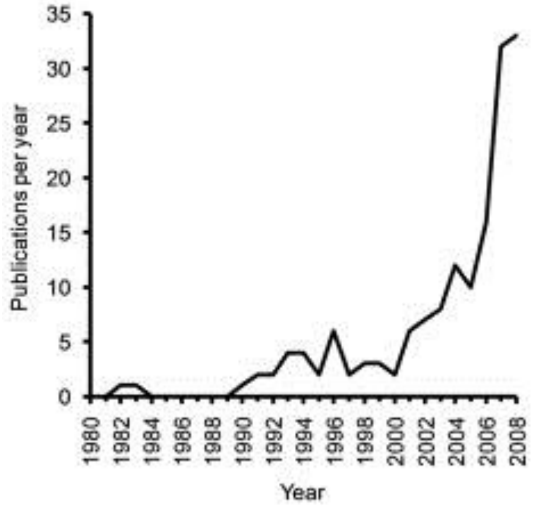


Appendix A. The number of publications in the period 1981-2008 listed on Web of Science (2009) found using the search term “null model* AND (cooccurrence* OR co-occurrence*)”.

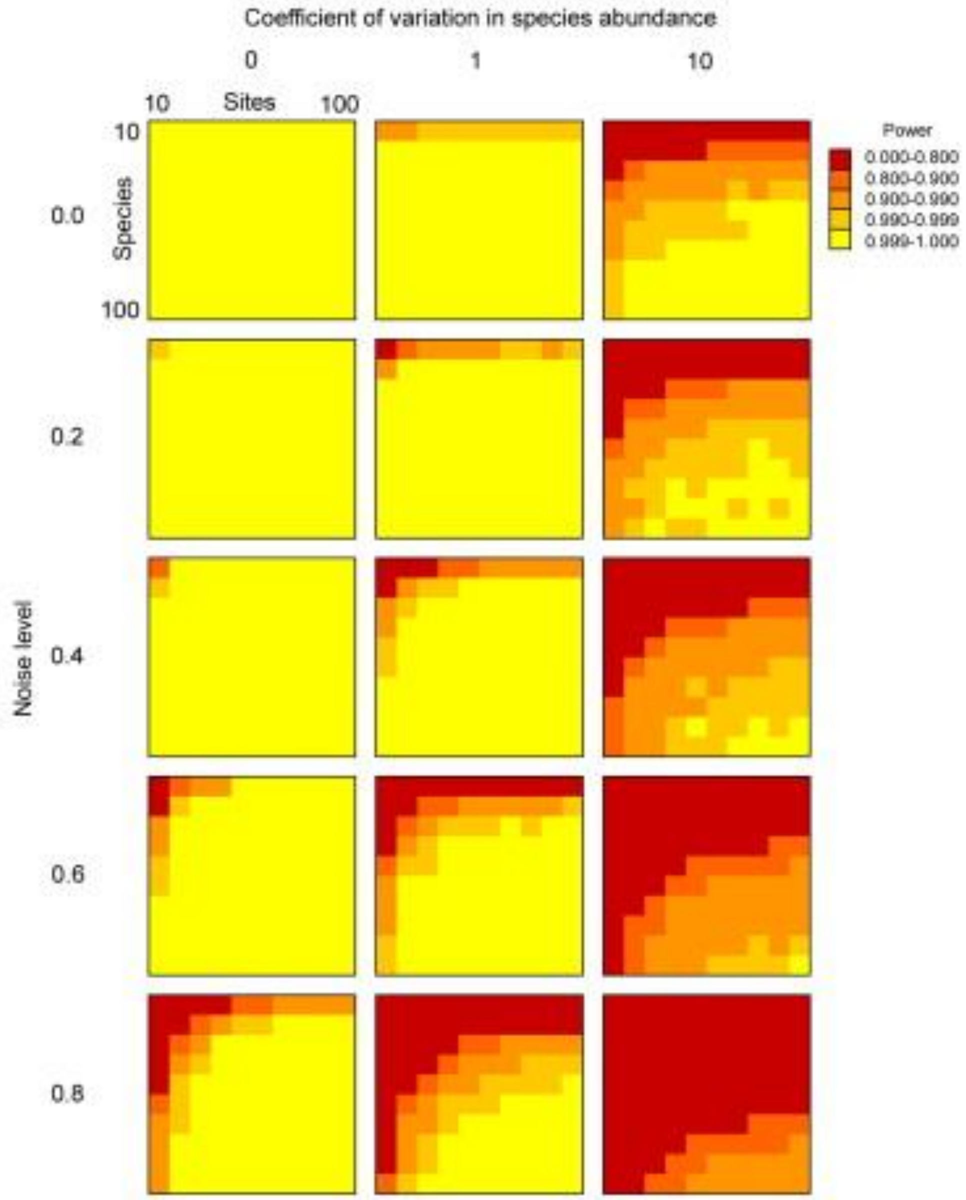
A

	A	B	C	D	E	F	G	H	I	J
Sp1	1	1	1	1	1	0	0	0	0	0
Sp2	1	1	1	1	1	0	0	0	0	0
Sp3	1	1	1	1	1	0	0	0	0	0
Sp4	1	1	1	1	1	0	0	0	0	0
Sp5	1	1	1	1	1	0	0	0	0	0
