

Biology of invasive Argentine ants

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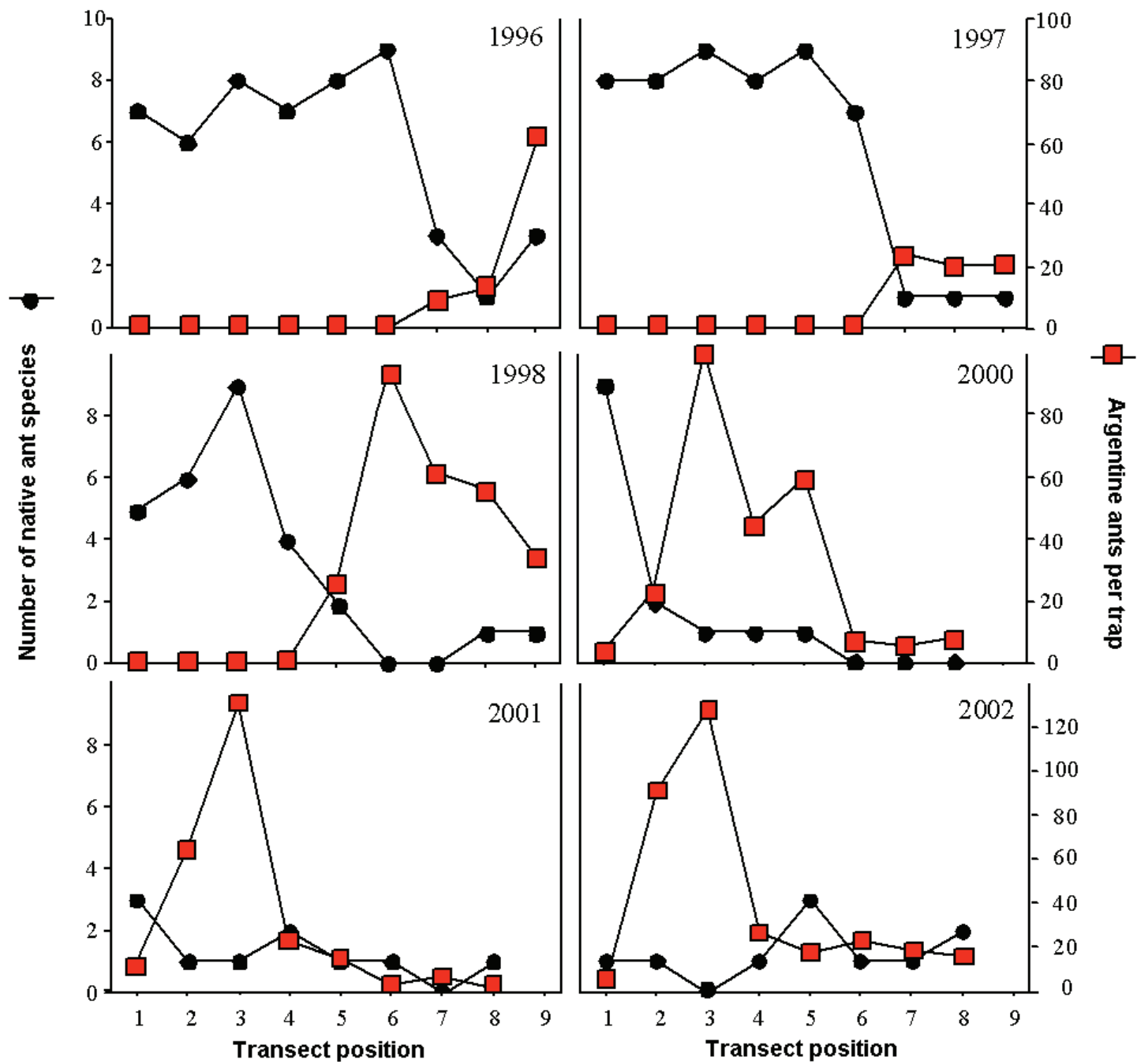
Characteristics that may make Argentine ants proficient colonists

- General nesting and dietary requirements allows close association with humans and disturbance
- Have many queens
- Colony reproduction occurs by budding
- Unicolonial colony structure

Rice Canyon

Total native ant diversity: 26 species





Mechanisms responsible for invasion success in Argentine ants:

Escape from natural enemies, predators and parasites.

Pre-adapted to disturbed environments.

Different competitive environment - competitive release.

Increased competitive ability

The fire ant and the Argentine ant are native to the same part of South America!



native range of *L. humile* from Wild 2004



native range of *S. invicta* from Mescher 2003

Insight from comparisons between native and introduced populations:

Community competitive hierarchies

Trophic ecology: Carbon and nitrogen isotope analyses

Variation in colony structure / colony size

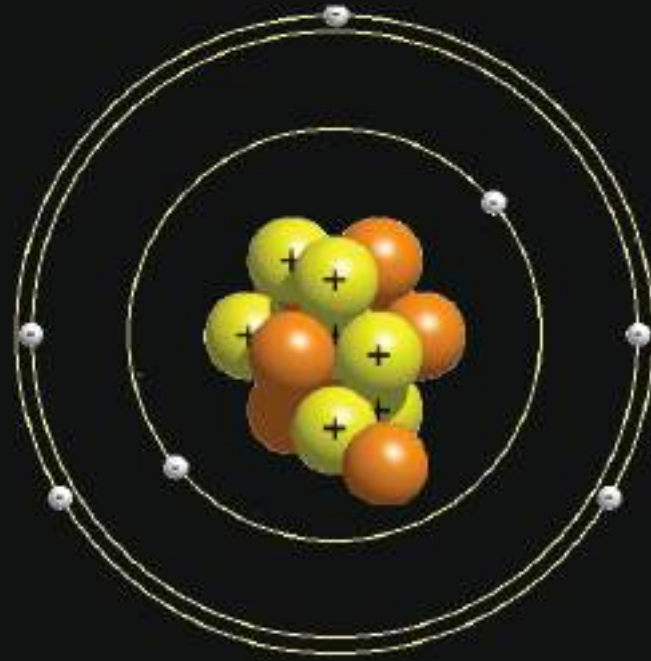
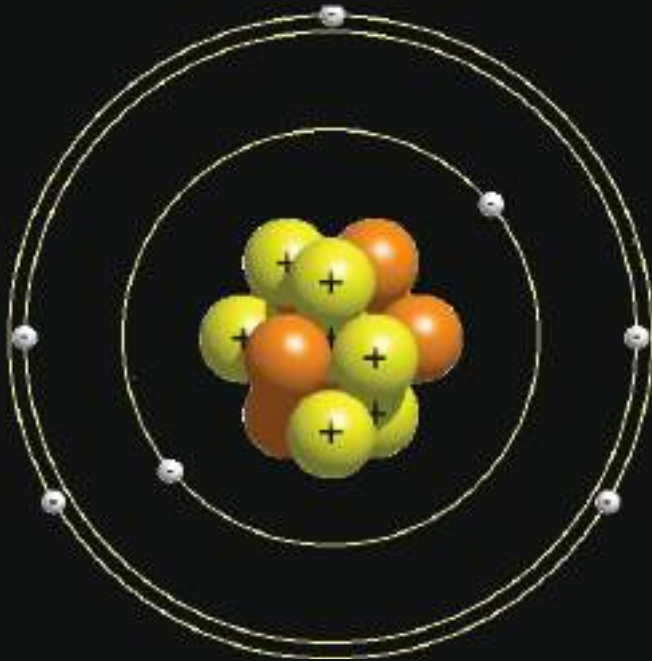
Stable isotopes

