IMGT-Kaleidoscope, the Formal IMGT-ONTOLOGY paradigm

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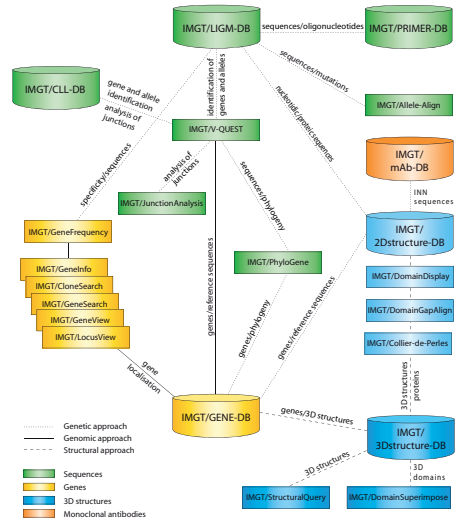
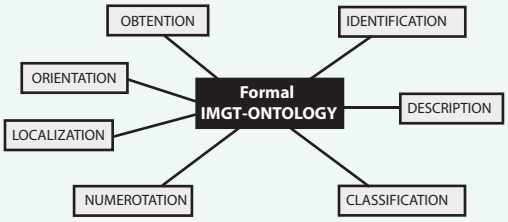


Lefranc, M.-P. et al., Nucl. Acids Res., 37, D1006-D1012 (2009). PMID: 18978023

IMGT-Kaleidoscope axioms

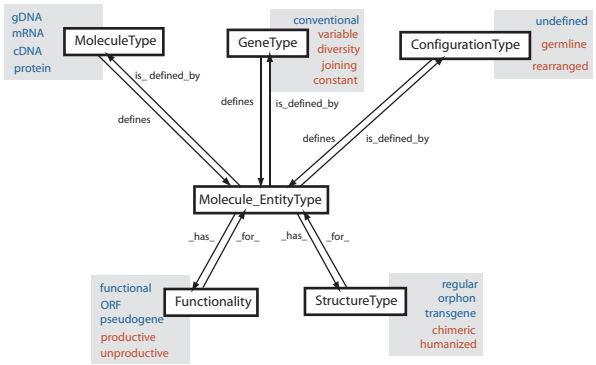
IMGT®, the international ImMunoGeneTics information system (http://imgt.cines.fr) is based on the IMGT-ONTOLOGY concepts. These concepts were generated through the seven axioms of the Formal IMGT-ONTOLOGY or IMGT-Kaleidoscope.



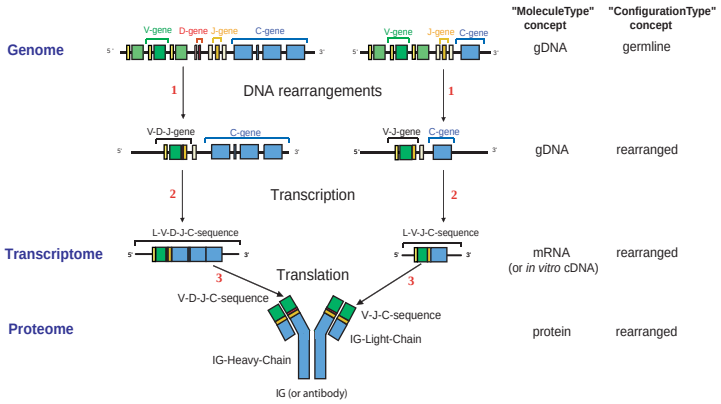
The Formal IMGT-ONTOLOGY or IMGT-Kaleidoscope comprises seven axioms, "IDENTIFICATION", "CLASSIFICATION", "DESCRIPTION", "LOCALIZATION", "NUMEROTATION", "ORIENTATION" and "OBTENTION". These axioms postulate that objects, processes and relations have to be identified, described, classified, numerotated, localized, orientated, and the way they are obtained, determined. The Formal IMGT-ONTOLOGY represents a paradigm for system biology ontologies, which need to identify, to describe, to classify and to numerotate objects, processes and relations at the molecule, cell, tissue, organ, organism or population levels.

Duroux, P. et al., Biochimie, 90, 570-583 (2008). PMID: 17949886

IDENTIFICATION



The "Molecule_EntityType" concept is a major concept of identification. It is defined by the "MoleculeType", "GeneType" and "ConfigurationType" concepts of identification and has relations with the "Functionality" and "StructureType" concepts.

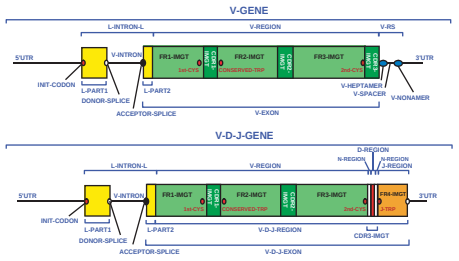


Ten "Molecule_EntityType" concepts are necessary to identify knowledge, at the molecular level, for the synthesis of an immunoglobulin or antibody in humans: V-gene, D-gene, J-gene, C-gene, V-D-J-gene, V-J-gene, L-V-D-J-C-sequence, L-V-J-C-sequence, V-D-J-C-sequence and V-J-C-sequence.

DESCRIPTION

Sequences

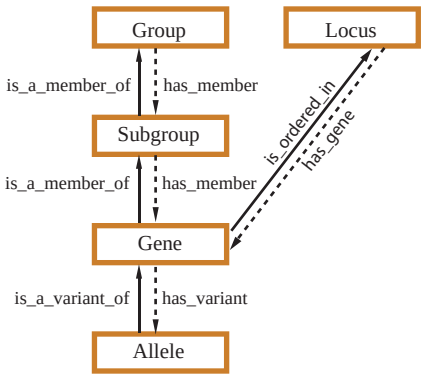
Relation	*Reciprocal relation*
"adjacent_at_its_5_prime_to"	"adjacent_at_its_3_prime_to"
"included_with_same_5_prime_in",	"includes_with_same_5_prime",
"included_with_same_3_prime_in",	"includes_with_same_3_prime",
"overlaps_at_its_5_prime_with"	"overlaps_at_its_3_prime_with"
"included_in"	"includes"



Graphical representation of two instances of the "Molecule_EntityPrototype" concept. Twenty-five motifs and ten relations are necessary and sufficient for a complete description of these instances.

CLASSIFICATION

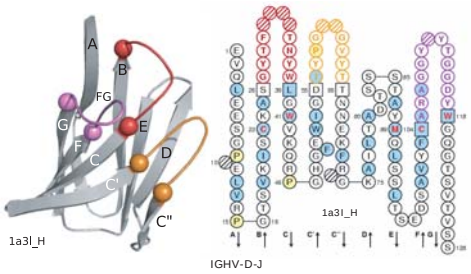
Genes



Concepts of classification allowed to define a standardized nomenclature. Hierarchy of the concepts of classification and their relations.

NUMEROTATION

3D structures



The "IMGT_unique_numbering" concept is illustrated by the "IMGT_Collier_de_Perles" concept which allows graphical representation in two dimensions (2D) of the amino acid sequences of V, C or G type domains and comprises three concept instances.

Lefranc, M.-P.et al., Dev. Comp. Immunol., 27, 55-77 (2003). PMID: 12477501
Lefranc, M.-P. et al., Dev. Comp. Immunol., 29, 185-203 (2005). PMID: 15572068

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