Evert Gutteling

Using integrative approaches to understand the genetics of vegetable traits

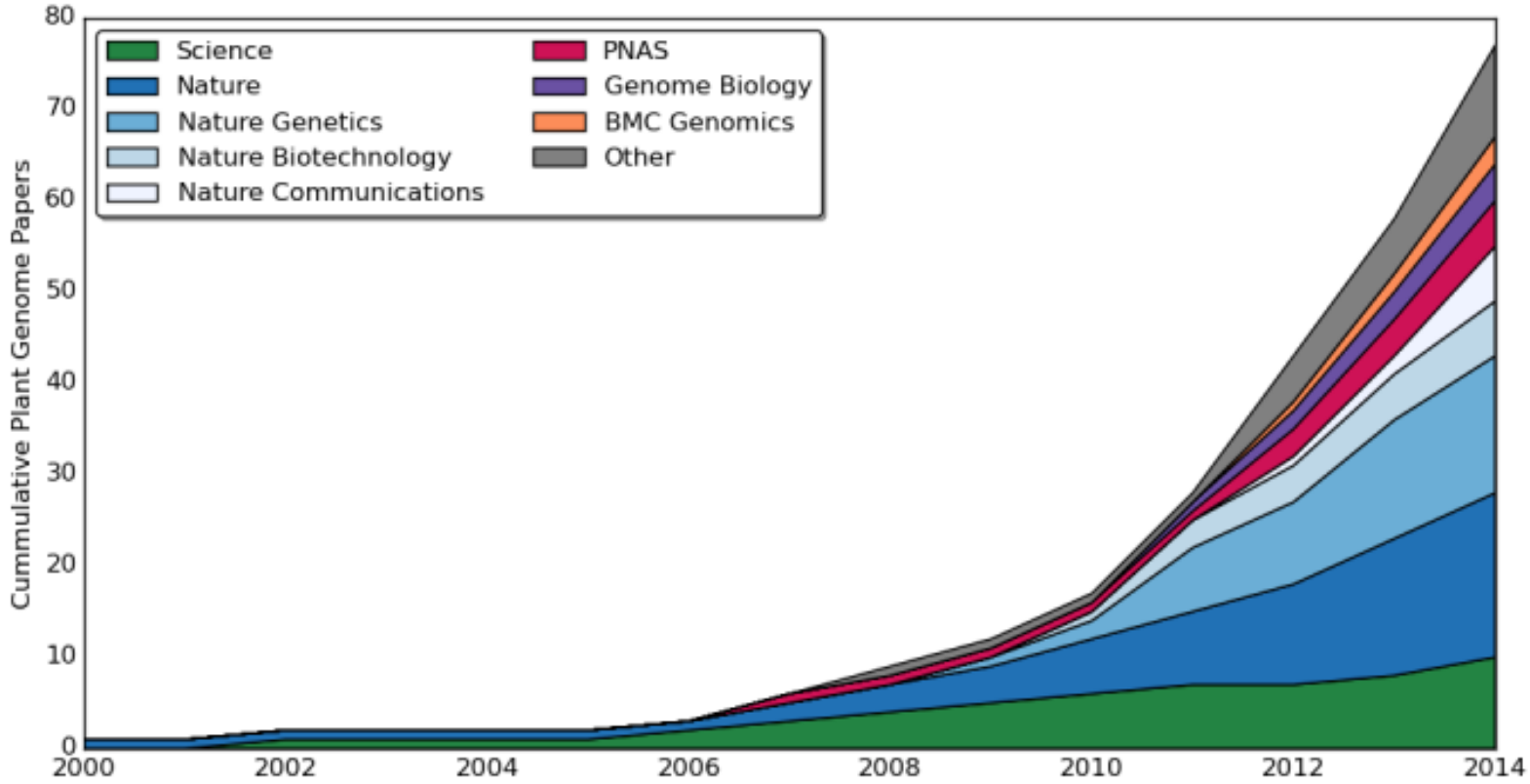
Sharing a healthy future

RIJK ZWAAN

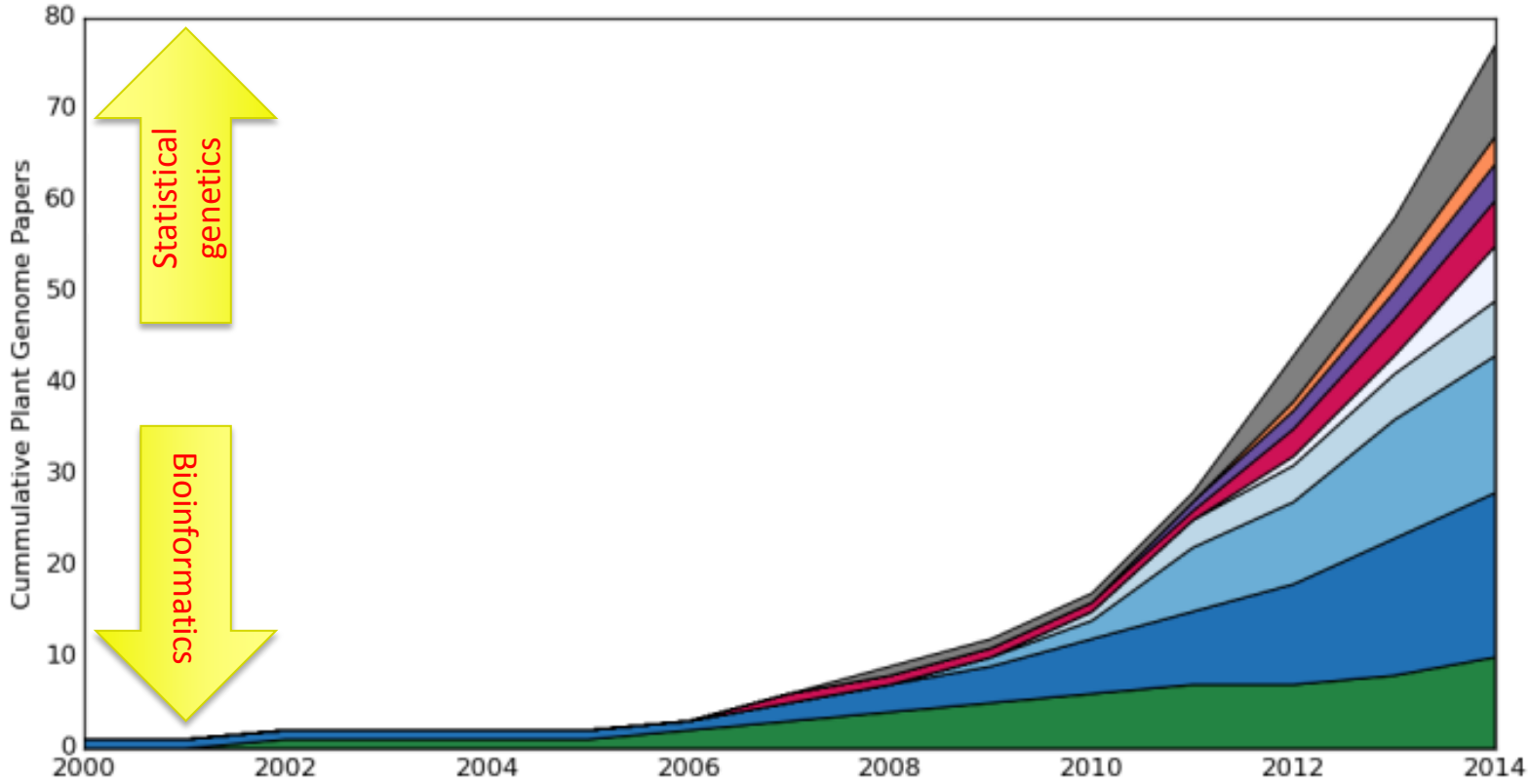
Increasing amounts of vegetable sequence data

- Crop genome sequences
- More crop genome sequences (more sequence from same genus)
  - Pan genomes
