Food-Biomarker Ontology (FOBI)

An ontology to represent food intake data and associate it with metabolomic data

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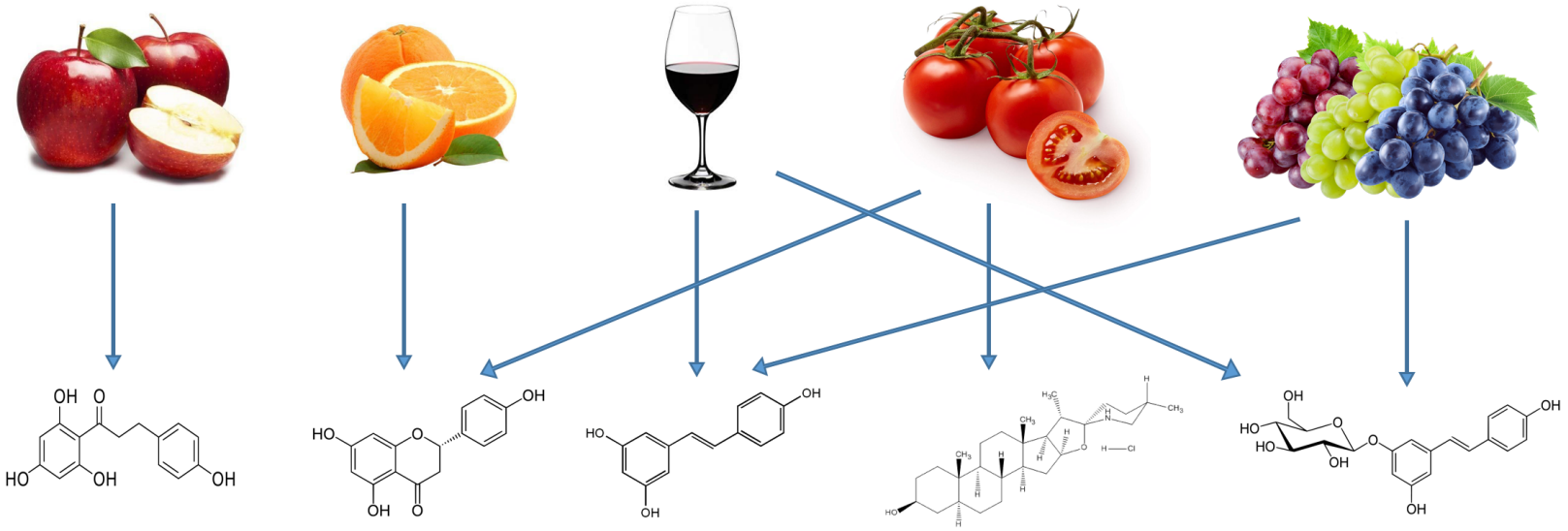
Context

- Heterogeneus nutritional data (semantic problem) -> **FoodOn**
- Difficult association of nutritional data with other types of data (semantic and quantitative problem)
- **Unclear relationships between foods and metabolites**



Aims

- Create an ontology that clearly defines the many complex relationships between **diet derived metabolites** and **foods** in a consistent and homogeneous way

- Reuse previous existing terms to maintain a consistent and standardized nomenclature (OBOFoundry)
  - FoodOn
  - ChEBI

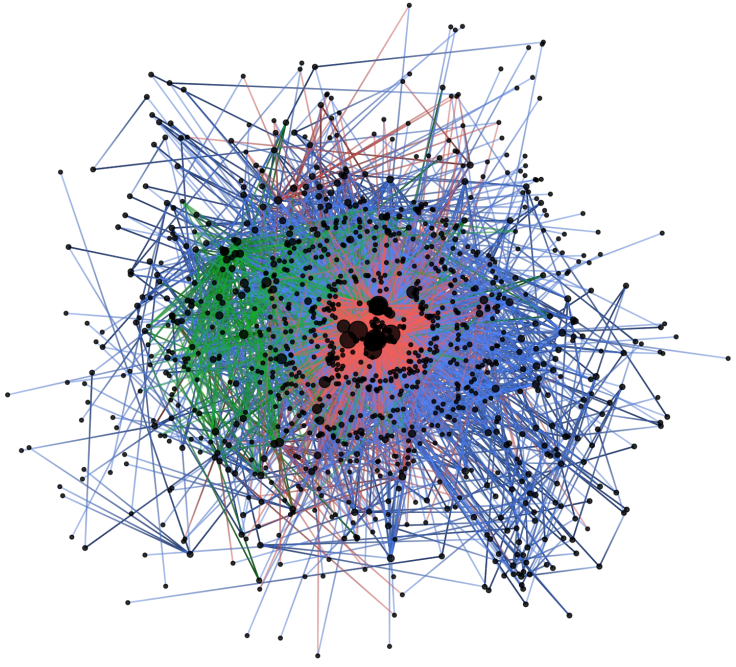
- Propose a consistent starting point for nutrimetabolomic studies
  - Design
  - Validation

