

# CARO

## Common Anatomy Reference Ontology

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March 29, 2007

Many species specific anatomy ontologies — developed independently:

- ▶ Different top-level types
- ▶ Different definitions of types
- ▶ Different relations are used
- ▶ Different approaches to represent development

Terms like *GO:neural tube closure* contain only implicit reference to an anatomical entity

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- ▶ Standardization of the annotation of morphological phenotypes
- ▶ Species-independent ontology for qualities (PATO)
- ▶ Way to link anatomical types across species (CARO)

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- ▶ Canonical anatomy
- ▶ Species independent
- ▶ Structural definitions of the types
- ▶ List of relations + definitions
- ▶ Guidelines how to represent development

# CARO within the OBO Foundry

RELOCATION TO TIME  GRANULARITY	CONTINUANT			OCCURRENT	
	INDEPENDENT		DEPENDENT		
ORGAN AND ORGANISM	Organism (NCBI Taxonomy)	<b>Anatomical Entity (CARO)</b>	Organ Function (FMP)	Phenotypic Quality (PaTO)	Biological Process (GO)
CELL AND CELLULAR COMPONENT	Cell (CL)	Cellular Component (GO)	Cellular Function (GO)		
MOLECULE	Molecule (ChEBI, SO, RnaO, PrO)		Molecular Function (GO)		Molecular Process (GO)

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- ▶ Economical advantage: definitions can be reused in different ontologies
- ▶ CARO can be used as a template for new anatomy ontologies
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  - ▶ Use FMA as a template
  - ▶ Purely structural view
  - ▶ Stick to single inheritance
  - ▶ Find a solution for development
- ▶ Paper by Melissa Haendel, Fabian Neuhaus, David Osumi-Sutherland, Paula Mabee, Onard Mejino, Chris Mungall, and Barry Smith
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x is a wing pouch if and only if:

1. x is a portion of columnar epithelium such that some cells that are part of x are ancestors of some cells that are part of some instance of the type wing; and
2. for all y, z: if y is a cell that is part of x and y is the ancestor of the cell z, then there is some type C and some instance c such that c is an instance of C, z is part of c and (either C is identical with the type wing or wing develops\_from C).

Stage S1	Stage S2	Stage S3	Stage S4	Stage S5	Stage S6
e1	e2	e3	e4	e5	e6







