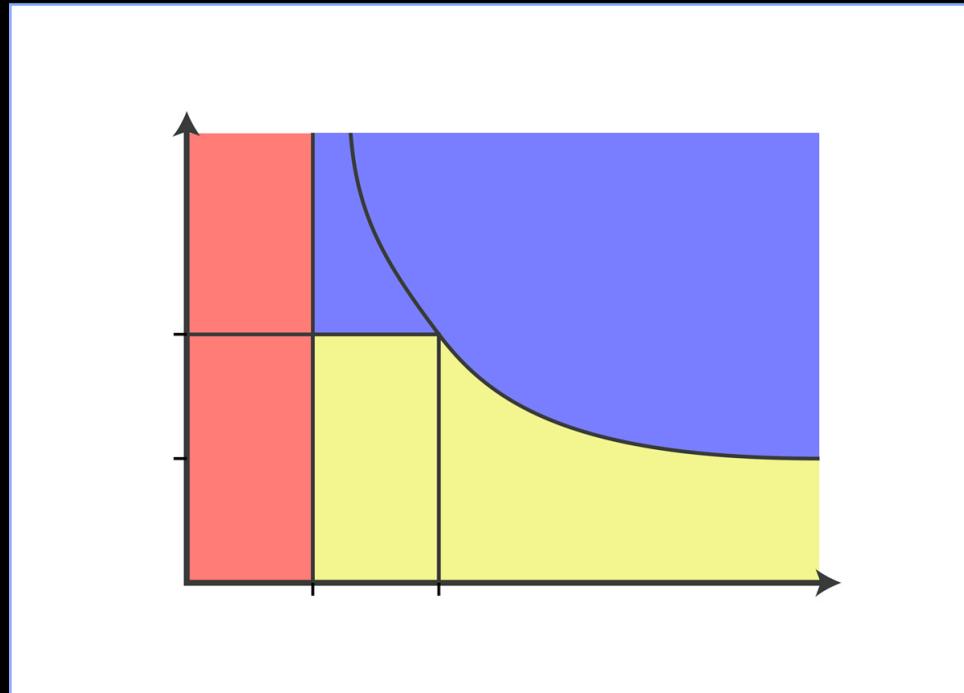


Predators vs. Parasites:

A Consumer-Resource Distinction
due to Ecological Exclusion?



Lev R. Ginzburg, Christopher X J. Jensen, and Roberta L. Harnett

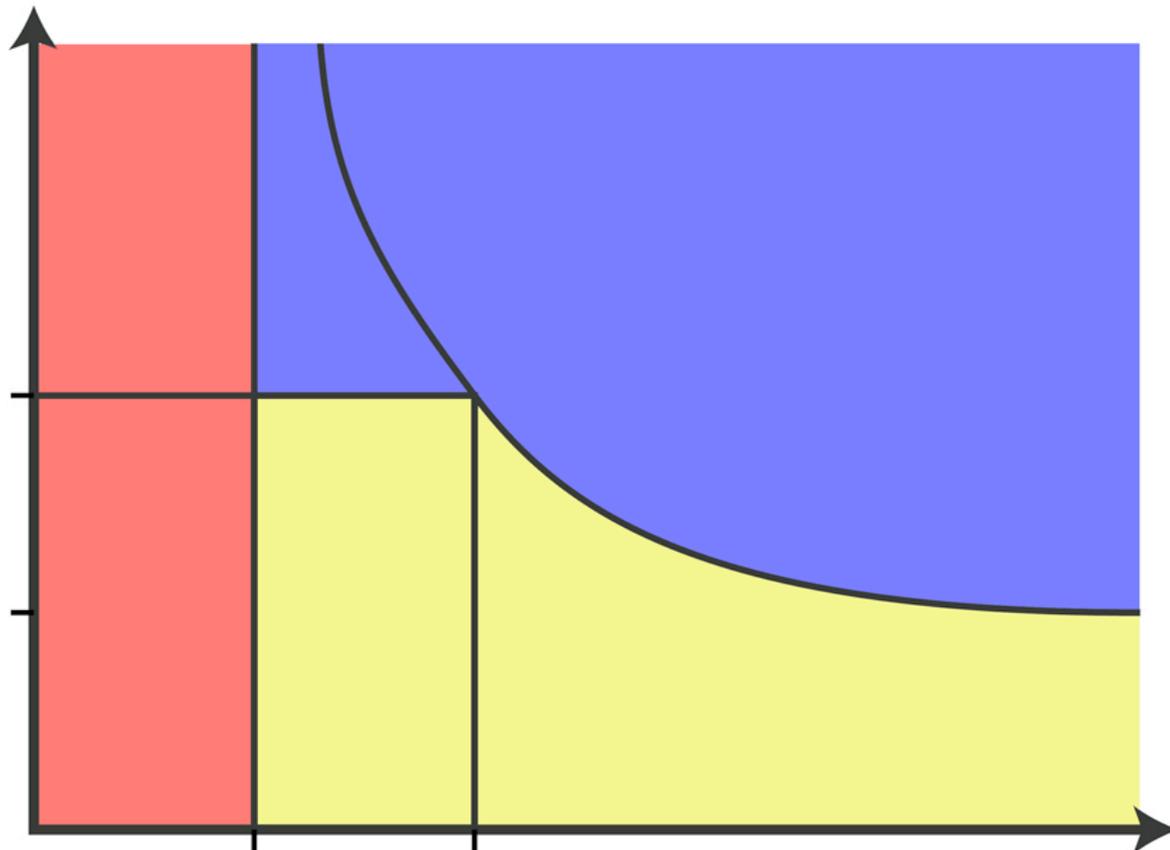
What is the Distinction between Predators and Parasites?