Nitrogen

Natural abundance:

^{14}N ~99.63%

^{15}N ~0.37%



Stable Isotope Analysis

$$\delta = [(R_{\text{sample}} / R_{\text{standard}}) - 1] \times 1000$$

R = heavy/light

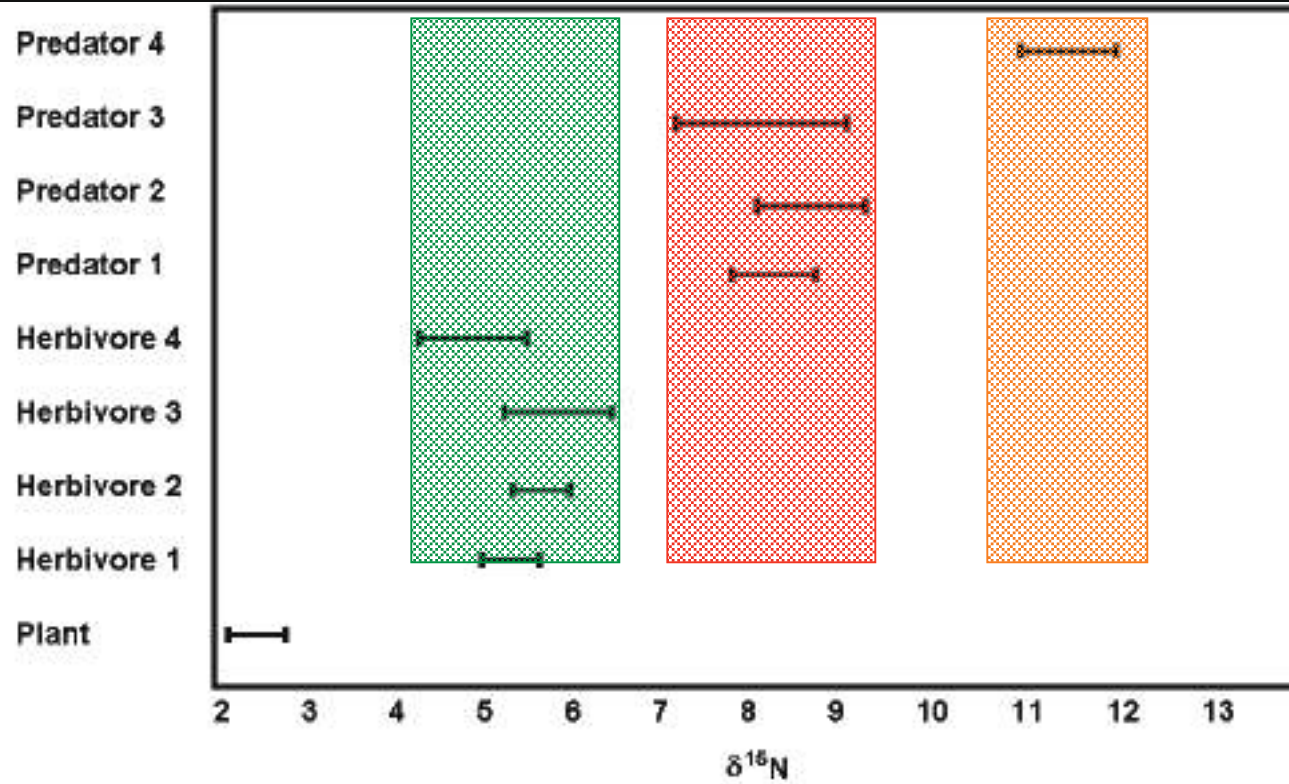
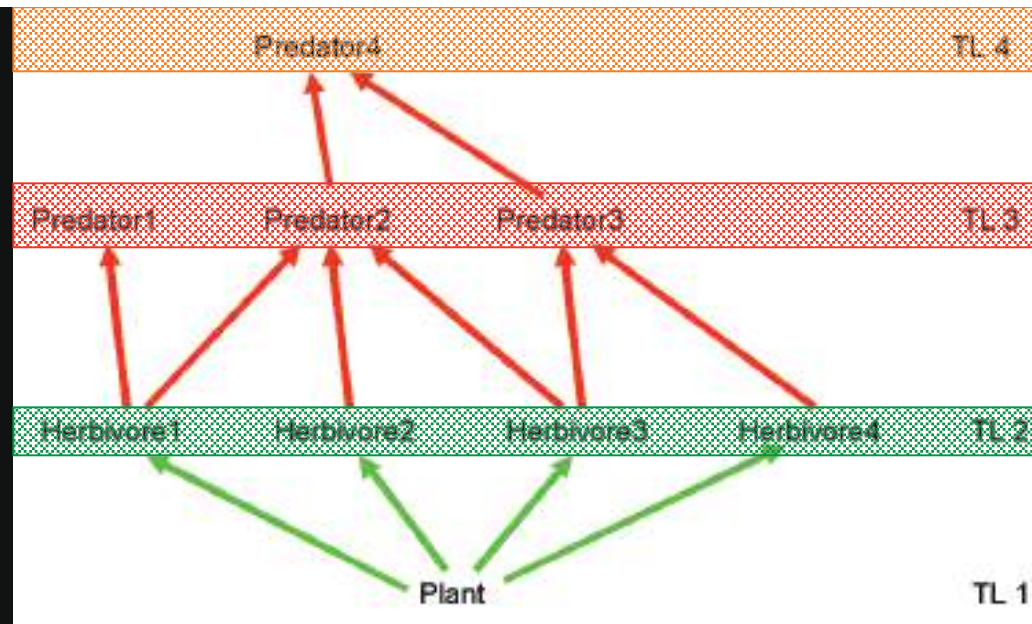
N: $^{15}\text{N}/^{14}\text{N}$

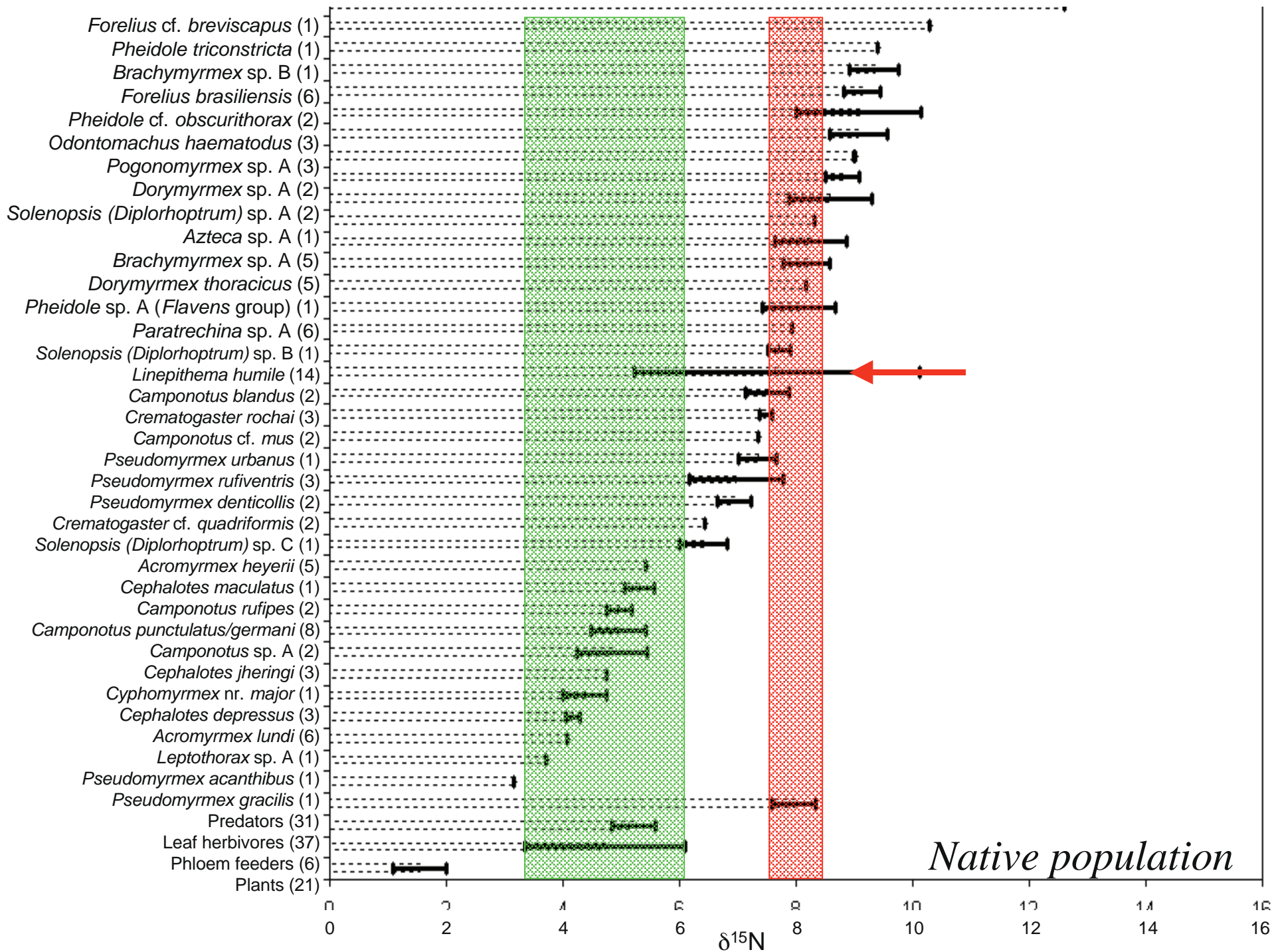
Nitrogen

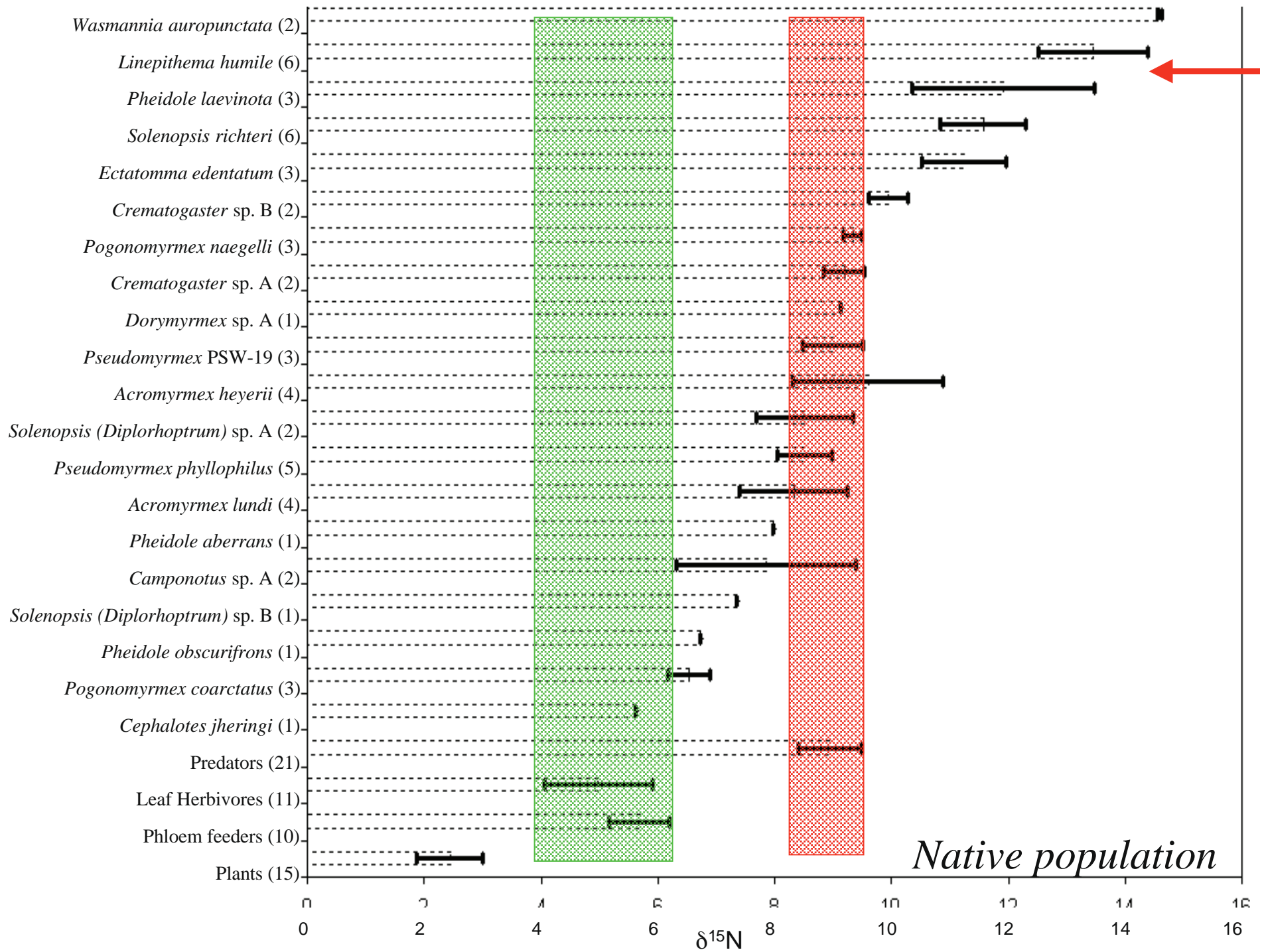
~ 2 - 3 ‰ enrichment with
each trophic level

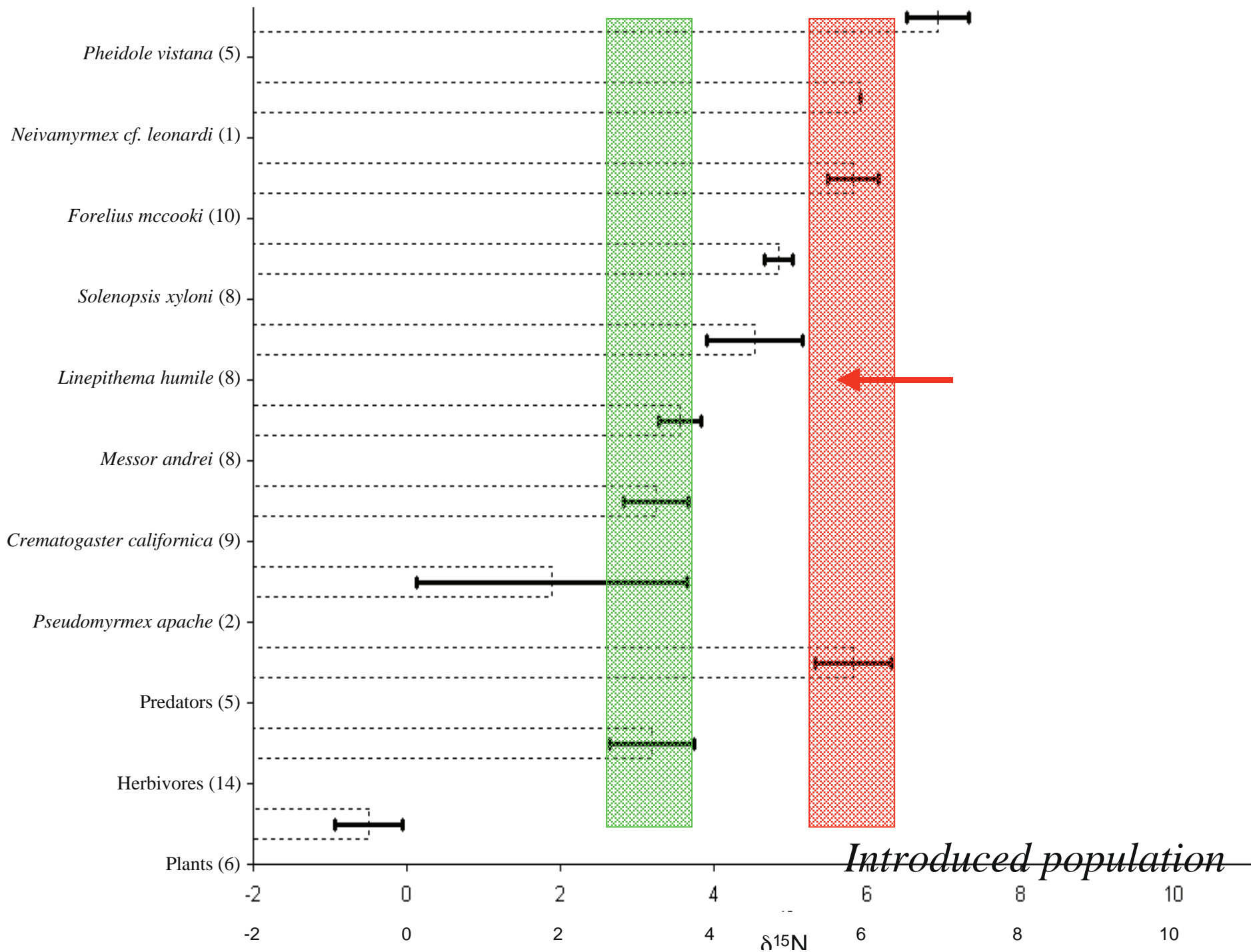
- Higher $\delta^{15}\text{N}$ values
indicate higher trophic level

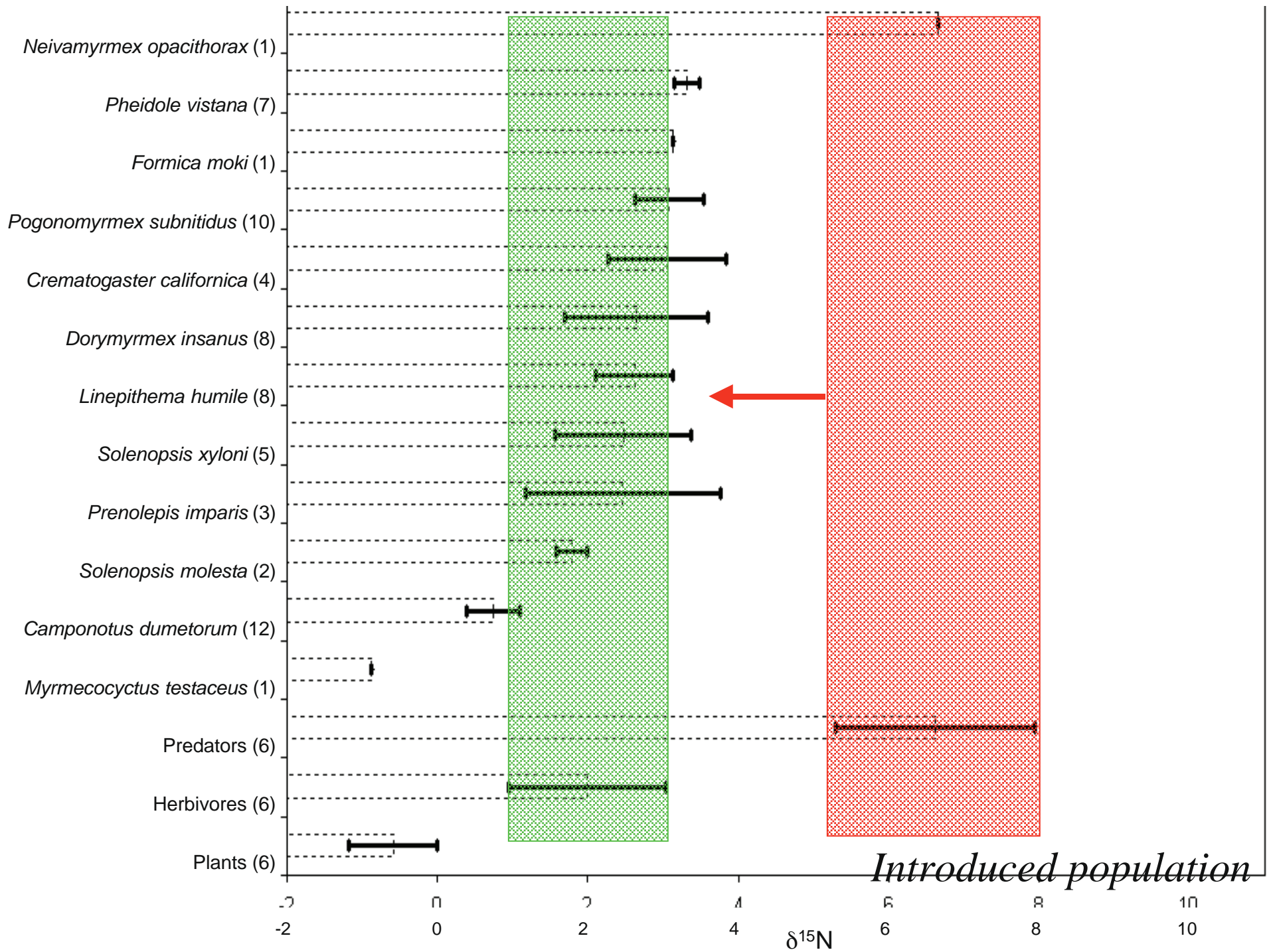




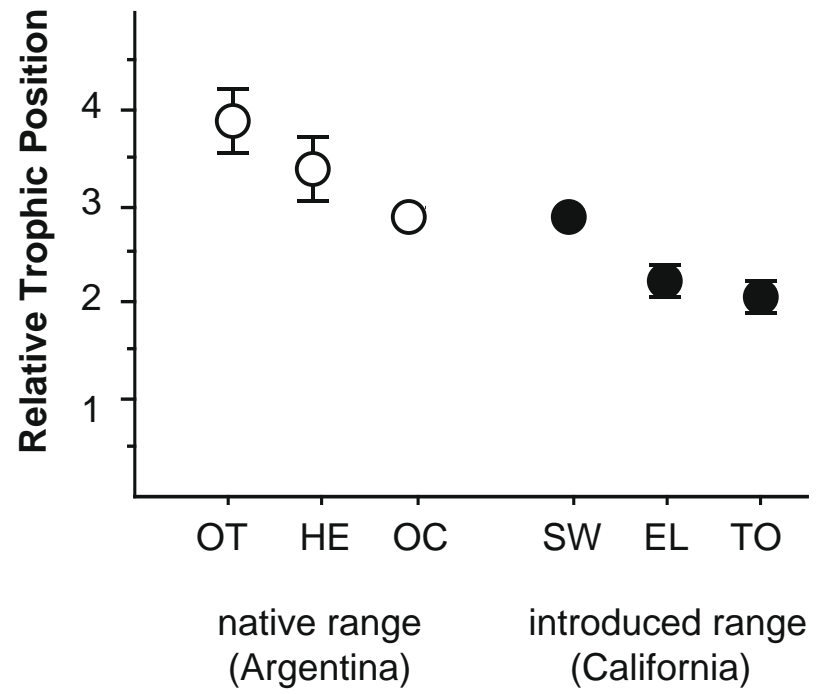




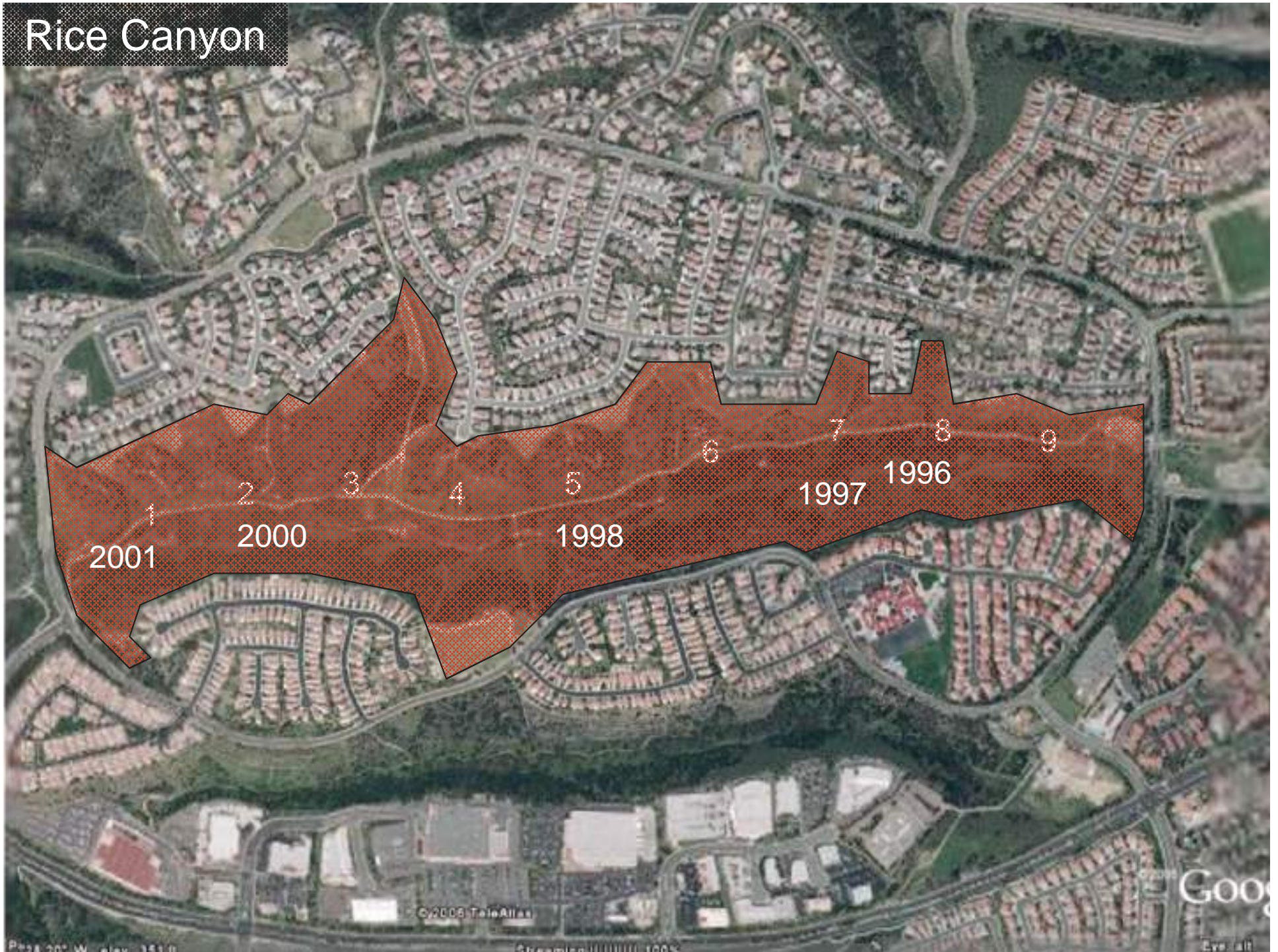




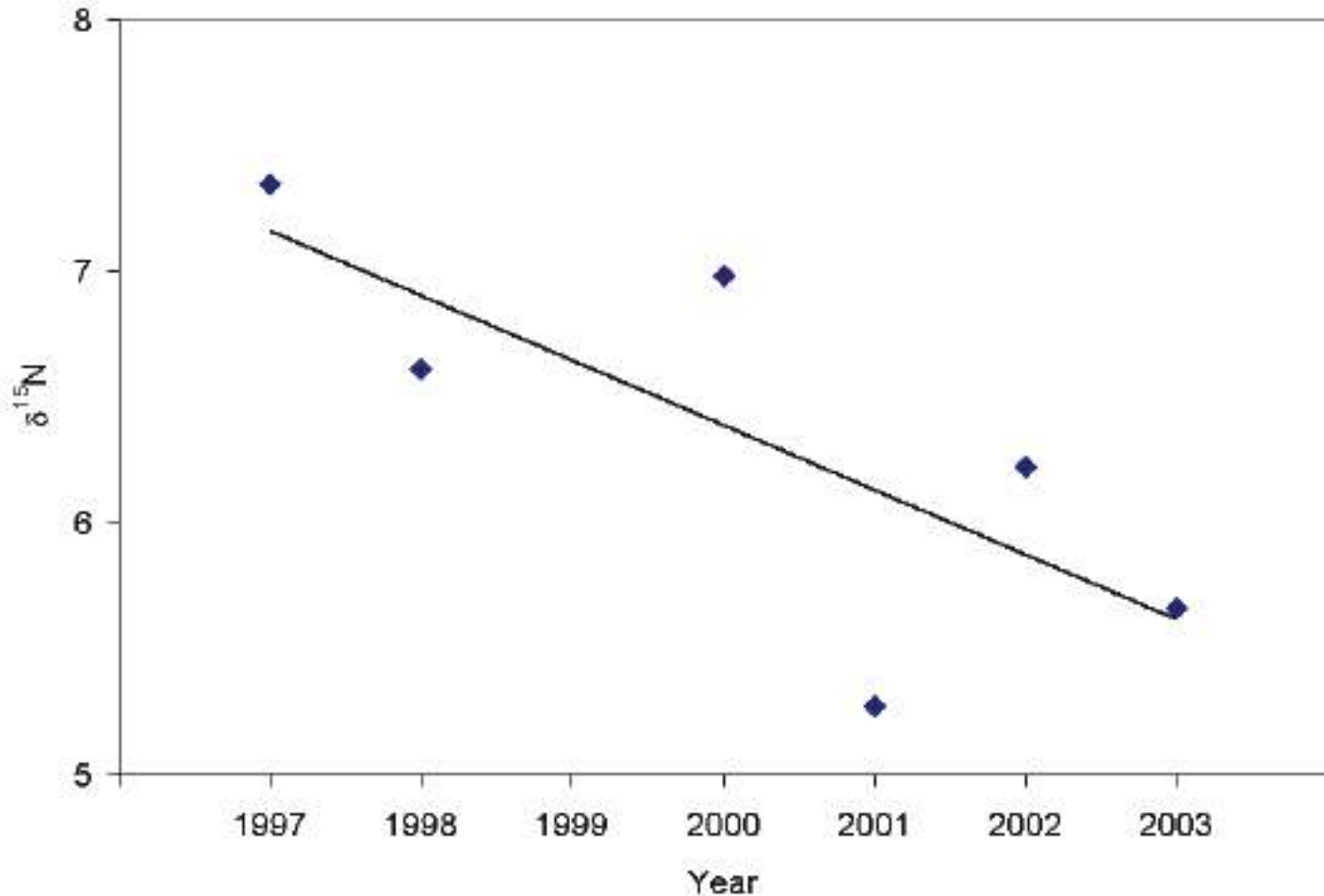
Introduced population



Rice Canyon



Rice Canyon



