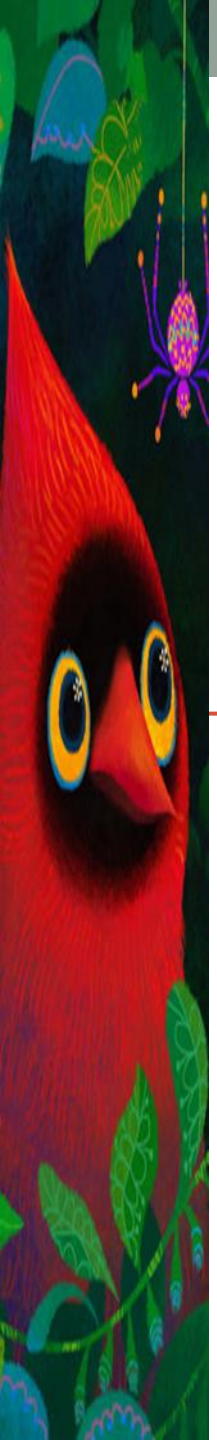

Herbivory and herbivores in enemy free space along a complete elevation gradient in the tropics

Katerina Sam, Bonny Koane, Jimmy Moses, Peter A. Konga, Vojtech Novotny

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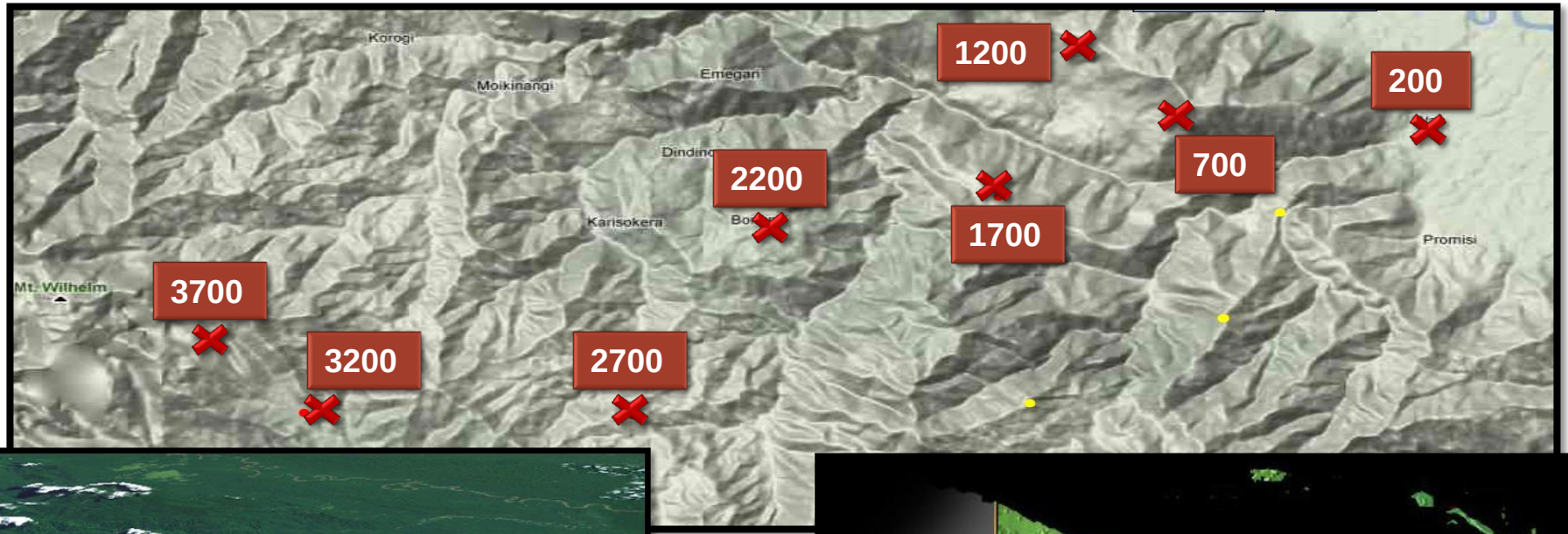
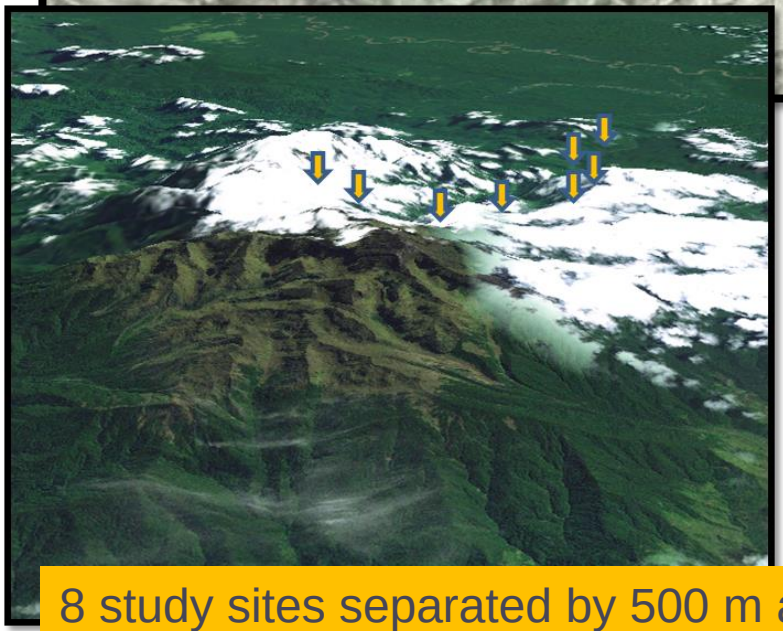
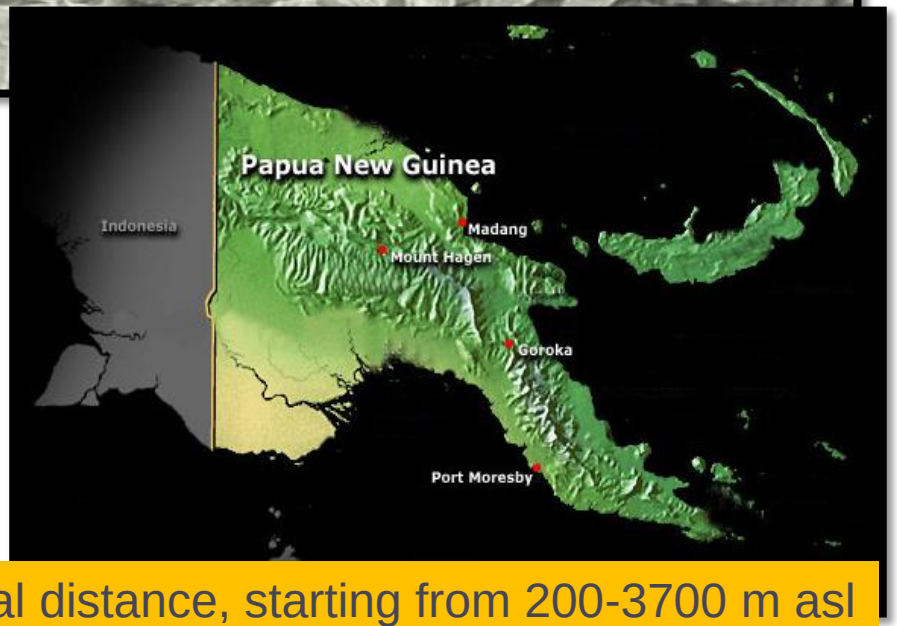
- Predators can enhance plant growth by reducing herbivore abundance