  - *n* genome sequence projects
- RNA-seq
- Copy number variations

Data, data, data



Early days


Cummulative Plant Genome Papers
0
10
20
30
40
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60
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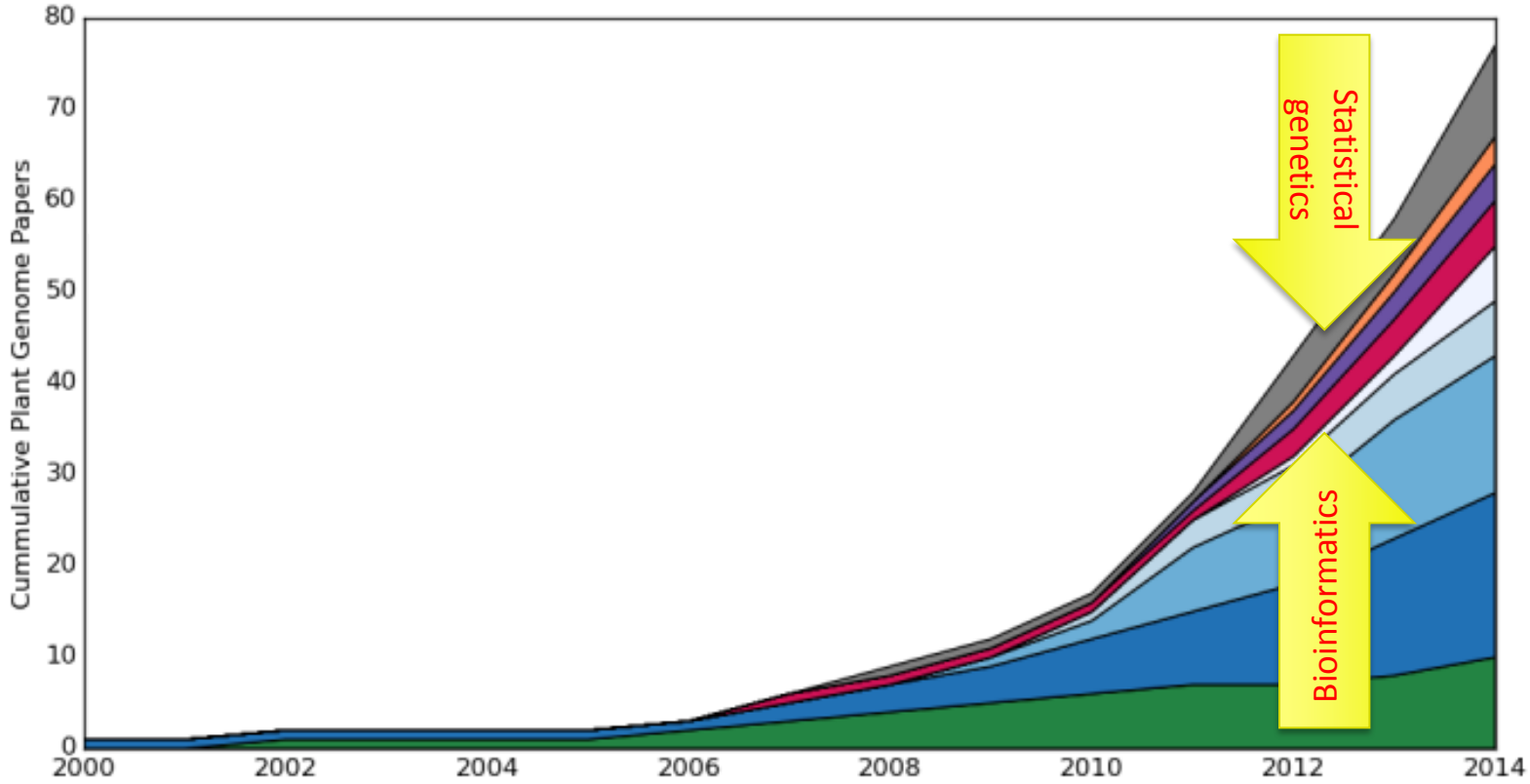
2000
2002
2004
2006
2008
2010
2012
2014
Statistical genetics
Bioinformatics

