

Testing the match-mismatch hypothesis across terrestrial trophic interactions.

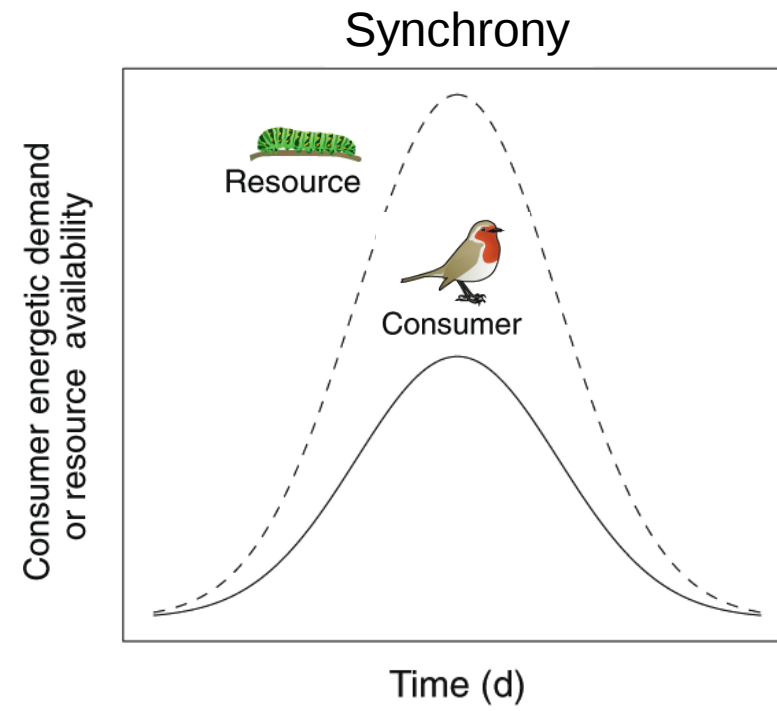


Heather Kharouba¹
&
Elizabeth Wolkovich²

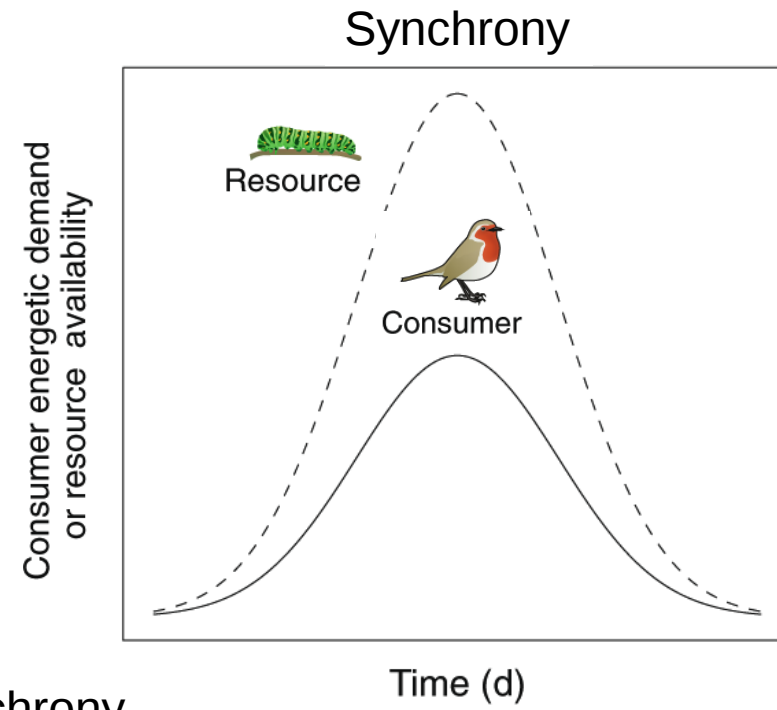


The timing of species interactions are shifting with climate change.

