

What types of networks in ecology?

Part II: Elisa Thébault



Part II

**How is data collected?
What type of data is there?**

Data collection: a time-consuming work and different methods

Species sampling



Taxonomic determination



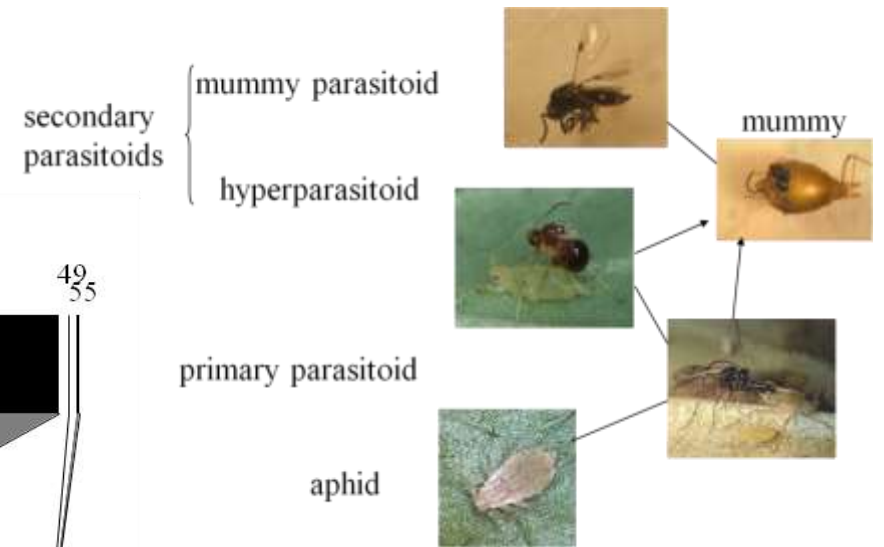
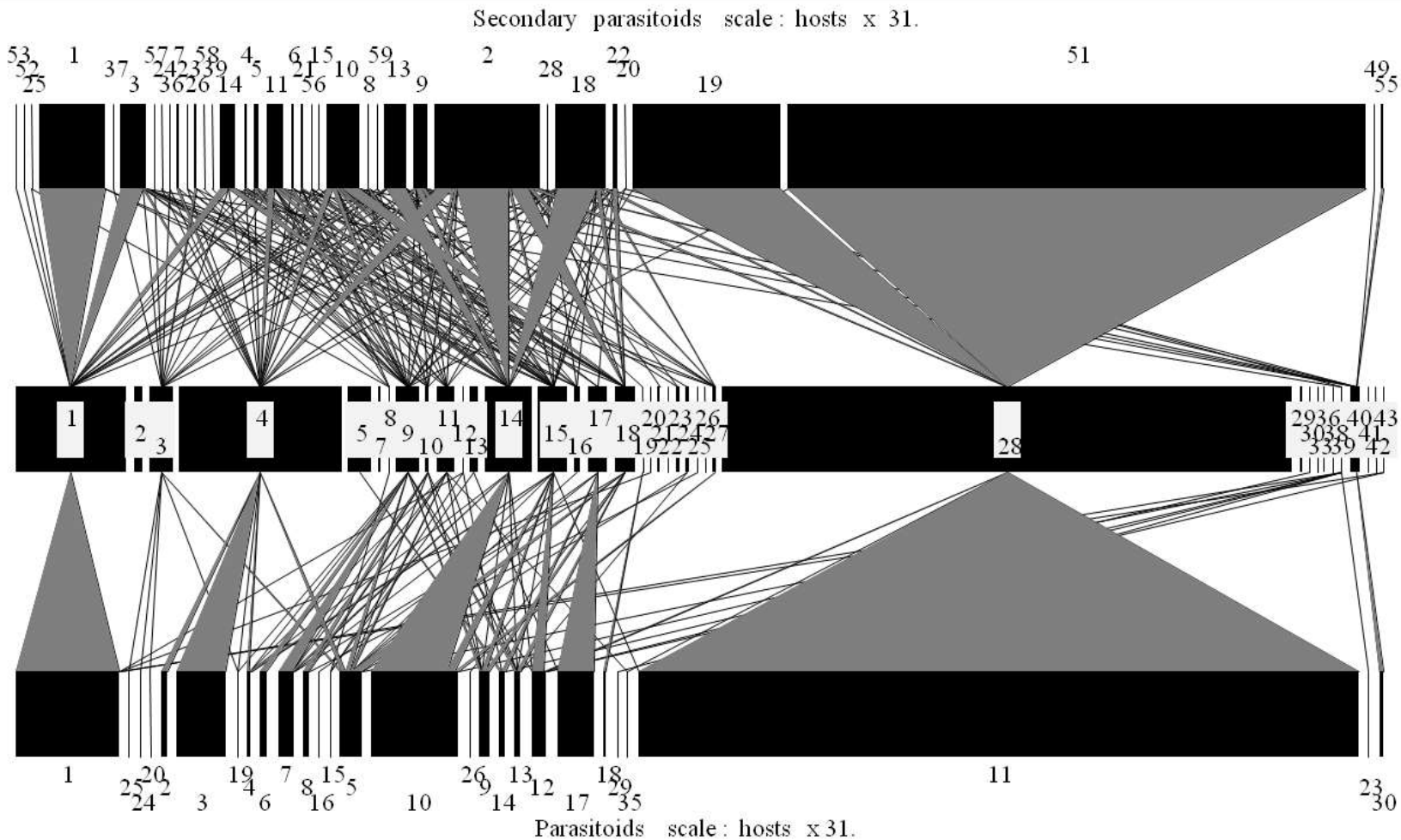
Direct observation



