

Supplementary Information

More or Less? The Effect of Symbiont Density in Protective Mutualisms

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The American Naturalist

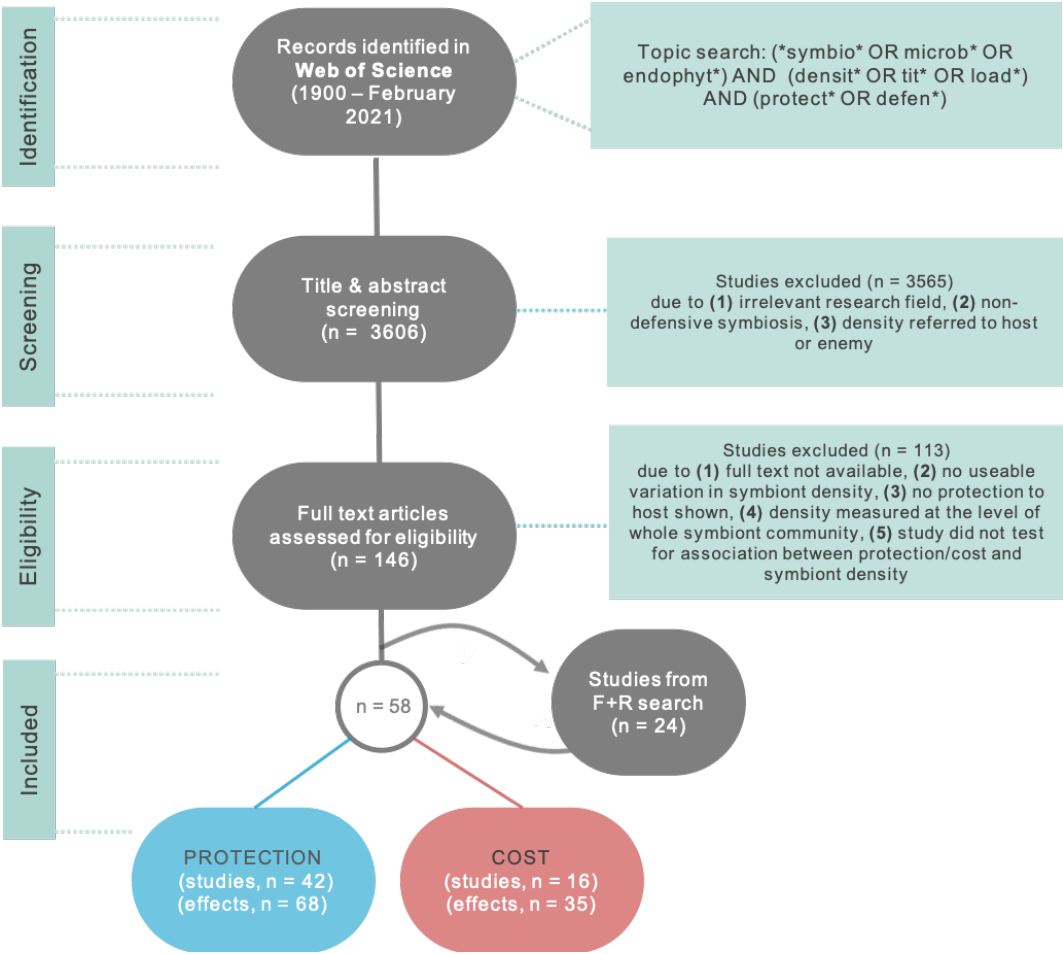


Figure S1. PRISMA style flow diagram detailing the systematic review process used for the meta-analysis. Included studies. Forward and reverse (F & R) citation searches were made of the included studies to identify further relevant studies.