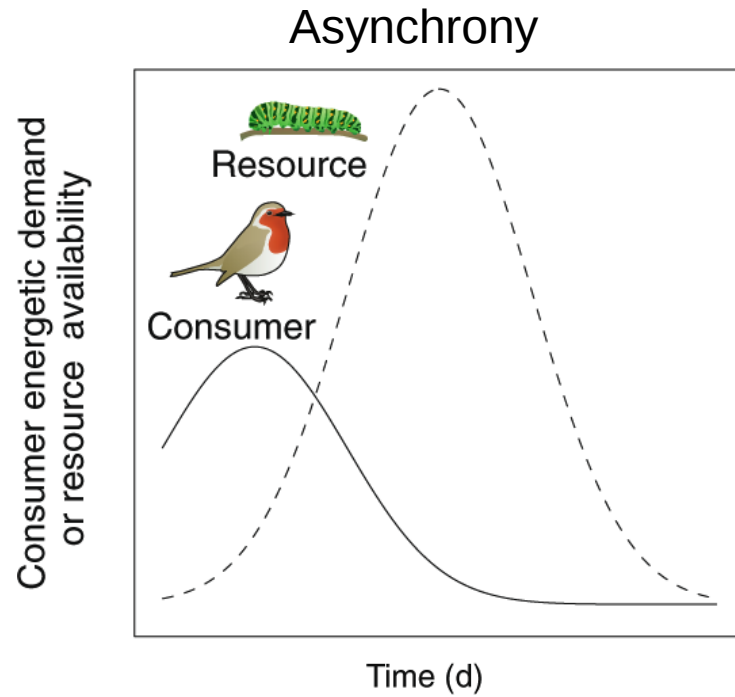
Pre-climate change



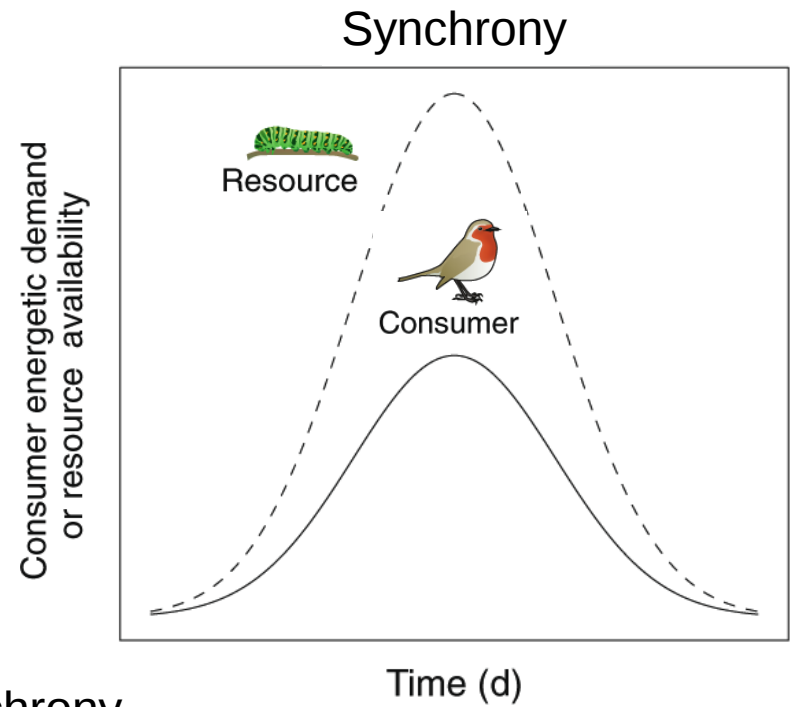
Pre-climate change



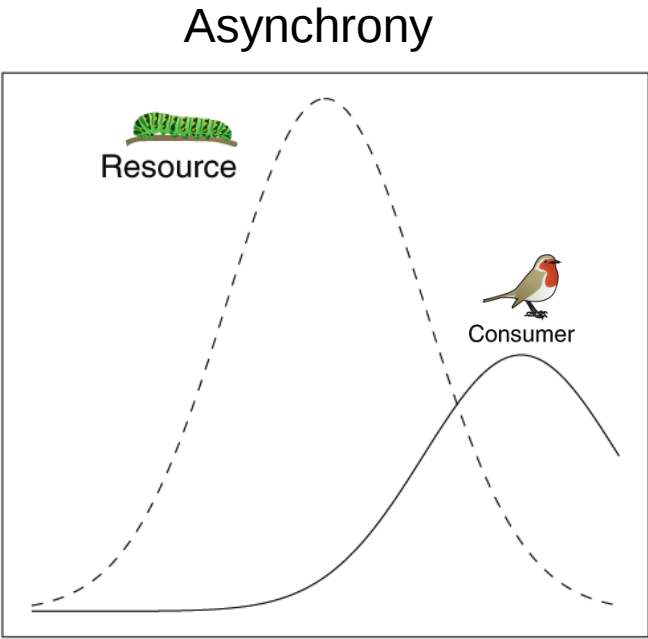
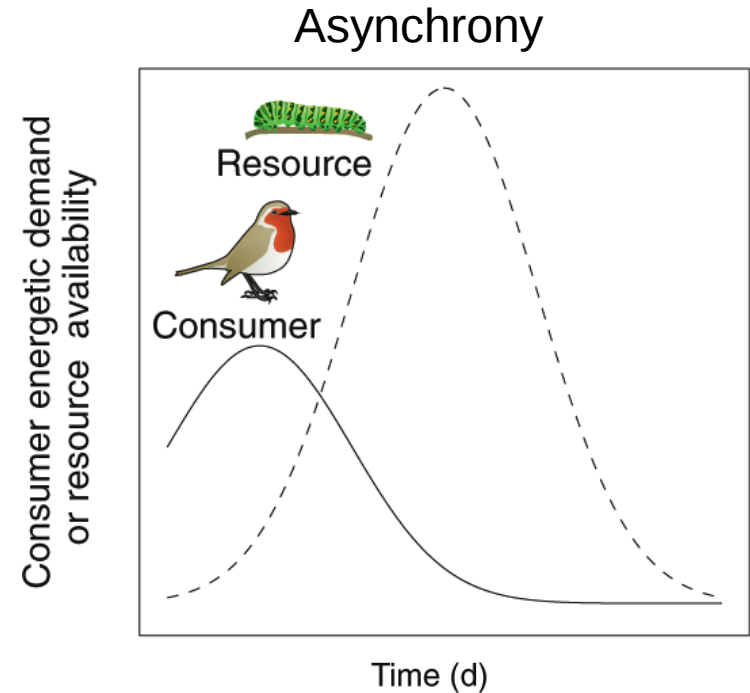
With climate change



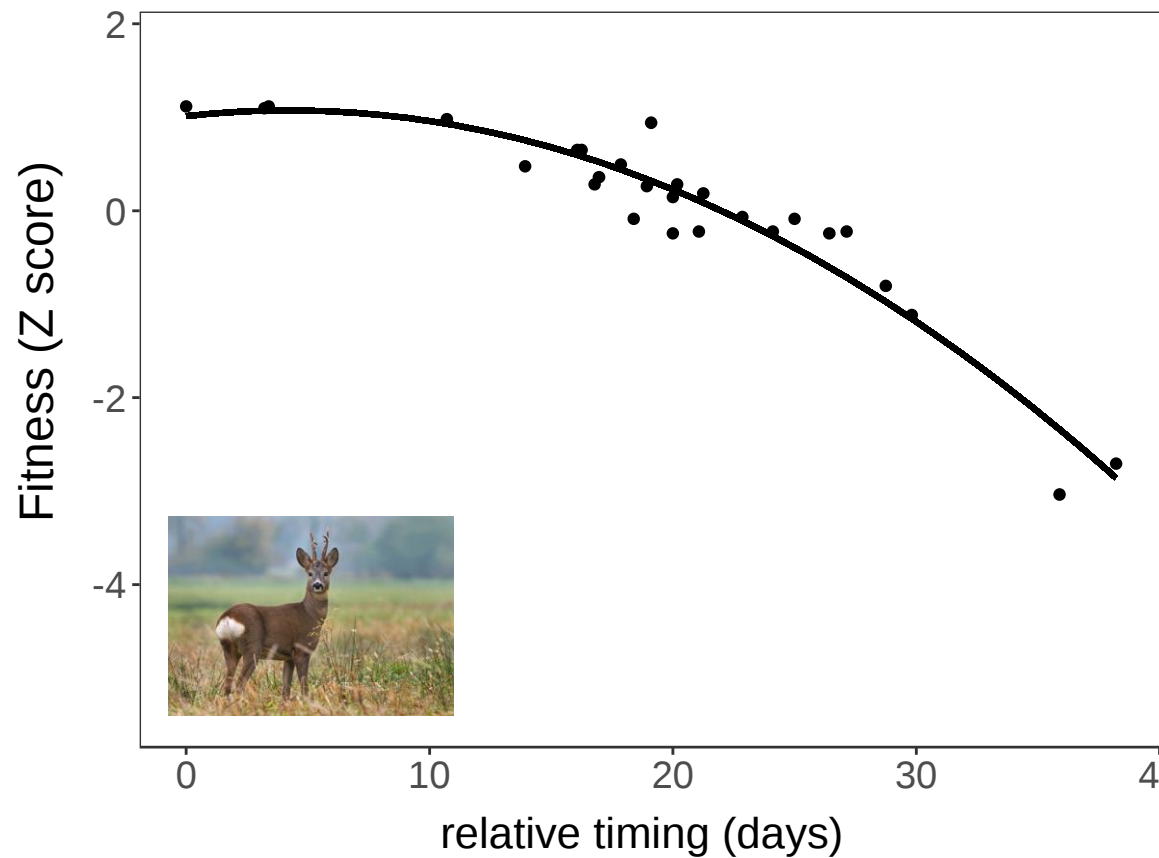
Pre-climate change



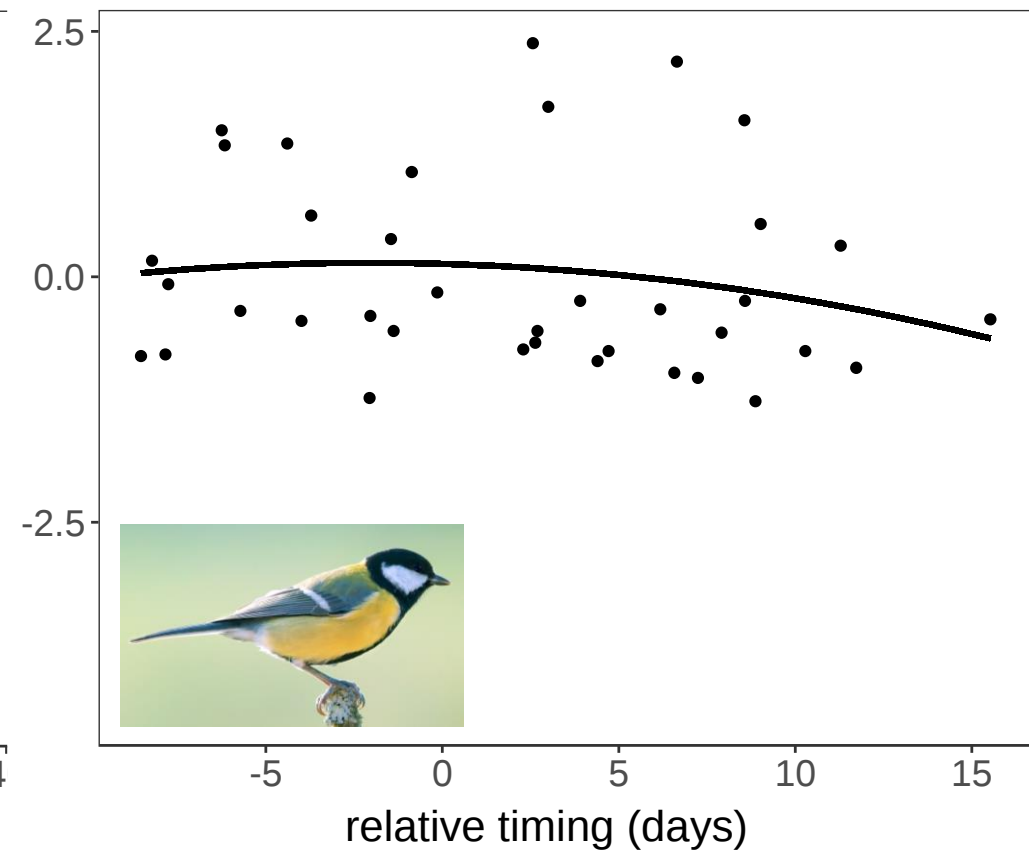
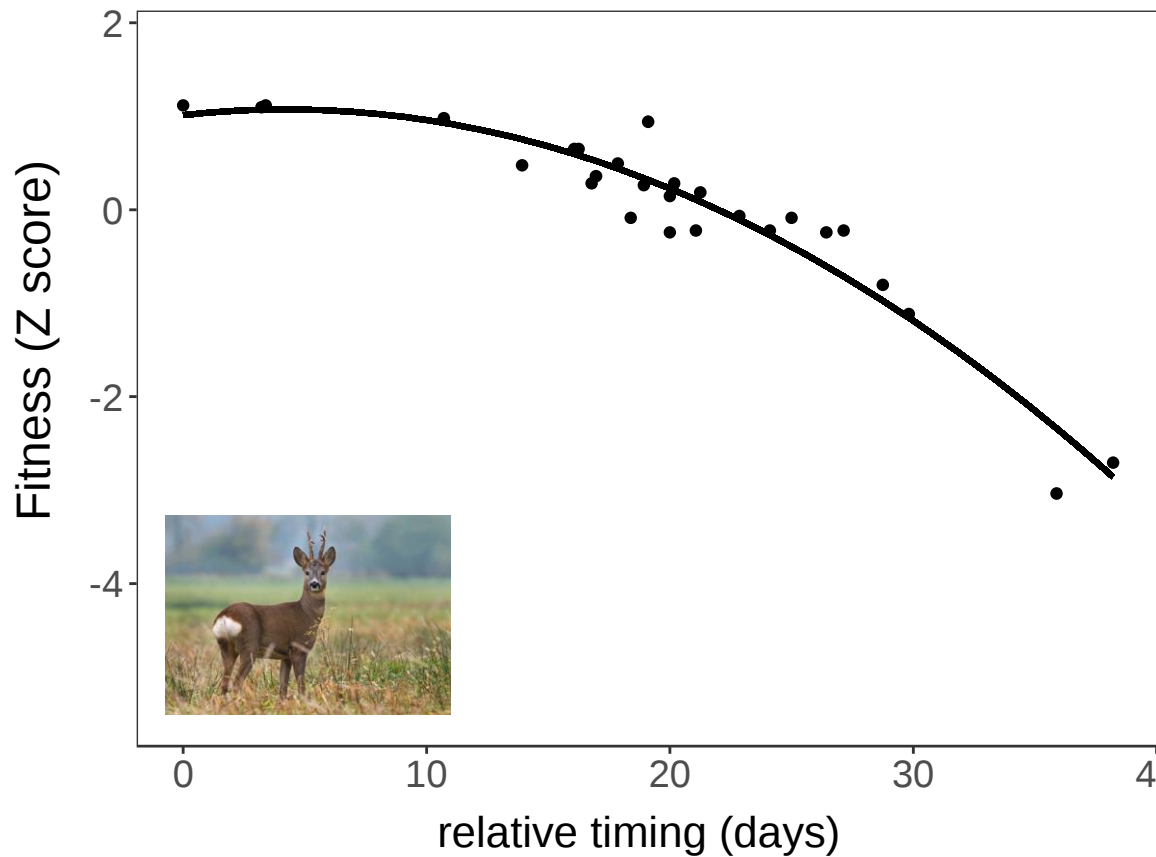
With climate change