Determining interactions between species



Direct observation of interactions: an example



Van Veen et al. 2008

Total aphid density in 1994, 1995, 1996, 1997, 1998, 1999, 2000 : 6376. per square metre

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Gut content



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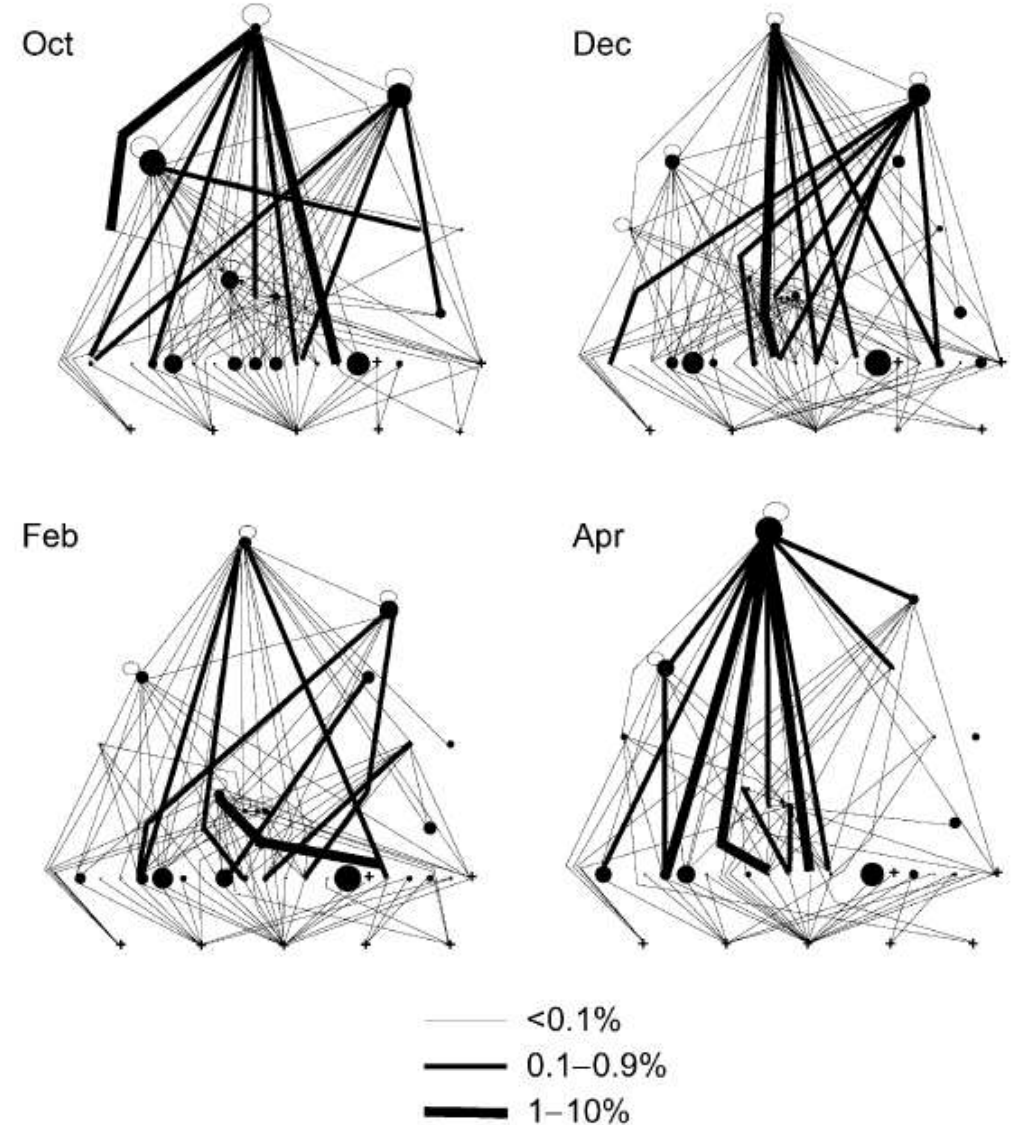
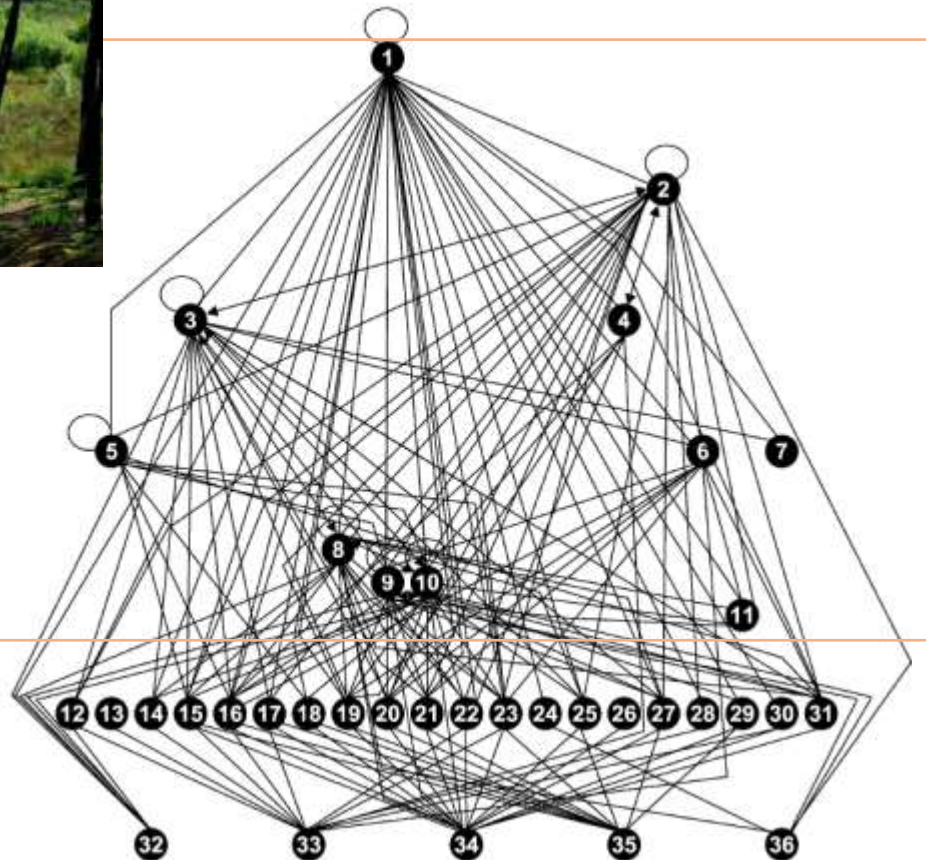