This decade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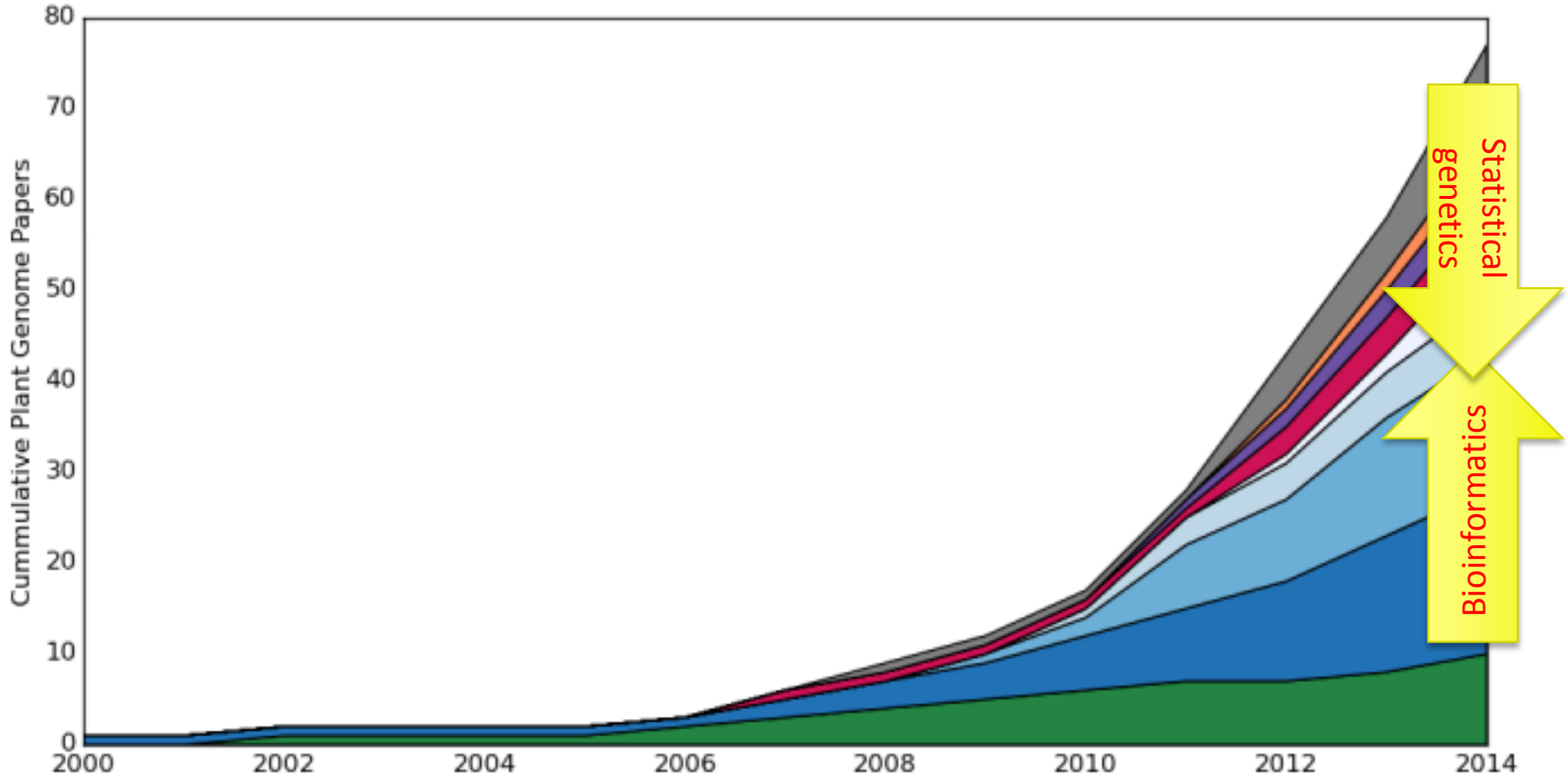
Statistical genetics
Bioinformatics