- Strength of such trophic cascades has been found to be quite variable both within and between communities

Mt Wilhelm – Papua New Guinea

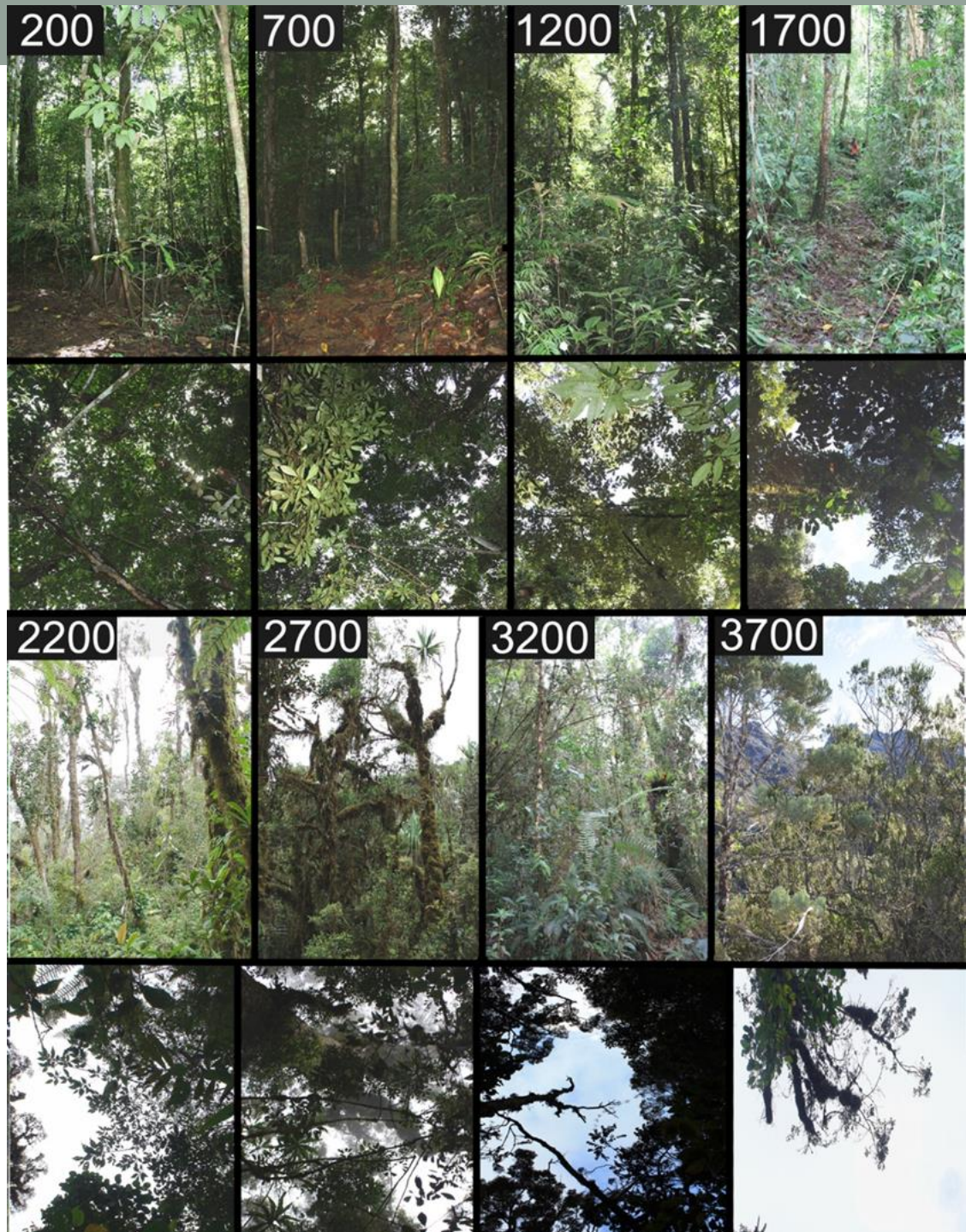






8 study sites separated by 500 m altitudinal distance, starting from 200-3700 m asl

Examples of the forest type at each study site



Treatments

80 saplings (DBH = 10 ± 2.5 cm; ca. 3 m high) per elevational site
4 treatments – 20 saplings each

1) Ant removal

2) Vertebrate removal
- permanently placed cages 2x2x2m

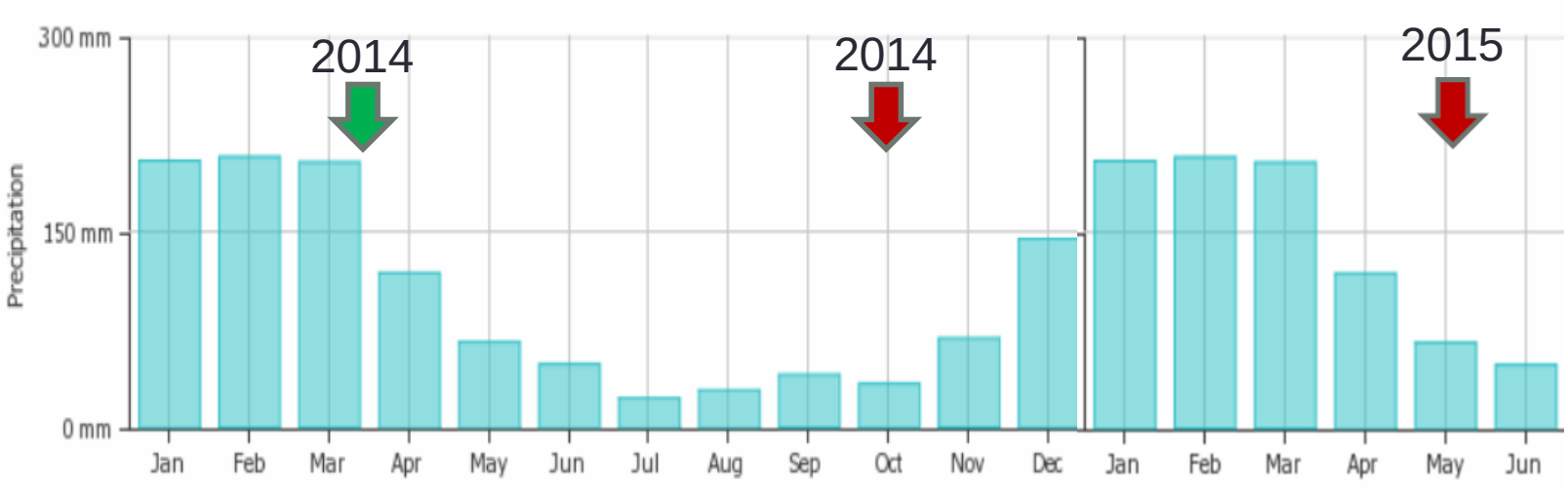
3) Ant + vertebrate removal

4) Control

In separate experiment – 200, 700, 2200 and 2700 m – bird/bat/control exclosures
10 saplings per treatment – not discussed it this talk