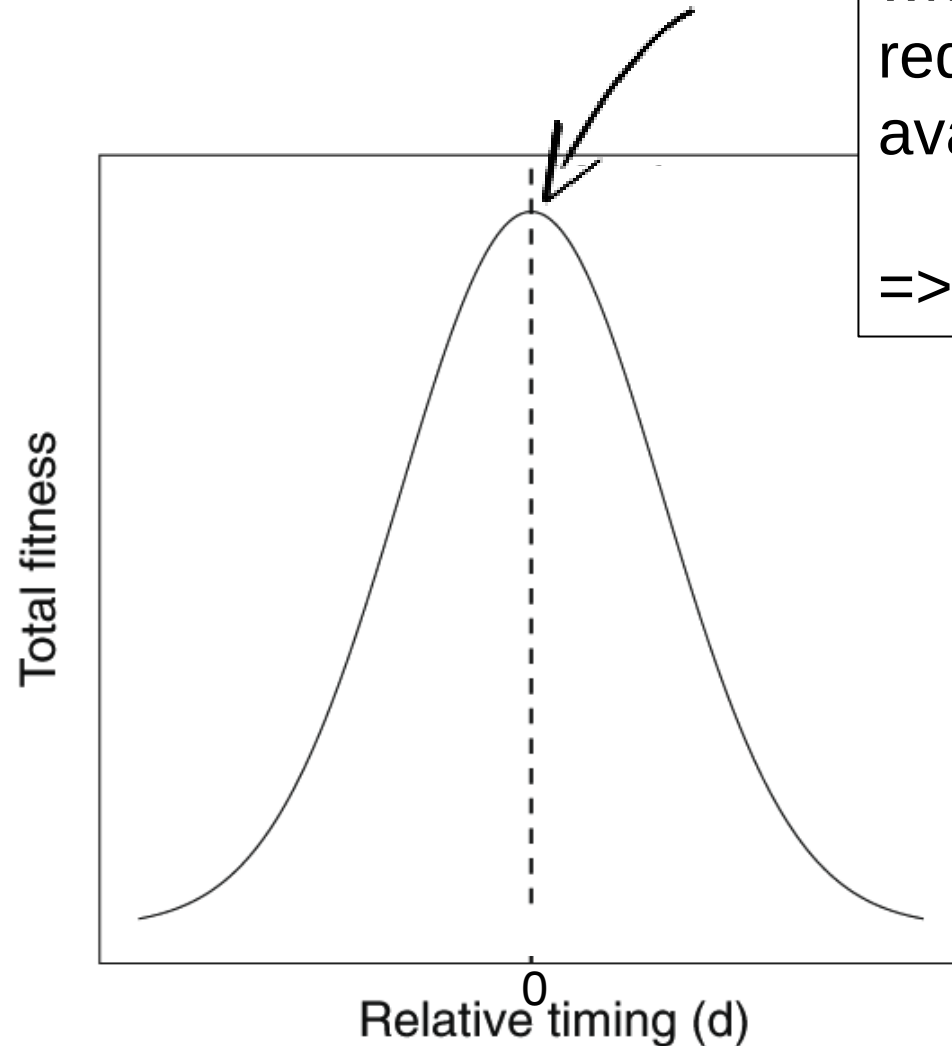
These shifts can have negative fitness consequences but hard to predict



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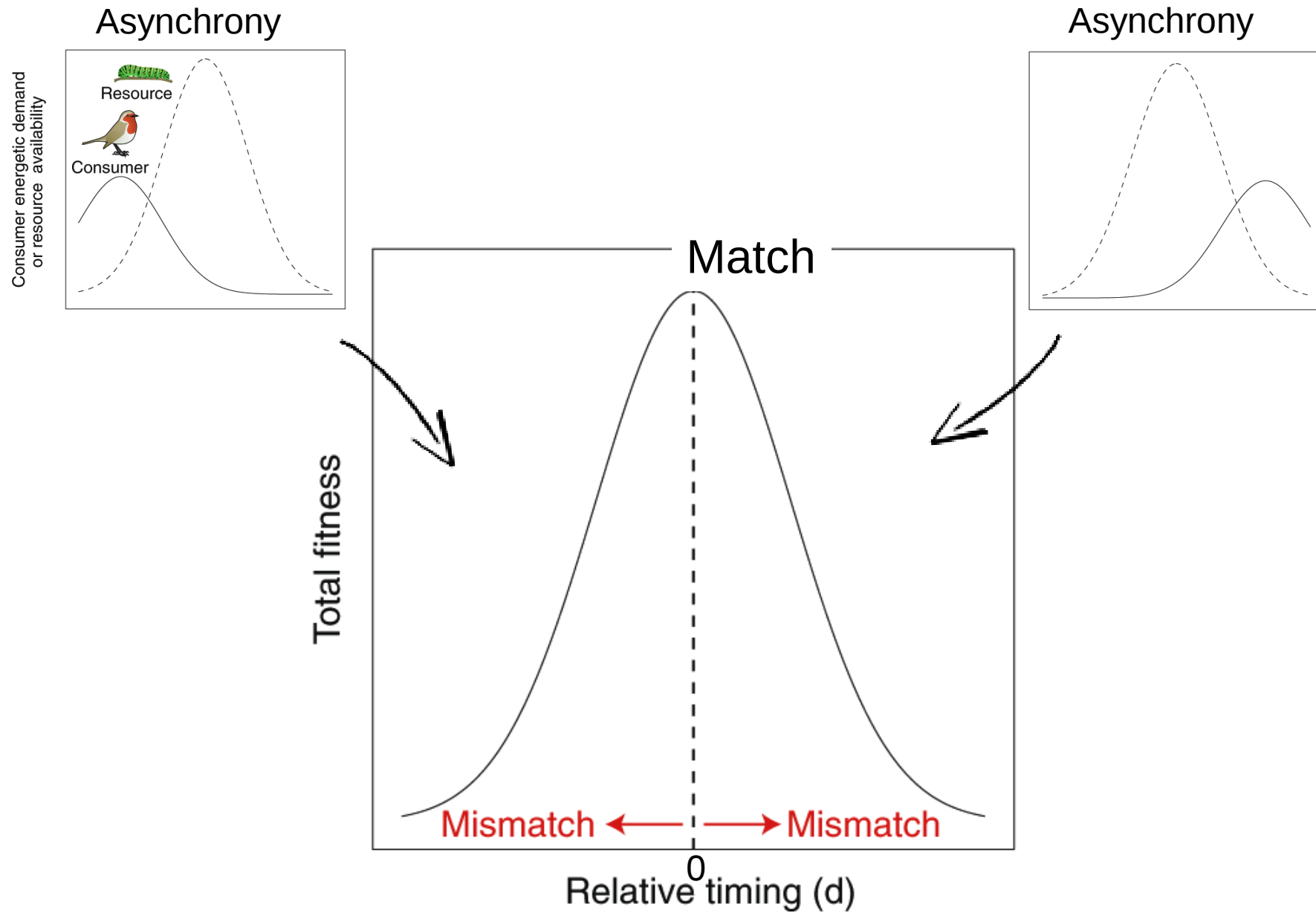
The Cushing match-mismatch hypothesis