Statistics help you to make sense of the data



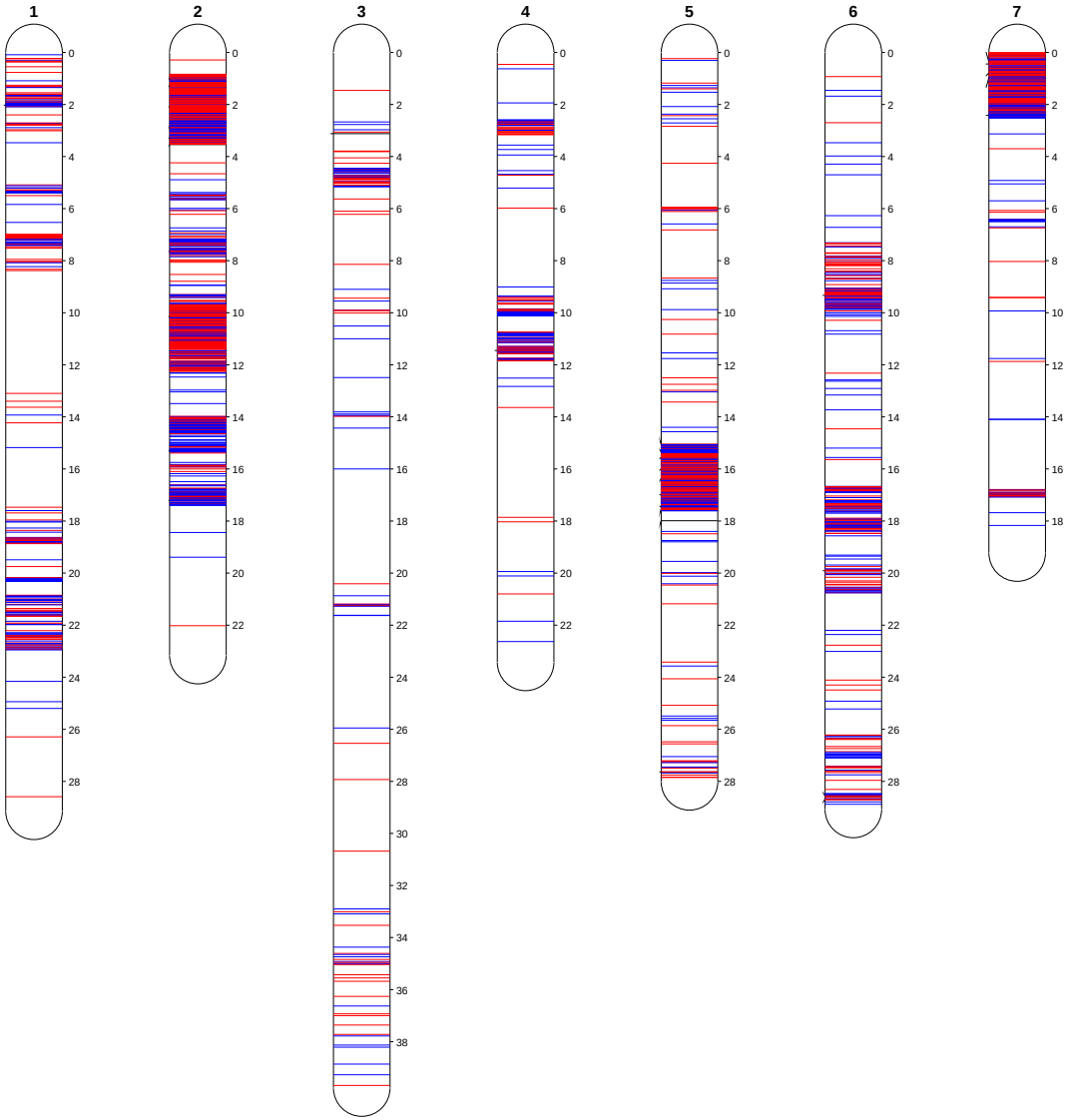
All the sequence data allows you now to do cool statistical stuff