Sp6	0	0	0	0	0	1	1	1	1	1
Sp7	0	0	0	0	0	1	1	1	1	1
Sp8	0	0	0	0	0	1	1	1	1	1
Sp9	0	0	0	0	0	1	1	1	1	1
Sp10	0	0	0	0	0	1	1	1	1	1

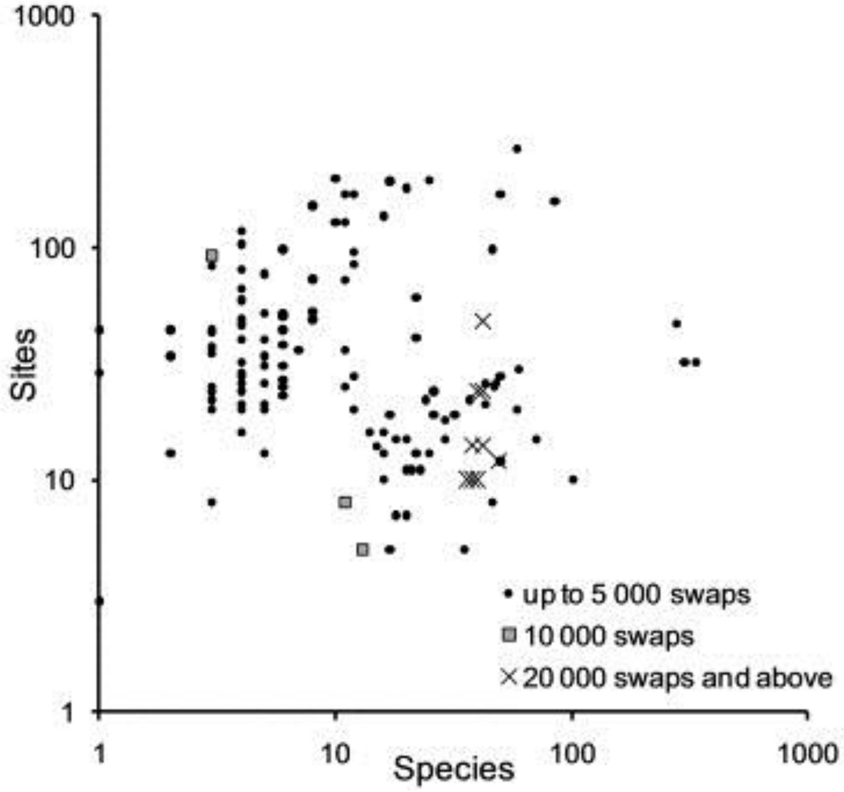
B

	A	B	C	D	E	F	G	H	I	J
Sp1	1	1	1	1	1	1	1	1	1	0
Sp2	1	1	1	1	1	1	1	1	0	0
Sp3	1	1	1	1	0	0	0	0	0	0
Sp4	1	0	0	0	0	0	0	0	0	0
Sp5	1	0	0	0	0	0	0	0	0	0
Sp6	0	0	0	0	0	0	0	0	0	1
Sp7	0	0	0	0	0	0	0	0	1	1
Sp8	0	0	0	0	1	1	1	1	1	1
Sp9	0	1	1	1	1	1	1	1	1	1
Sp10	0	1	1	1	1	1	1	1	1	1

