

Immunotechnologies

Enseignements d'Immuno-informatique-
IMGT®, the international ImMunoGeneTics information system®

Séance : Mardi 2 octobre

Souphatta SASORITH

I. Origines de la diversité des domaines variables des IG :

- diversité combinatoire
- réarrangement des gènes V(D)J
- diversité de la jonction (séquences N entre D et J et entre V et D-J)
- mutations somatiques

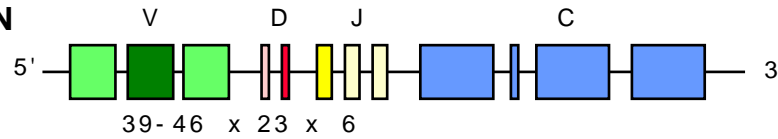
II. IMGT Collier de Perles

III. Propriétés physicochimiques des acides aminés

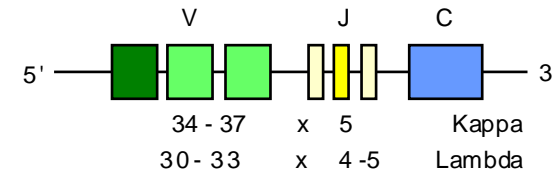
Immunoglobulin (IG) synthesis

150 FUNCTIONAL IG GENES

HEAVY CHAIN



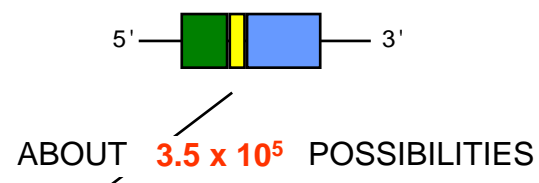
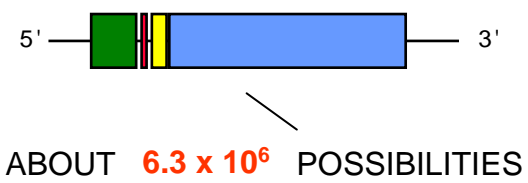
LIGHT CHAIN



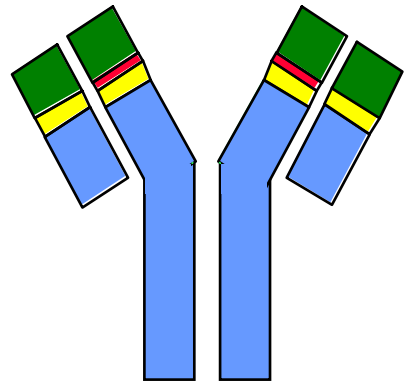
6300 POTENTIAL RECOMBINATIONS

185 + 165 POTENTIAL RECOMBINATIONS

N-DIVERSITY
SOMATIC MUTATIONS
x 1000



2×10^{12}
DIFFERENT ANTIBODIES



IMGT/V-QUEST

IMGT/V-QUEST

Alignment for V-GENE

AF402940		score	GTGCAGCTGCTCGAGCAGTCTGGGGCT__GAGGTGAGCAAGCCTGGGGCCTCAGTAAAGGTTTCCTGCA
X62109	IGHV1-3*01	1146	CA.GTC.A...T.T.....AG.....G.....
X62107	IGHV1-3*02	1110	CA.GTT.A...G.T.....AG.....G.....
M99637	IGHV1-8*01	957	CA.GT..A...G.T.....AG.....G...C.....
L06612	IGHV1-46*03	948	CA.GT..A...G.T.....AG.....G.....
X92343	IGHV1-46*01	948	CA.GT..A...G.T.....AG.....G.....