Increasing amounts of vegetable sequence data

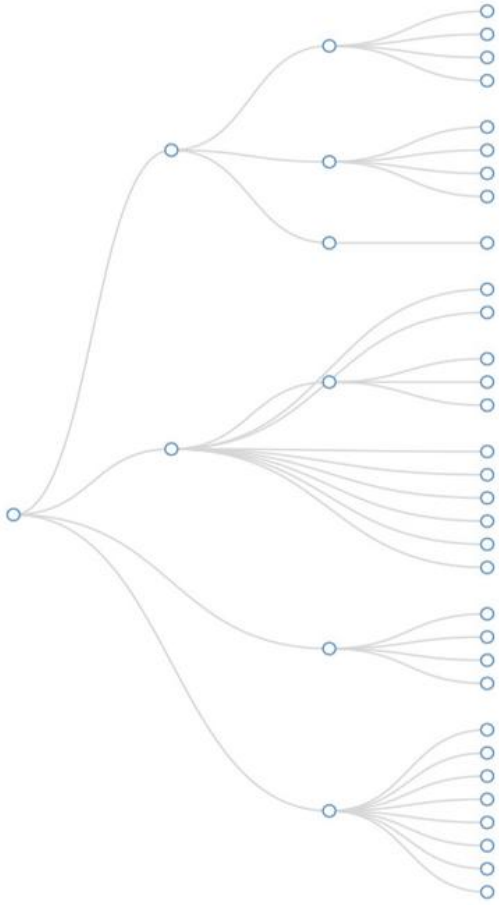
- Crop genome sequences
- More crop genome sequenc… sequence from same…
  - Pan genome…
  - *n* ge… …jects
- …amber variations

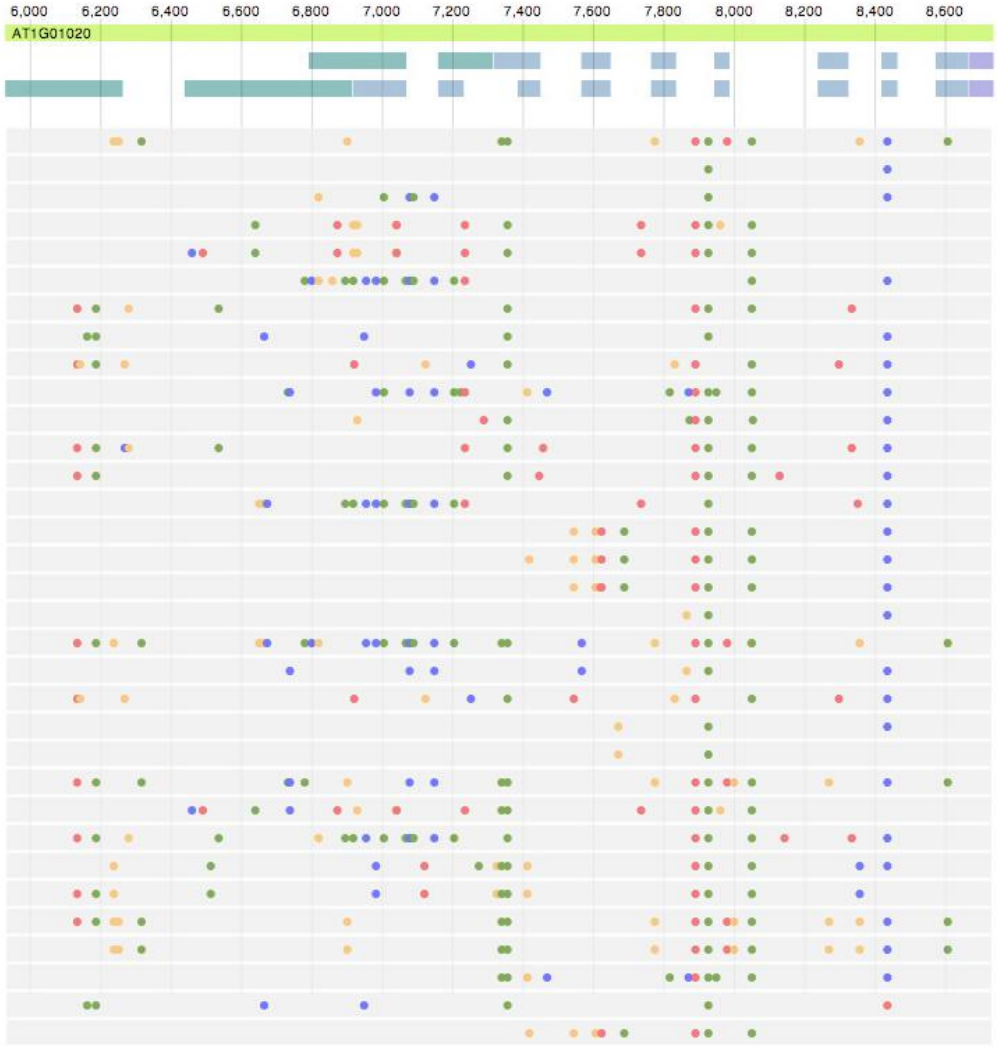
The basics allow you to perform the more complex research

