

Enseignements d'Immuno-informatique-
IMGT®, the international ImMunoGeneTics information system®
Séance : lundi 4 novembre AM

Souphatta SASORITH

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

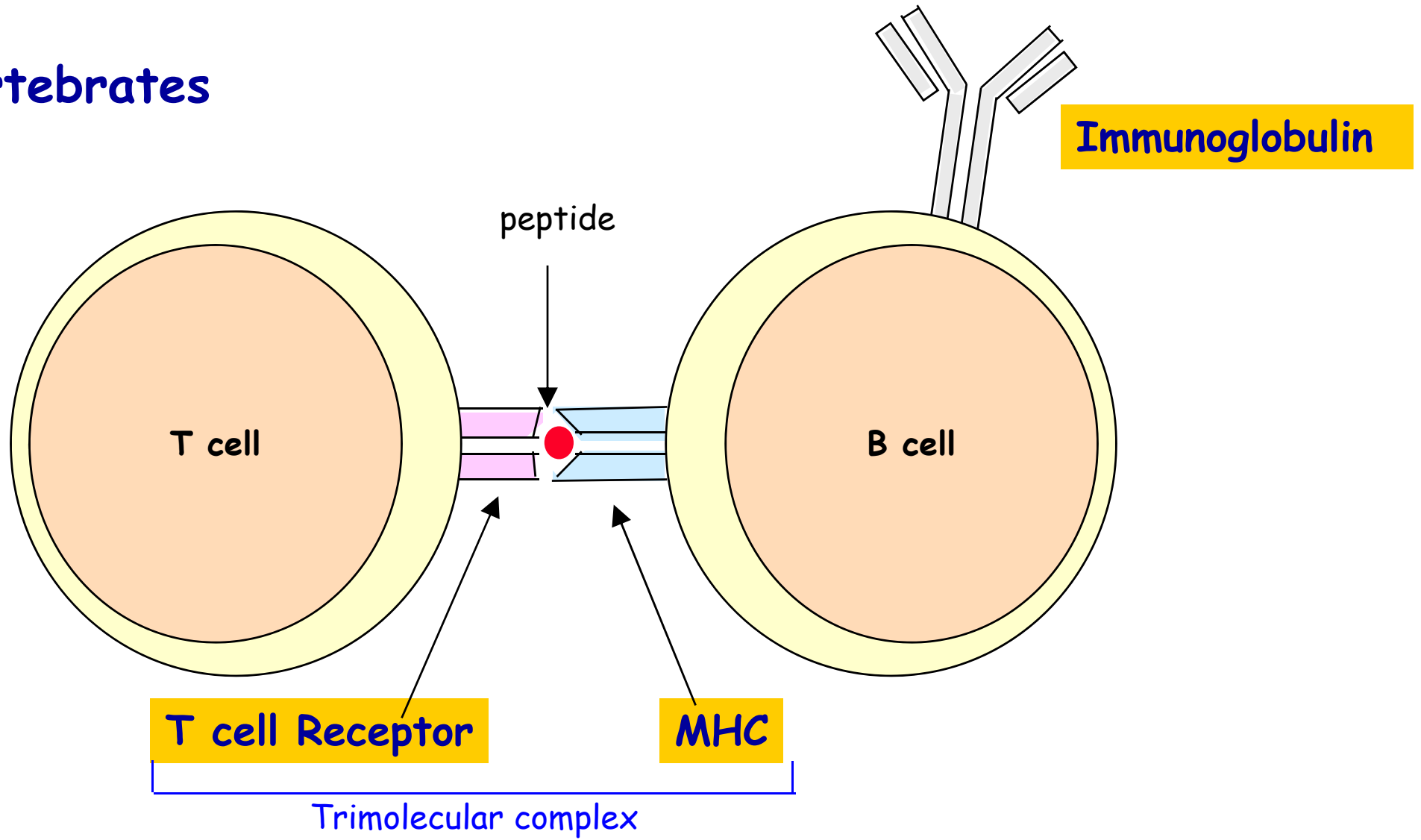
- diversité combinatoire
- réarrangement des gènes V(D)J
- diversité de la jonction (séquences N entre D et J et entre V et D-J)
- mutations somatiques