Match:

when peak food
requirement = peak food
availability

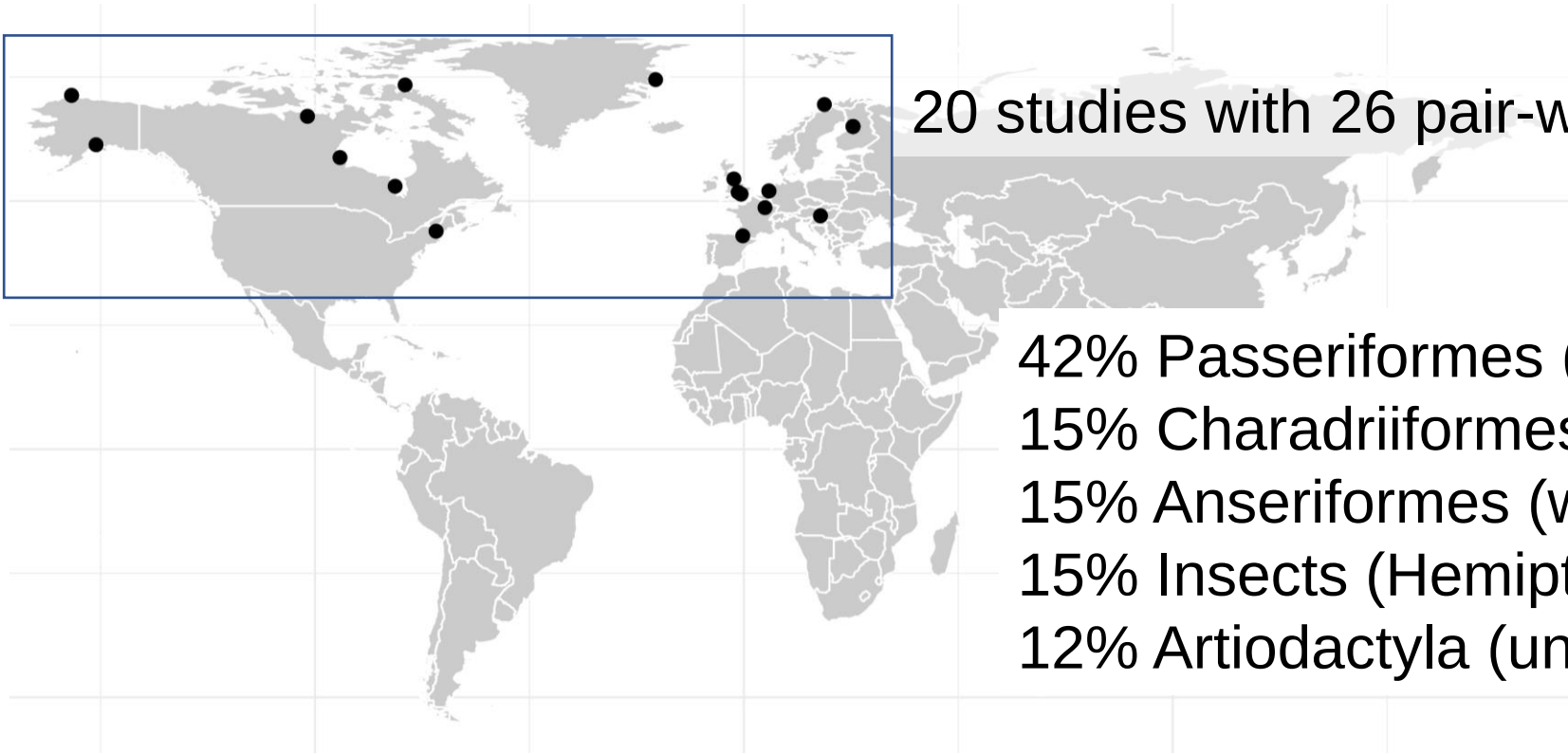
=> Relative timing = 0



Testing the match-mismatch hypothesis

1. What is the prevalence of negative fitness impacts of asynchrony (i.e. mismatch) across terrestrial systems?
2. Do studies that meet the assumptions of the hypothesis more likely to find a mismatch?