Food webs from gut content: an example

Quantification and Resolution of a Complex, Size-Structured Food Web

GUY WOODWARD, DOUGIE C. SPEIRS, AND
ALAN G. HILDREW

Woodward et al. 2004



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Experimental tests



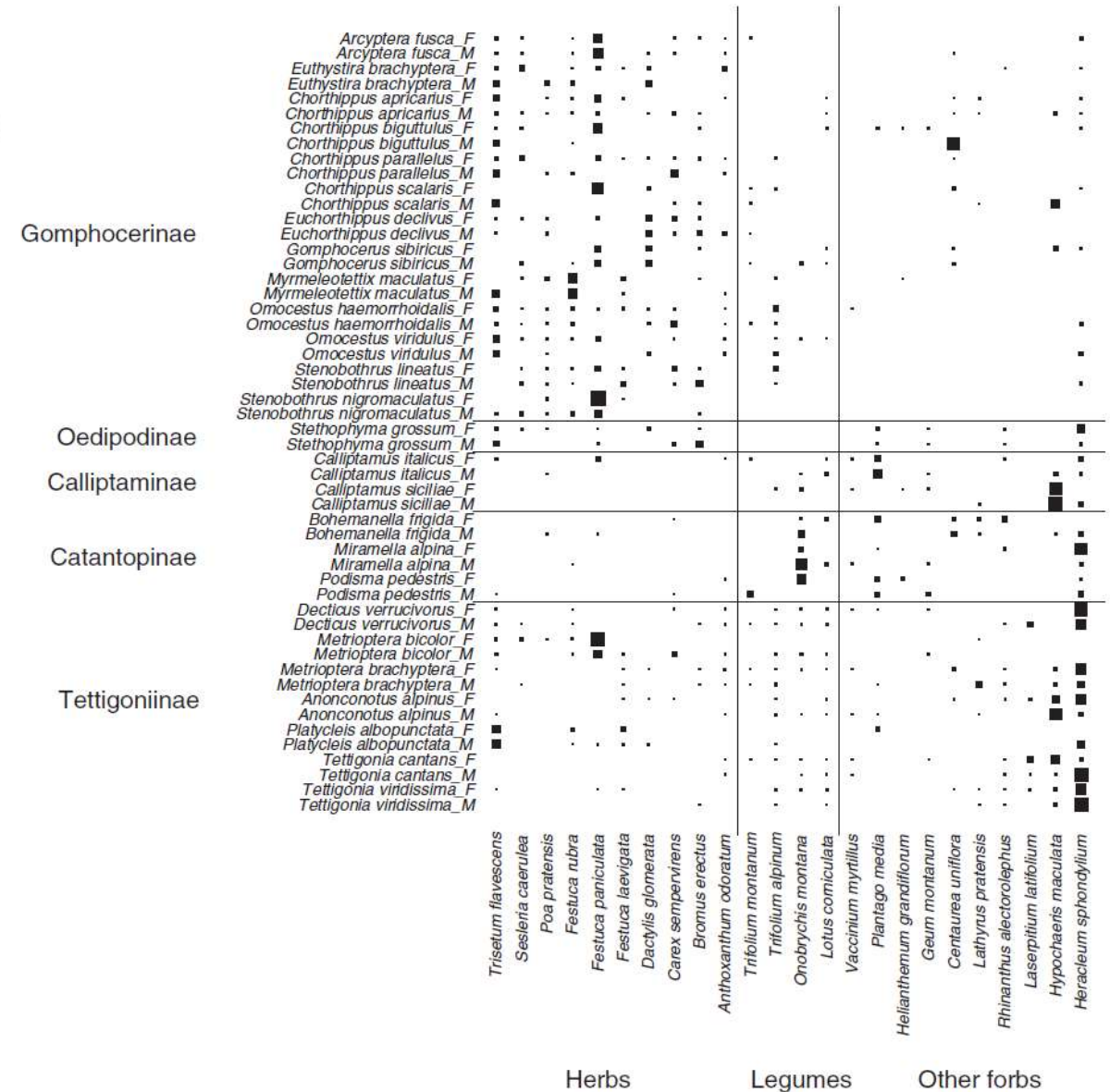
Using experimental tests: an example

Functional Ecology 2013, 27, 479–489

doi: 10.1111/1365-2435.12058

Herbivory mediated by coupling between biomechanical traits of plants and grasshoppers

Sébastien Ibanez^{*1}, Sandra Lavorel², Sara Puijalon³ and Marco Moretti¹



Herbs Legumes Other forbs

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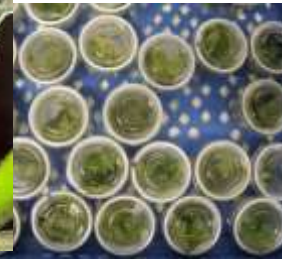
Direct observation