Treated saplings left exposed for 176 ± 8 days

Two collections made within a year

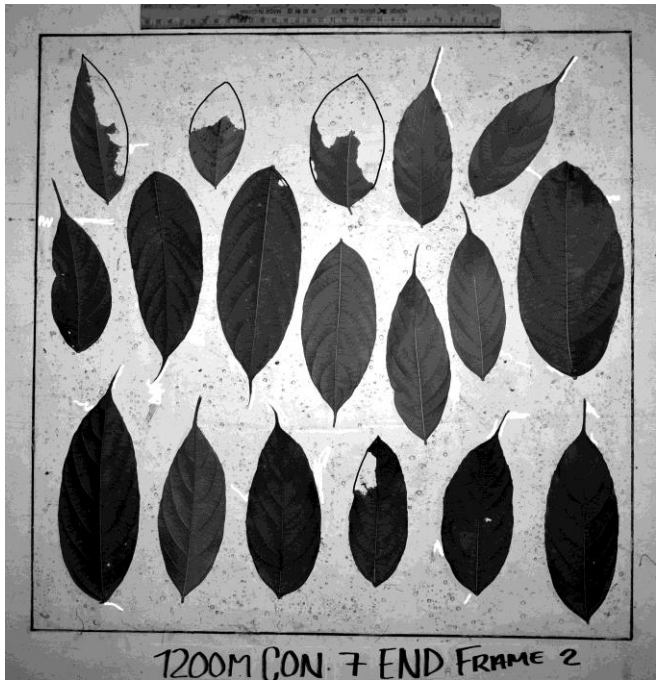


1. Collection – non-destructive; all insect + 50 leaves collected + leaves counted
2. Collection – destructive; all insect + all leaves (tree not cut)

METHOD – Insect sampling

METHOD – Insect sampling

METHOD – Leaf herbivory work

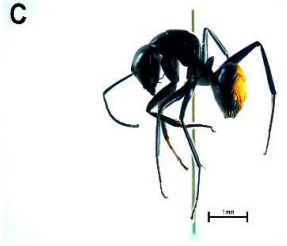


26,567 leaves analysed from 1. collection from 560 trees

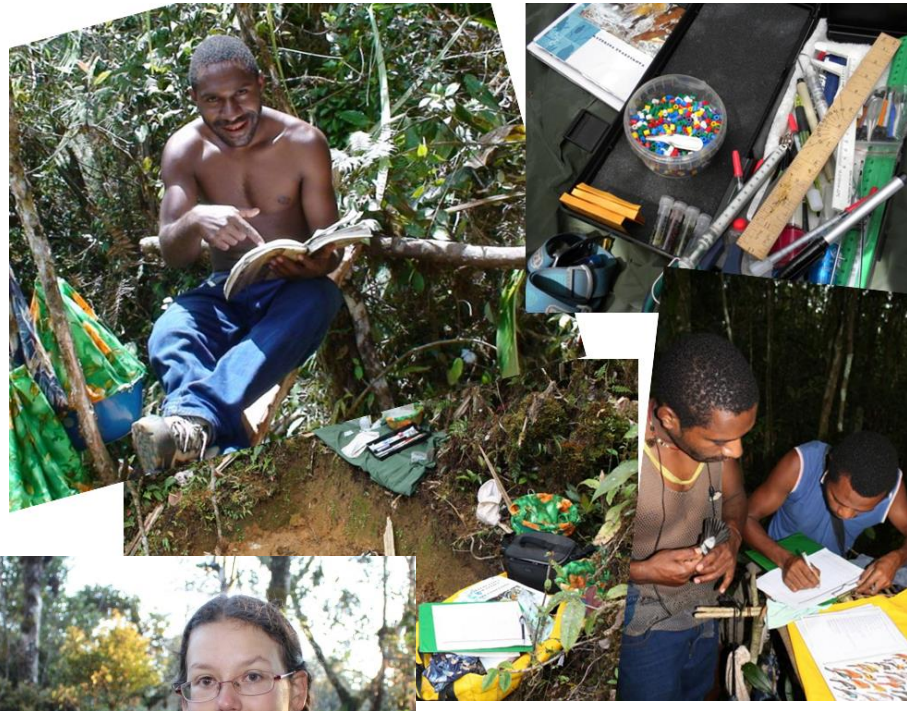
Total mean leaf area per sapling = 8 m^2

$\Rightarrow$ ca. 4,500 m^2 of leaves involved in project

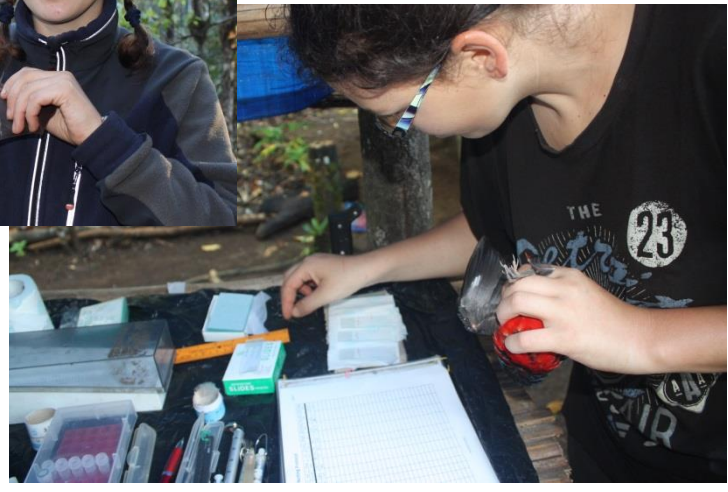
Ant work



Bird work

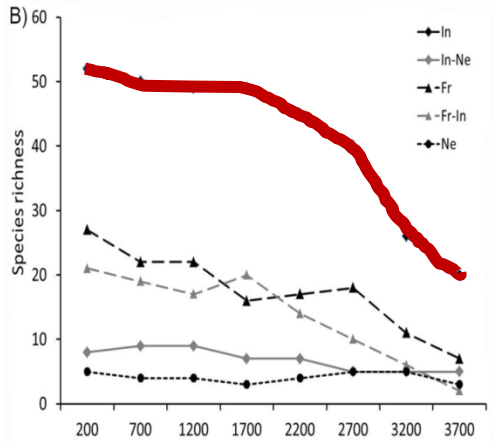


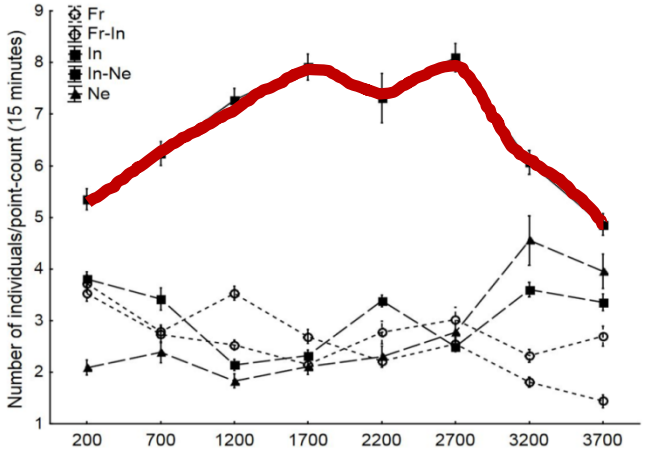
Bat work



BIRD SURVEY – 33,639 individuals recorded – 241 species

- 1,354 individuals mist-netted – 105 species, food surveyed





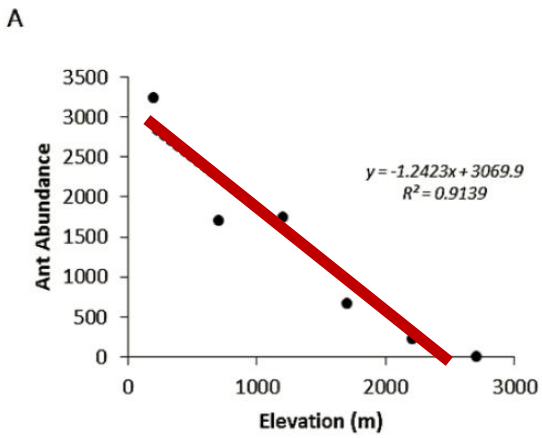
BAT SURVEY – similar pattern, only up to 2700 m, ca. 19 species – more than 900 individuals trapped