II. IMGT Collier de Perles

III. Propriétés physicochimiques des acides aminés

IMGT domain of research: the adaptive immune system

Vertebrates

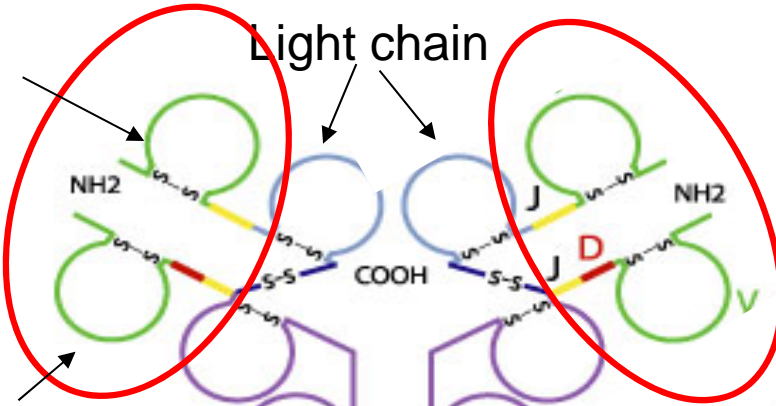


Immunoglobulin (IG)

T cell receptor (TR)

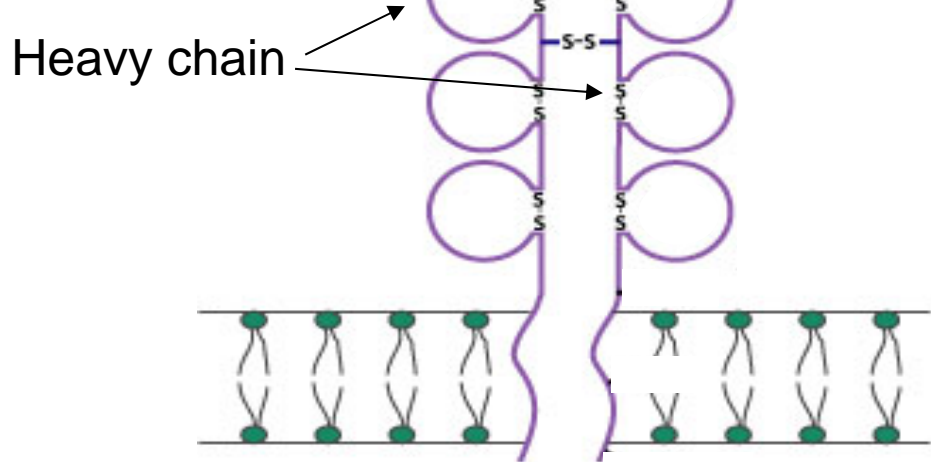