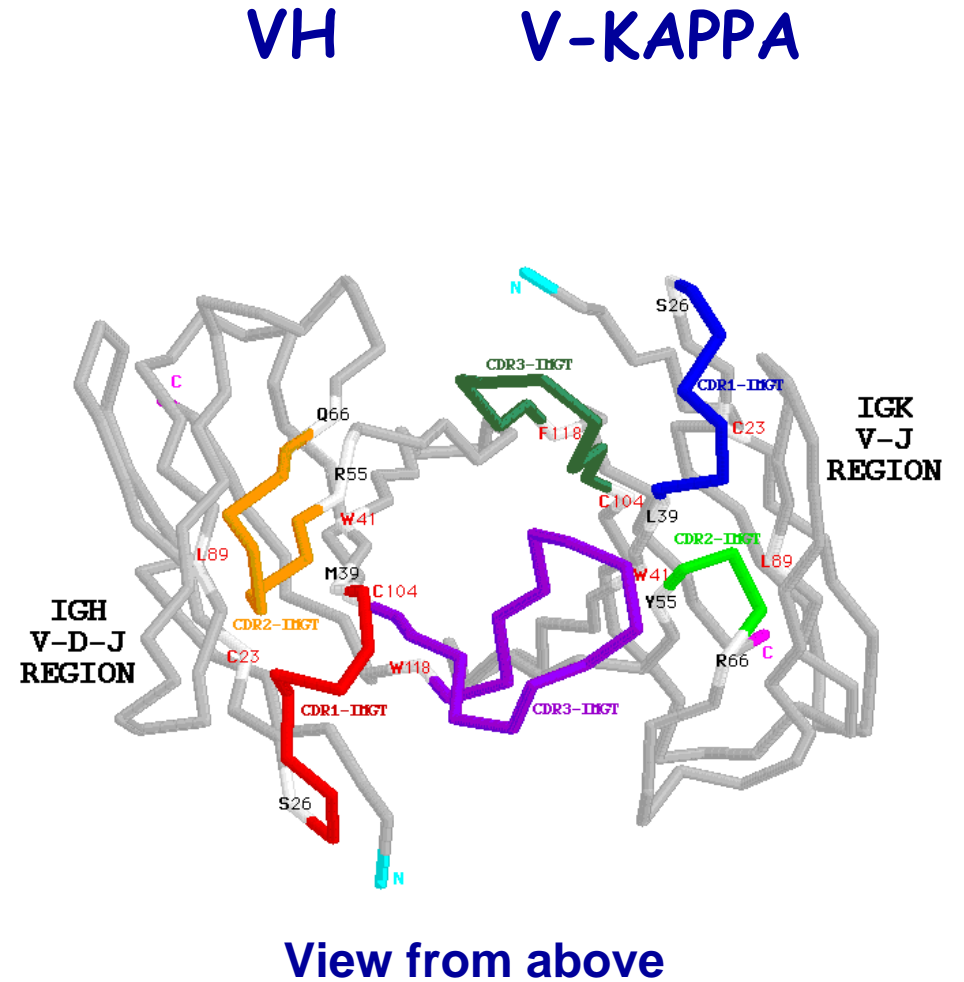
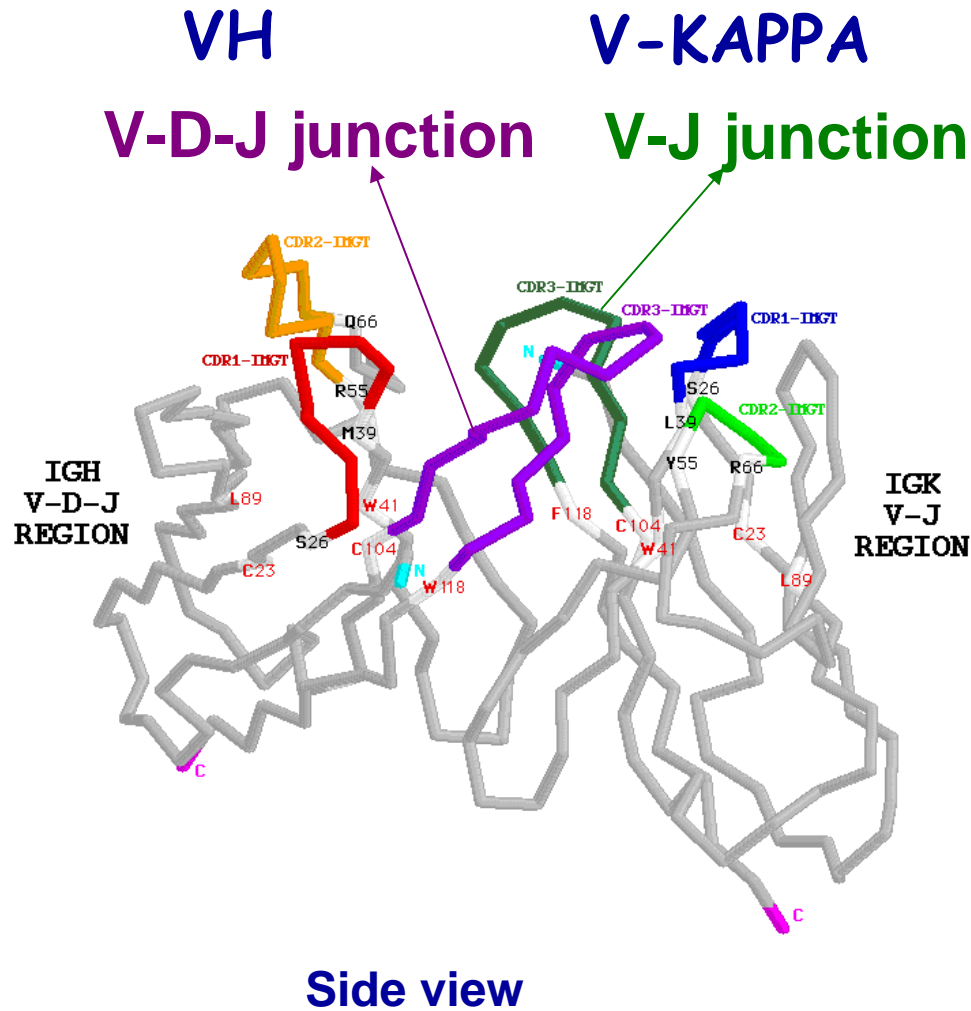
Alignment for J-GENE