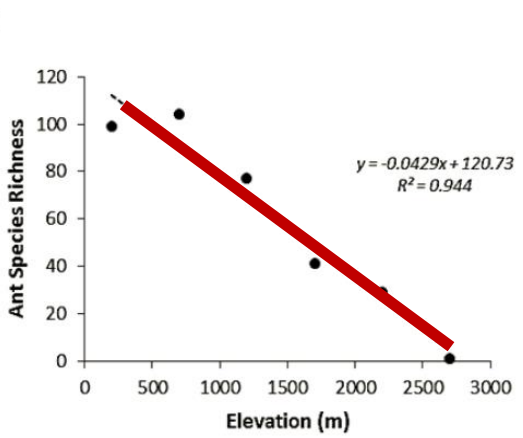
ANT SURVEY –

4 sampling methods

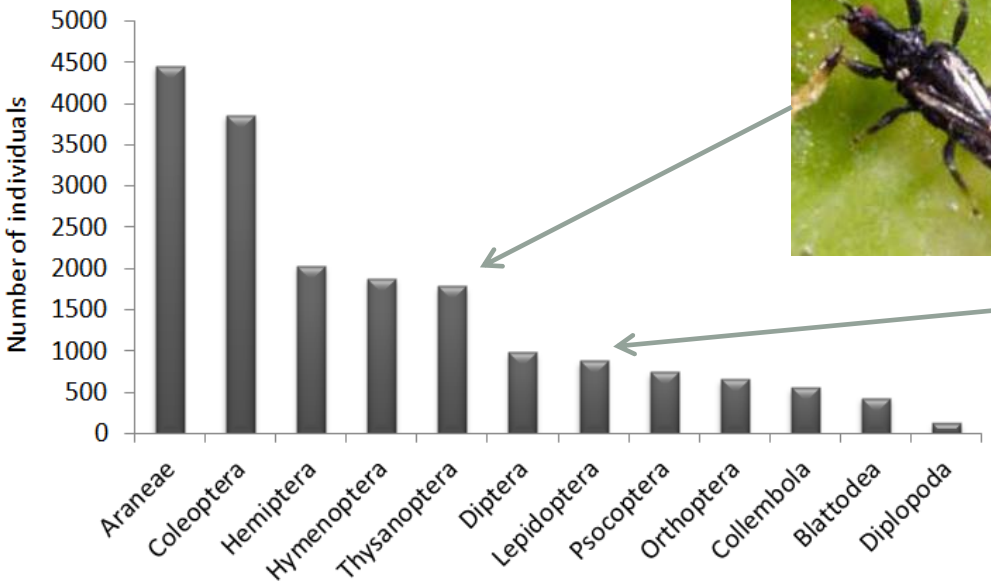
232 species,

7,611 individuals





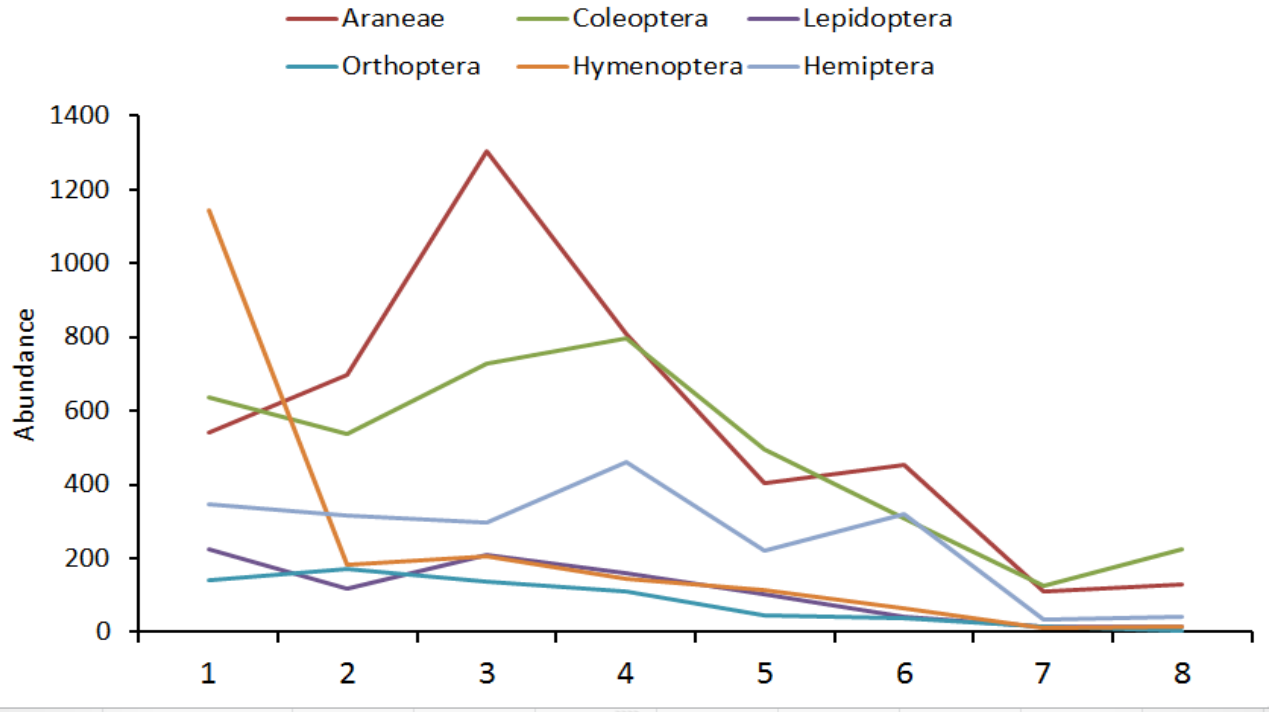
RESULTS – Insect Total