Change in Argentine ant $\delta^{15}\text{N}$ during invasion:

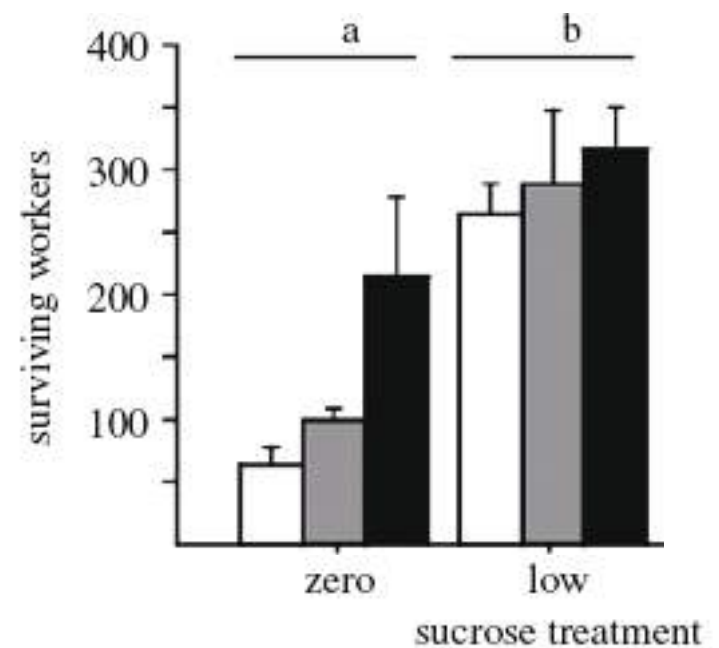
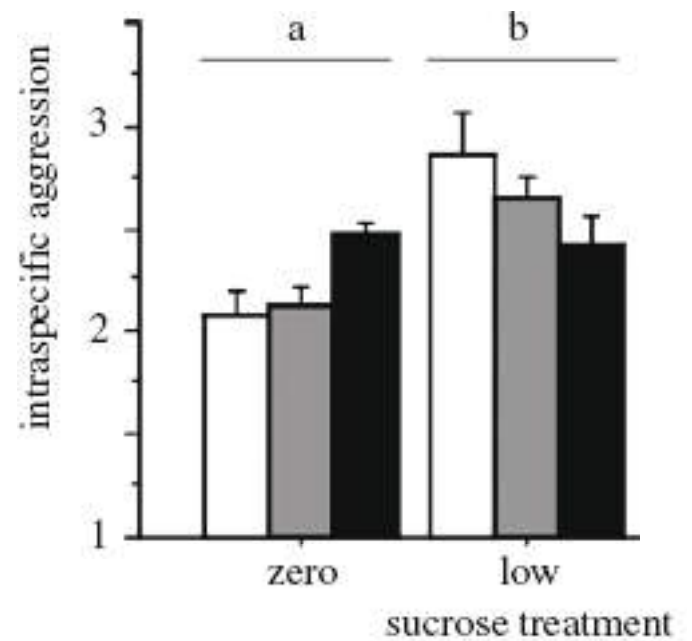
Invasion front: $DF = 4$, $H = 4$, $P = 0.41$

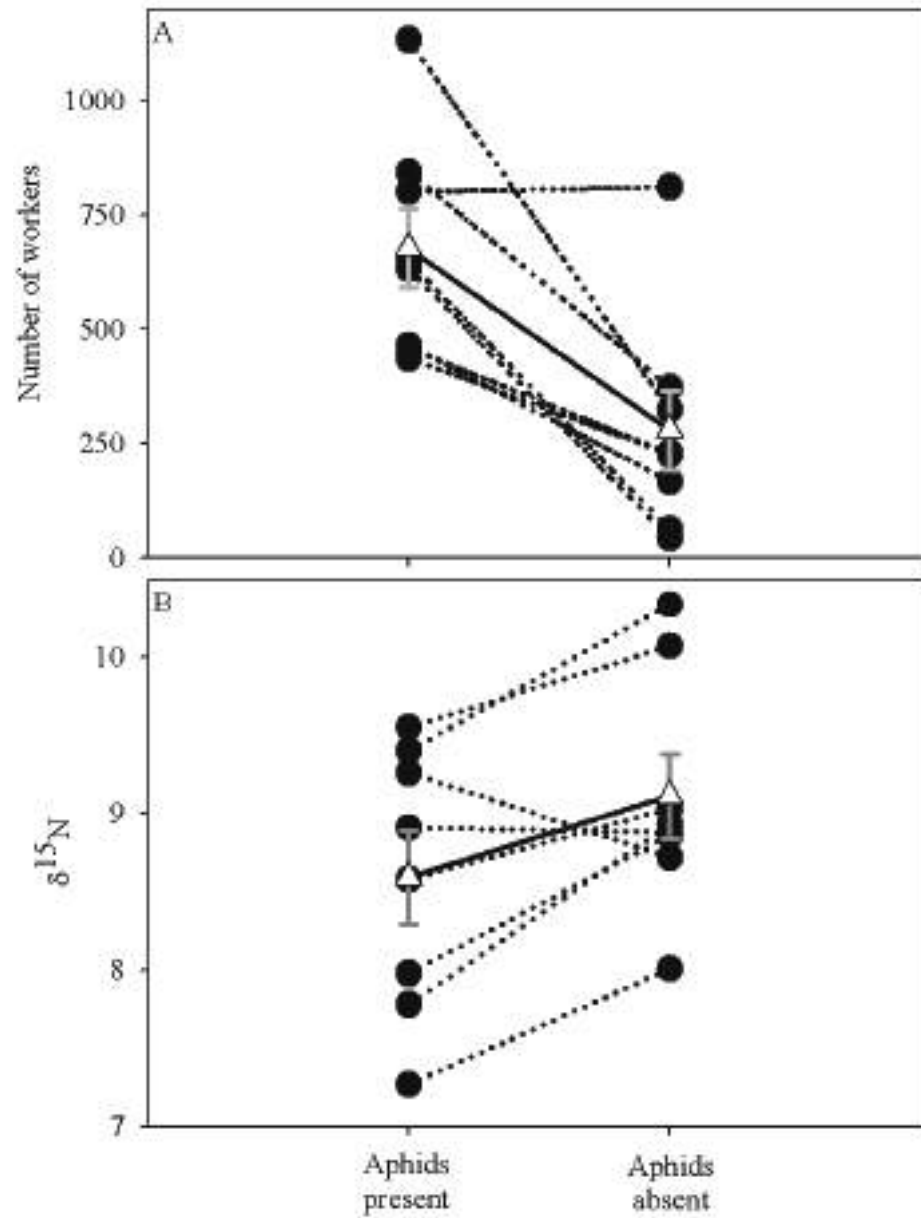
Behind invasion front: $DF = 5$, $H = 13.28$, $P = 0.021$