FOBI (Food-Biomarker Ontology)

https://github.com/pcastellanoescuder/FoodBiomarkerOntology

Metrics

- 2 sub-ontologies
- 1197 terms
- 4 different properties
- 13 food top-level classes
- 11 biomarker top-level classes
- More than 4700 relationships
- Part of **OBOFoundry project** http://purl.obolibrary.org/obo/fobi.owl
- FOBI IDs are indexed into the HMDB (Human Metabolome Database) and FooDB (Food Database)



Sub-Ontologies

Food sub-ontology

- 13 food top-level classes (according to the related importance with metabolites)
- Most part of the structure adopted from FooDB
- Around 350 terms (306 adopted from FOODON) -> ~ 87%

Biomarker sub-ontology

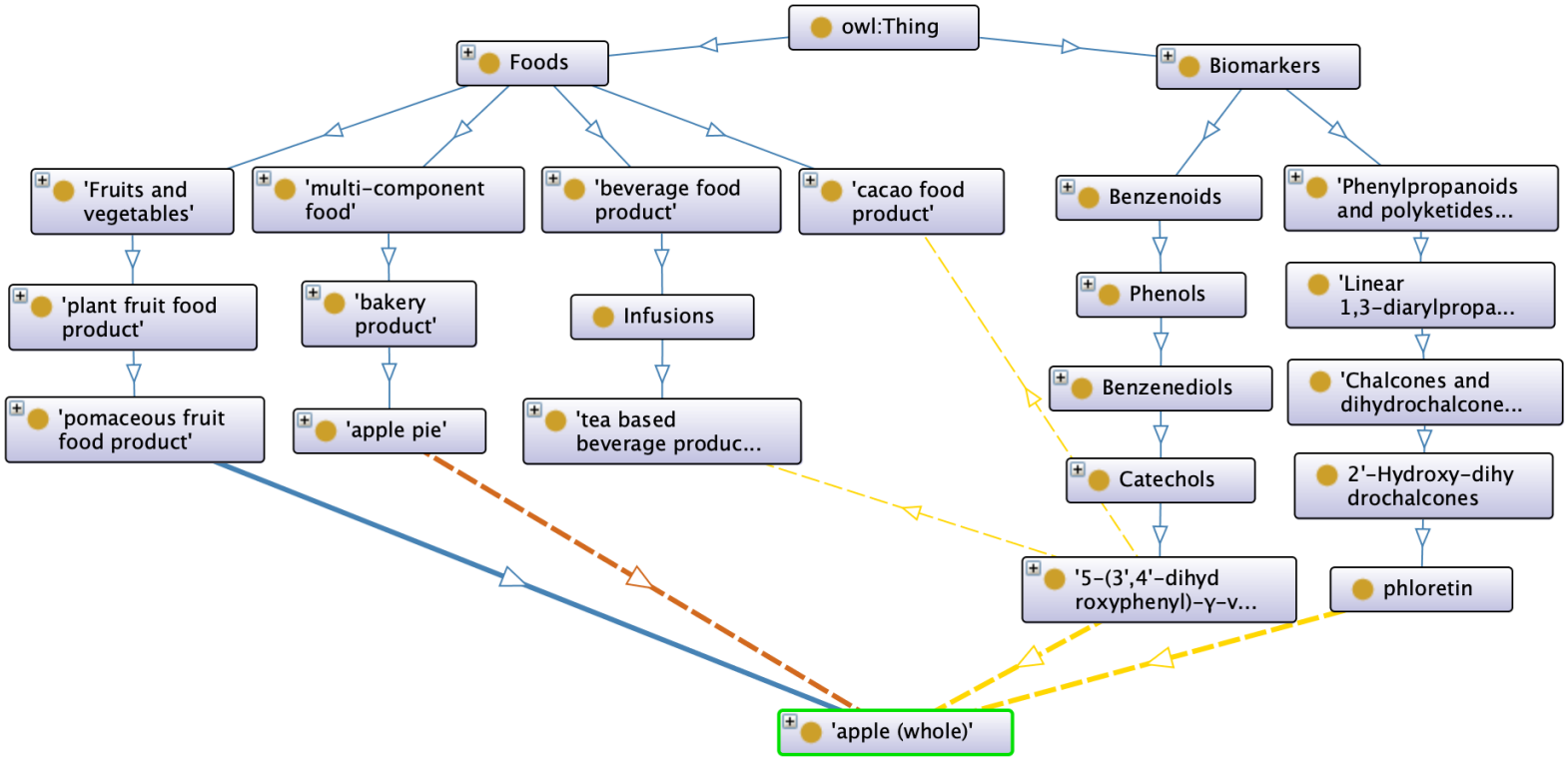
- 11 biomarker top-level classes
- Structure adopted from ChemFOnt (chemical functional ontology)
- Around 850 terms (159 adopted from CHEBI) -> ~ 19%