Table S1. Inclusion criteria & rationale for moderator variables

Moderator variable	Group level	Inclusion criteria	Rationale for testing
Host type	Plant	Host species is a plant	Explore if differences are observed at broad taxonomic groupings of host type
	Animal	Host species is an animal	
Protects against ¹	Animal enemy	Main attacker symbiont defends against are animal species	Fundamental differences occur in the attack approach and populations sizes of animals versus microbes that may affect the importance of symbiont density
	Microbial enemy	Main attacker symbiont defends against are microbial species	
Symbiont localisation	Exo-symbiont	A symbiont present on, or associating with, predominantly with the host surface	Endosymbiont density can be physically restricted e.g. by intracellular environment or tissue boundaries
	Endo-symbiont	Loosely defined as any symbiont occurring within the host body (this is not exclusive to intracellular symbionts)	
Transmission mode	Horizontal	Predominant mode of symbiont transmission is horizontal	Differences in the alignment of fitness interests between host & symbiont commonly occur as a function transmission mode
	Vertical	Predominant mode of symbiont transmission is vertical	
Density manipulation method	Physical	Physical manipulation of symbiont density (e.g. by addition/removal of known symbiont numbers or by antibiotics)	Ensure overall effect is not skewed by differences in density control methods (e.g. potentially less controlled in natural variation cases and confounded by additional factors)
	'Natural' variation	Studies that use inherent or established differences in symbiont density (e.g. due to geography, host genotypes and strain/isolate variation)	
Measure of protection ²	Survival / Host fitness based	Host centric measures (e.g. survival, mortality, offspring no.)	Explore if different approaches to measuring host protection produce different effect estimates
	Damage sites	Observable damage to host (e.g. herbivore damage sites on leaves, visible tissue damage)	
	Enemy inhibition	Based on enemy activity (e.g. pathogen inhibition, pathogen titer, parasite mortality, herbivore grazing time)	
Measure of cost ³	Host fitness based	Host fitness based (e.g. egg hatch rate, offspring number, fruit production)	Explore if different approaches to measuring cost to host produces different effect estimates
	Longevity	Host longevity	
	Developmental	Host developmental metrics (e.g. growth rate, biomass, root length)	

¹ cleaning symbioses excluded due to a low number of observations

² protection analysis only

³ cost analysis only

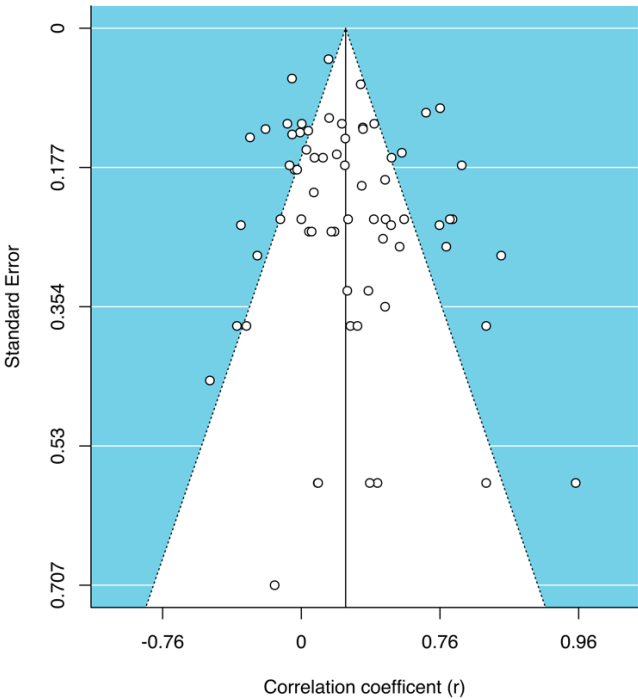


Figure S2. Funnel plot of the dataset exploring the effect of symbiont density on protection conferred to hosts.

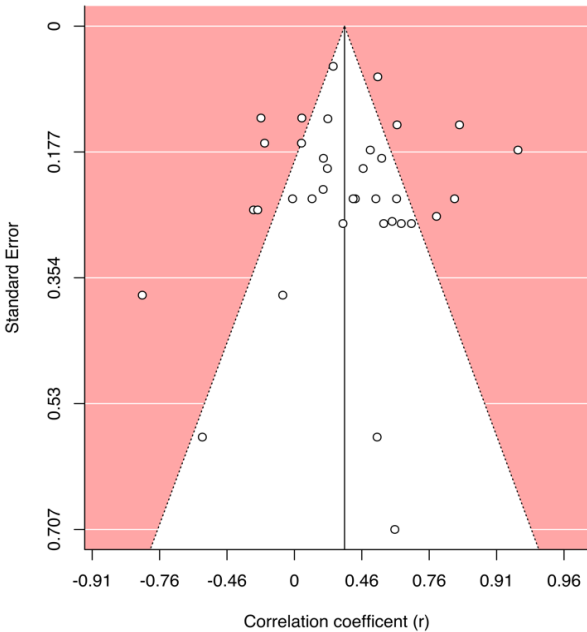


Figure S3. Funnel plot of the dataset exploring the effect of symbiont density on the extent of cost conferred to hosts.