SNPs between parental lines of commercial hybrids

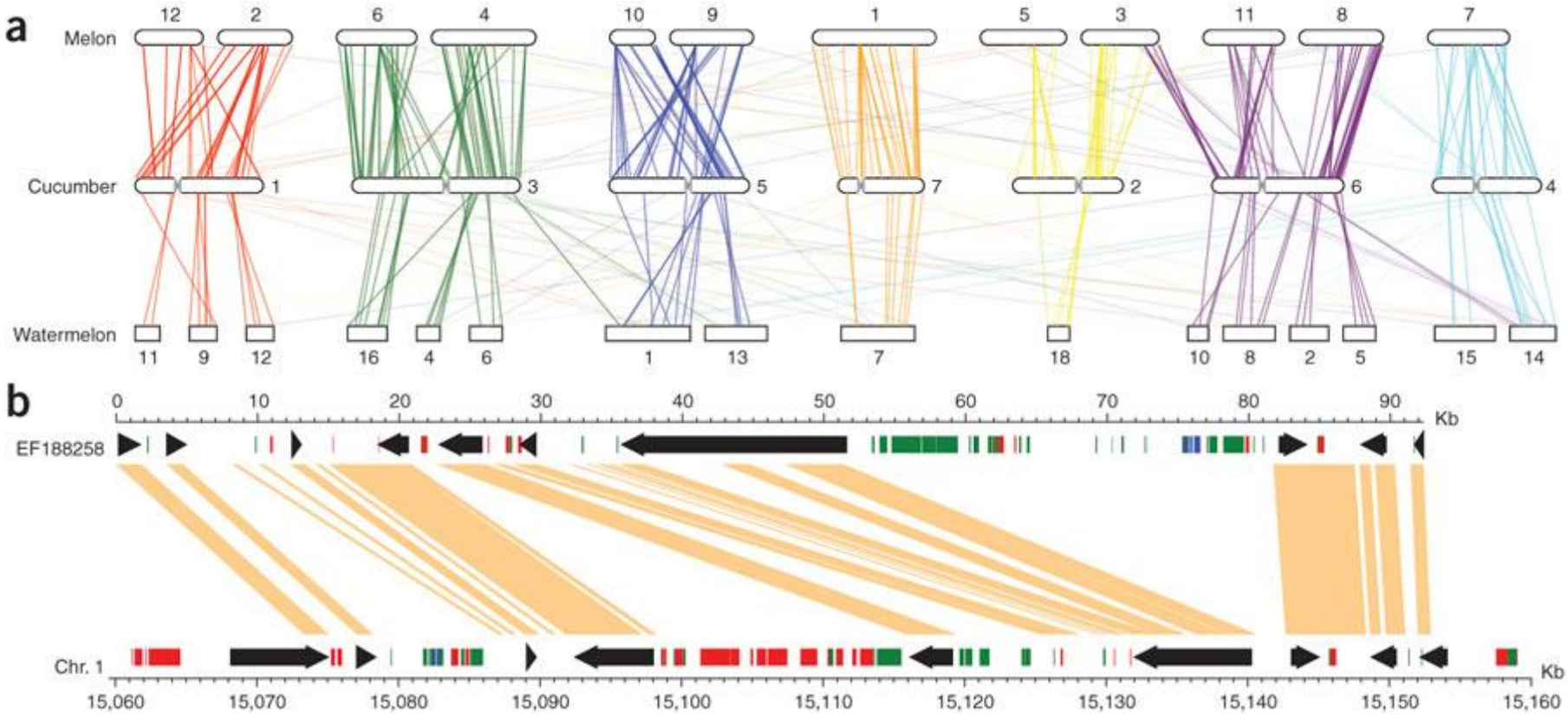


The “basics”: large scale allelic variation at a nucleotide level

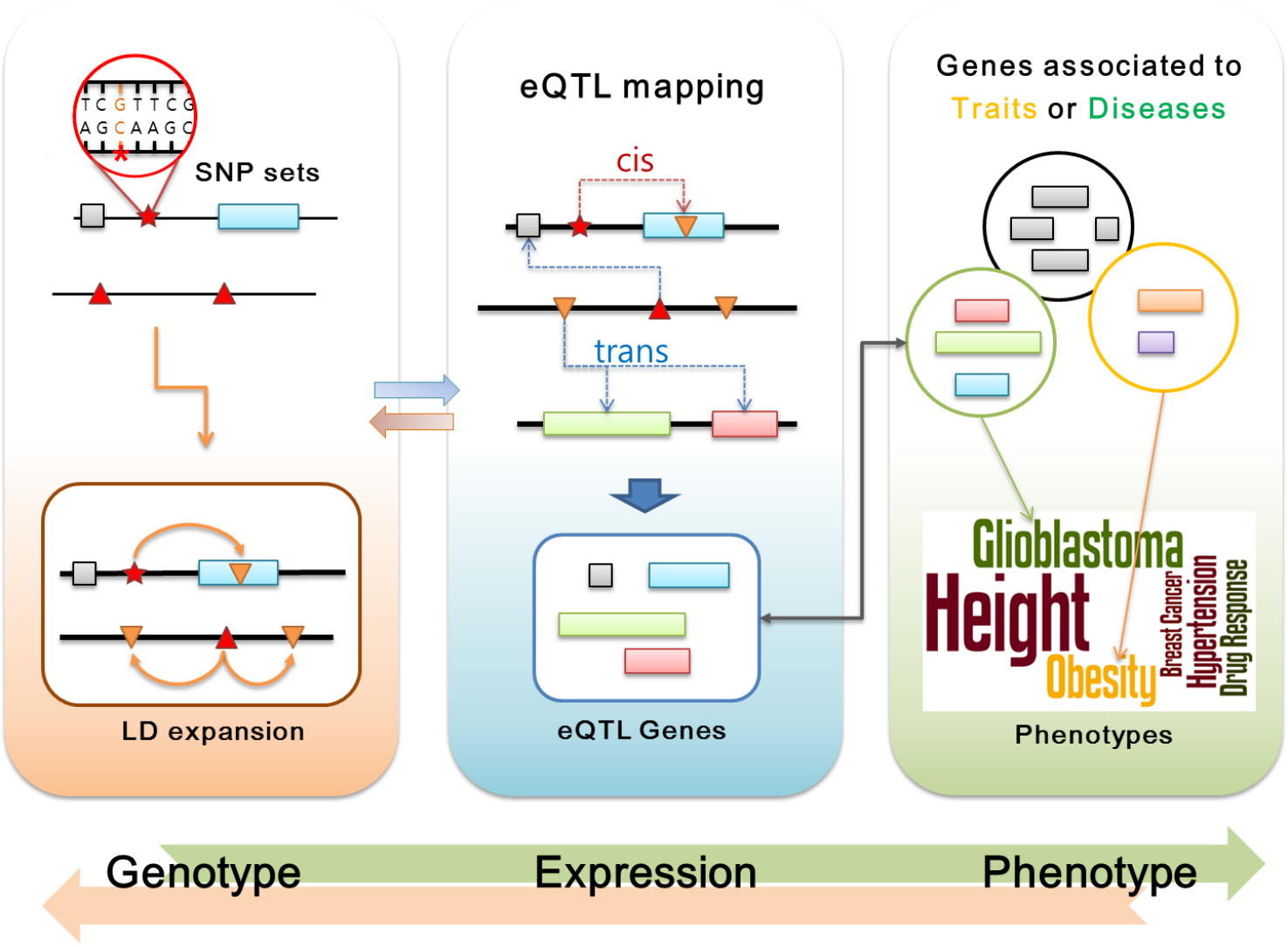




Synteny between species



Integrated approaches: genetical genomics