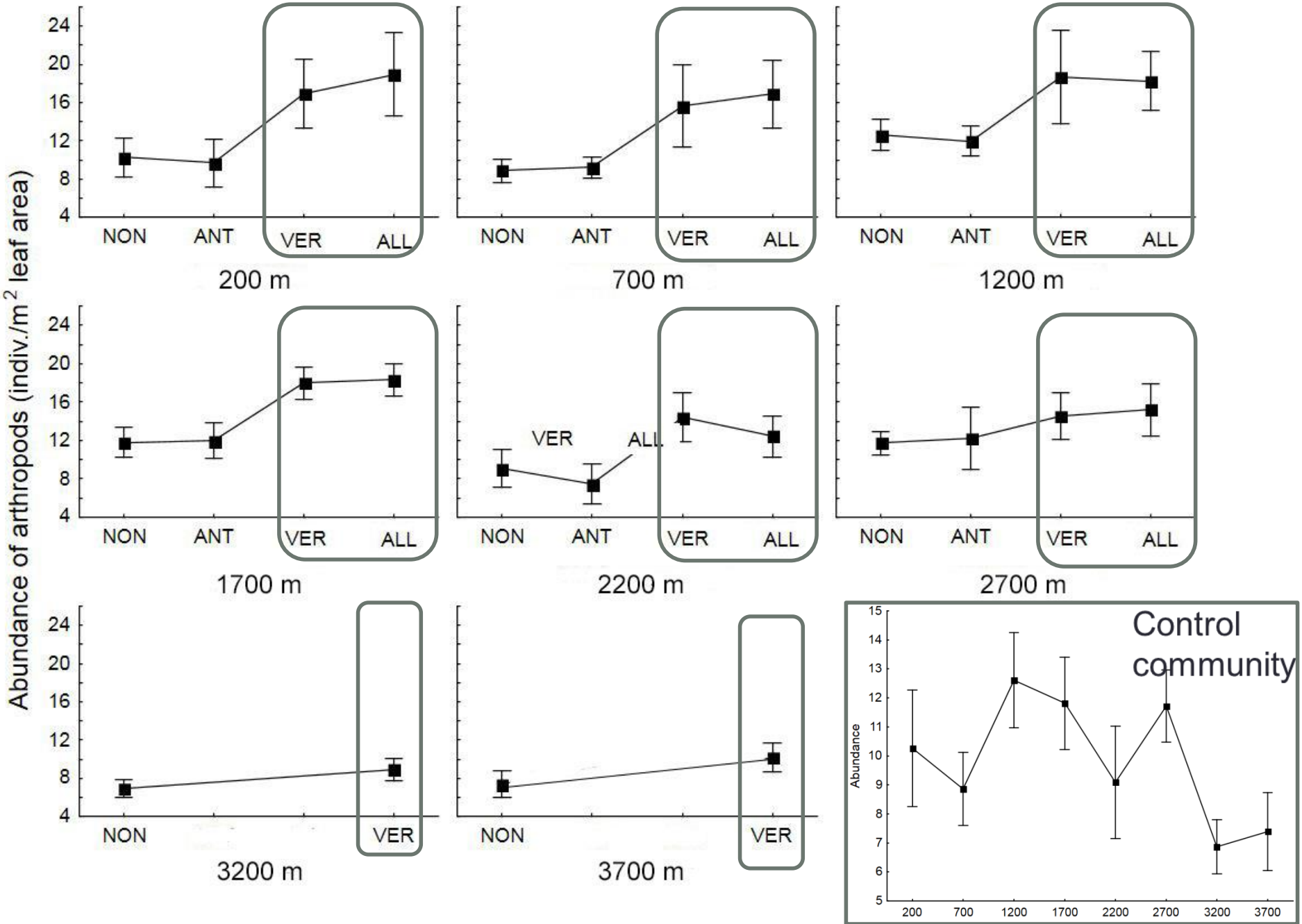
Sorted to Order, Family + adults/juvenile

Feeding specialization identified + classified

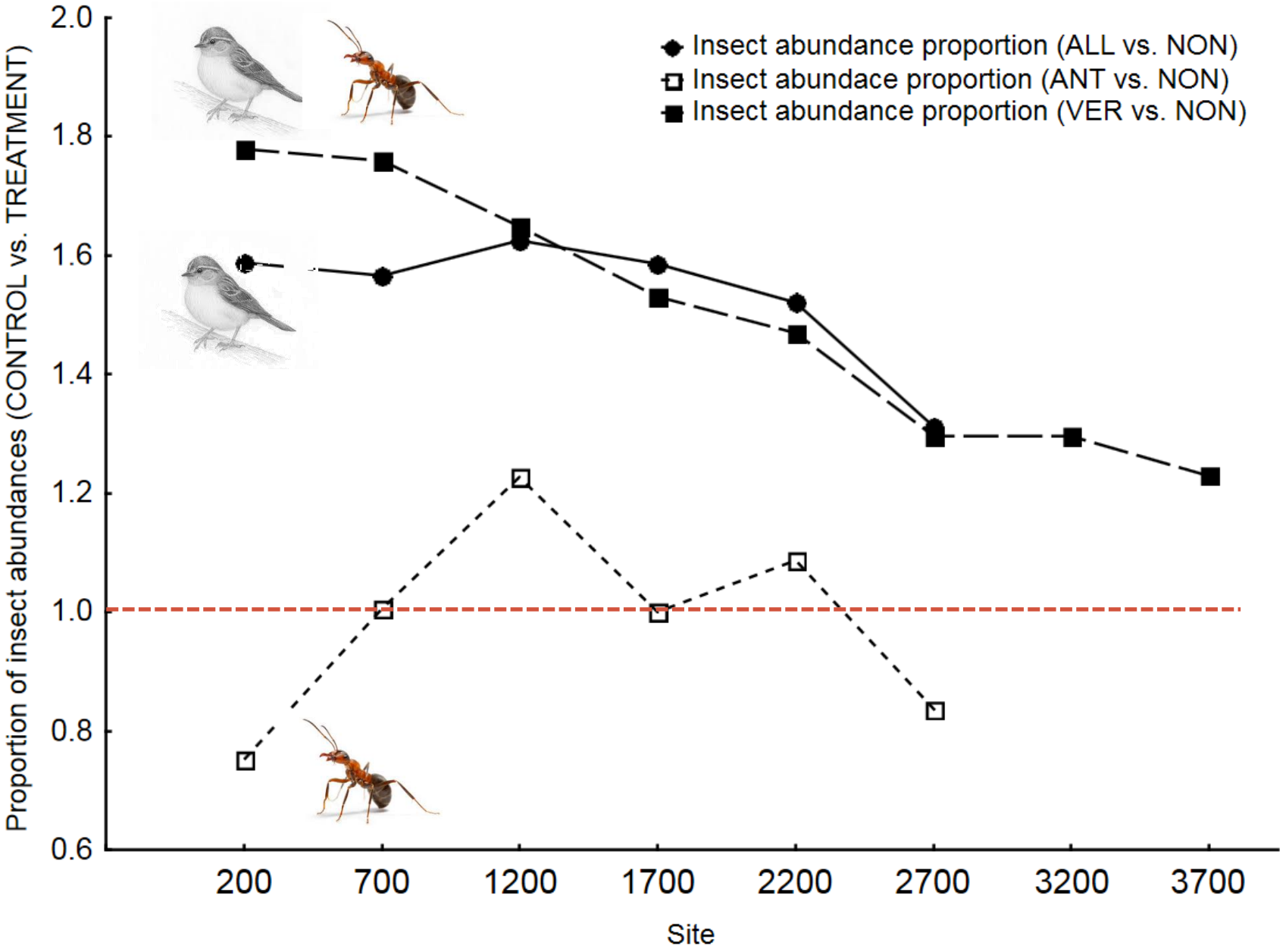
1) Causing herbivory
2) No relationship to herbivory
3) Predators