AF402940		score	CTTCACGGGGCGGGACGCTTTGGACGTCTGGGGCCAAGGGACCACGGTCACCGTCTCCTCA
J00256	IGHJ3*01	181	.....T.....T..T.....A.T.....T...G
X86355	IGHJ6*02	179	T.A.TACTACTACT...G.A.....
X86355	IGHJ3*02	172	.....T.....T..TA.....A.T.....T...G



IMGT/JunctionAnalysis

Junctions of the V-DOMAINS



Mouse (Mus musculus) E5.2Fv

CDR3-IMGT= Complementarity determining region (105-117)

V-J junction (104-118)

V-D-J junction (104-118)

Generation of the JUNCTION diversity



JUNCTION

C A P Y R G D T Y D Y S W
tgt gcg cca tac cgg ggt gac act tat gat tac tcc tgg

THANK YOU for using [IMGT/JunctionAnalysis](#)

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<http://imgt.cines.fr>

Analysis of the JUNCTIONS

Input	V name	V-REGION	N1	D-REGION	N2
#1 M62724	IGHV7-4-1*02	tgttccgagaga	aga	.tagcaatggctacaa....	aata
#2 Z47269	IGHV1-69*06	tgtgcgagag.	gggggggctaagg	....tcgaatttttggagtggtt.....	tcatgggt

Input	J-REGION	J name	D name	Vmut	Dmut	Jmut	Ngc
#1 M62724	.....tttaactactag	IGHJ4*02	IGHD5-24*01	0	2	0	1/7
#2 Z47269	...actggttcgaccctgg	IGHJ5*02	IGHD3-3*02	0	2	0	13/20