Properties

- *BiomarkerOf* and *HasBiomarker* (between Food and Biomarker sub-ontologies)
- *Contains* and *IsIngredientOf* (within Food sub-ontology, to relate raw and multi-component foods)

FOBI Architecture

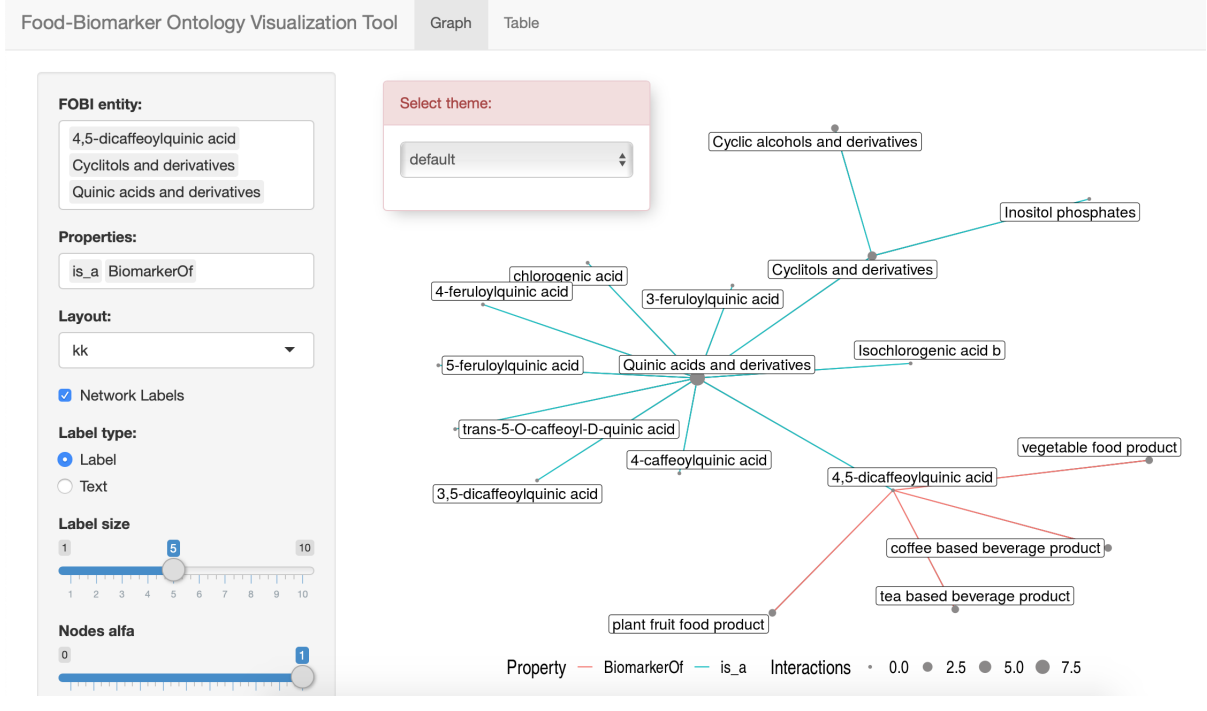
FOODON:00002473 -> "apple (whole)"



Applications

1) **fobitools** (beta version): R package that provides some FOBI applications like ORA or automatic nutritional text annotation. https://github.com/pcastellanoescuder/fobitools

2) **FOBI Visualization Tool**: https://polcastellano.shinyapps.io/FOBI_Visualization_Tool



Thank you all!