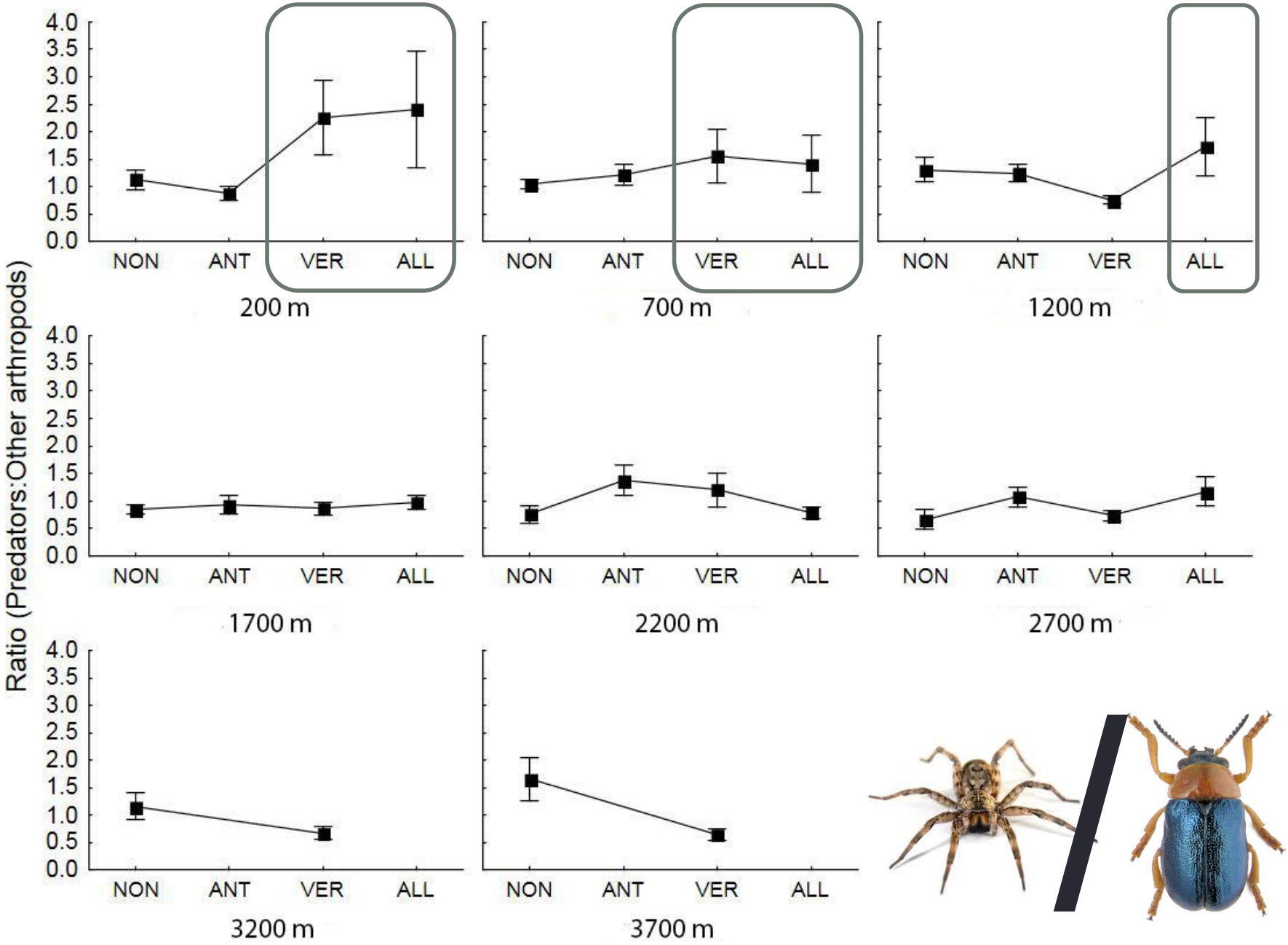
RESULTS – Insect Total



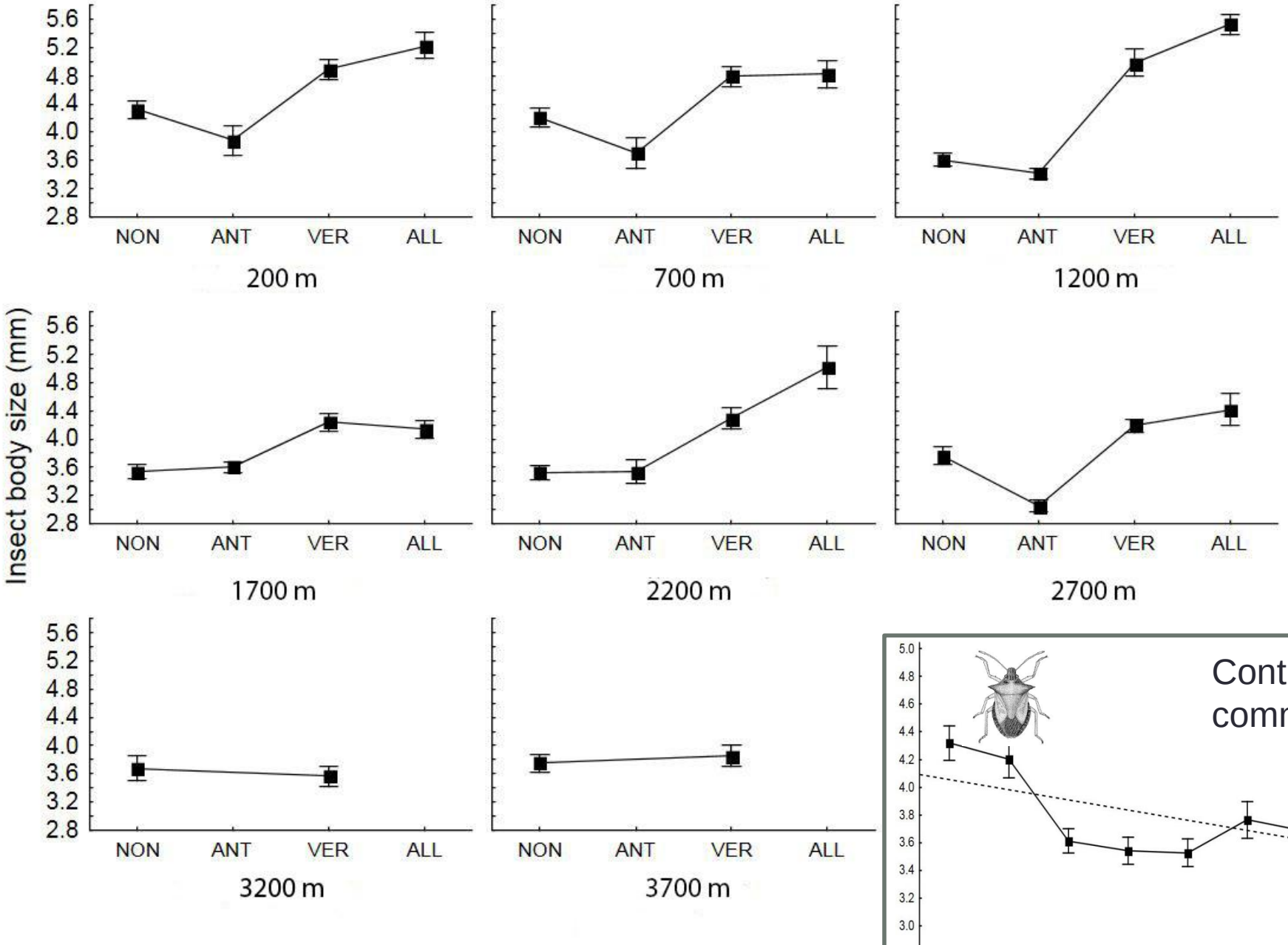
RESULTS – Insect Total



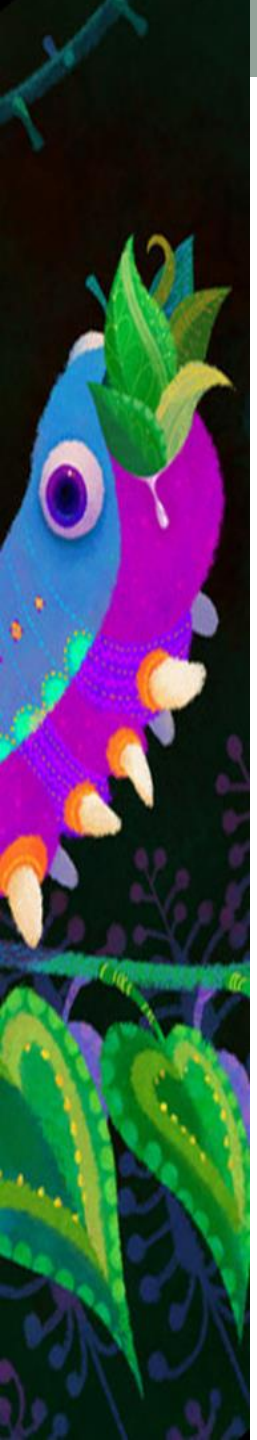
RESULTS – Insect Guilds

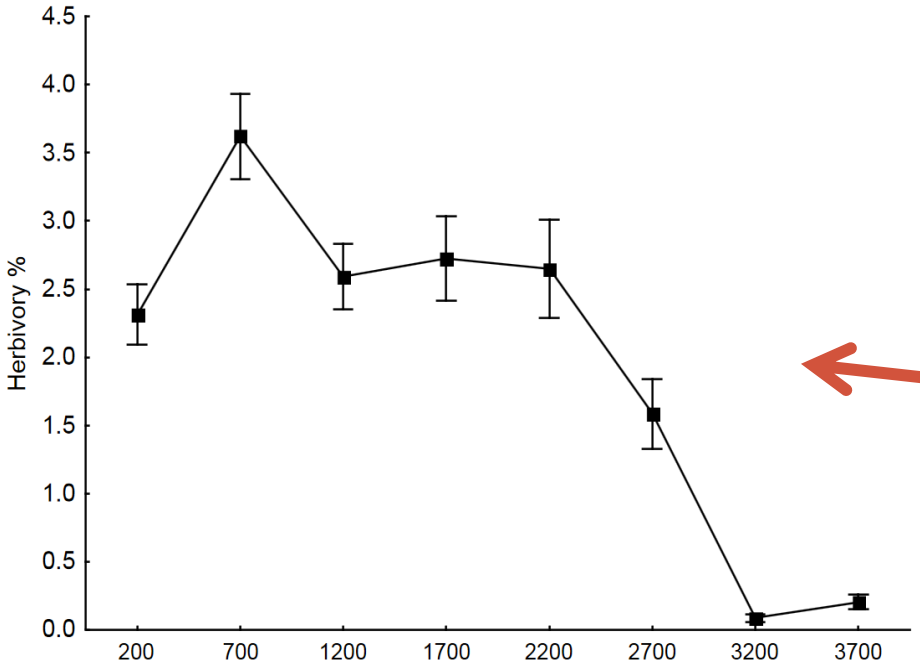


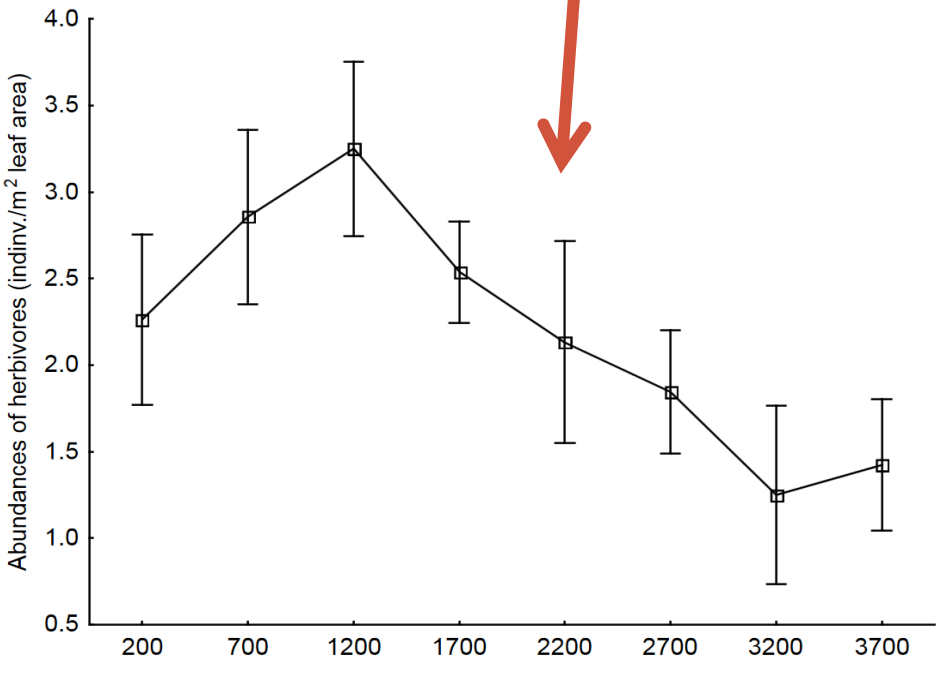
RESULTS – Insect Body Sizes



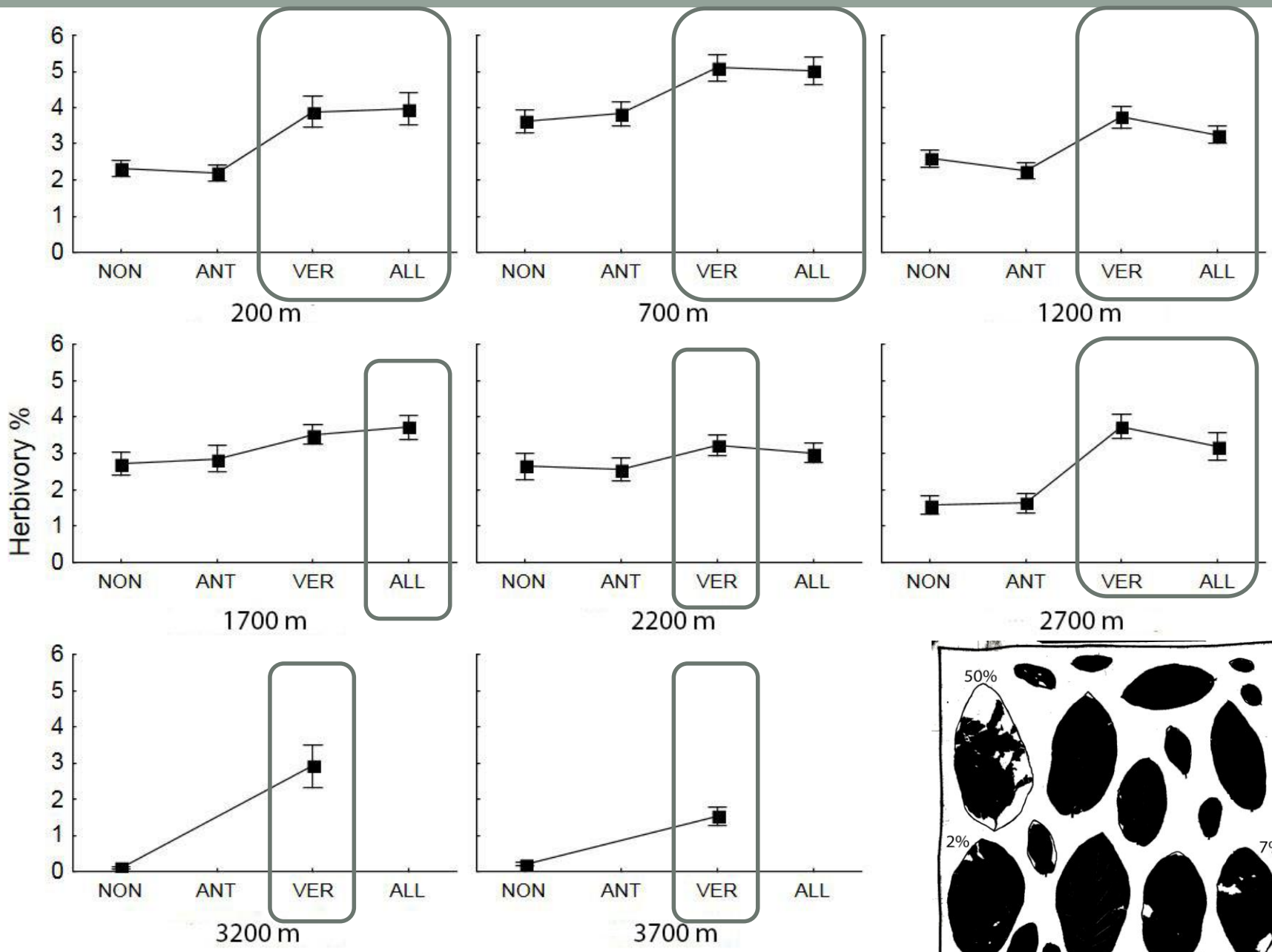
RESULTS – Herbivory







RESULTS – Herbivory



CONCLUSIONS

- Exclusion of vertebrates has positive effect on abundances of arthropods
- This effect decreases with increasing elevation
- Exclusion of ants have little or no effect on abundances of arthropods
- This effect appears only at lowest elevations