System genetics approach to understand PepMV in tomato

- Endemic in commercial tomato growing
- Current (non-desirable) control methods result in yield loss of ~5%

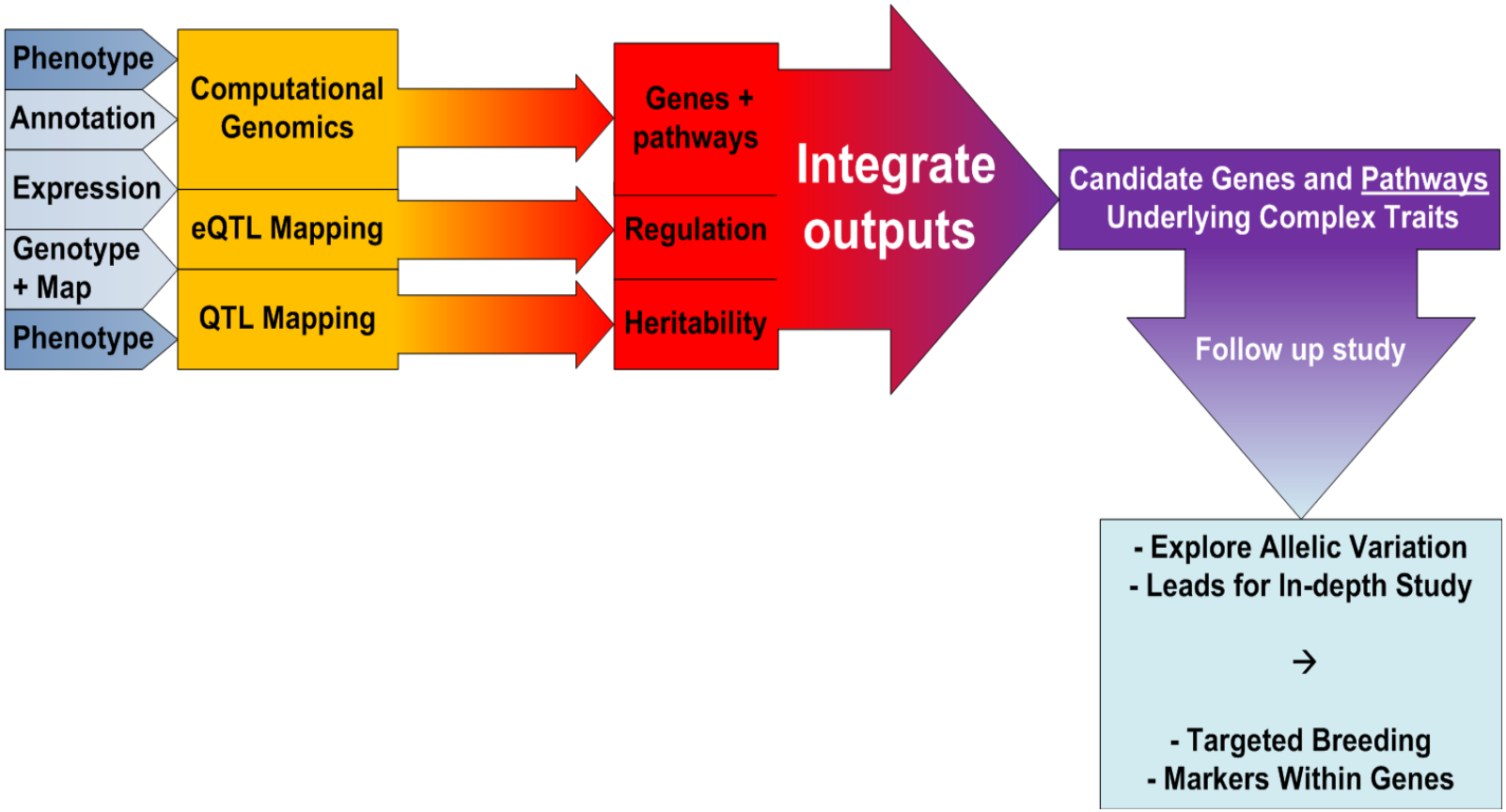
- Complex trait
  - Limited knowledge on the genetics
  - Little is known about the host-resistance mechanism