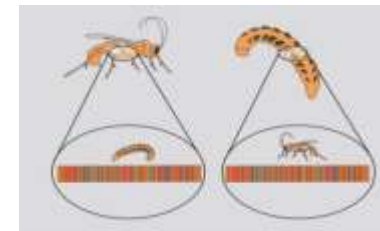
Gut content



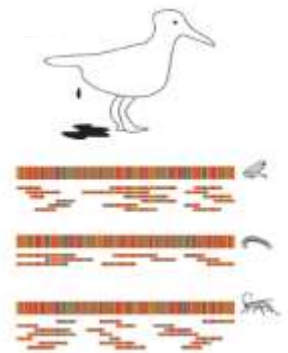
Determining interactions between species



Experimental tests



Molecular methods

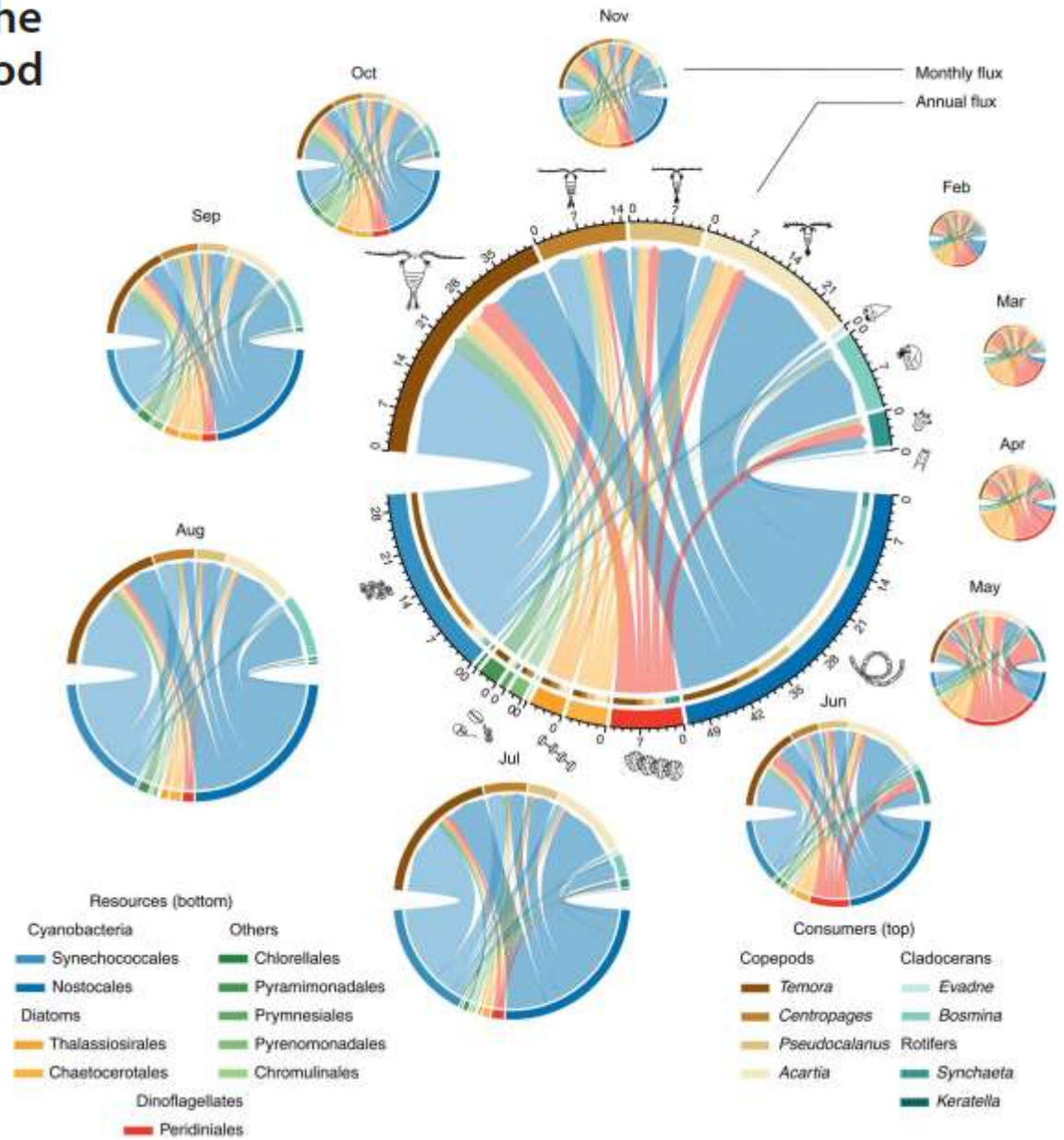
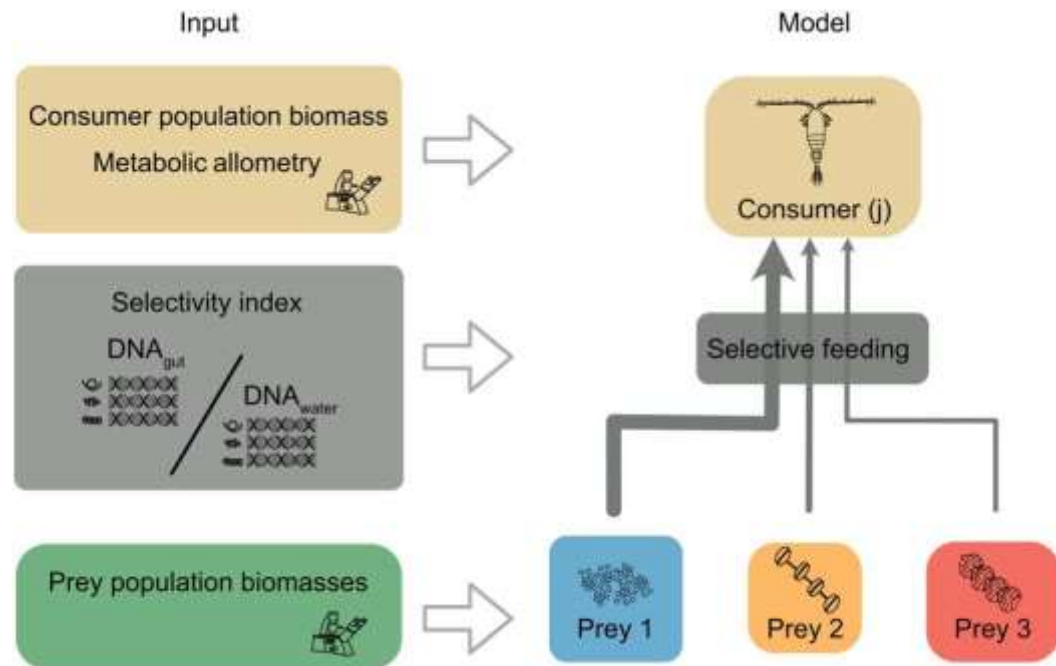