- Predators kill their prey (preventing future reproduction), parasites do not kill their host.
- Predators consume their entire prey, parasites consume only part of their host.
- Parasites spend the entirety of each life stage on a particular host, whereas predators do not.
- Predators are “bigger” than their prey, whereas parasites are “smaller” than their hosts.

Is there an ecological distinction between parasites and predators, or is our characterization purely linguistic?

Do evolutionary processes drive an ecological distinction?

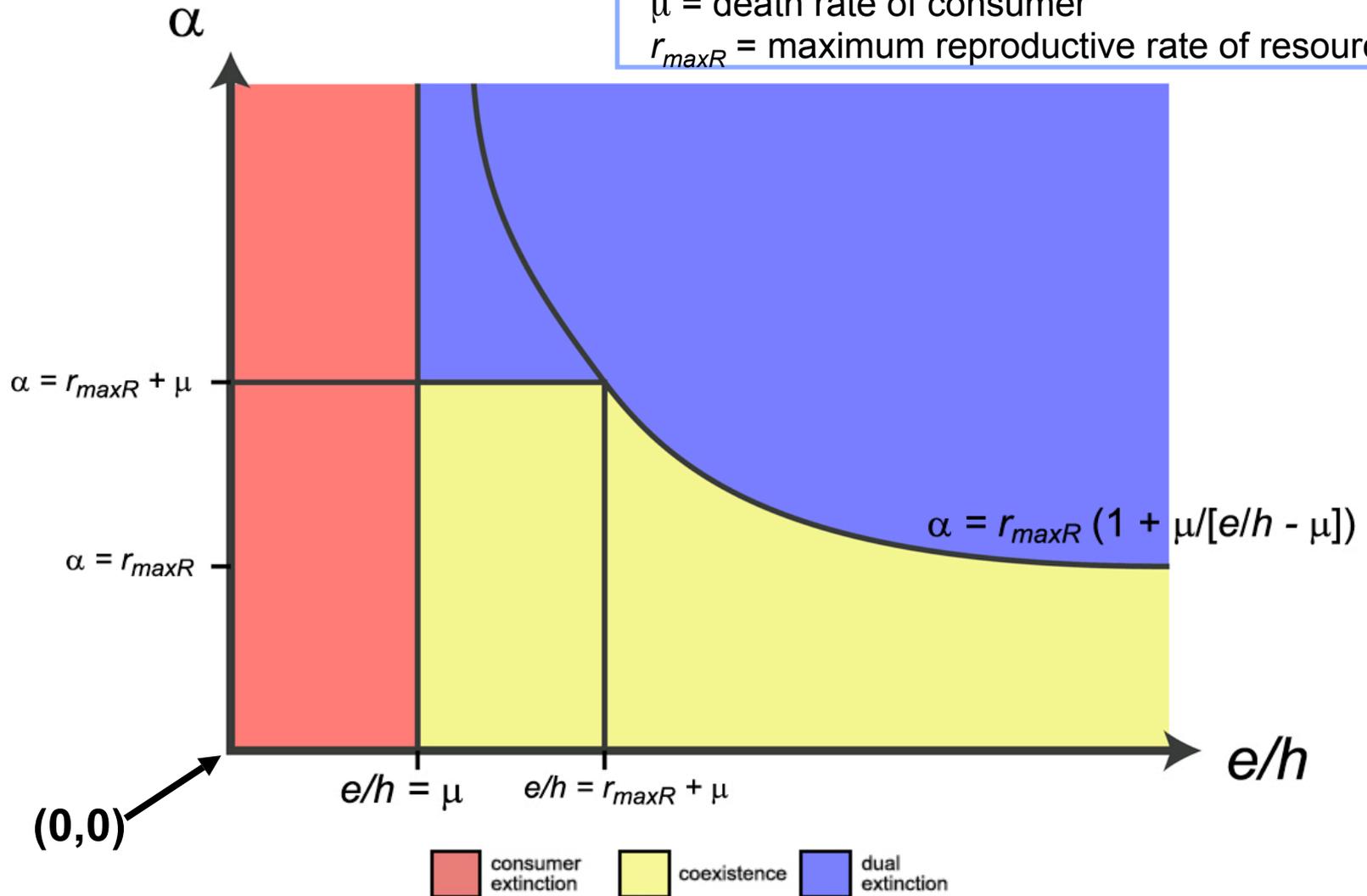
BKA Parameter Space:



 consumer extinction  coexistence  dual extinction

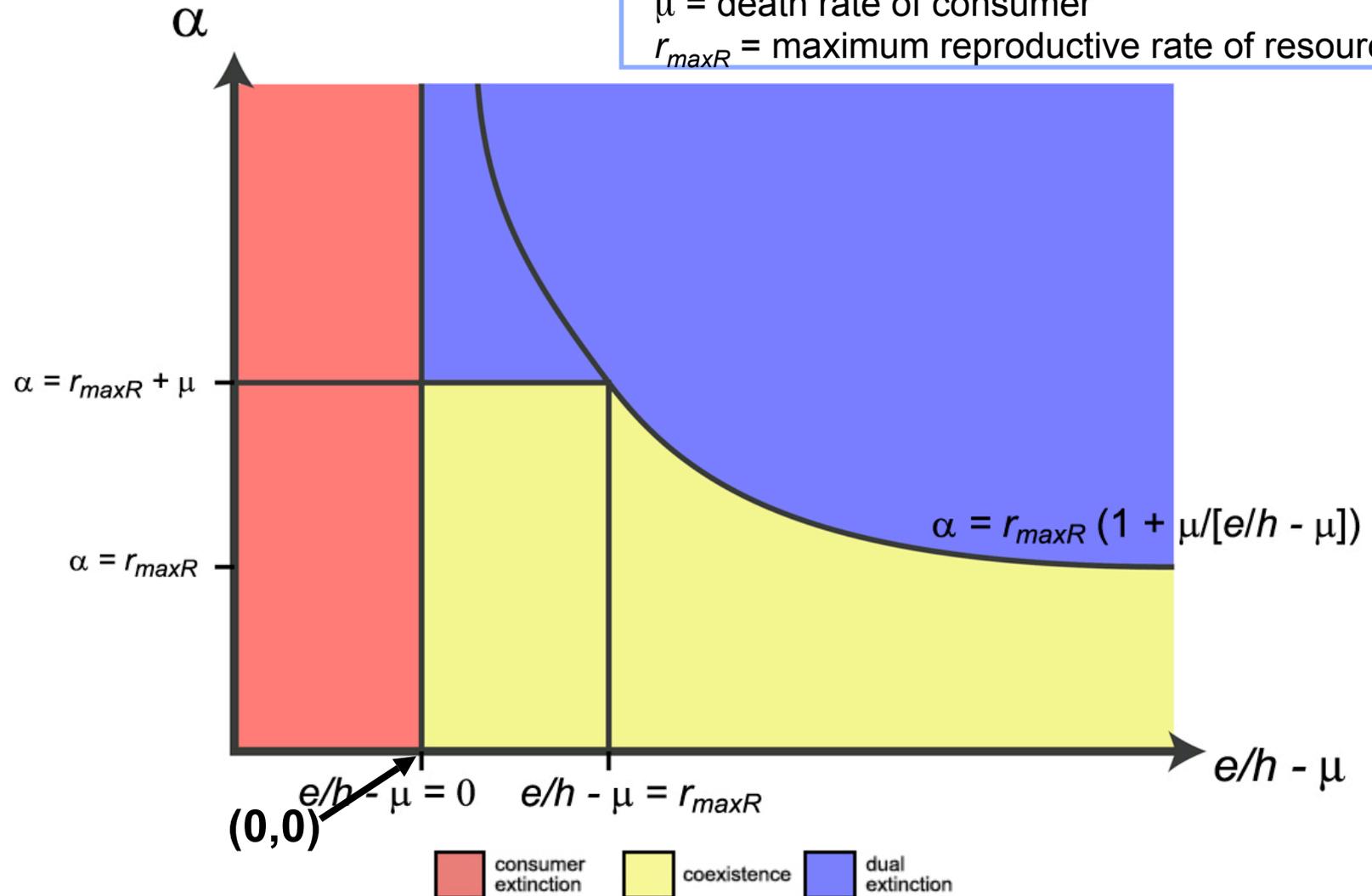
BKA Parameter Space:

α = capture efficiency of consumer
 e = conversion efficiency of consumer
 h = handling time of consumer
 μ = death rate of consumer
 r_{maxR} = maximum reproductive rate of resource



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**What is the maximum
net reproductive rate of
the consumer?**

Maximum Consumption Rate = $1/h$

Maximum Reproductive Rate = e/h

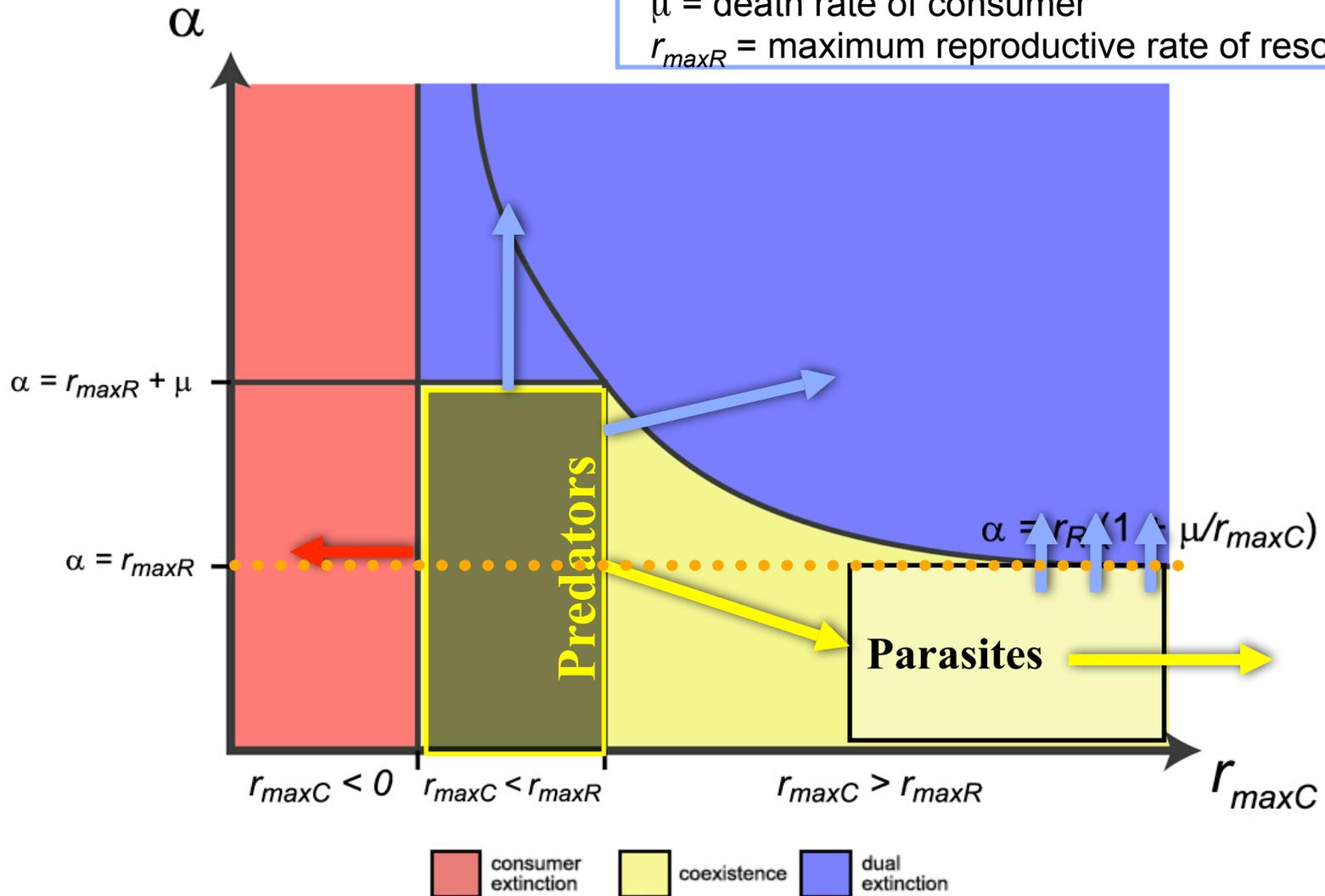
Max. Net Reproduction = $e/h - \mu$

$$r_{maxC} =$$

$$(e/h - \mu)$$

BKA Parameter Space:

α = capture efficiency of consumer
 e = conversion efficiency of consumer
 h = handling time of consumer
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 r_{maxR} = maximum reproductive rate of resource



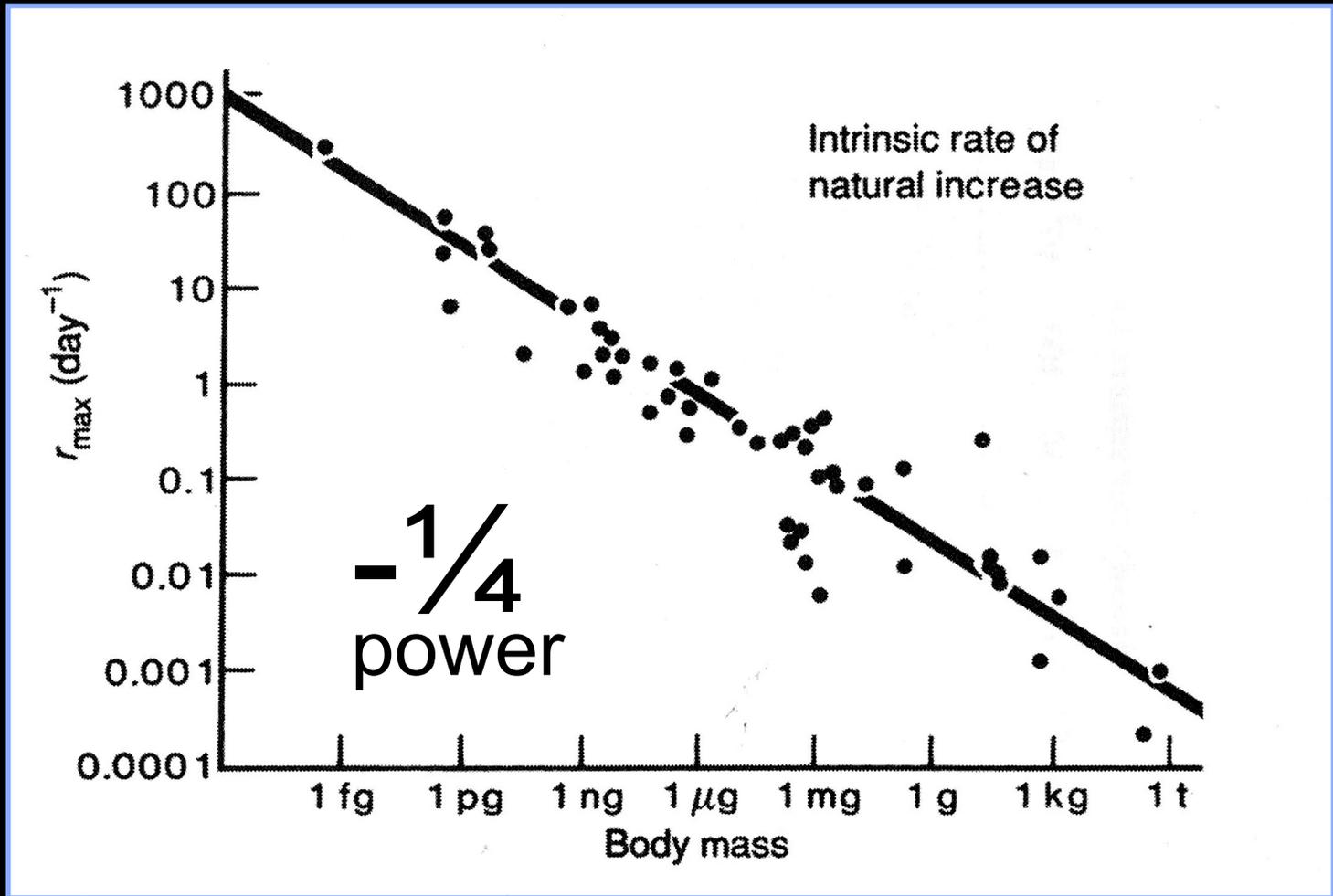
Data that we do have:

Body Size Ratios for consumer-resource pairs, labeled as:

- | | |
|---------------|------------|
| 1. Predator | (n= 15419) |
| 2. Parasitoid | (n= 215) |
| 3. Parasite | (n= 47) |
| 4. Pathogen | (n= 3) |

(Source: Brose *et al.* 2005, Ecology 86:2545)

Net Reproductive Rate is Allometrically Scaled:



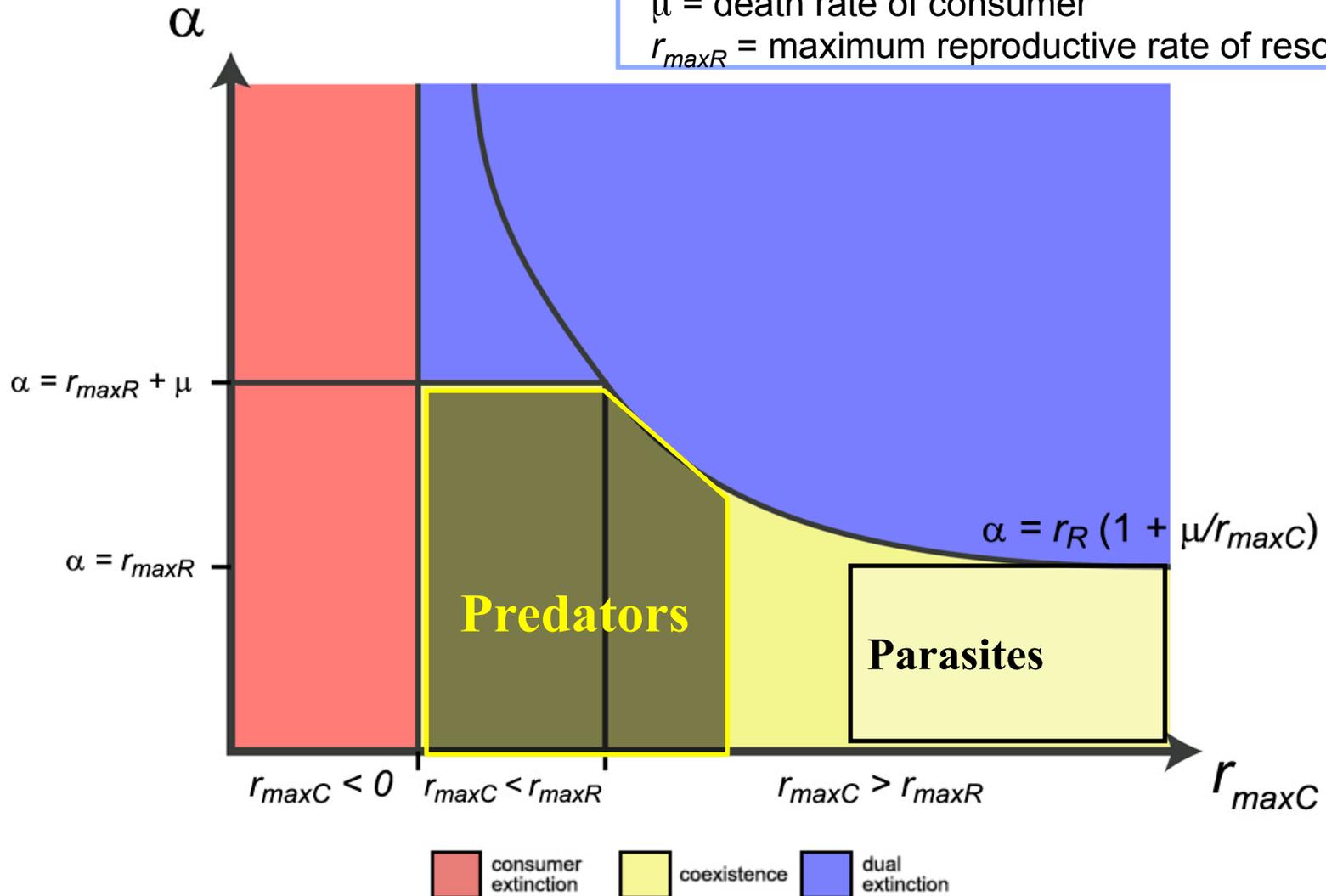
A Comparison of Definitions:

(net reproductive rate inferred from body size)

	Our "Predator" ($r_C \leq r_R$)	Our "Parasite" ($r_C > r_R$)
Predator	78.3%	21.7%
Parasitoid	38.6%	61.4%
Parasite	0.0%	100.0%
Pathogen	0.0%	100.0%

BKA Parameter Space:

α = capture efficiency of consumer
 e = conversion efficiency of consumer
 h = handling time of consumer
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 r_{maxR} = maximum reproductive rate of resource



Substantiating this distinction between predators and parasites:

- Actual maximum net reproductive rates for consumer resource pairs would yield more direct insights
- We need more data on parasites/pathogens and their hosts
- Key prediction is a limitation on consumption efficiency: this data would allow for falsification of this hypothesis

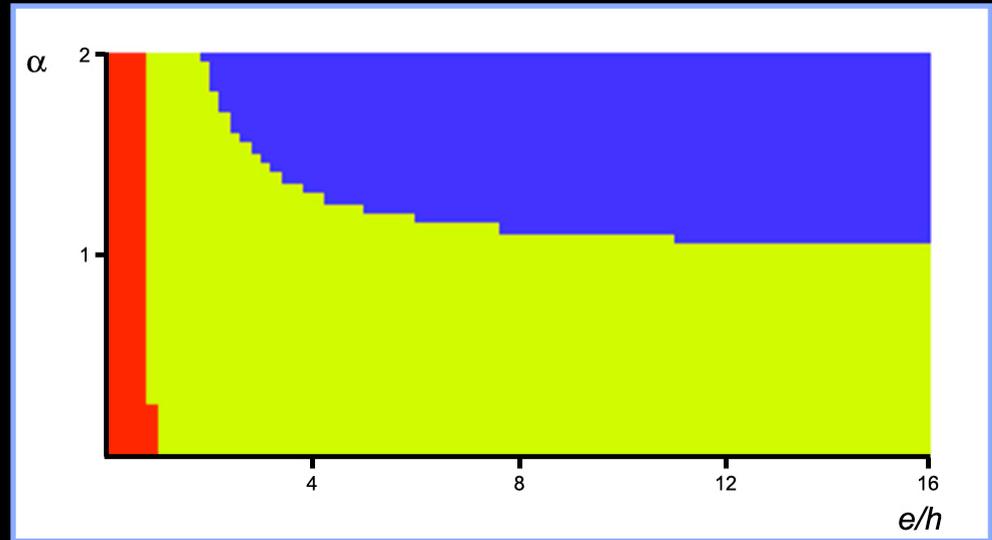
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Is this theory robust to functional response form?

Ratio Dependent:



Prey Dependent:

