EARTH & LIFE INSTITUTE

Challenges of widespread nettle-feeding butterflies in anthropogenic landscapes

Lessons from a resource-based habitat approach and field experiments on larval development

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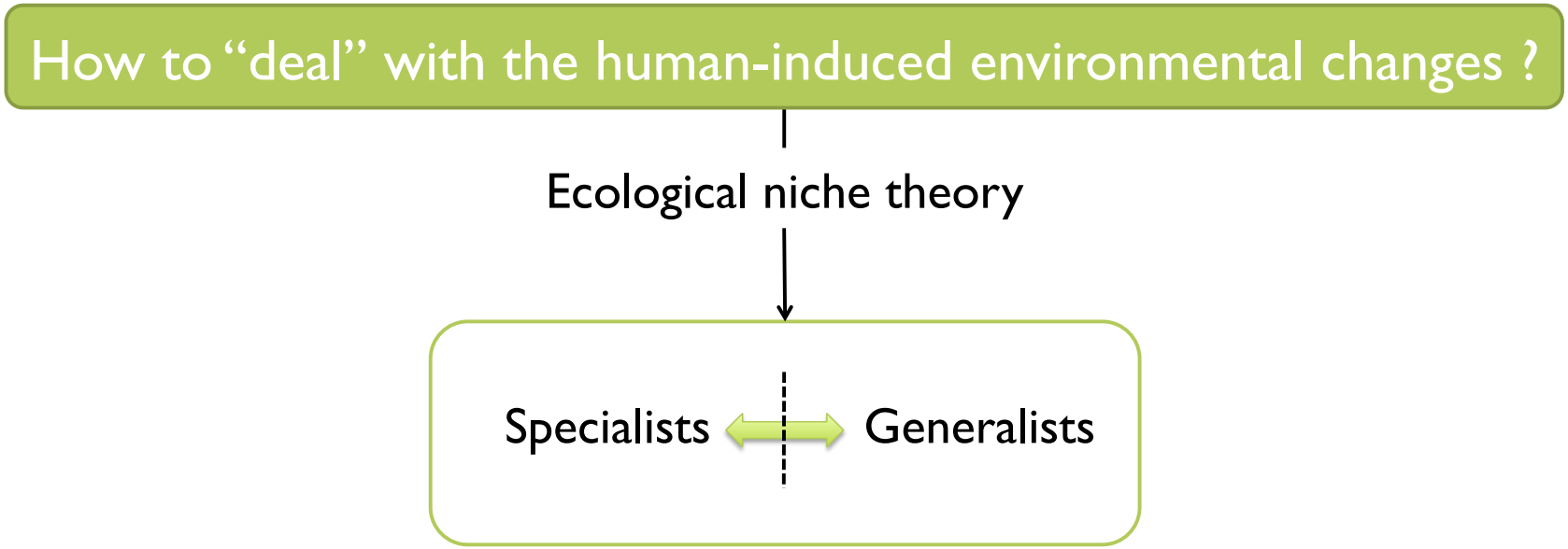
Human activities impact all environments



Human activities impact all environments

How to "deal" with the human-induced environmental changes ?

Ecological niche theory

Specialists ⟷ Generalists

Human-induced environmental changes → Specialists ↘

Human-induced environmental changes → Generalists ↗ AND ↘

The study of mechanisms

Challenges of widespread organisms
in anthropogenic landscape

Integration of two research frameworks
at landscape scale

The study of mechanisms

Challenges of widespread organisms
in anthropogenic landscape

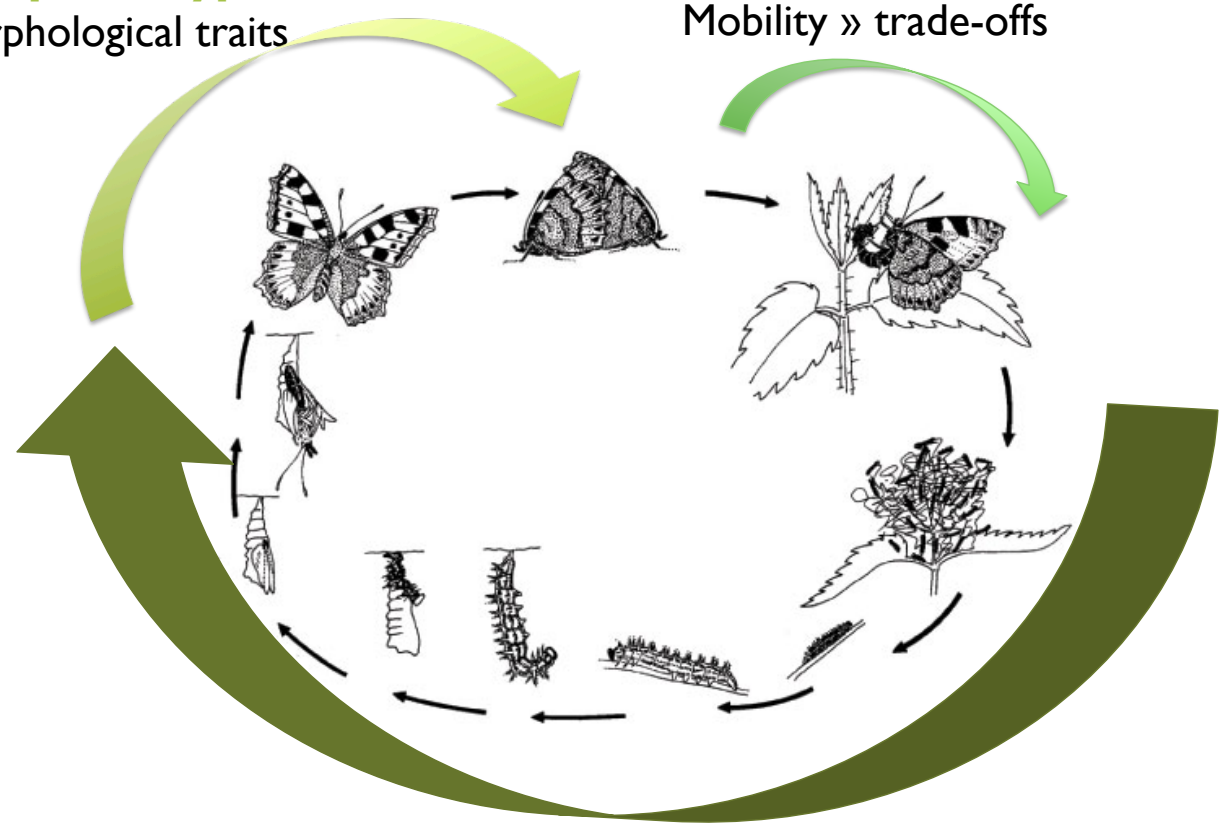
Integration of two research frameworks
at landscape scale

Functional habitat ← → Eco-Evo-Devo

Eco-Evo-Devo in Butterflies

Adult phenotype
⇒ Morphological traits

Fitness
⇒ « Fecundity-Mobility » trade-offs



Larval phenotype
⇒ Development in breeding cages

Nettle-feeding butterflies as models

Araschnia levana

Polygonia c-album

Aglais urticae

Inachis io

Nettle-feeding butterflies as models

Generalists

Araschnia levana

Polygonia c-album

Aglais urticae

Inachis io

Nettle-feeding butterflies as models

Generalists

Araschnia levana

(*Polygonia c-album*)

Aglais urticae

Inachis io

Host plant
Urtica dioica

Specialists

Nettle-feeding butterflies as models

Araschnia levana

Polygonia c-album

Aglais urticae

Inachis io

Host plant
Urtica dioica

Generalists

Specialists

Van Dyck *et al.* (2009) *Conservation Biology*

I I Larval development and adult phenotype expression under different anthropogenic environments in *Inachis io*

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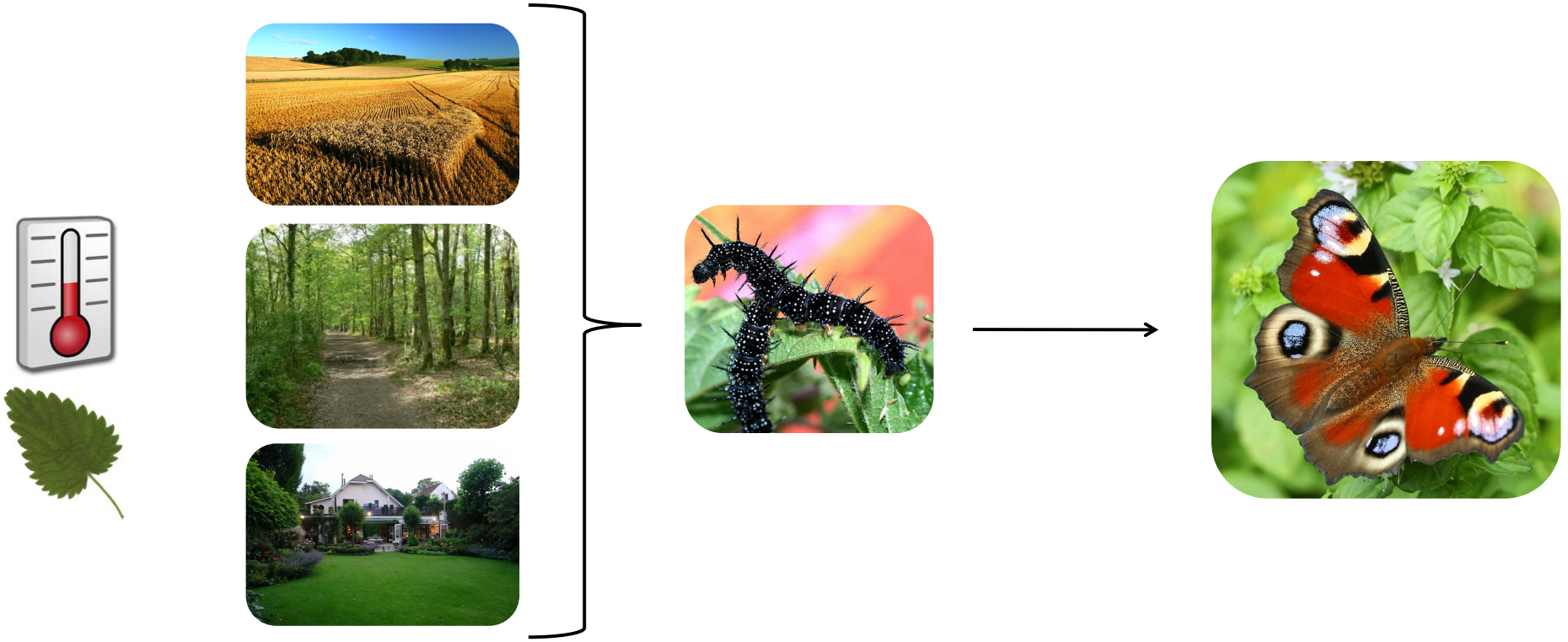


Experimental scheme



Site :	1	2	3	4	5	6	7	8	9
Cage :	1	7	13	19	25	31	37	43	49
	2	8	14	20	26	32	38	44	50
	3	9	15	21	27	33	39	45	51
	4	10	16	22	28	34	40	46	52
	5	11	17	23	29	35	41	47	53
	6	12	18	24	30	36	42	48	54

July - Augustus 2011

⇒ 54 cages

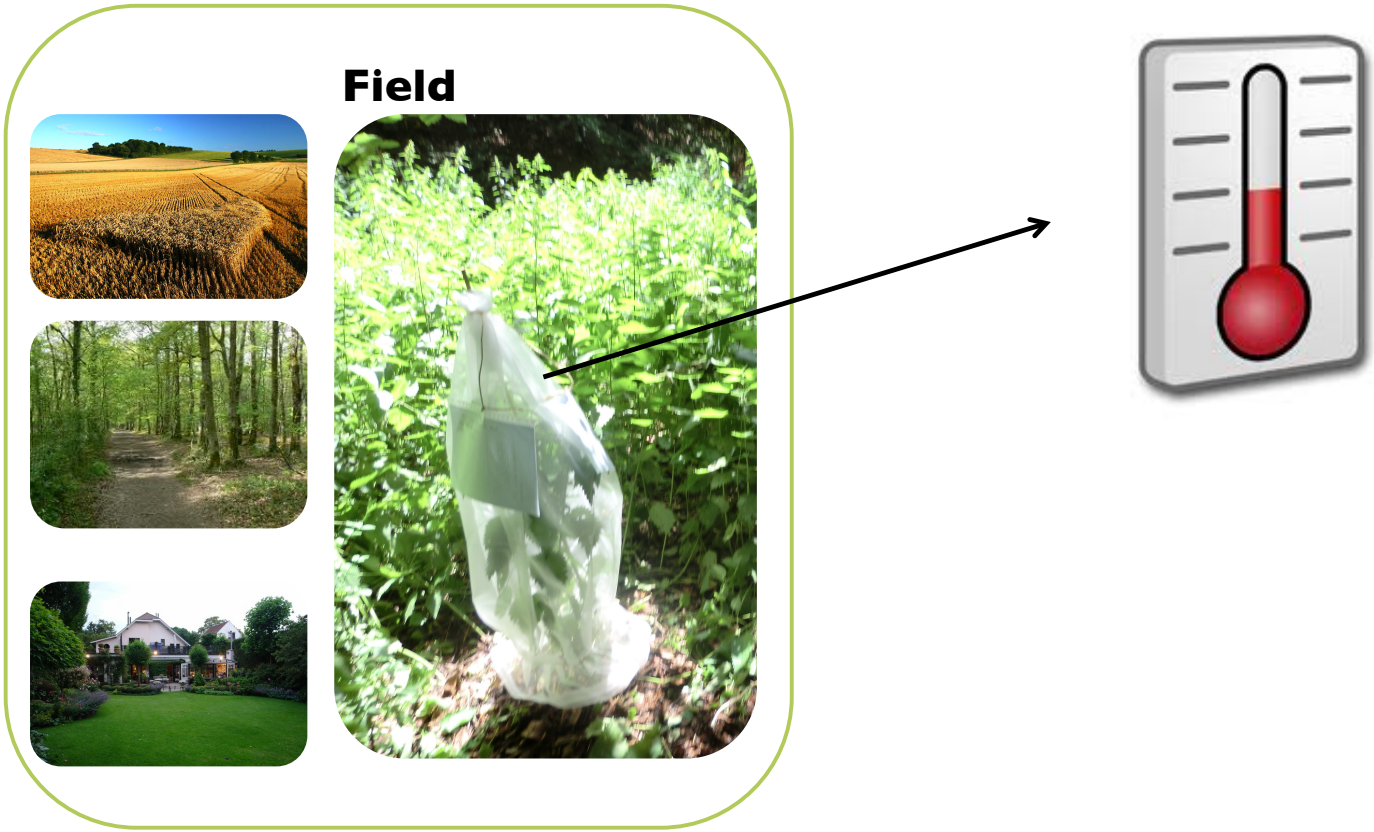
⇒ 810 larvae

Experimental scheme

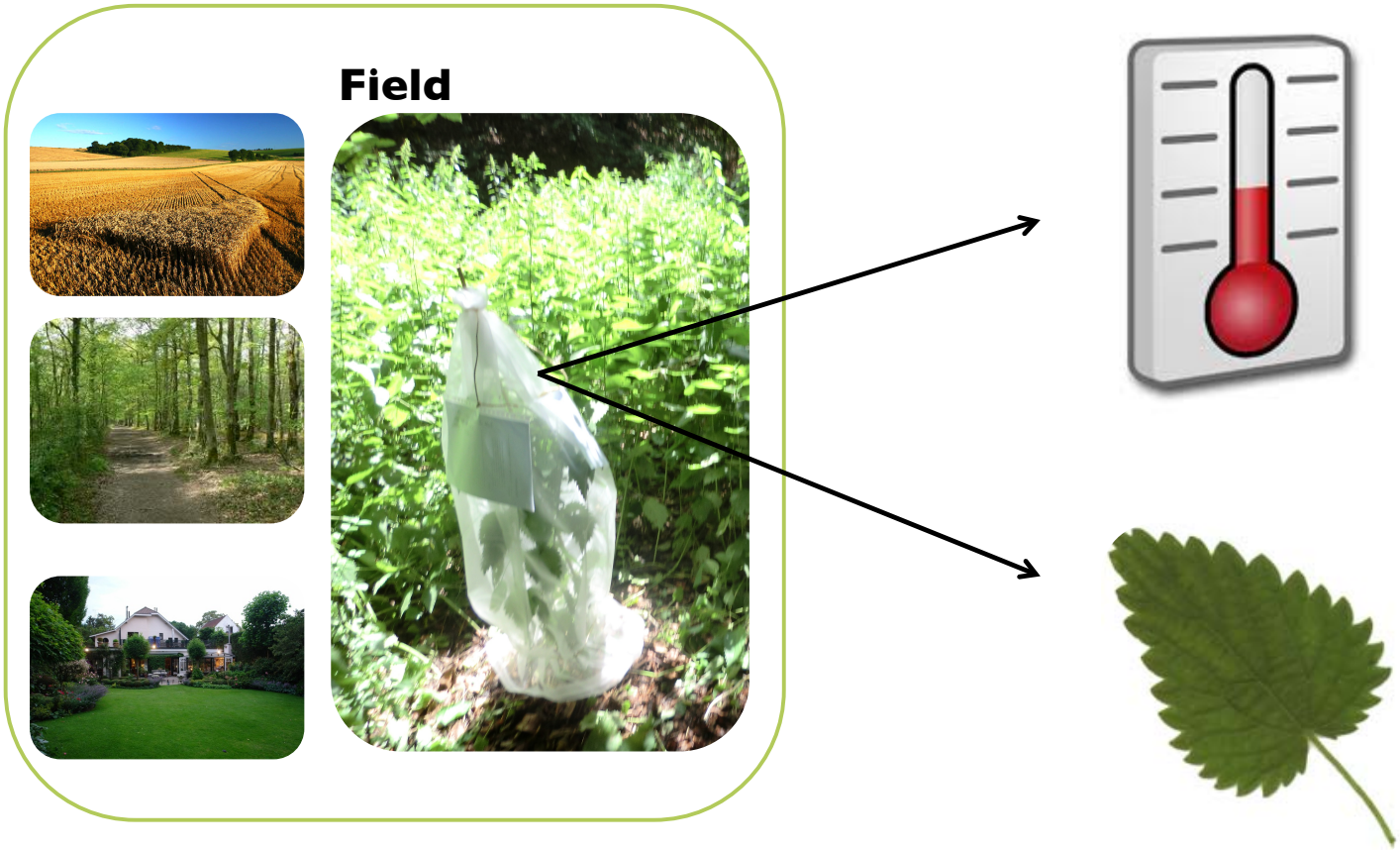
Field

Experimental scheme

Experimental scheme



Experimental scheme



Experimental scheme

Field

Laboratory

Experimental scheme

Field

Laboratory

Life-history and morphology

- Larval development time
- Adult body mass
- Lipid content
- Wing area
- Wing loading
- Mortality and parasitism

Predictions

Predictions

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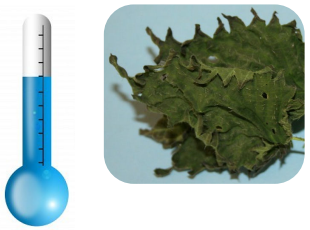
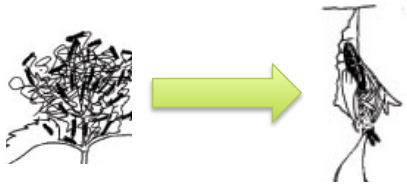
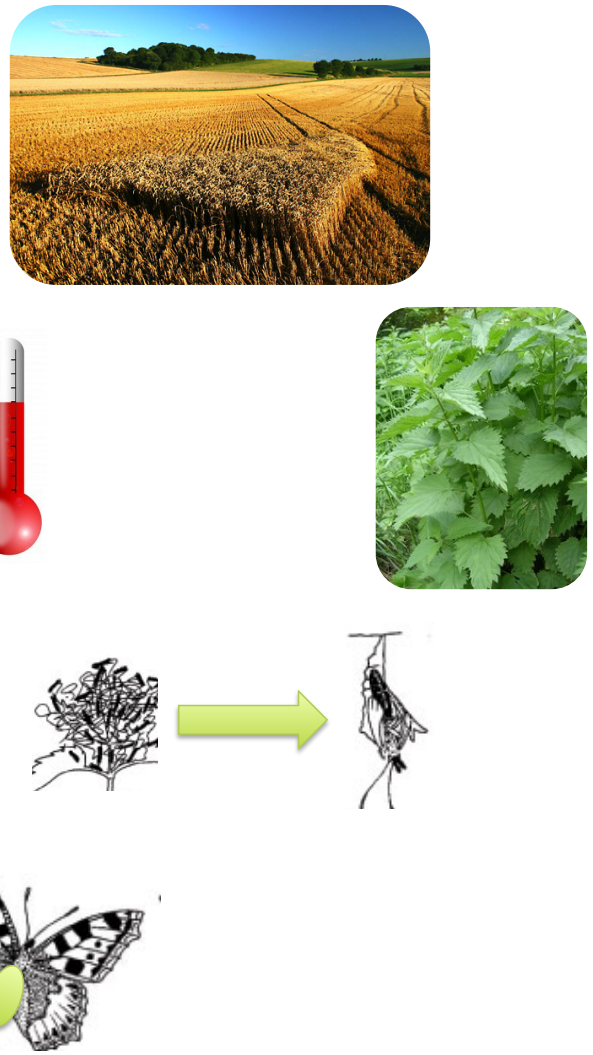
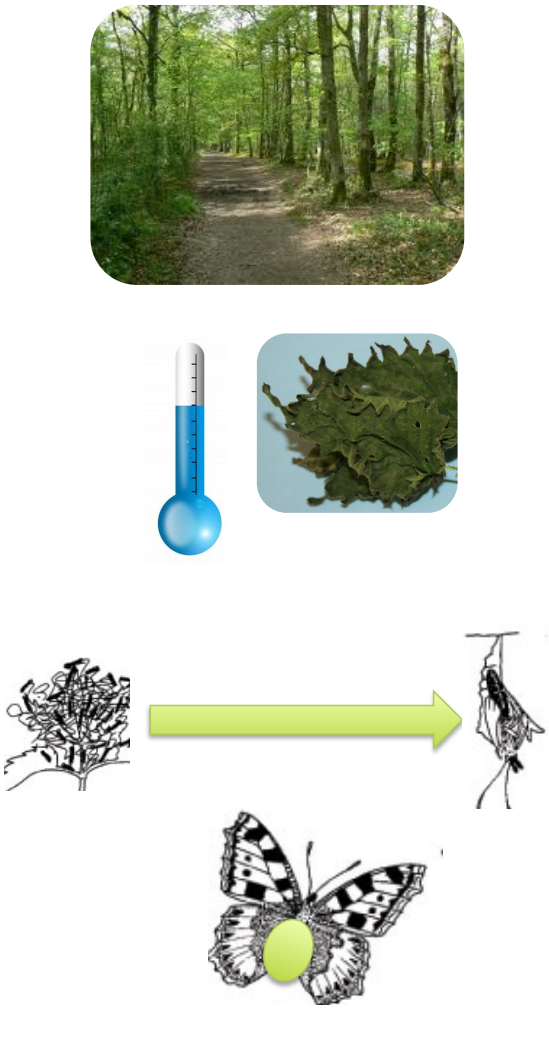




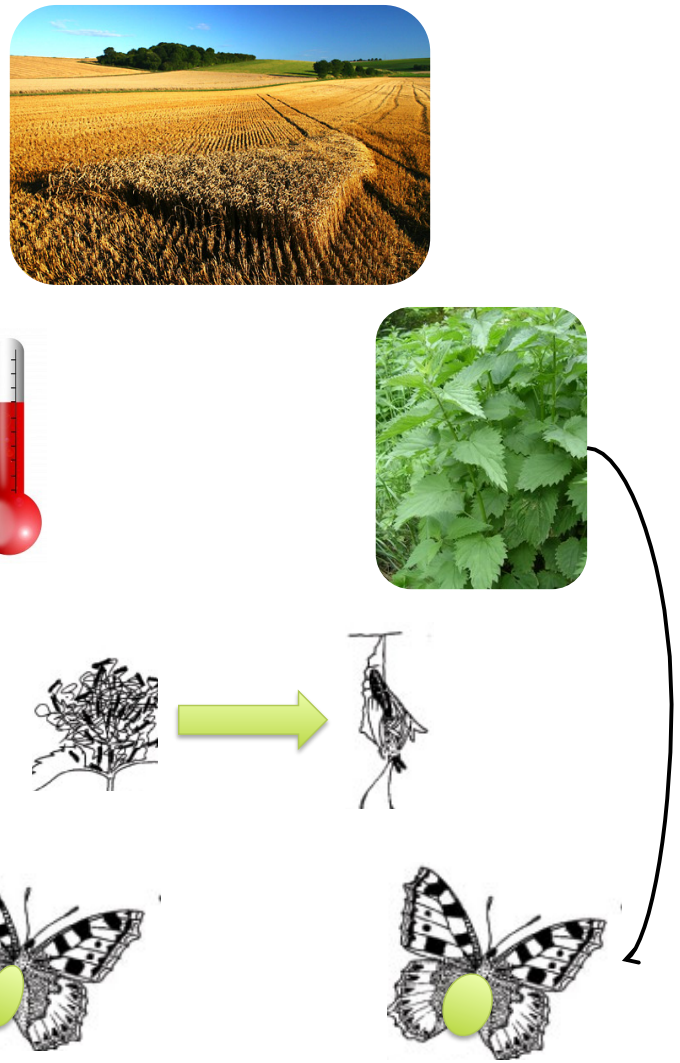
Predictions



Predictions

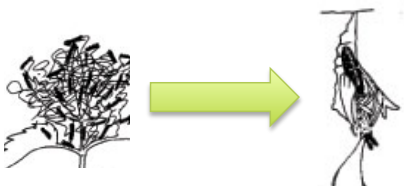


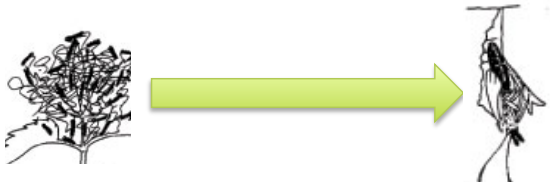
Predictions



Temperature and host plant quality

Changes in larval development time across landscapes





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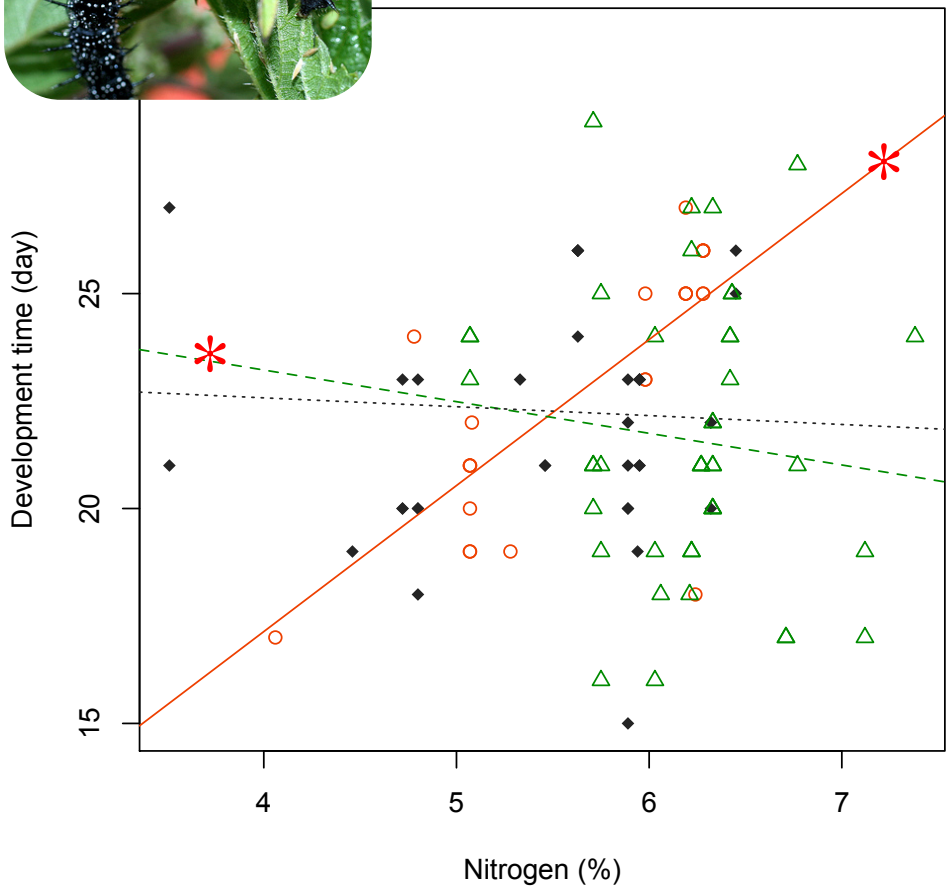
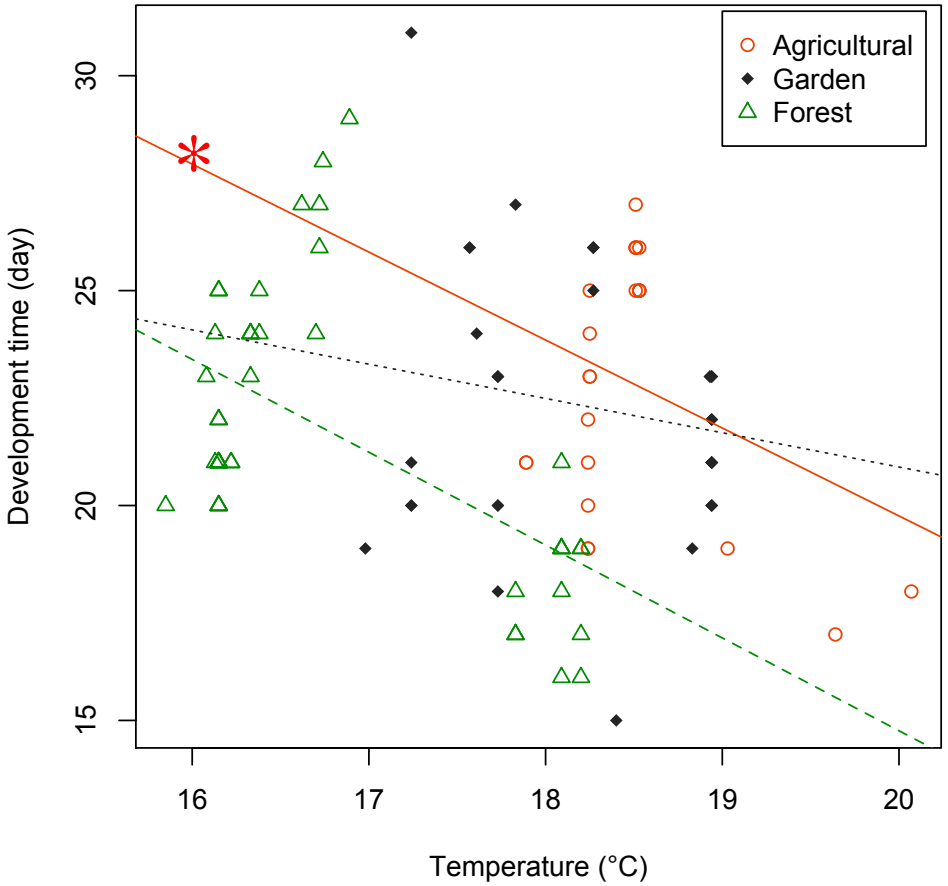
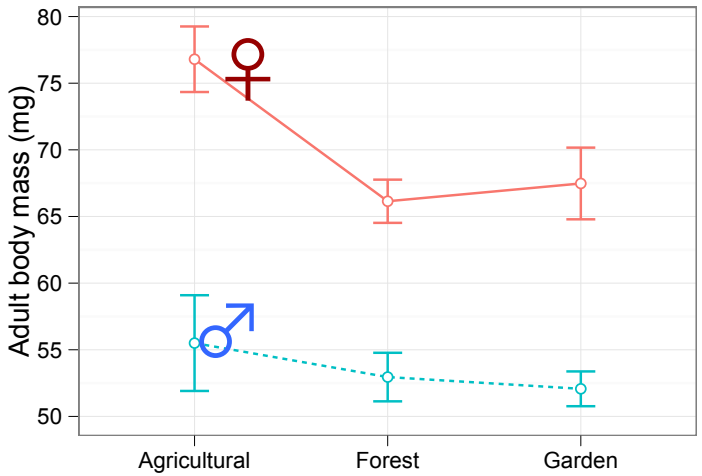
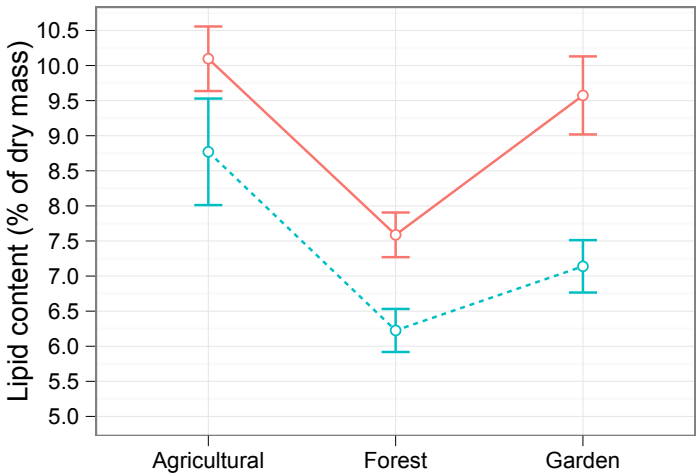
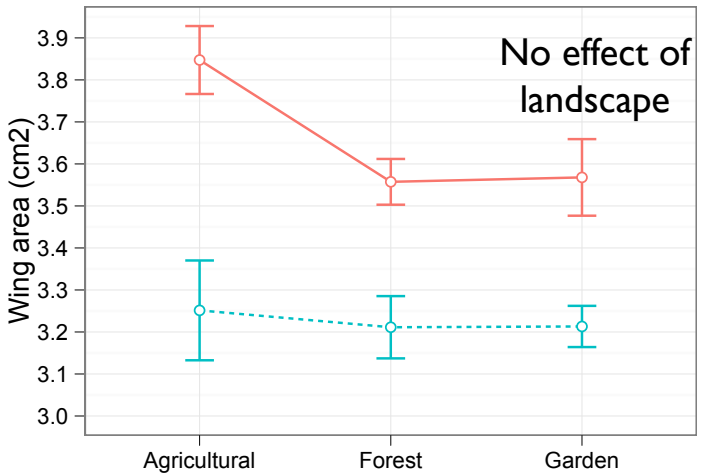