Using molecular methods: an example

DNA metabarcoding highlights cyanobacteria as the main source of primary production in a pelagic food web model

Andreas Novotny^{1†*}, Baptiste Serandour¹, Susanne Kortsch^{2,3}, Benoit Gauzens^{4,5}, Kinlan M. G. Jan¹, Monika Winder^{1*}

Novotny et al. 2023



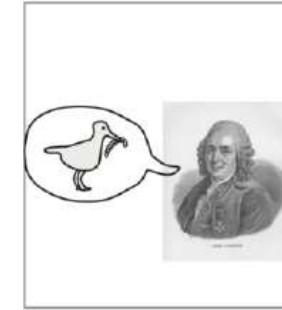
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Taxonomic determination

Expert knowledge and use of databases



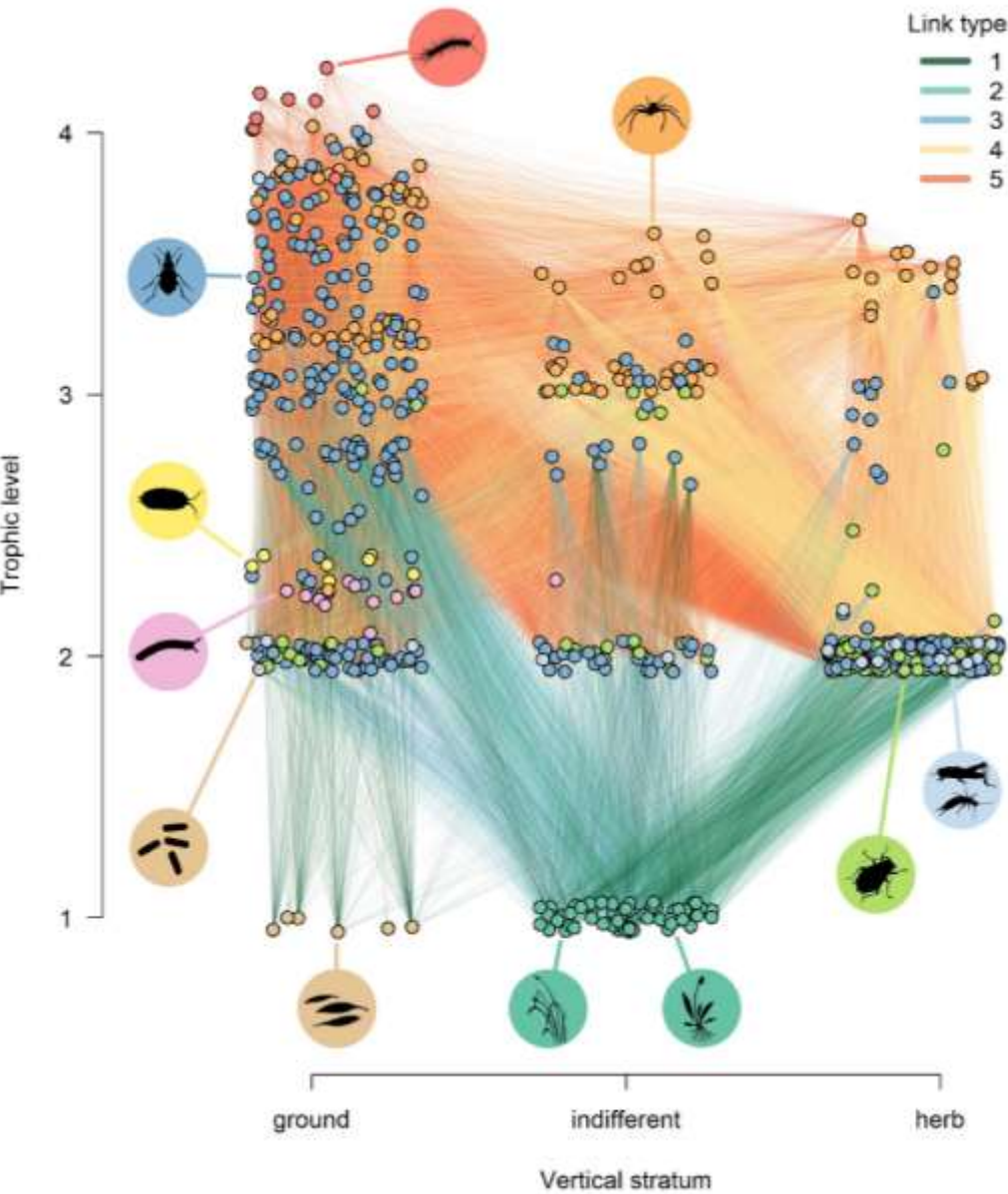
Determining interactions between species



GlobalWeb, GATEWAY...



Expert knowledge, use of databases: an example








Data Papers

Ecology, 100(6), 2019, e02679
 © 2019 The Authors. *Ecology* © 2019 The Ecological Society of America

A meta food web for invertebrate species collected in a European grassland

JES HINES,^{1,2,6} DARREN P. GILING,^{1,2,3} MICHAEL RZANNY,⁴ WINFRIED VOIGT,³ SEBASTIAN T. MEYER,⁵
 WOLFGANG W. WEISSER,⁵ NICO EISENHÄUER,^{1,2} AND ANNE EBELING³

	1		3
Specific feeding interaction reported in the literature		Trophic level (Taxa feed on resources based on trophic group)	
	2		4
Generalized feeding interaction reported in the literature (Taxa that are reported to feed on all species in a given taxonomic group)		Trait-based rule (Links based on taxonomic identity and matching single trait)	
	5	Combined trait-based rules (Links based on taxa, body size, vertical stratification and/or trophic level)	

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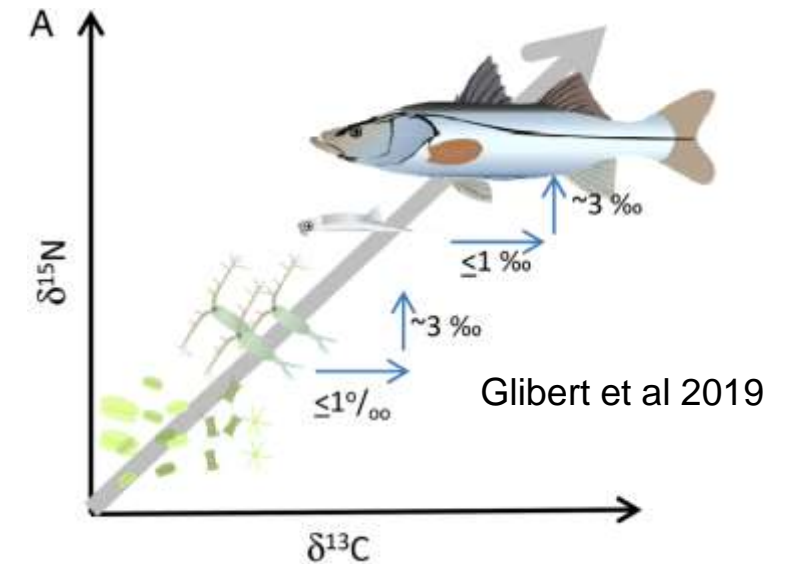
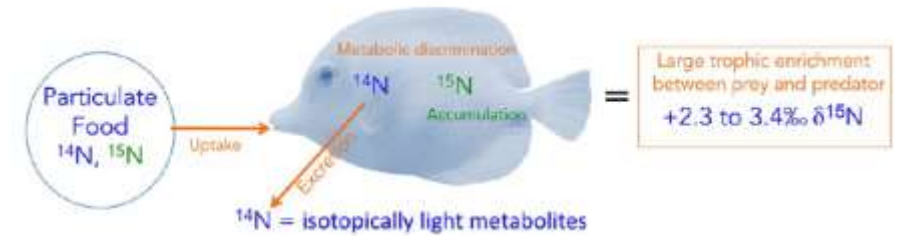


Determining interactions between species



Indirect methods

Methods based on stable isotope ratios

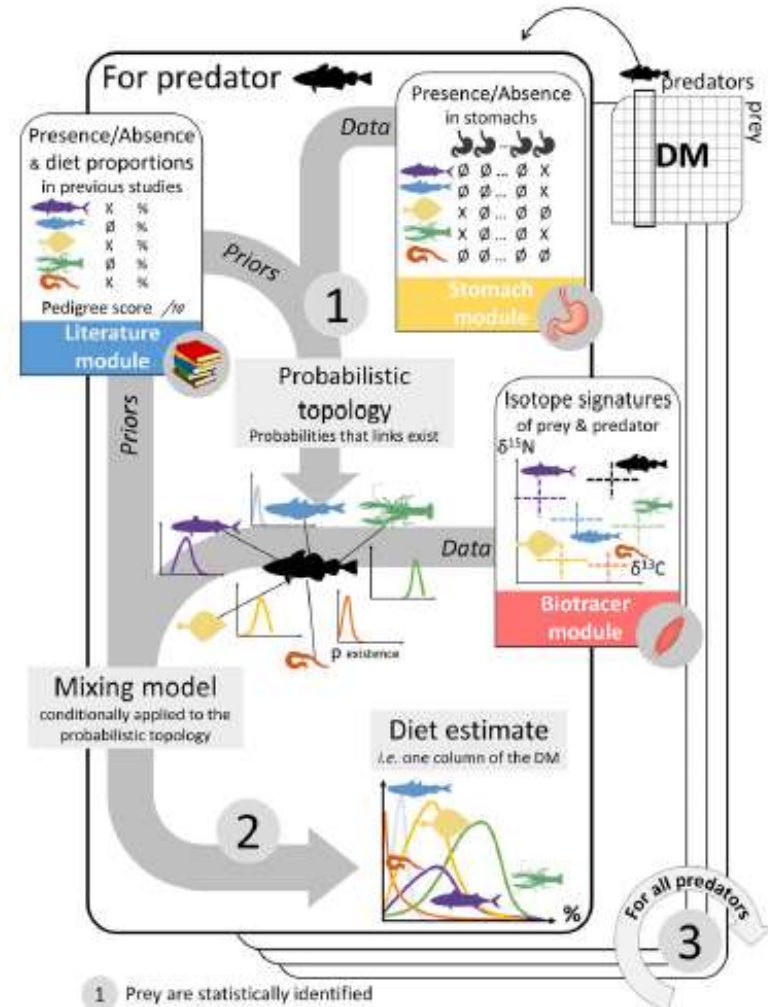
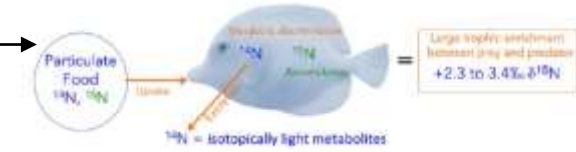
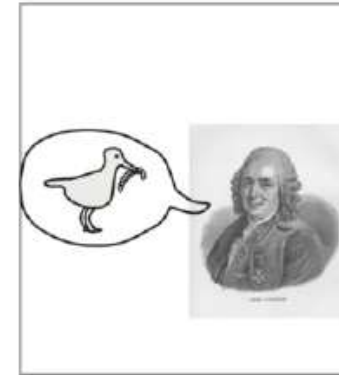