Proc. R. Soc. B (2007) 274, 2951–2957

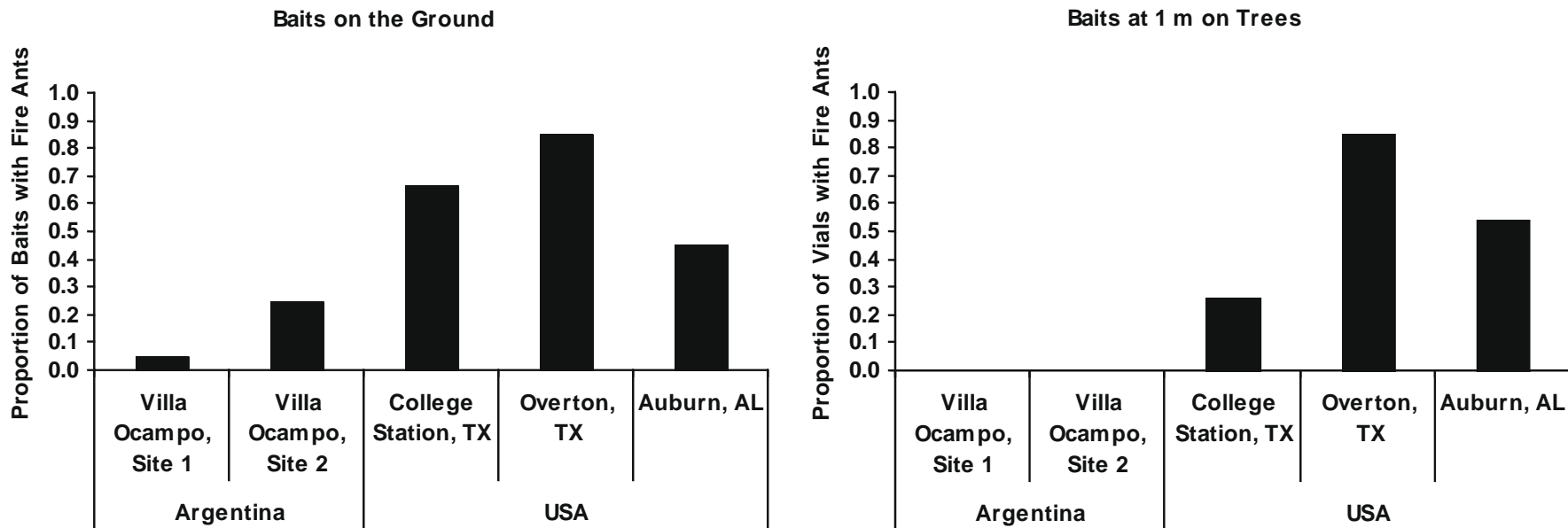
**Linking nutrition and behavioural dominance:
carbohydrate scarcity limits aggression
and activity in Argentine ants**

Crystal D. Grover¹, Adam D. Kay², Jessica A. Monson², Thomas C. Marsh²
and David A. Holway^{1,3*}