- Mesopredators (i.e. spiders, wasps) seems to compensate for removed predators at low elevations only
- Exclusion of predators influences size composition of arthropod communities
- Exclusion of predators leads to lower plant growth (i.e. higher herbivorous damage)

THANK YOU FOR YOUR ATTENTION

Follow the project: katerina.sam.cz@gmail.com

Web page: http://tvardikova.weebly.com/

Twitter: @CzSam00

Chat + more results: Poster Session 1, Tuesday - Poster 251

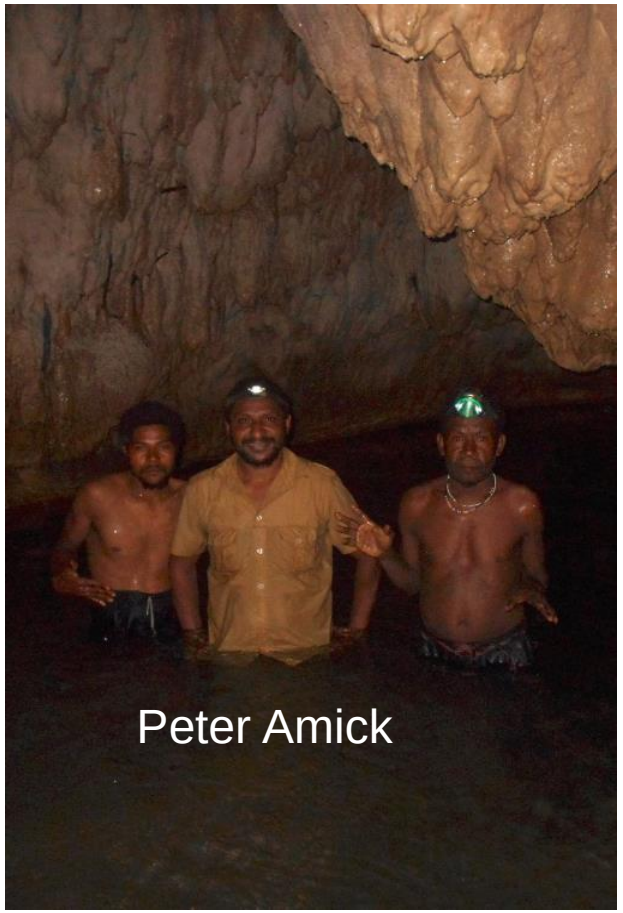
Acknowledgements

Staff of The New Guinea Binatang Research Center

Numerous village assistants from Kausi, Numba, Bundi, Sinopass, Bruno Sawmill and Kegesugl for assistance

Czech Science Foundation Grant 14-32024P