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Methods based on stable isotope ratios

Gut content



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DOI: 10.1002/eap.2521

ARTICLE

EcoDiet: A hierarchical Bayesian model to combine stomach, biotracer, and literature data into diet matrix estimation

Pierre-Yves Hervann^{1,2,3} | Didier Gascuel² | Dorothee Kopp¹ | Marianne Robert¹ | Etienne Rivot²

ECOLOGICAL APPLICATIONS
AN INTERNATIONAL JOURNAL OF THE
ECOLOGICAL SOCIETY OF AMERICA

Effects of sampling methods on network structure

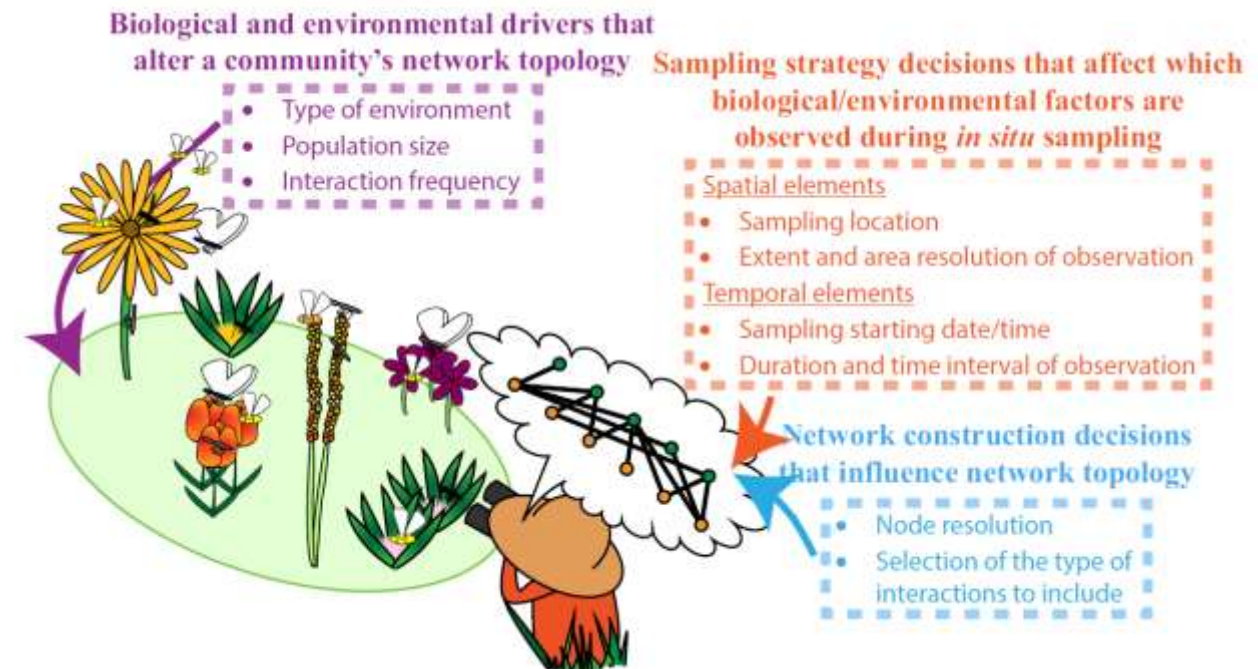
- Sampling methods strongly affect node resolution, measure of interaction strength, etc.
- Need to be careful when comparing network structure between different ecological communities

META-RESEARCH ARTICLE

Shortcomings of reusing species interaction networks created by different sets of researchers

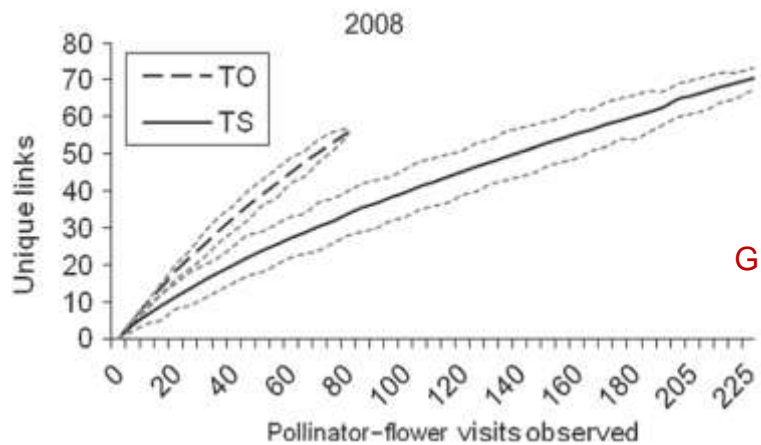
Chris Brimacombe^{1*}, Korryn Bodner², Matthew Michalska-Smith^{3,4}, Timothée Poisot^{5,6}, Marie-Josée Fortin¹