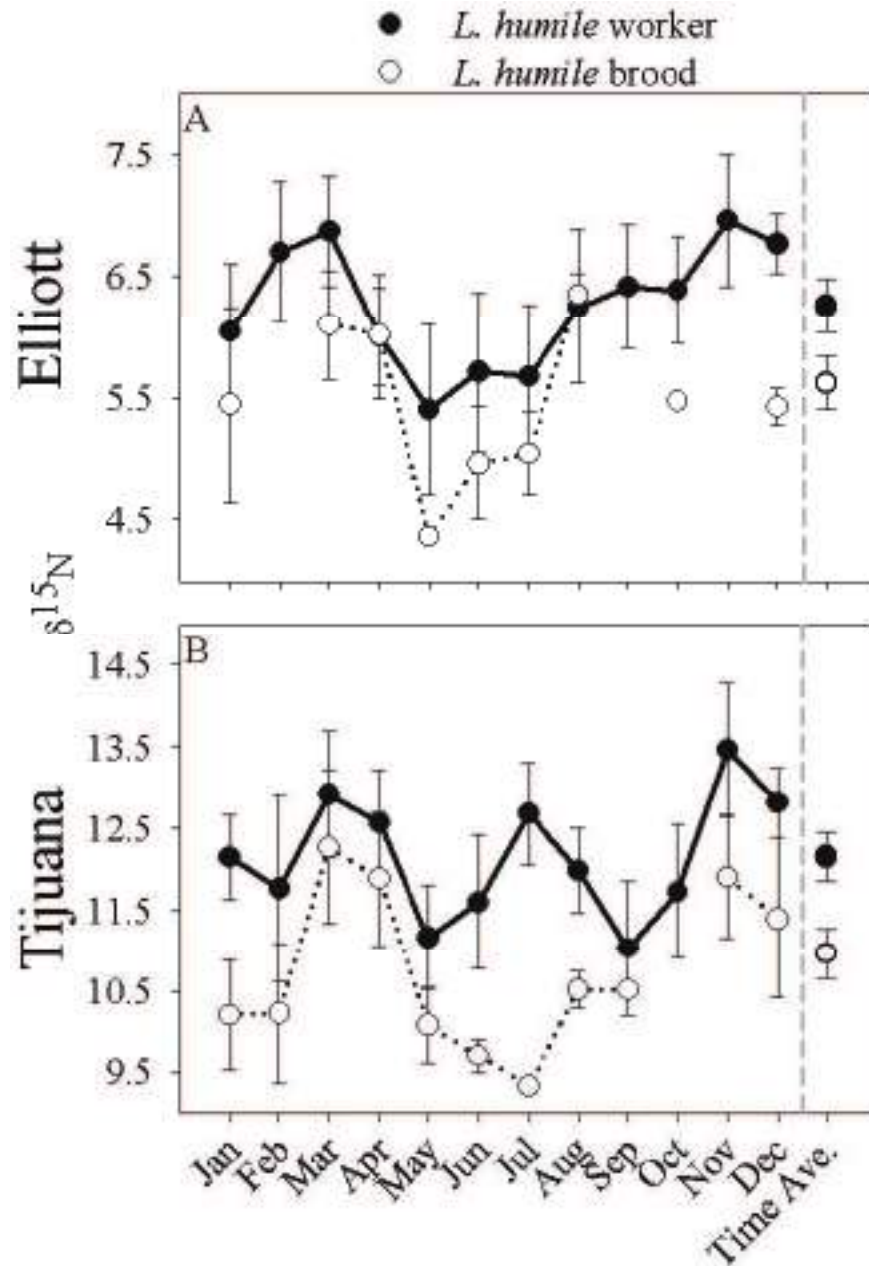




Recruitment to Carbohydrate Baits by *Solenopsis invicta*



Wilder, Eubanks, Suarez, Holway, unpub. data



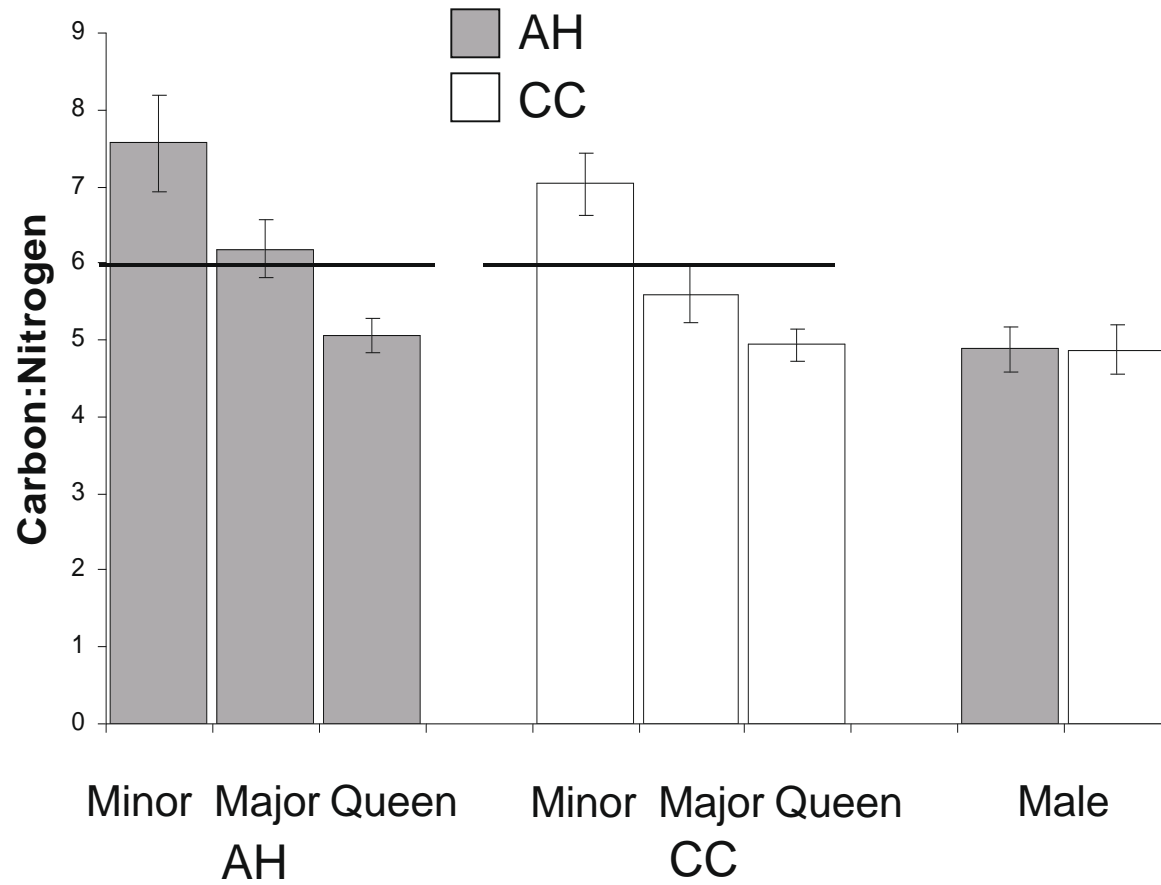
Menke et al. in press

Pogonomyrmex badius

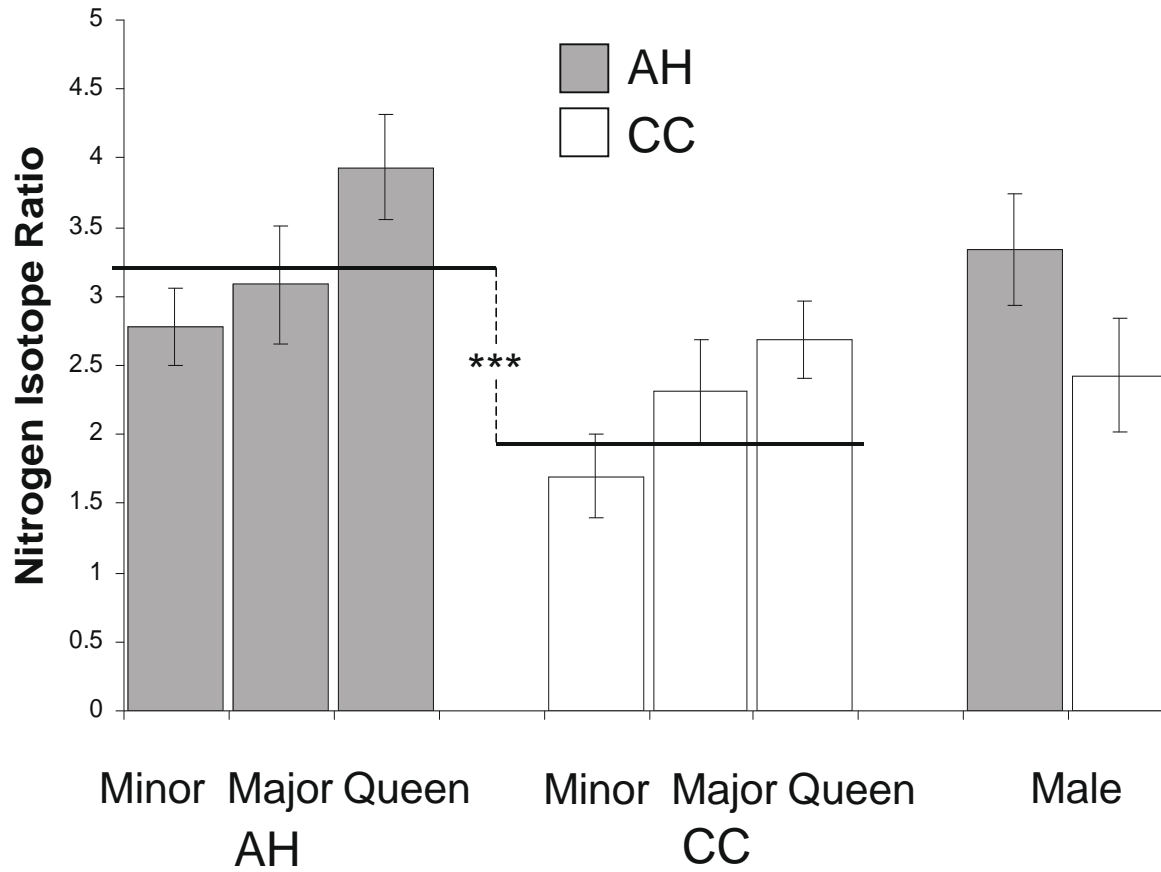
mixed diet: insects & seeds



Elemental Composition of Castes



Trophic Ecology of Castes



Calibration Samples