V-DOMAIN

V-J-REGION



V-DOMAIN

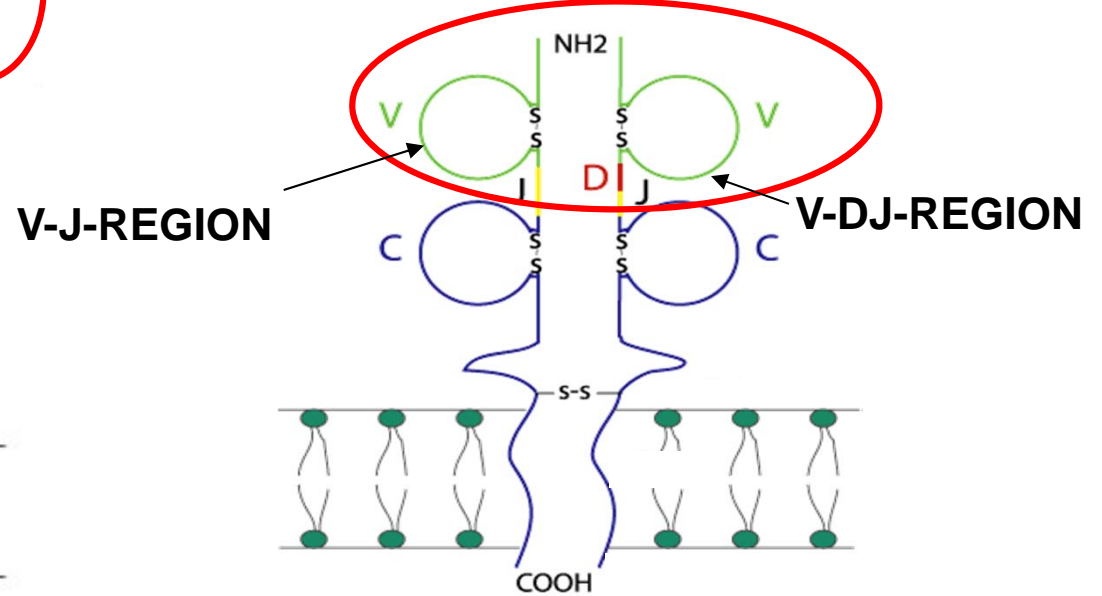
V-D-J-REGION



Membrane IgM

Contribution of the
2 V-DOMAINS
to the antigen binding site

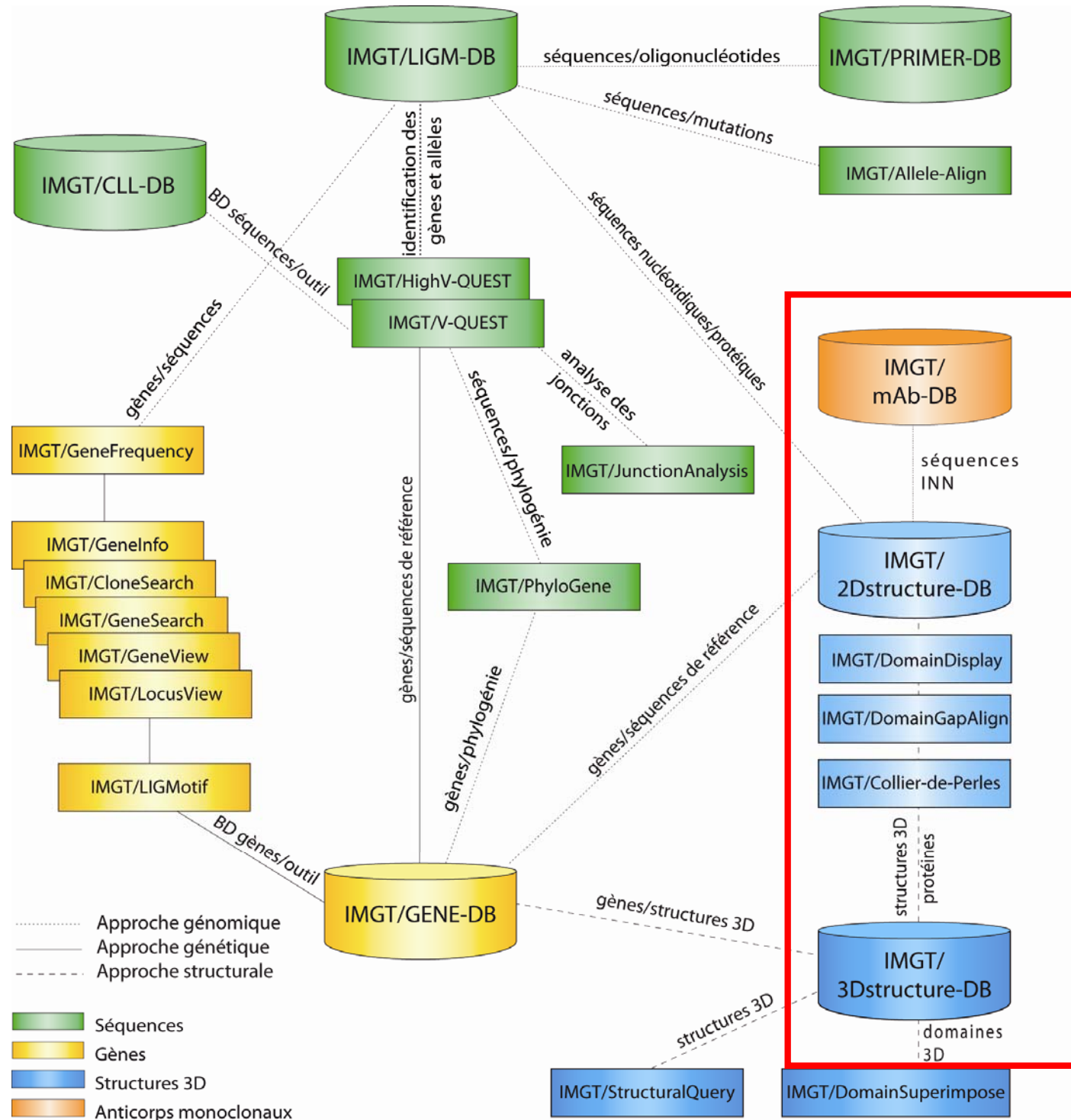
Alpha	-	Beta
Gamma	-	Delta



T cell receptor