Brimacombe et al. 2023



Effects of sampling methods on network structure

➤ Type of sampling: transect vs. timed-observation

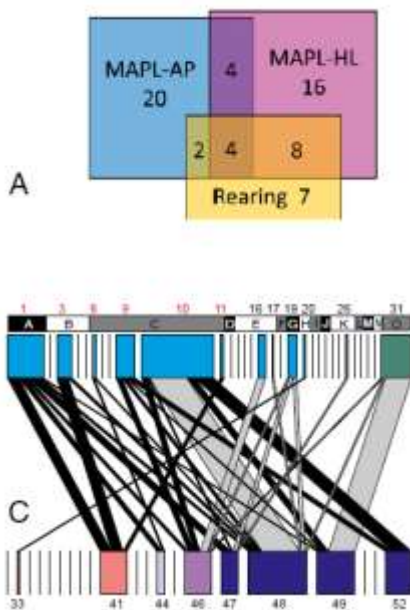


Gibson et al. (2011)

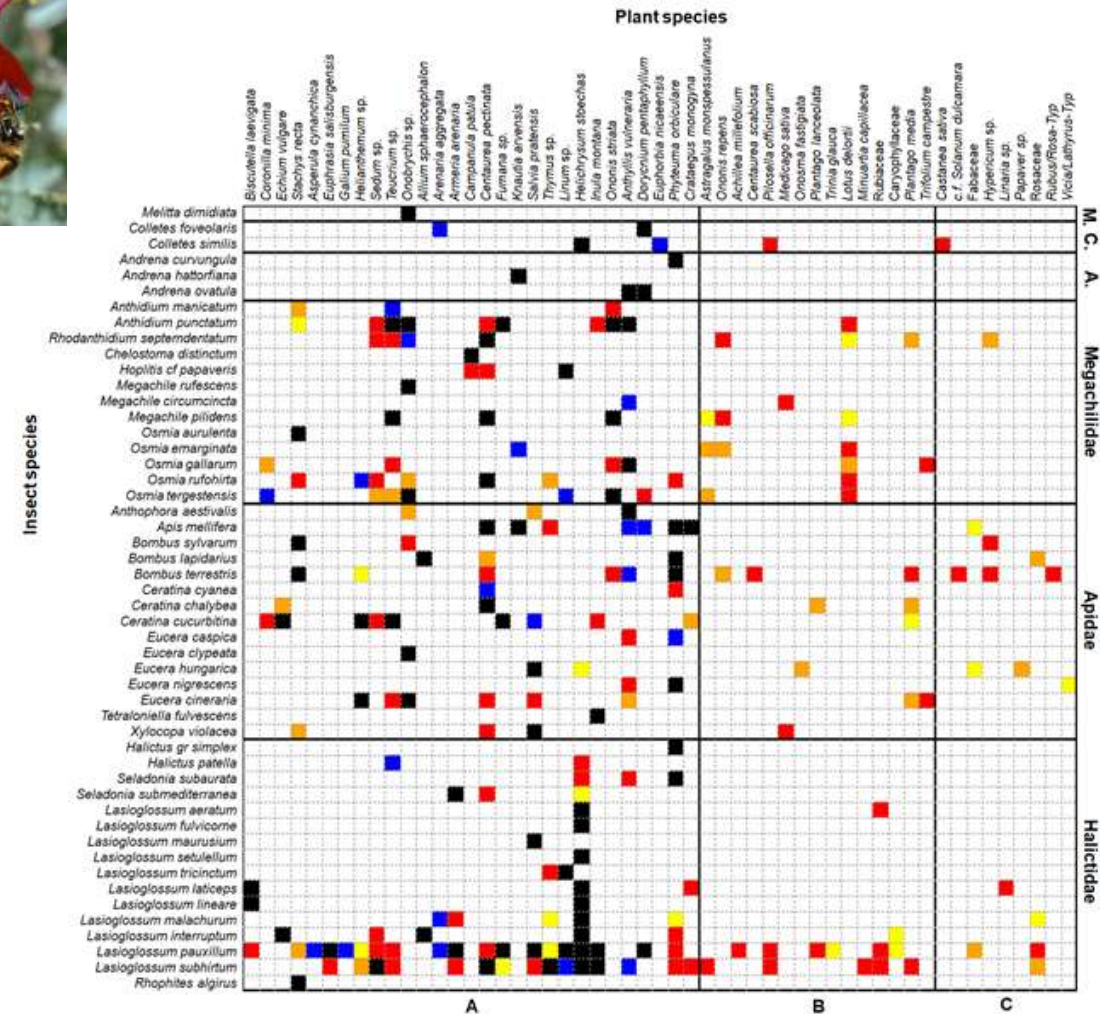
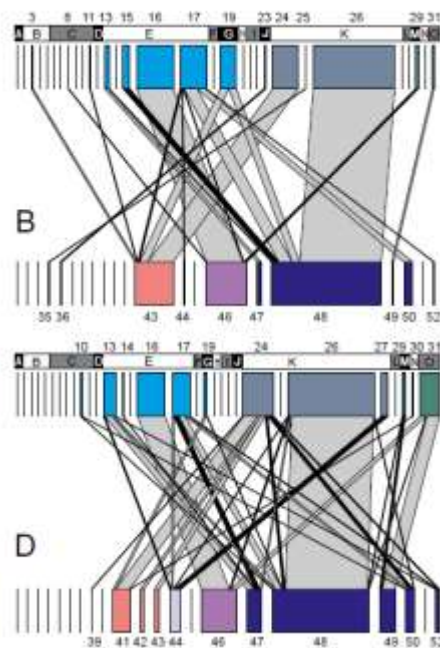


Visits vs. pollen based

Rearing method vs. molecular



Wirta et al. (2014)



De Manincor et al. (2020)