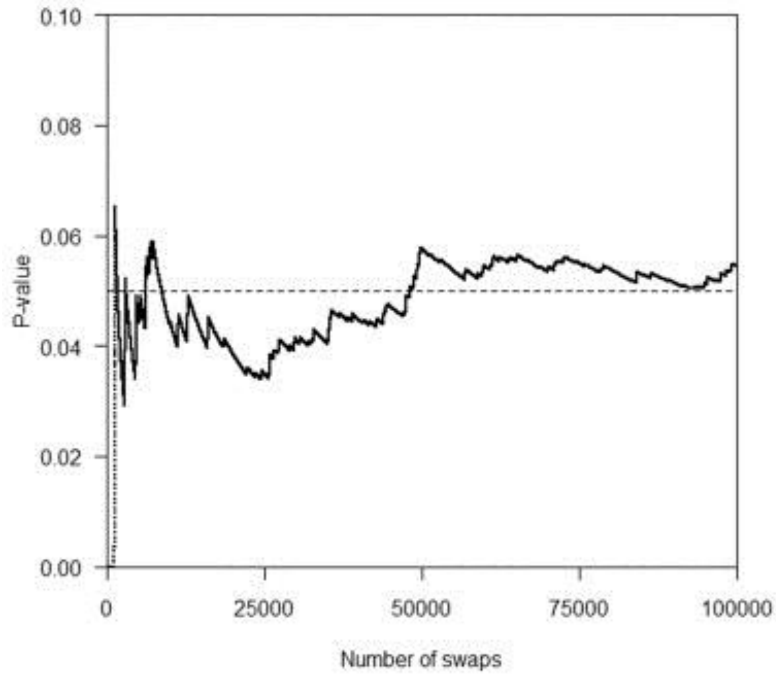
Appendix B. Ordered matrices with coefficients of variation in species abundance of 0 (A) and 1 (B).



Appendix C. Type 2 errors incurred by the c-score method of assessing patterns of species co-occurrence for a range of numbers of sites, numbers of species and coefficients of variation in species abundance. Type 2 errors were estimated by progressively randomizing ordered matrices. All errors are given for a critical p-value of 0.1 (two-tailed). 30,000 swaps were used to generate null matrices for testing the significance of the metric.



Appendix D. The majority of c-score analyses using the sequential swap to generate null matrices only use 5,000 swaps. Larger matrices are not always analysed using larger numbers of swaps. Data are presented only for the 141 matrices from 24 papers found during literature surveys (Appendix A) that reported the numbers of swaps used.



Appendix E. Stabilisation of p-values with increasing number of swaps for an unstructured matrix of 50 species and 50 sites. Results from a matrix with a marginally non-significant p-value for 100,000 swaps are presented here. The broken line indicates the critical p-value of 0.05 for this test (upper tail presented here). P-values do not stabilise at marginal non-significance until after 50,000 swaps have been carried out. See Appendix G for the R code that carries out this analysis.

Appendix F. Publications used to generate Figure 1.

Armbruster, W. S. 1986. Reproductive Interactions Between Sympatric Dalechampia Species: Are Natural Assemblages "Random" or Organized? Ecology **67**:522-533.

Azevedo, M. C. C. d., F. G. Araujo, A. L. M. Pessanha, and M. d. A. Silva. 2006. Co-occurrence of demersal fishes in a tropical bay in southeastern Brazil: A null model analysis. Estuarine, Coastal and Shelf Science **66**:315-322.

Bagchi, S., C. Mishra, and Y. V. Bhatnagar. 2004. Conflicts between traditional pastoralism and conservation of Himalayan ibex (*Capra sibirica*) in the Trans-Himalayan mountains. Animal Conservation **7**:121-128.

Behnke, J. M., F. S. Gilbert, M. A. Abu-Madi, and J. W. Lewis. 2005. Do the helminth parasites of wood mice interact? Journal of Animal Ecology **74**:982-993.

Boschilia, S. M., E. F. Oliveira, and S. M. Thomaz. 2008. Do aquatic macrophytes co-occur randomly? An analysis of null models in a tropical floodplain. Oecologia **156**:203–214.

