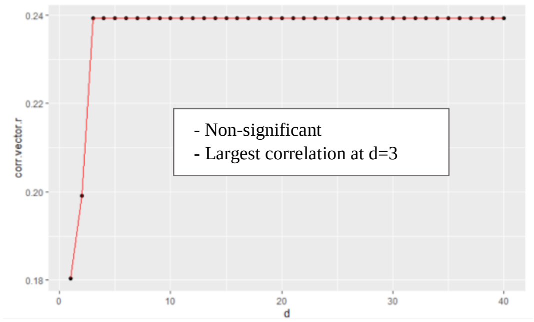
MAMMALS only (n=13)



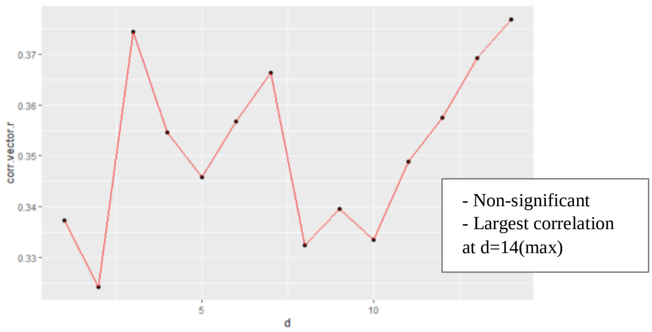
MAMMALS only (n=12)



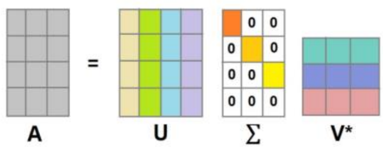
REPTILES only (n=16)



REPTILES only (n=14)



The Foraging Traits' matrix is obtained from the decomposition of the adjacency matrix of the metaweb (*SXS*).



A -> Species x Species food web Adjacency Matrix

U -> Foraging Traits

V -> Vulnerability Traits

Example of a piece of "U" matrix from the Metaweb:

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14
Abutilon anderssonianum	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e
Abutilon depauperatum	-2.279173e-15	0.000000e+00	1.013261e-15	2.296112e-16	4.440772e-16	-8.954506e-16	1.301904e-15	-5.594074e-16	6.431984e-16	-8.699540e-16	6.919382e-16	8.417728e-16	1.629646e-15	-6.238813
Abutilon dianthum	-5.697933e-16	-1.988065e-15	-7.720083e-16	-7.556823e-16	-1.776309e-16	-1.736632e-16	-1.091919e-15	6.740452e-16	-4.124326e-16	2.294384e-16	2.464438e-16	-4.989540e-16	5.314063e-16	3.639308
Abutilon viscosum	-1.424483e-16	-9.940326e-16	-1.351015e-15	-6.743012e-16	-1.953940e-15	6.946526e-16	-5.879565e-16	3.407812e-16	-1.374775e-16	8.030345e-16	2.274865e-16	-7.331569e-16	9.211043e-16	-2.545349
Acacia caven	0.000000e+00	-6.212704e-17	-1.158012e-15	-2.964600e-16	4.440772e-16	-2.007980e-16	4.199689e-17	-6.013786e-17	1.571172e-16	-6.118358e-16	5.308019e-16	1.086158e-16	0.000000e+00	-4.159209
Acalypha abingdonii	-1.112878e-18	-1.553176e-17	-1.158012e-15	3.153520e-16	1.243416e-15	-8.683158e-17	1.007925e-15	-1.002298e-16	-1.767568e-16	7.456749e-16	-5.308019e-16	5.883358e-16	-6.376876e-16	3.292707
Acalypha flacida	0.000000e+00	0.000000e+00	0.000000e+00	4.069059e-16	0.000000e+00	1.845171e-16	8.399379e-17	4.009191e-17	5.891894e-16	1.529589e-16	6.066308e-16	5.430792e-16	0.000000e+00	-3.769283
Acalypha hispida	0.000000e+00	6.067093e-20	7.237578e-17	3.720282e-16	-3.552617e-16	-8.683158e-16	1.343901e-15	-5.011489e-17	6.677480e-16	-3.823974e-16	0.000000e+00	-8.372471e-17	-1.417084e-15	2.426205
Acalypha parvula	0.000000e+00	0.000000e+00	-1.206263e-17	-5.580423e-16	8.881544e-17	1.736632e-16	0.000000e+00	1.002298e-17	4.713515e-16	-6.118358e-16	3.033154e-16	3.620528e-17	-2.125625e-16	-6.412113
Acalypha sericea	0.000000e+00	0.000000e+00	0.000000e+00	3.720282e-16	8.881544e-17	3.473263e-16	3.359752e-16	-3.207353e-16	7.070272e-16	-4.588768e-16	-9.099462e-16	5.068739e-16	-7.085418e-17	-3.119407
Acalypha velutina	-1.326653e-25	-2.962448e-23	-6.031315e-18	-7.440564e-16	-7.216254e-17	1.736632e-16	3.359752e-16	-3.207353e-16	5.314979e-16	4.588768e-16	-1.061604e-15	4.706687e-16	2.479896e-16	-1.906304
Acalypha wigginsii	0.000000e+00	0.000000e+00	-1.507829e-18	-3.720282e-16	-8.881544e-17	-3.473263e-16	-1.259907e-16	-1.603676e-16	-3.142343e-16	7.647947e-17	3.033154e-16	1.086158e-16	0.000000e+00	3.379357
Acalypha wilkesiana	0.000000e+00	0.000000e+00	0.000000e+00	-1.860141e-16	-4.440772e-17	-3.473263e-16	-1.679876e-16	1.002298e-17	9.574327e-17	-3.059179e-16	2.274865e-16	1.719751e-16	-3.896980e-16	-1.733004
Adenostemma platyphyllum	0.000000e+00	0.000000e+00	1.884786e-19	4.650353e-17	2.220386e-17	1.736632e-16	8.399379e-17	4.009191e-17	-3.142343e-16	3.823974e-16	1.516577e-16	-7.241056e-16	2.834167e-16	4.332509
Adiantum concinnum	5.060781e-31	1.808135e-27	7.067947e-20	4.650353e-17	2.775482e-17	3.039105e-16	3.779720e-16	1.443309e-15	-4.713515e-15	3.441576e-16	2.350694e-15	-2.172317e-16	-6.908282e-16	-3.466007
Adiantum henslovianum	0.000000e+00	0.000000e+00	0.000000e+00	1.453235e-18	1.387741e-18	1.085395e-17	2.099845e-17	-8.018382e-17	-3.142343e-16	-3.823974e-17	3.033154e-16	-1.810264e-16	-3.542709e-16	-2.079604
Adiantum macrophyllum	0.000000e+00	0.000000e+00	-3.681223e-22	-3.633088e-19	-3.469353e-19	-5.426974e-18	-5.249612e-18	-3.207353e-16	2.356757e-16	6.118358e-16	3.127940e-16	-2.896423e-16	-7.085418e-17	2.426205
Adiantum patens	0.000000e+00	0.000000e+00	4.601528e-23	9.082720e-20	8.673382e-20	1.356743e-18	7.874418e-18	9.622058e-16	4.320722e-16	1.529589e-16	1.516577e-16	0.000000e+00	2.834167e-16	-3.206057
Adiantum petiolatum	0.000000e+00	0.000000e+00	1.150382e-23	1.135340e-20	0.000000e+00	0.000000e+00	2.624806e-18	6.414705e-16	1.571172e-16	-7.647947e-17	-7.582885e-17	2.172317e-16	2.479896e-16	3.119407
Adiantum tenerum	0.000000e+00	0.000000e+00	2.875955e-24	5.676700e-21	5.420864e-21	1.695929e-19	1.312403e-18	4.811029e-16	3.142343e-16	3.823974e-16	1.895721e-16	-8.689268e-16	-3.896980e-16	1.039802
Adiantum villosum	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	1.355216e-21	4.239823e-20	0.000000e+00	0.000000e+00	0.000000e+00	1.529589e-16	1.516577e-16	-2.172317e-16	-1.417084e-16	1.386403
Ageratum conyzoides	0.000000e+00	0.000000e+00	0.000000e+00	8.869844e-23	3.388040e-22	5.299779e-21	8.202518e-20	8.018382e-17	7.855858e-17	1.529589e-16	1.516577e-16	5.792845e-16	2.479896e-16	-2.252905

To compute distance matrices based on increasing number of dimensions [,1:i], we can't use Jaccard distances since we have continue and negative values that resulted from the decomposition. Therefore, I used **Euclidean distances** to compute the Foraging traits' distance matrix for each given dimension.

Madelaine Proulx (Master student at Dominiqur Gravel's lab, Univ.Sherbrooke) used Jaccard distances to compute dissimilarity matrix od predator's diets. Our results largely differ for the Uncalibrated Tree, but are quite similar for the Time-Calibrated Tree.