IMG T databases and tools

IMGT®, the international ImMunoGeneTics information system®



7 bases de données

19 outils

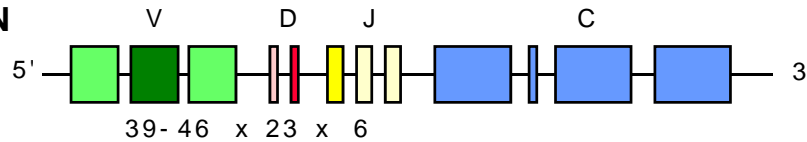
15 000 pages web

Origines de la diversité des domaines variables des immunoglobulines

Immunoglobulin (IG) synthesis

150 FUNCTIONAL IG GENES

HEAVY CHAIN

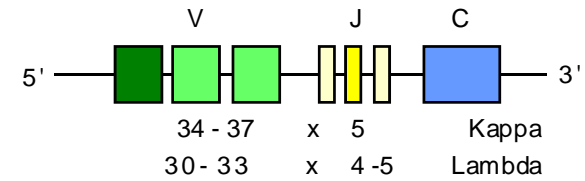


6300 POTENTIAL RECOMBINATIONS



ABOUT 6.3×10^6 POSSIBILITIES

N-DIVERSITY
SOMATIC MUTATIONS
 $\times 1000$

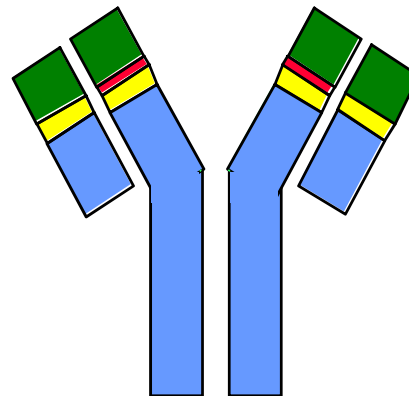