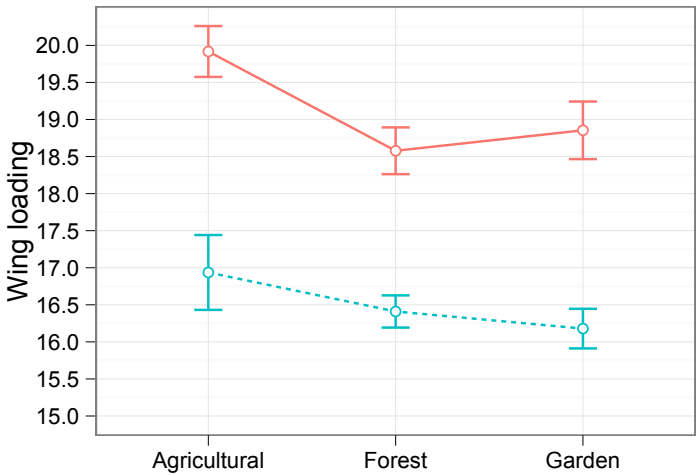


Adults traits





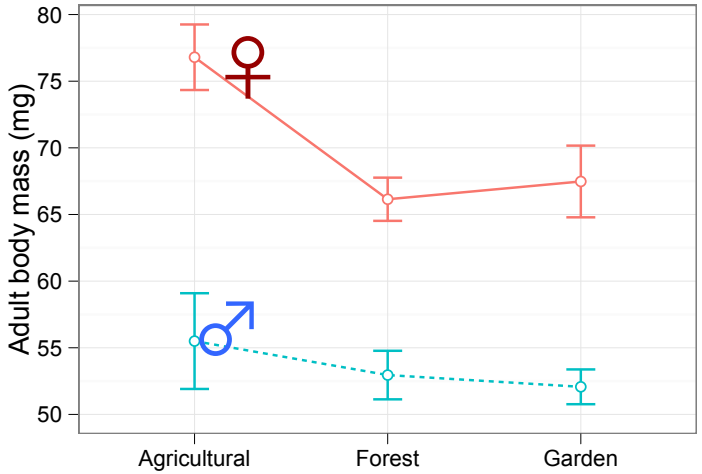


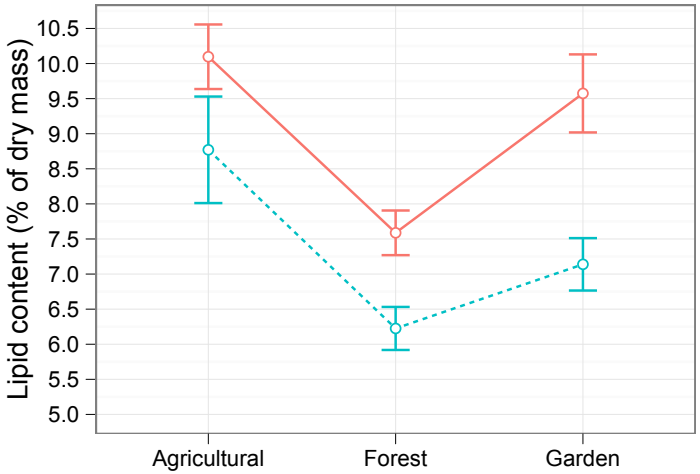


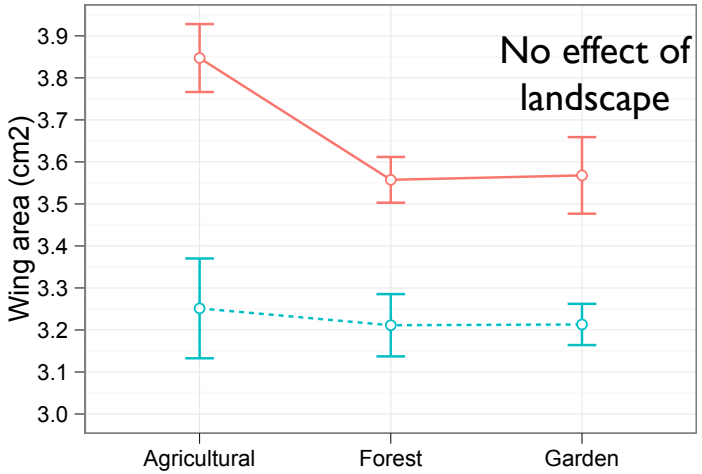
Adults traits

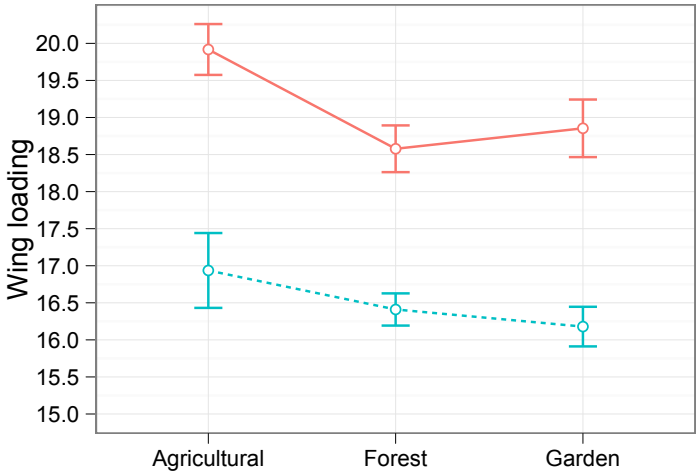
Mortality and parasitism

⇒ No effect of landscape

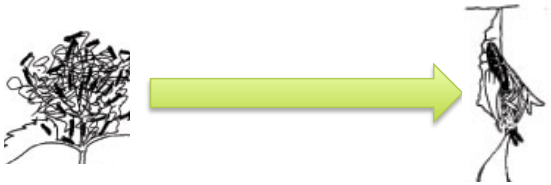






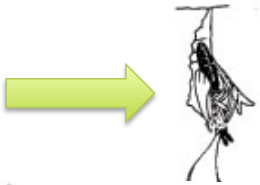


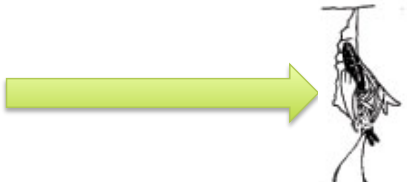
Summary



+ Higher wing loading

Summary





+ Higher wing loading

Higher potential fecundity

Higher flight capacity

Discussion

- Landscape-related larval environment

  ⇒ Life history and morphological plasticity

- Body mass : Agricultural land > Forest

  Lipids

- Greater potential fecundity ?

  ⇒ Alternative interpretations

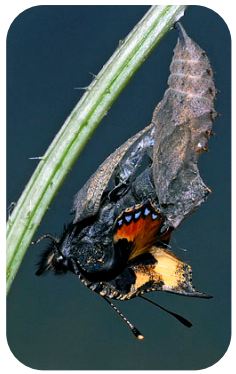
  - Flight cost in different landscape types?
  - Thermoregulation ?

  ⇒ Further tests “in prep”

Perspectives and other aspects of my PhD

Field

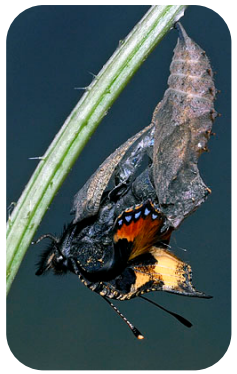
Laboratory



Perspectives and other aspects of my PhD

Field

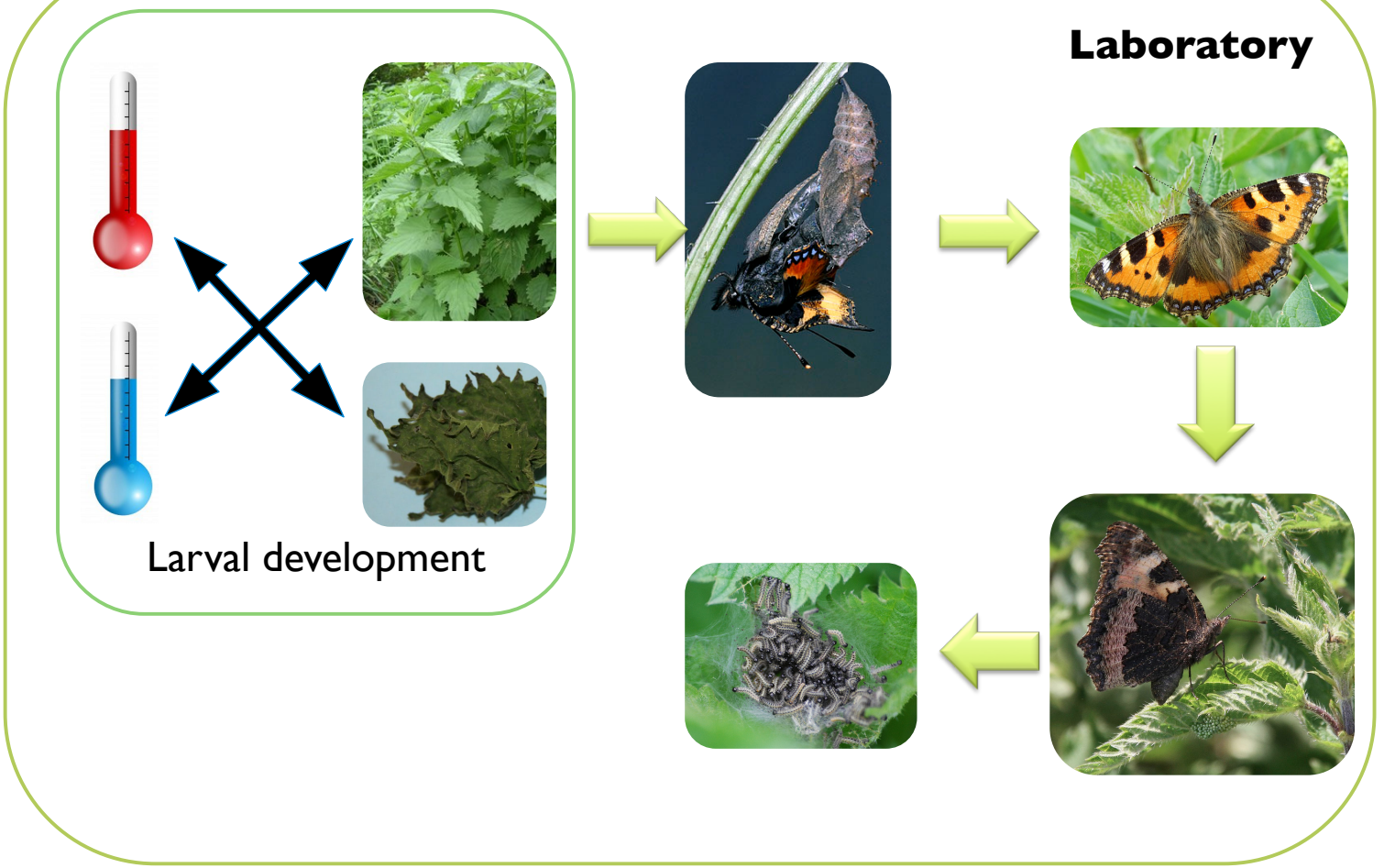
Laboratory



Flight-fecundity trade-offs

(1) Direct oviposition
(2) Forced to fly

Perspectives and other aspects of my PhD



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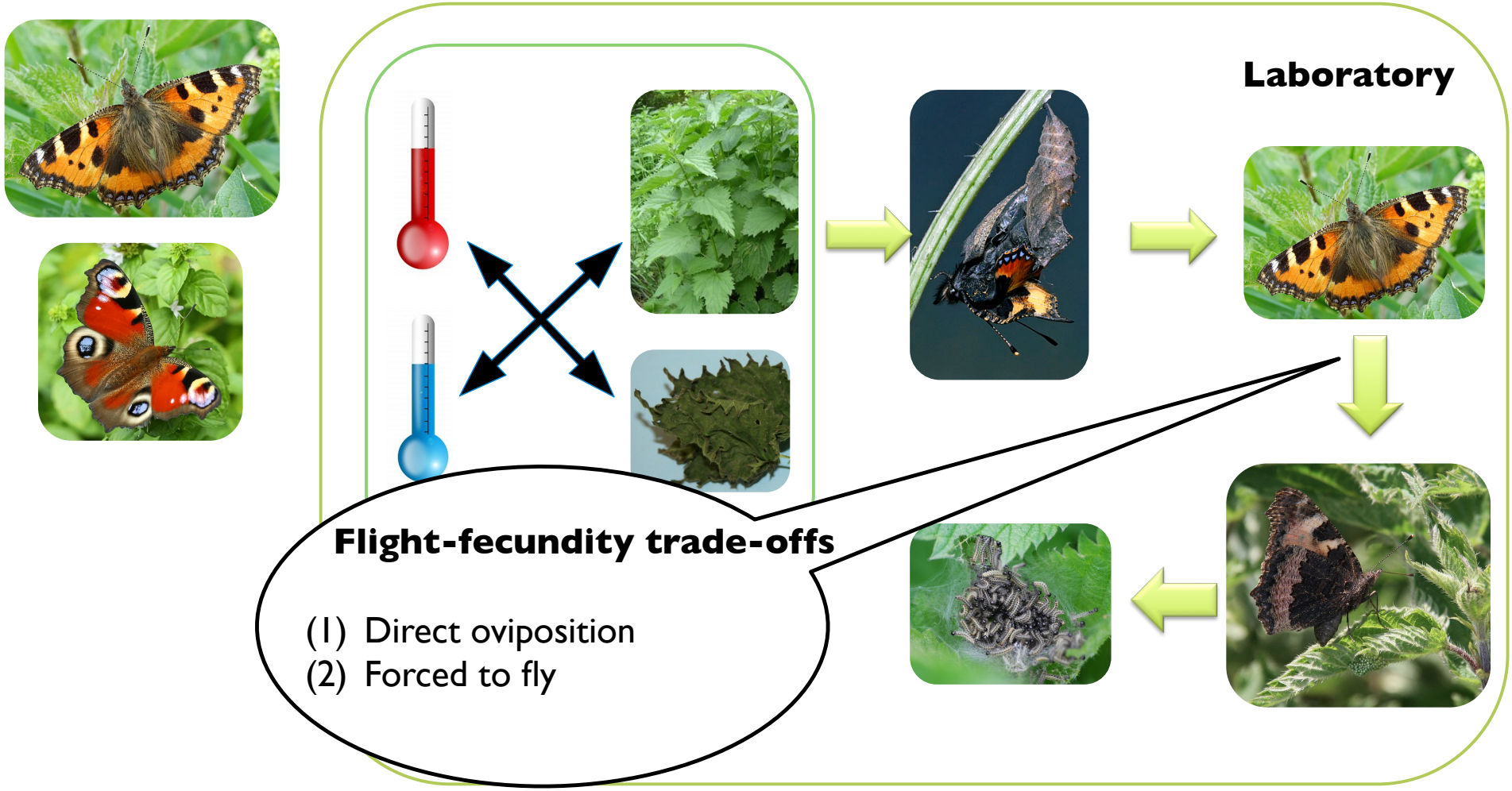