Brualdi, R. A. and J. G. Sanderson. 1999. Nested species subsets, gaps, and discrepancy. Oecologia **119**:256-264.

Burns, K. C. 2007. Patterns in the assembly of an island plant community. Journal of Biogeography **34**:760-768.

Cook, R. R. and J. F. Quinn. 1998. An evaluation of randomization models for nested species subsets analysis. Oecologia **113**:584-592.

Feeley, K. 2003. Analysis of avian communities in Lake Guri, Venezuela, using multiple assembly rule models. Oecologia **137**:104-113.

Fernandez-Palacios, J. M. and C. Andersson. 1993. Species composition and within archipelago co-occurrence patterns in the Canary Islands. Ecography **16**:31-36.

Franzen, D. 2004. Plant species coexistence and dispersion of seed traits in a grassland. Ecography **27**:218-224.

Giokas, S. and S. Sfenthourakis. 2008. An improved method for the identification of areas of endemism using species co-occurrences. Journal of Biogeography **35**:893-902.

Gjerde, I., M. Saetersdal, J. Rolstad, H. H. Blom, and O. Storaunet. 2004. Fine-scale Diversity and Rarity Hotspots in Northern Forests. Conservation Biology **18**:1032-1042.

Gotelli, N. J. 2000. Null Model Analysis of Species Co-Occurrence Patterns. Ecology **81**:2606-2621.

Gotelli, N. J. and A. M. Ellison. 2002. Assembly rules for New England ant assemblages. Oikos **99**:591-599.

Gotelli, N. J. and K. Rohde. 2002. Co-occurrence of ectoparasites of marine fishes: a null model analysis. Ecology Letters **5**:86-94.

Graves, G. R. and N. J. Gotelli. 1993. Assembly of avian mixed-species flocks in Amazonia. Proceeding of the National Academy of Sciences **90**:1388-1391.

Hausdorf, B. and C. Hennig. 2007. Null model tests of clustering of species, negative co-occurrence patterns and nestedness in meta-communities. Oikos **116**:818-828.

Heino, J. and J. Soinnen. 2005. Assembly rules and community models for unicellular organisms: patterns in diatoms of boreal streams. Freshwater Biology **50**:567-577.

Helmus, M. R., K. Savage, M. W. Diebel, J. T. Maxted, and A. R. Ives. 2007. Separating the determinants of phylogenetic community structure. Ecology Letters **10**:917-925.

Hoeinghaus, D. J., K. O. Winemiller, and J. S. Birnbaum. 2007. Local and regional determinants of stream fish assemblage structure: inferences based on taxonomic vs. functional groups. Journal of Biogeography **34**:324-338.

Janovy, J., M. T. Ferdig, and M. A. McDowell. 1990. A Model of Dynamic Behavior of a Parasite Species Assemblage. Journal of Theoretical Biology **142**:517-529.

Jonsson, B. G. 2001. A null model for randomization tests of nestedness in species assemblages. Oecologia **127**:309-313.

Klop, E. and J. v. Goethem. 2008. Savanna fires govern community structure of ungulates in Benoue National Park, Cameroon. Journal of Tropical Ecology **24**:39-47.

Leibold, M. A. and G. M. Mikkelson. 2002. Coherence, species turnover, and boundary clumping: elements of meta-community structure. Oikos **97**:237-250.

Luiselli, L., E. A. Eniang, and G. C. Akani. 2007. Non-random structure of a guild of geckos in a fragmented, human-altered, African rainforest. Ecological Research **22**:593-603.

Manly, B. F. J. 1995. A Note on the Analysis of Species Co-Occurrences. Ecology **76**:1109-1115.

Manly, B. F. J. 1996. The Statistical Analysis of Artefacts in Graves: Presence and Absence Data. Journal of Archaeological Science **1996**.

Mason, N. W. H., C. Lanoiselee, D. Mouillot, P. Irz, and C. Argillier. 2007. Functional characters combined with null models reveal inconsistency in mechanisms of species turnover in lacustrine fish communities. Oecologia **153**:441-452.

Mast, A. R. and R. Nyffeler. 2003. Using a Null Model to Recognize Significant Co-Occurrence Prior to Identifying Candidate Areas of Endemism. Systematic Biology **52**:271-280.