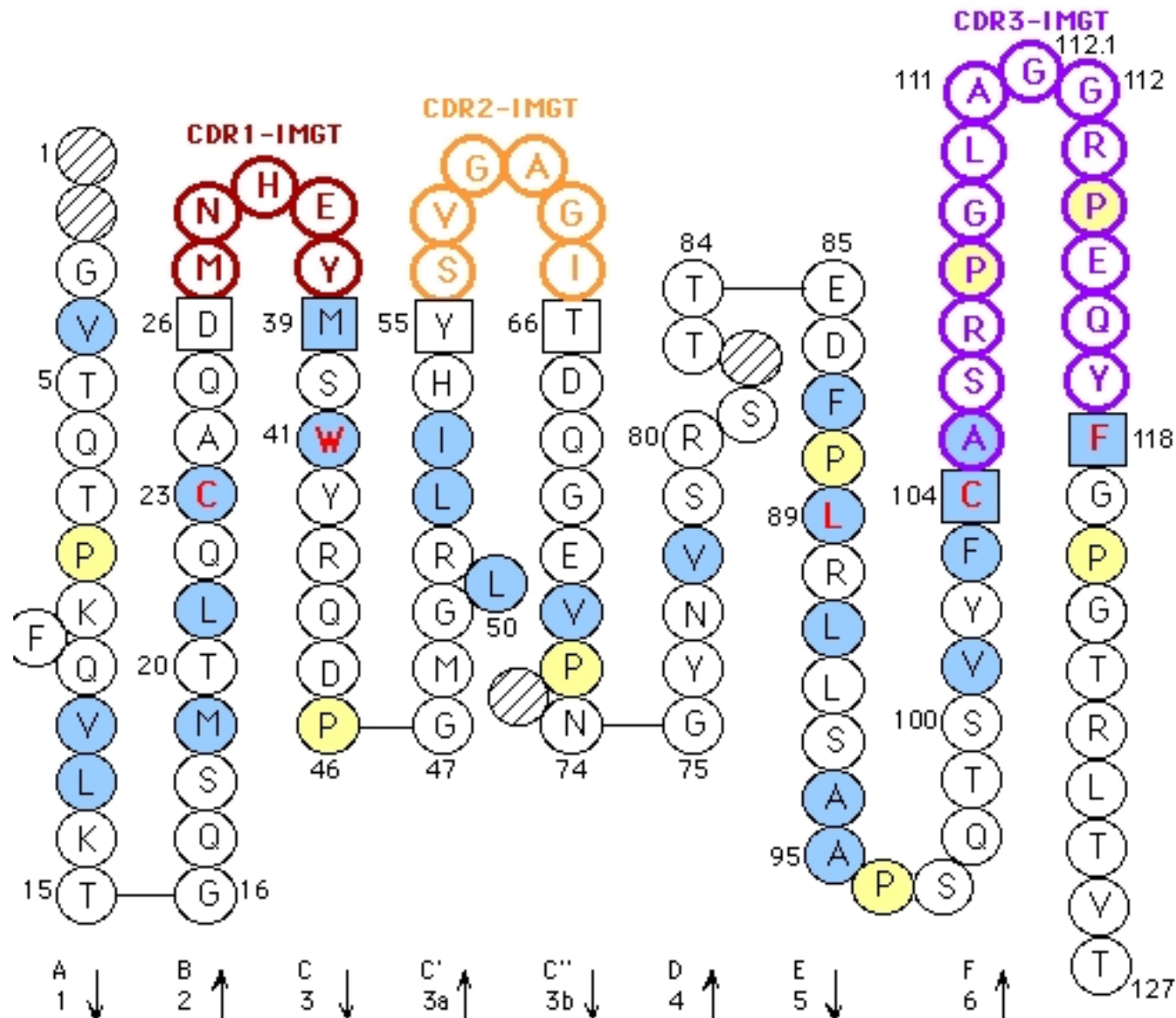
Translation of the JUNCTIONS

	104	105	106	107	108	109	110	111	111.1	111.2	111.3	112.4	112.2	112.1	112	113	114	115	116	117	118	frame	CDR3-IMGT length	
#1 M62724	C	A	R	E	D	S	N	G							Y	K	I	F	D	Y	W	+	13	
#2 Z47269	C	A	R	G	G	A	K	V	F	F	L	F	W	F	H	G	V	W	F	D	P	W	+	20

-> [IMGT/JunctionAnalysis Search page](#)
-> [IMGT/JunctionAnalysis Documentation](#)

Yousfi Monod et al. Bioinformatics, 20, 1379-1385 (2004)

IMGT Collier de Perles



The eleven IMG-T amino acid classes according to the physico-chemical properties

'Volume' classes		'Hydropathy' classes						
	in Å ³	Hydrophobic		Neutral		Hydrophilic		
Very large	189-228	F		W	Y			
Large	162-174	I	L	M		H	K R	
Medium	138-154	V					E Q	
Small	108-117			C	P		D N	
Very small	60-90	A			G			
		Aliphatic		Sulfur	Hydroxyl	Basic	Acidic	Amide
		Nonpolar			Uncharged	Charged	Uncharged	
					Polar			