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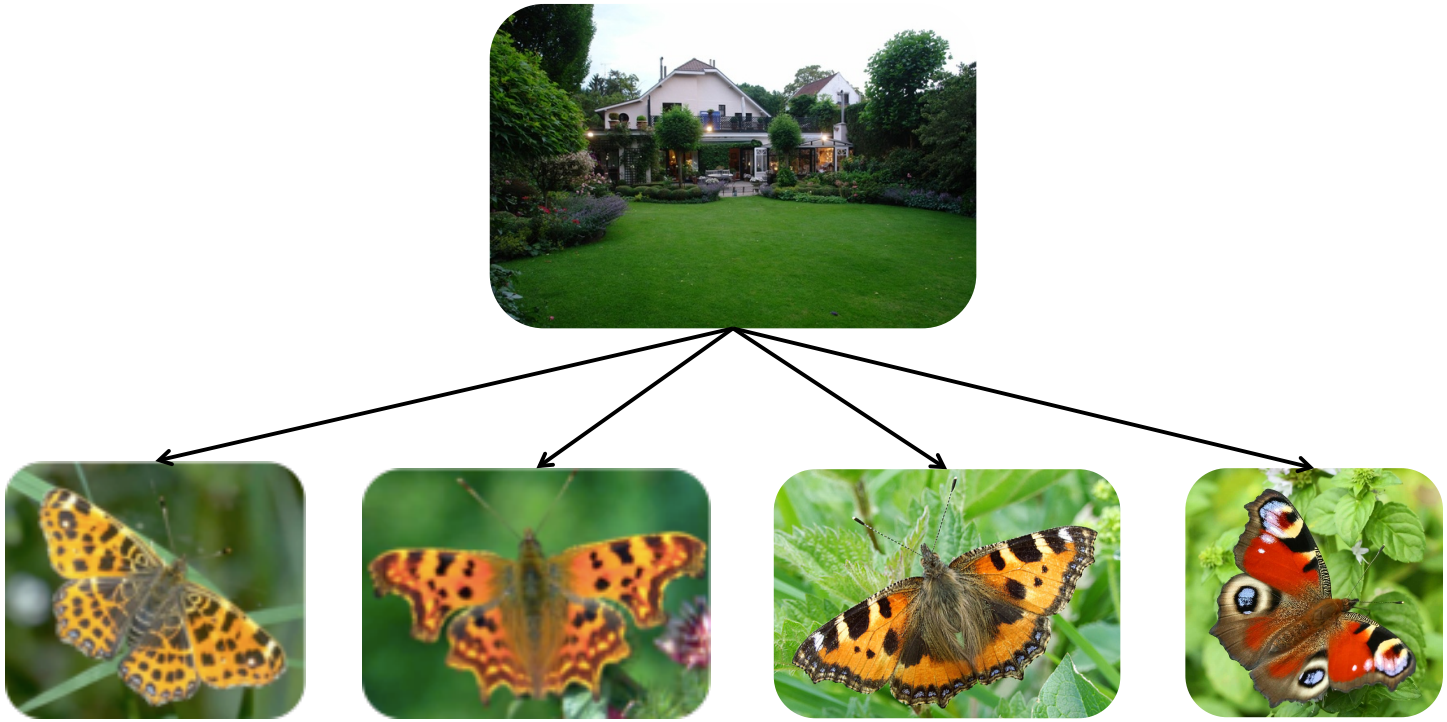

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Wouter Vanreusel (Natuurpunt)

Tuin telling vlinder

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- Benoît Pernechele & Julien Simon
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AND YOU FOR YOUR ATTENTION