Mouillot, D., O. Dumay, and J. A. Tomasini. 2007. Limiting similarity, niche filtering and functional diversity in coastal lagoon fish communities. Estuarine, Coastal and Shelf Science **71**:443-456.

Namgail, T., S. Bagchi, C. Mishra, and Y. V. Bhatnagar. 2008. Distributional correlates of the Tibetan gazelle *Procapra picticaudata* in Ladakh, northern India: towards a recovery programme. Oryx **2008**.

Panitsa, M., D. Tzanoudakis, and S. Sfenthourakis. 2008. Turnover of plants on small islets of the eastern Aegean Sea within two decades. Journal of Biogeography **35**:1049-1061.

Peres-Neto, P. R. 2004. Patterns in the co-occurrence of fish species in streams: the role of site suitability, morphology and phylogeny versus species interactions. Oecologia **140**:352-360.

Peres-Neto, P. R., J. D. Olden, and D. A. Jackson. 2001. Environmentally constrained null models: site suitability as occupancy criterion. Oikos **93**:110-120.

Pfeiffer, M., H. C. Tuck, and T. C. Lay. 2008. Exploring arboreal ant community composition and co-occurrence patterns in plantations of oil palm *Elaeis guineensis* in Borneo and Peninsular Malaysia. Ecography **31**:21-32.

Ribichich, A. M. 2005. From null community to non-randomly structured actual plant assemblages: parsimony analysis of species co-occurrences. Ecography **28**:88-98.

Sanderson, J. G. 2004. Null model analysis of communities on gradients. Journal of Biogeography **31**:879-883.

Sanderson, J. G., M. P. Moulton, and R. G. Selfridge. 1998. Null matrices and the analysis of species co-occurrences. Oecologia **116**:275-283.

Sfenthourakis, S., S. Giokas, and E. Tzanatos. 2004. From sampling stations to archipelagos: investigating aspects of the assemblage of insular biota. Global Ecology and Biogeography **13**:23-35.

Sfenthourakis, S., E. Tzanatos, and S. Giokas. 2005. Species co-occurrence: the case of congeneric species and a causal approach to patterns of species association. Global Ecology and Biogeography **15**:39-49.

Struass, R. E. 1982. Statistical Significance of Species Clusters in Association Analysis. Ecology **63**:634-639.

Szentesi, A., D. Schmera, and T. Jermy. 2006. Spatial and temporal organisation of the pre-dispersal seed predator guild in a perennial legume, *Vicia tenuifolia*. Ecological Entomology **31**:114-122.

Tello, J. S., R. D. Stevens, and C. W. Dick. 2008. Patterns of species co-occurrence and density compensation: a test for interspecific competition in bat ectoparasite infracommunities. Oikos **117**:693-702.

Tiho, S. and G. Josens. 2007. Co-occurrence of earthworms in urban surroundings: A null model analysis of community structure. european Journal of Soil Biology **43**:84-90.

Ulrich, W. and M. Zalewski. 2007. Are ground beetles neutral? Basic and Applied Ecology **8**:411-420.

Veech, J. A. 2006. A probability-based analysis of temporal and spatial co-occurrence in grassland birds. Journal of Biogeography **33**:2145-2153.

Appendix G. R code to assess the stabilisation of p-values of significance with increasing number of swaps. See Appendix E for an example of the graphical output from this code.

```
require(vegan)

nreps<-100000 #maximum number of swaps for which to calculate p-values

nestedchecker(x)$statistic->obs #x is the species/sites matrix

output<-matrix(nrow=nreps,ncol=3)

colnames(output)<-c("c.scores","utp","ltp")

commsimulator(x,"swap",thin=30000)->base

for (i in 1:nreps){

        commsimulator(base,"swap",thin=1)->base

        nestedchecker(base)$statistic->output[i,1]

        length(subset(output[1:i,1],output[1:i,1]>obs))/i->output[i,2]

        length(subset(output[1:i,1],output[1:i,1]<obs))/i->output[i,3]

        }

par(mfrow=c(2,1))

plot(output[,2])

abline(h=0.05,lty="dashed")

plot(output[,3])

abline(h=0.05,lty="dashed")
```