Bonny Koane

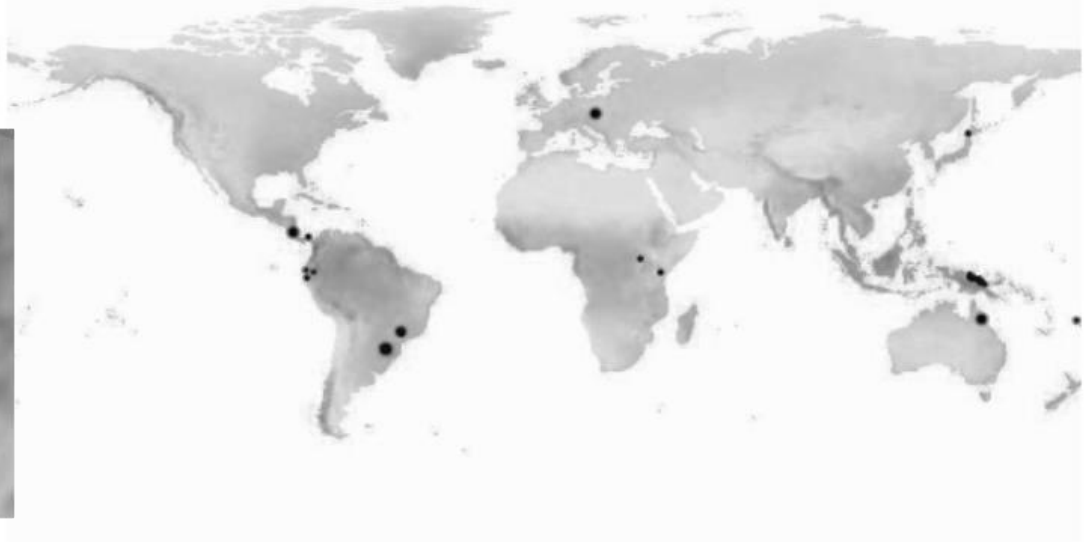

Peter Amick

LIFE WEBS Project

LIFE-WEBS Project - is a collaborative project aiming to use a meta-analytic approach to investigate how food webs between herbivorous insects and their host plants typically respond to latitude, elevation and human pressures such as land-use change.

CALL FOR DATA open in 2015 **http://lifewebs.weebly.com**

All contributors of data submitted to the database by the end of 2015 will be offered authorship of all resulting publications where the datasets will be used.



Sites that we have data for after six months of the project - 47 datasets which includes ca. 2300 insect species and ca. 1600 plant species.