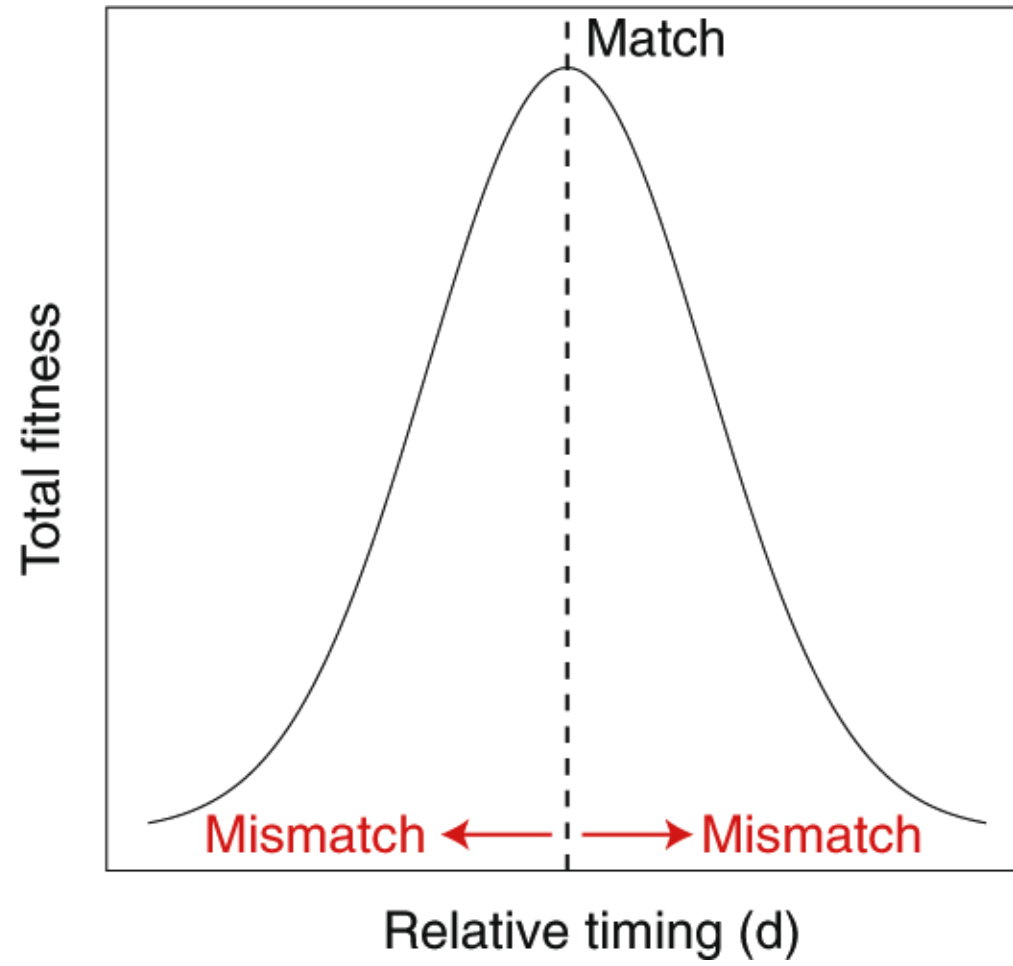
Testing the match-mismatch hypothesis



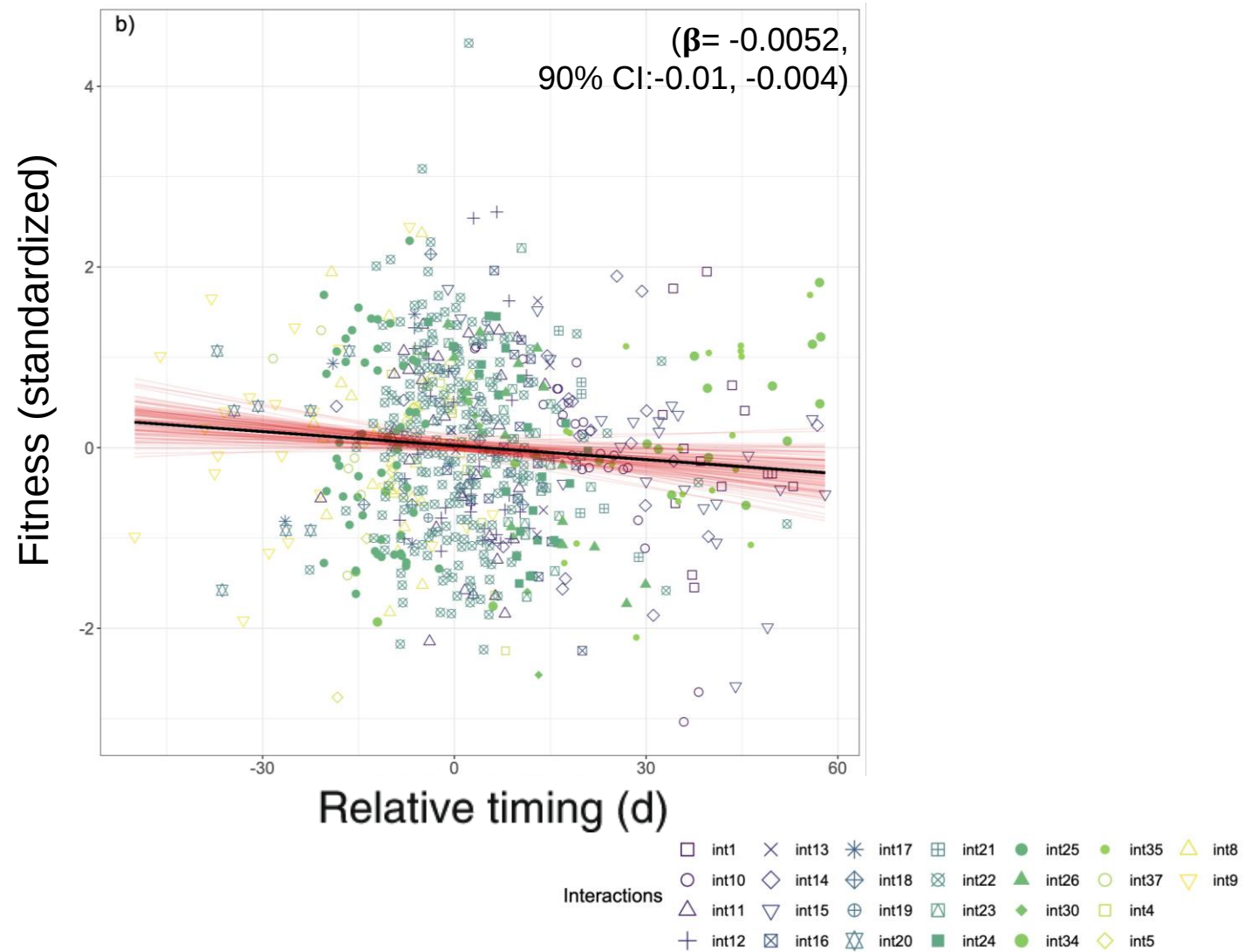
20 studies with 26 pair-wise species interactions:

- 42% Passeriformes (songbirds)
- 15% Charadriiformes (shorebirds)
- 15% Anseriformes (waterfowl)
- 15% Insects (Hemiptera, Lepidoptera)
- 12% Artiodactyla (ungulates)

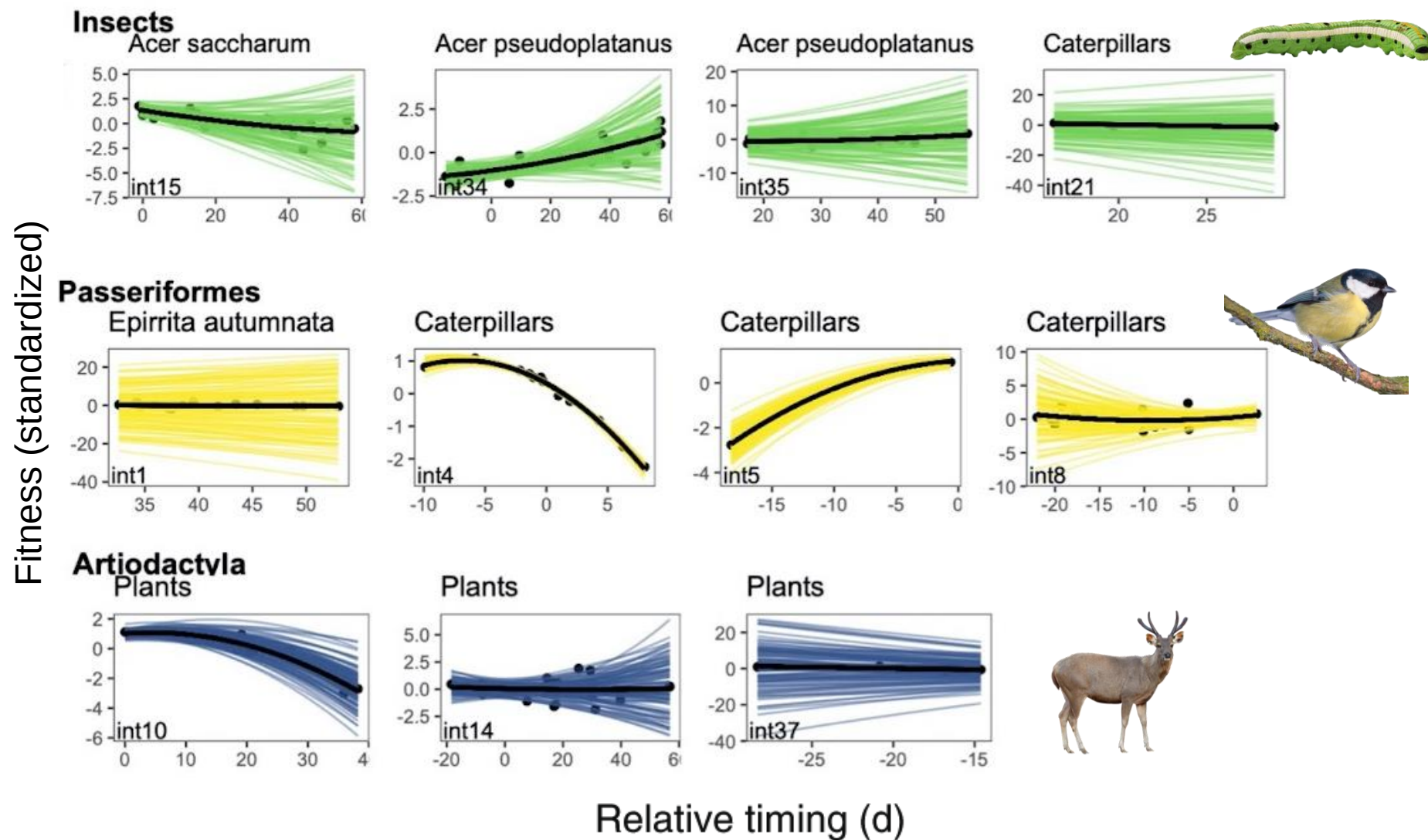




No support for the hypothesis



Both
synchrony
and
asynchrony
were prevalent
across
interactions



Assumptions of the hypothesis

Consumer and resource show seasonality.

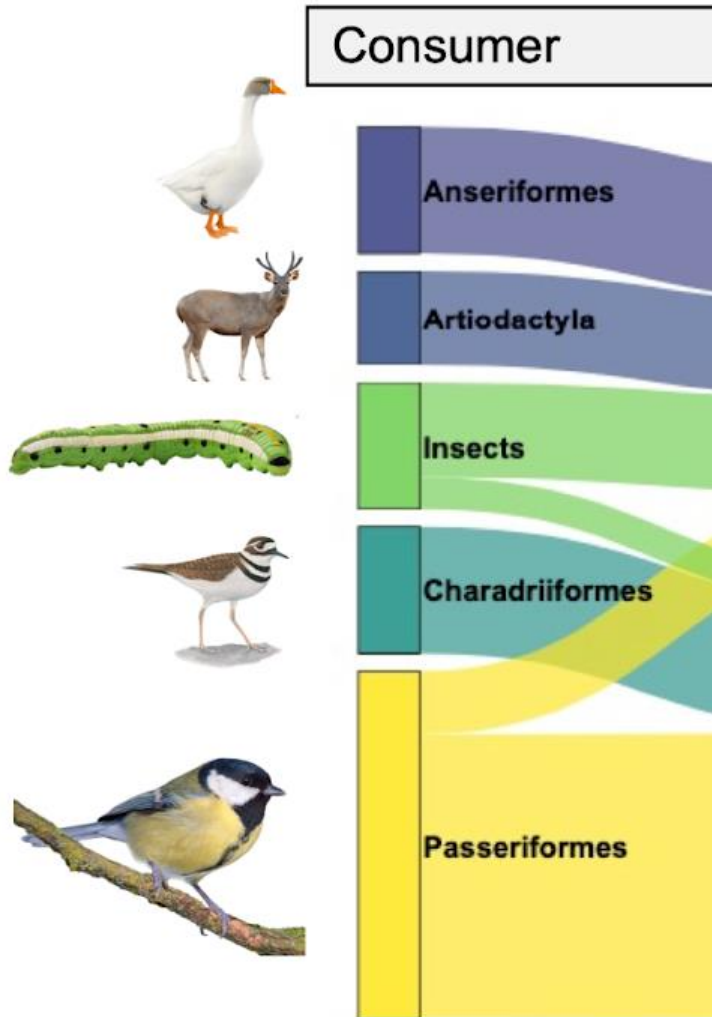
Consumer is specialized on the resource.

Consumer fitness is most determined by resource.



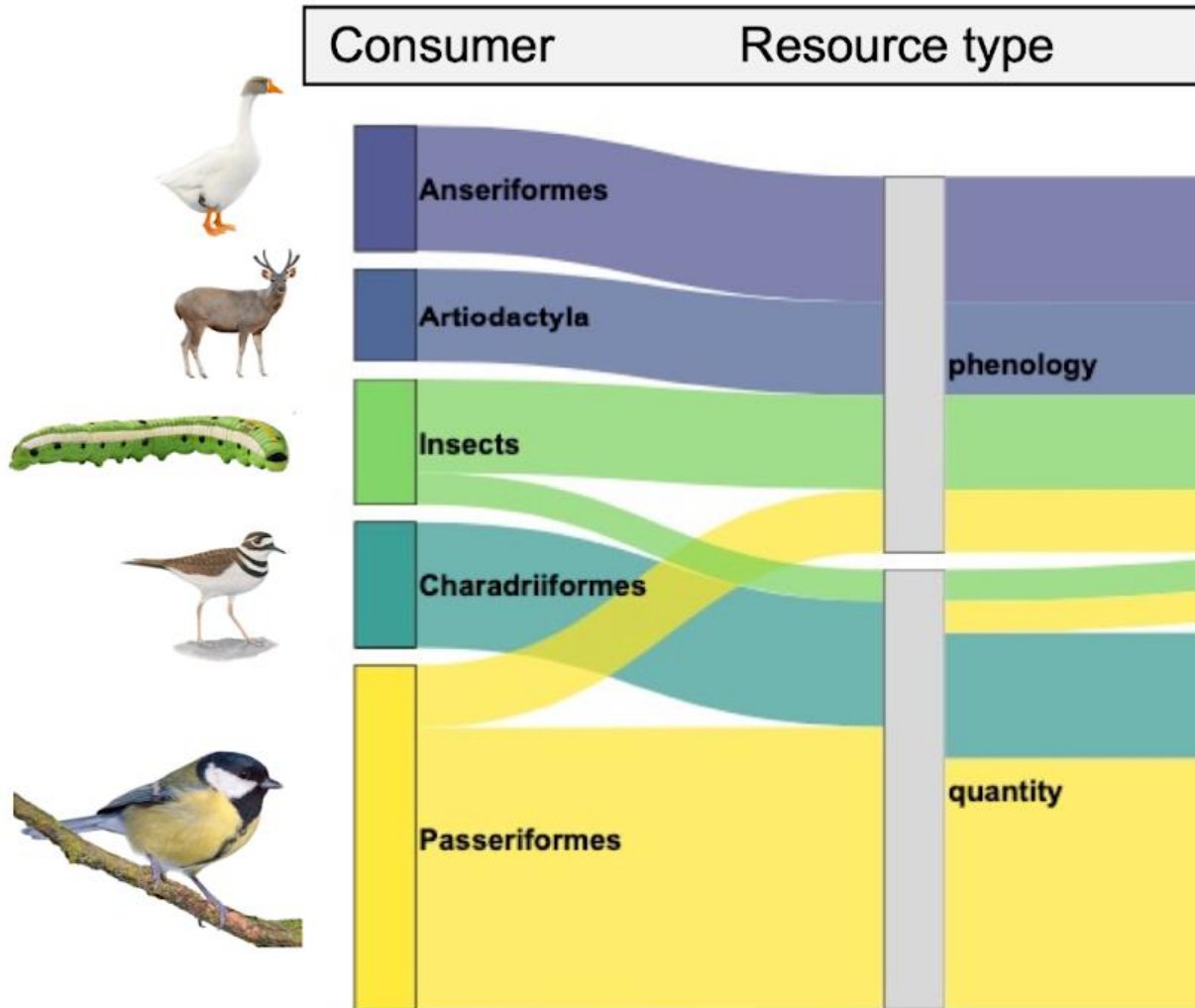
How well do studies address assumption of

ecological?



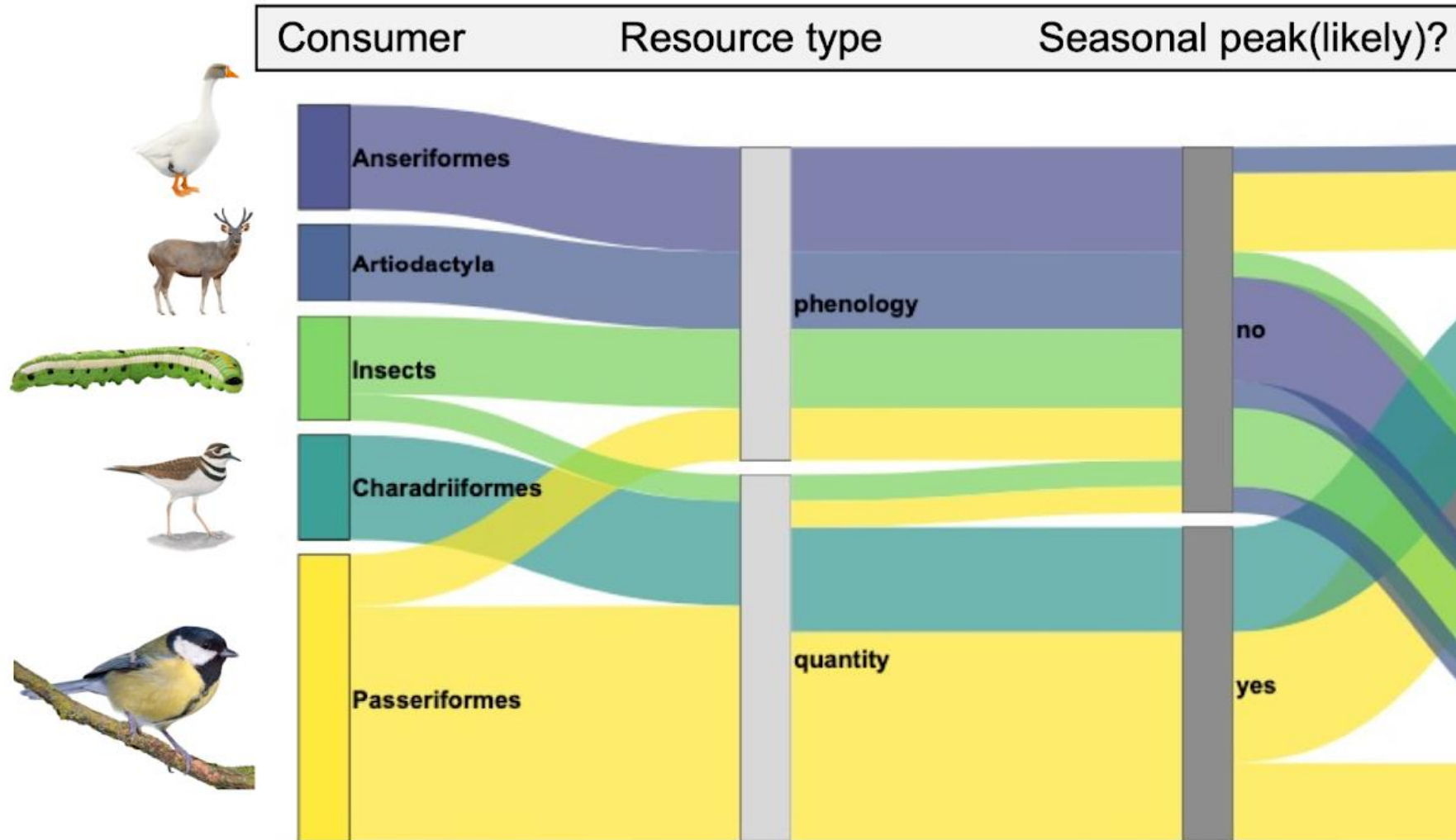
How well do studies address assumption of

specificity?



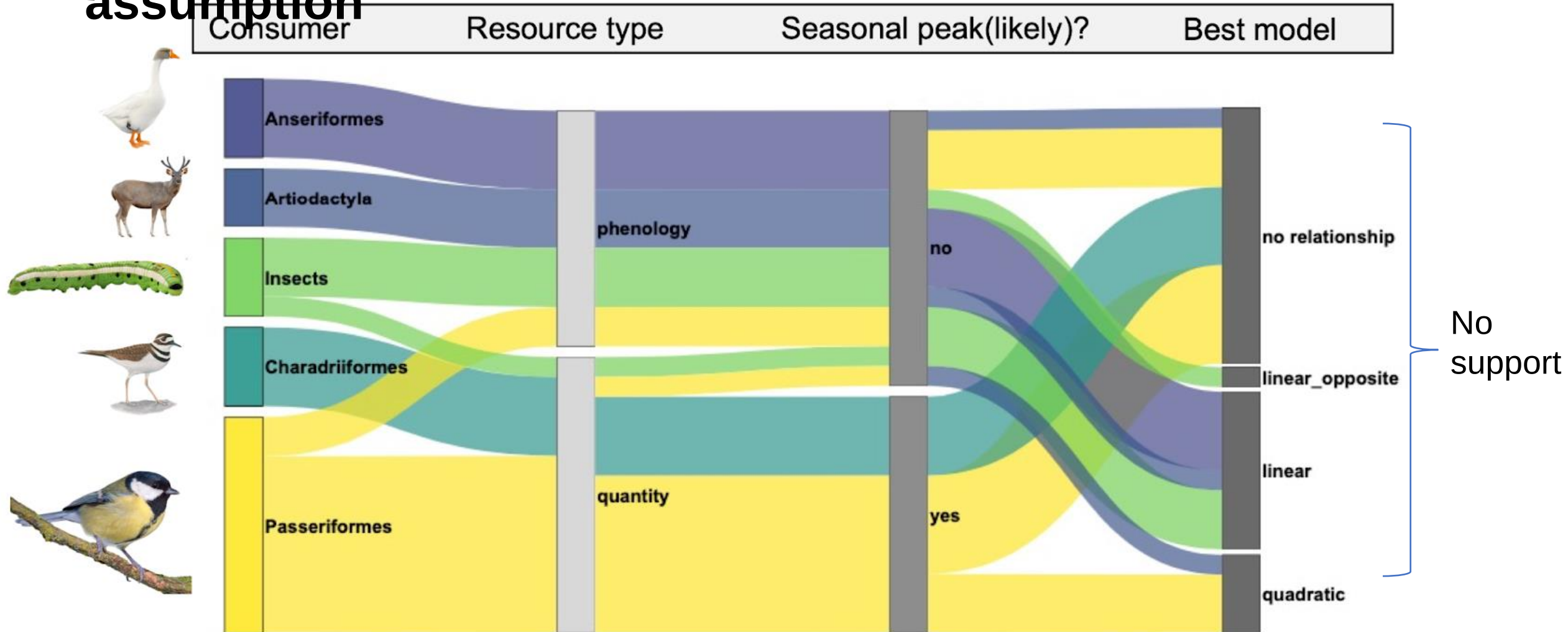
1. What type of metric do authors use to measure the resource?

How well do studies address assumption of seasonality?



2. Is there likely to be a seasonal peak in resource?

Resource seasonality may be an important assumption



Assumptions of the hypothesis

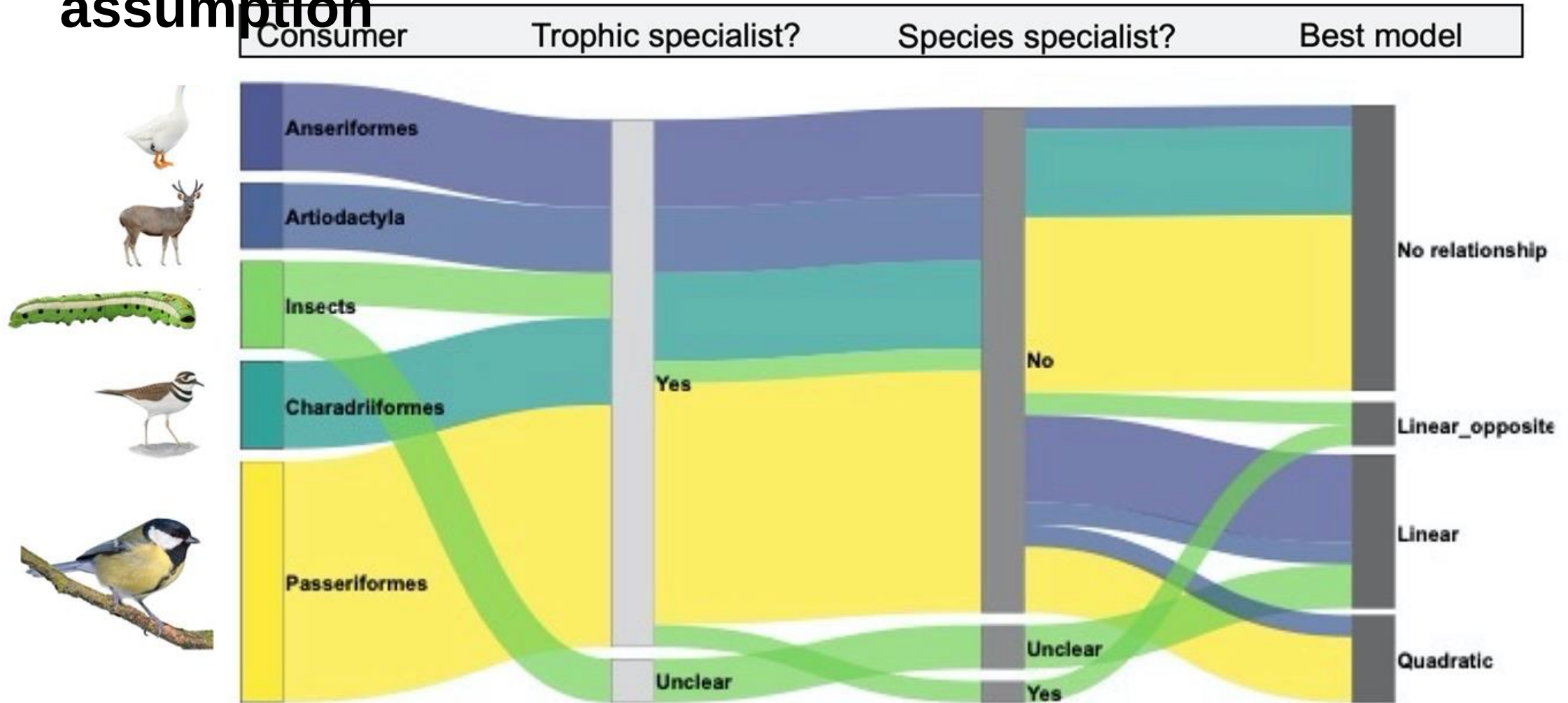
Consumer and resource show seasonality.

Consumer is specialized on the resource.

Consumer fitness is most determined by resource.



Specialization does not seem to be an important assumption



Conclusions

Weak support for the match-mismatch hypothesis.

Better tests of the hypothesis are needed in the context of climate change.

Multiple factors- testing assumptions, data quality.

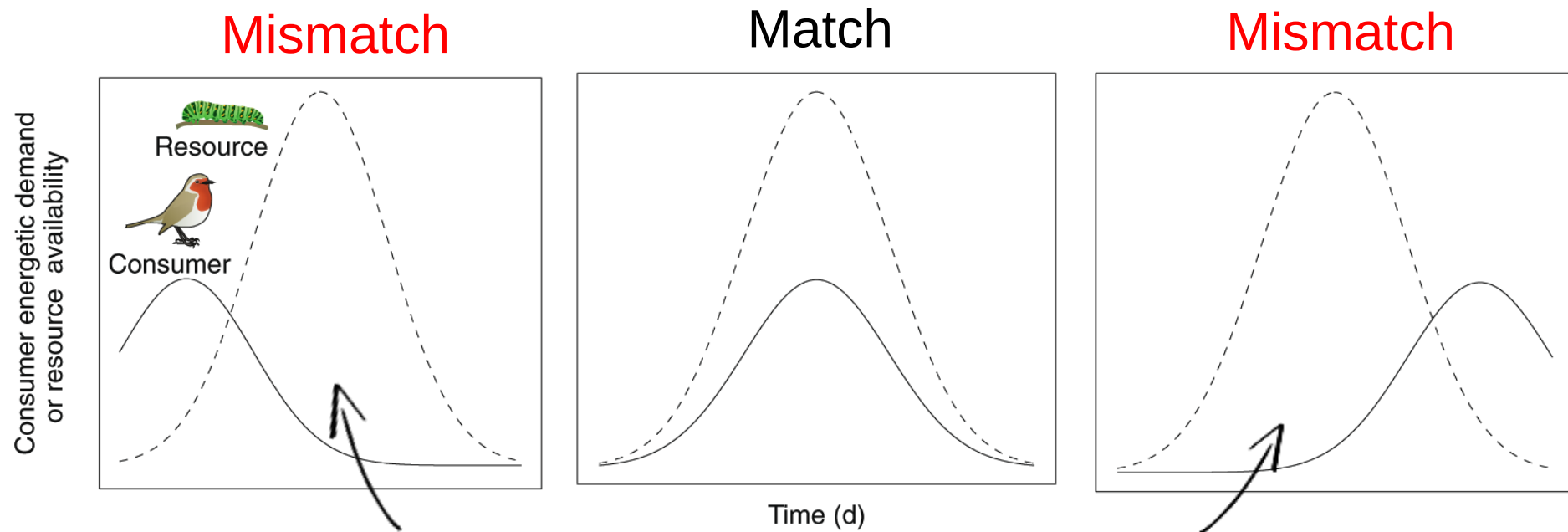


Acknowledgements



Vicki Senior
Anna Tucker
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Deirdre Loughnan