Pepino mosaic virus integrative approach

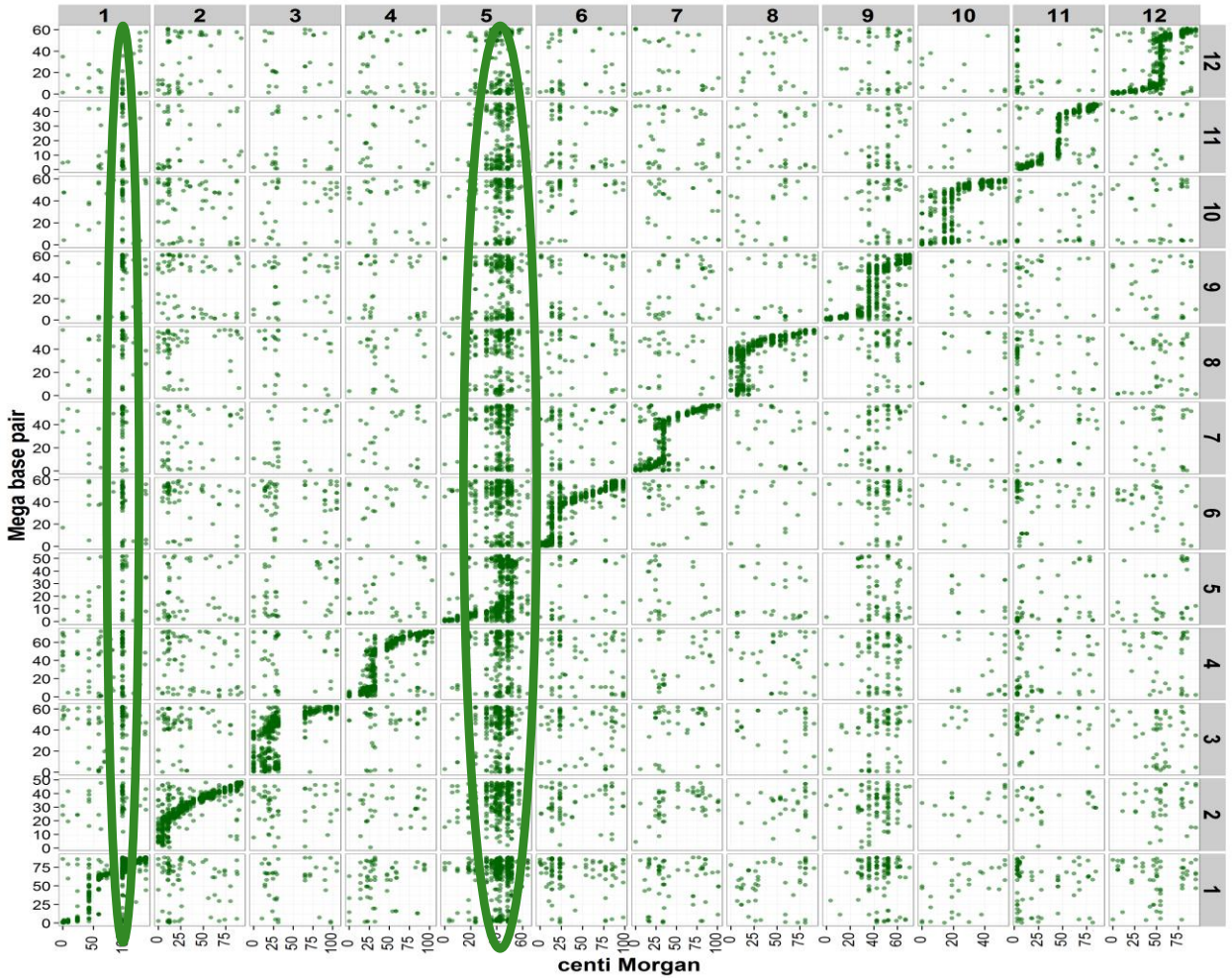
- “Classical” mapping population available
- Phenotype infected plants
- Transcriptome analysis
- Co-expression and network analysis
- Candidate gene exploration making use of tomato genome sequence

- Studying an organism as a system by putting all layers of evidence together

Systems genetics



Similar approach in potato



Integrating disciplines, data and analysis methods

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- Strengthens the power of your analysis
- Could result in faster identification of causal genes

If not convinced yet…

- *-omics* provides you with an objective and quantitative measurement

Remco Ursem

Dennis van Muijen

Acknowledgements

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