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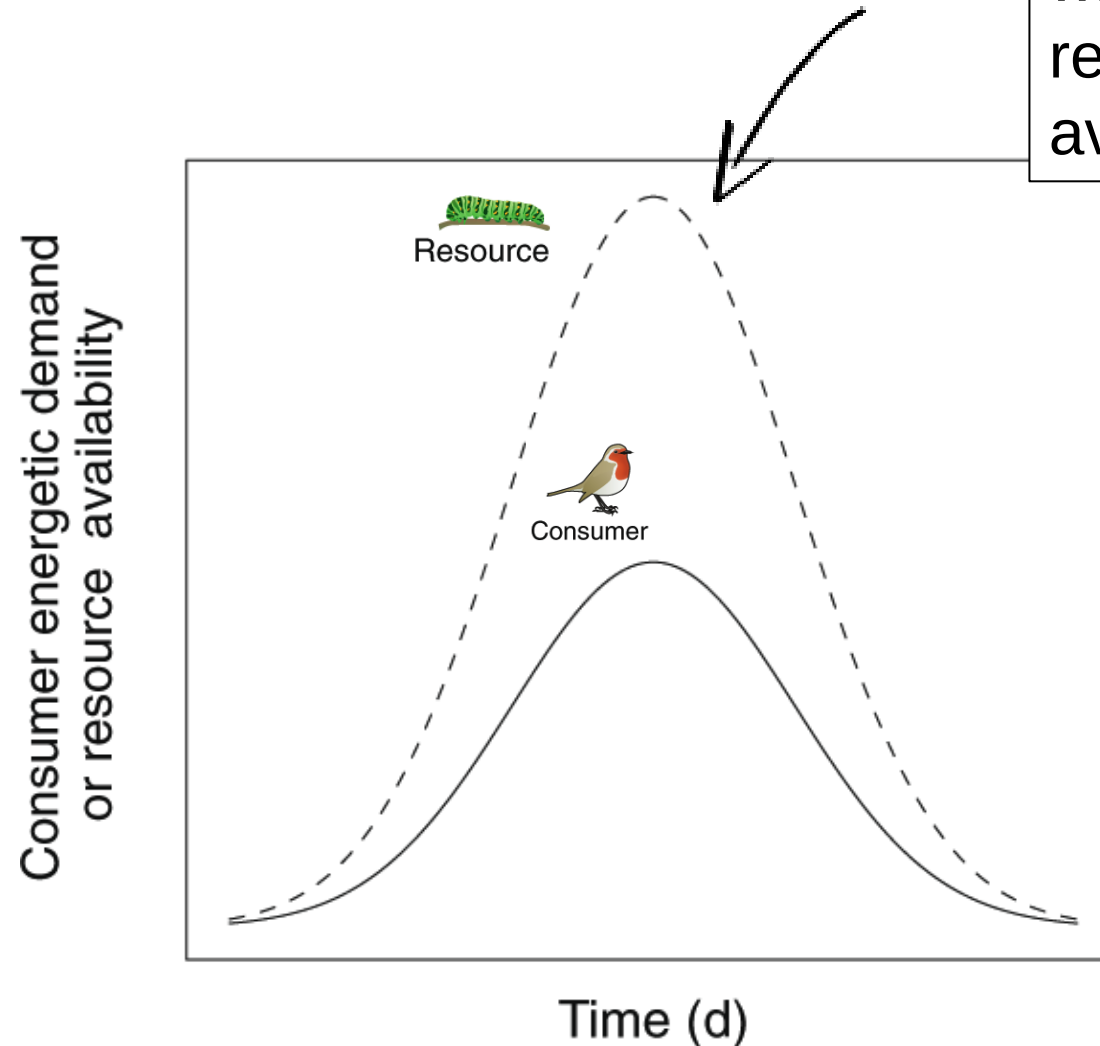


Mismatch: when gap between food requirement and food availability

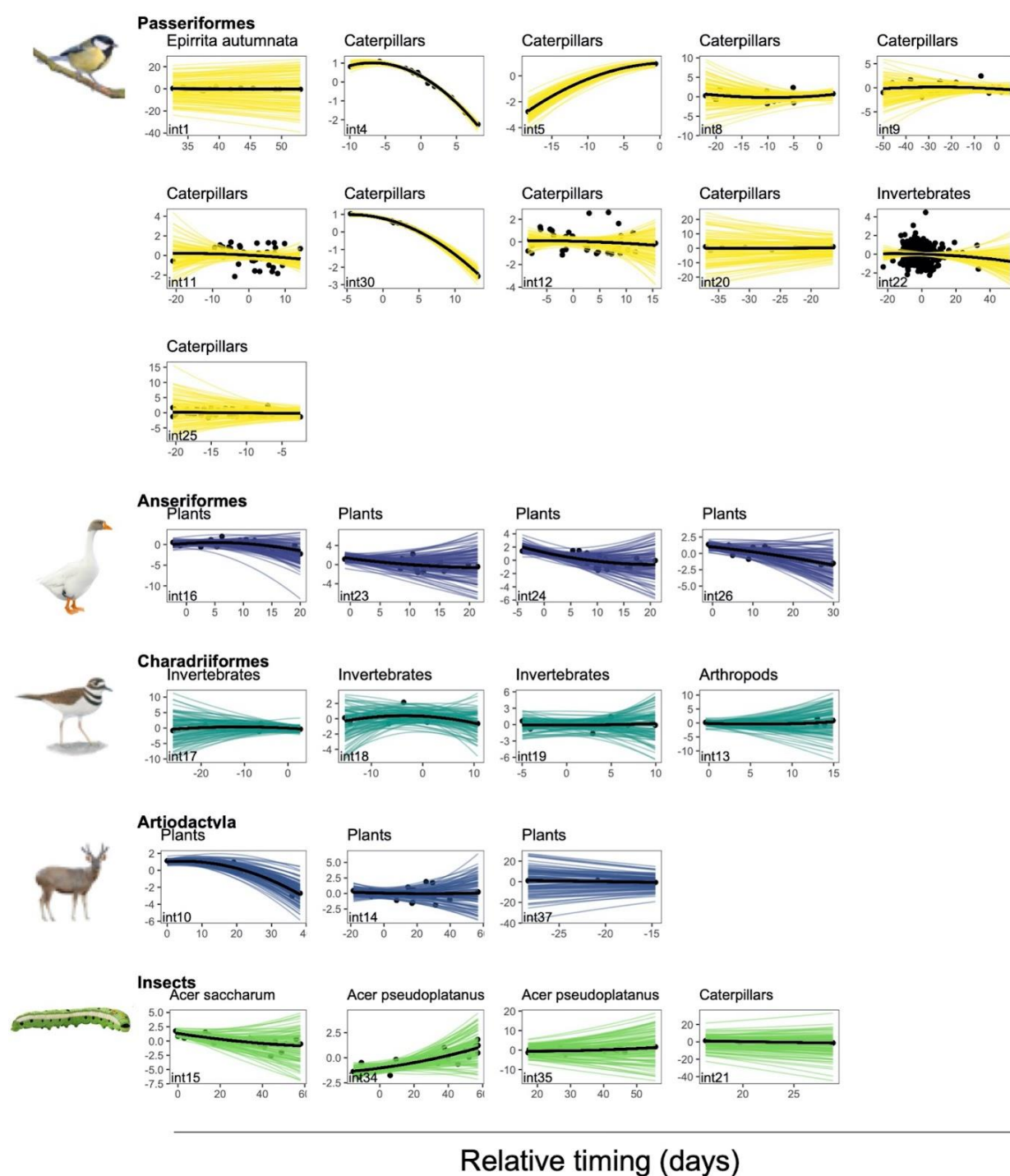
The Cushing match-mismatch hypothesis

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Both
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Fitness (Z-score)