185 + 165 POTENTIAL RECOMBINATIONS



ABOUT 3.5×10^5 POSSIBILITIES

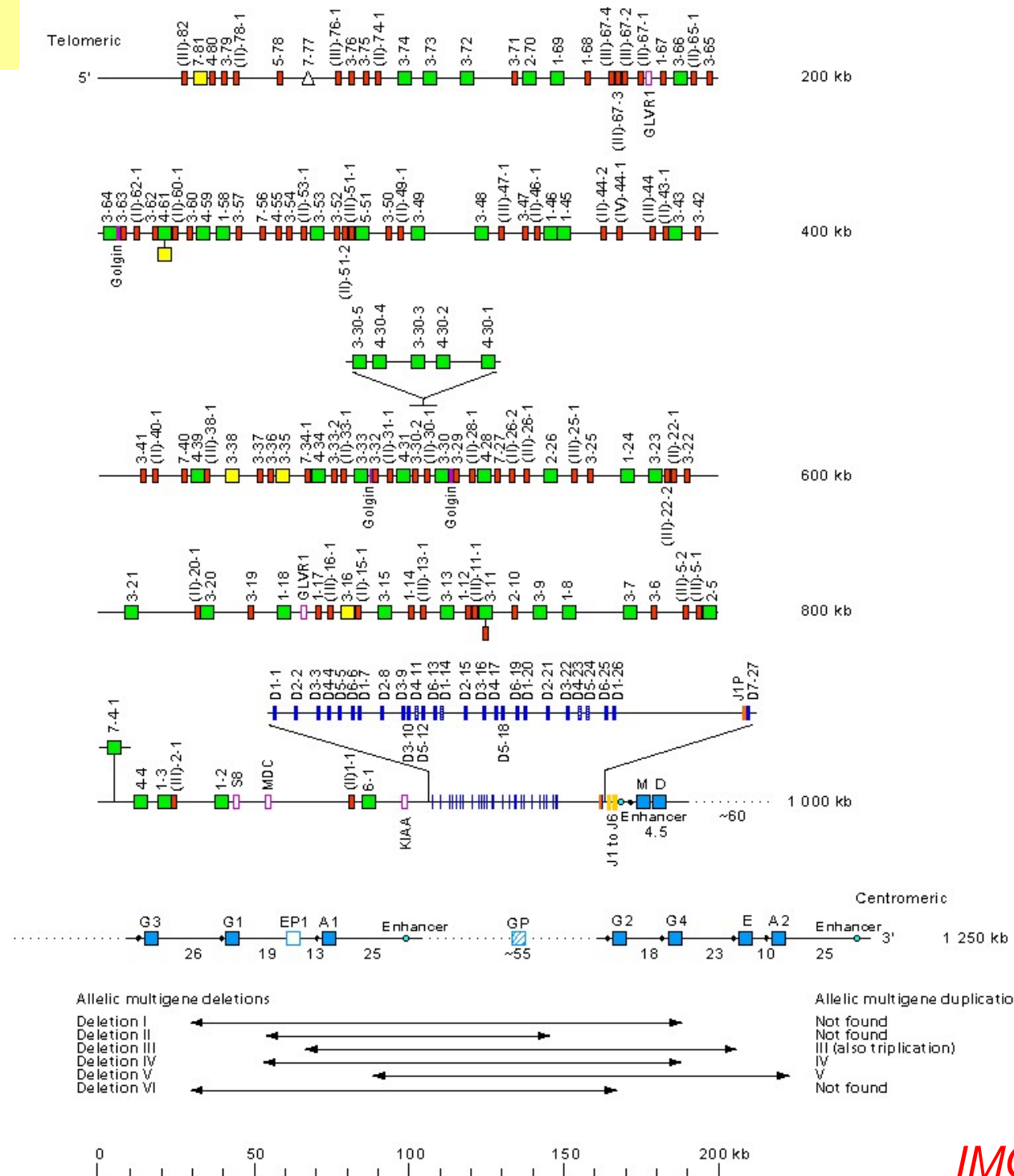
2×10^{12}
DIFFERENT ANTIBODIES



IMGT Repertoire

Human IGH locus

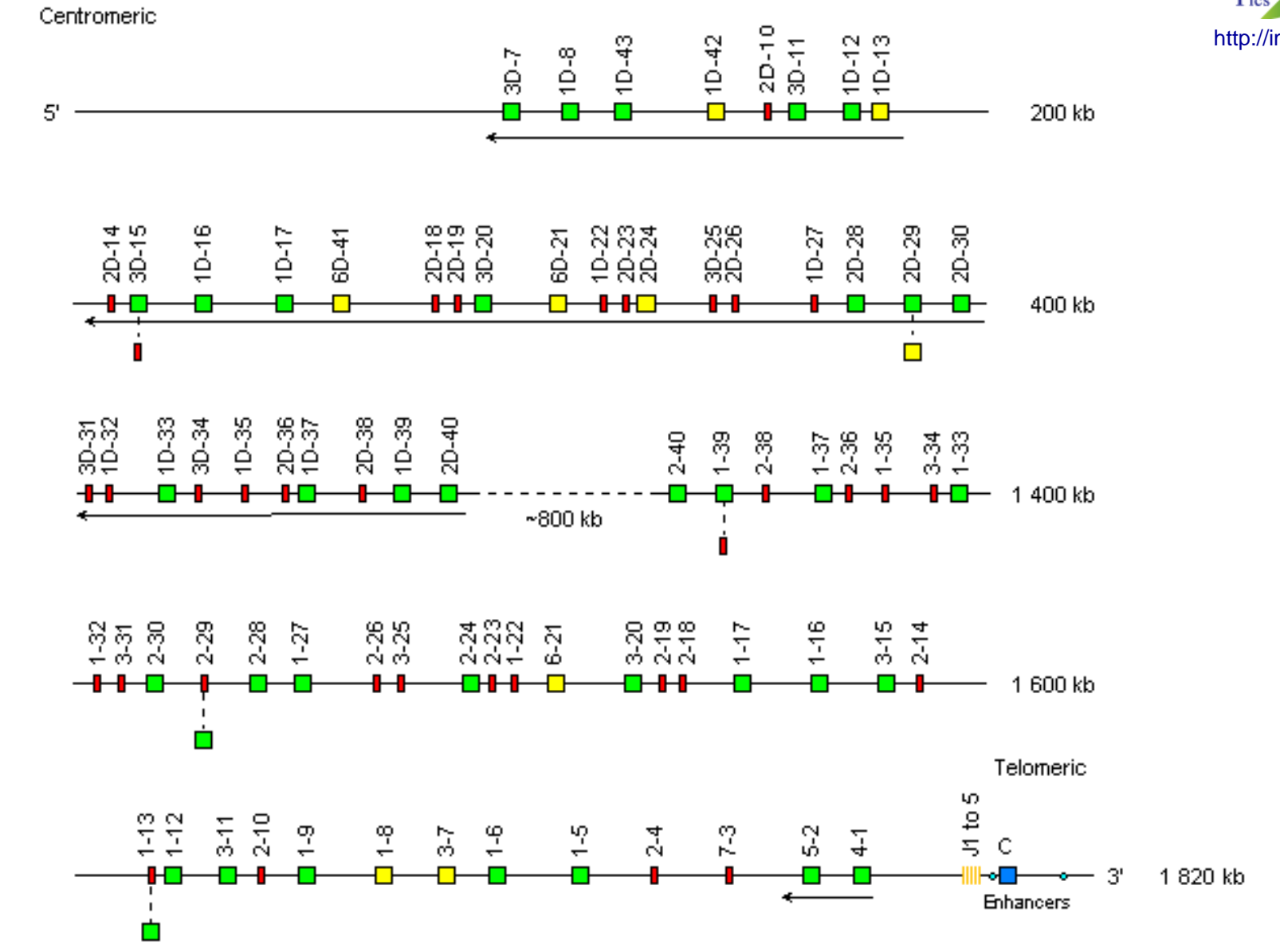
Chromosome
14q32.33



<http://imgt.cines.fr>

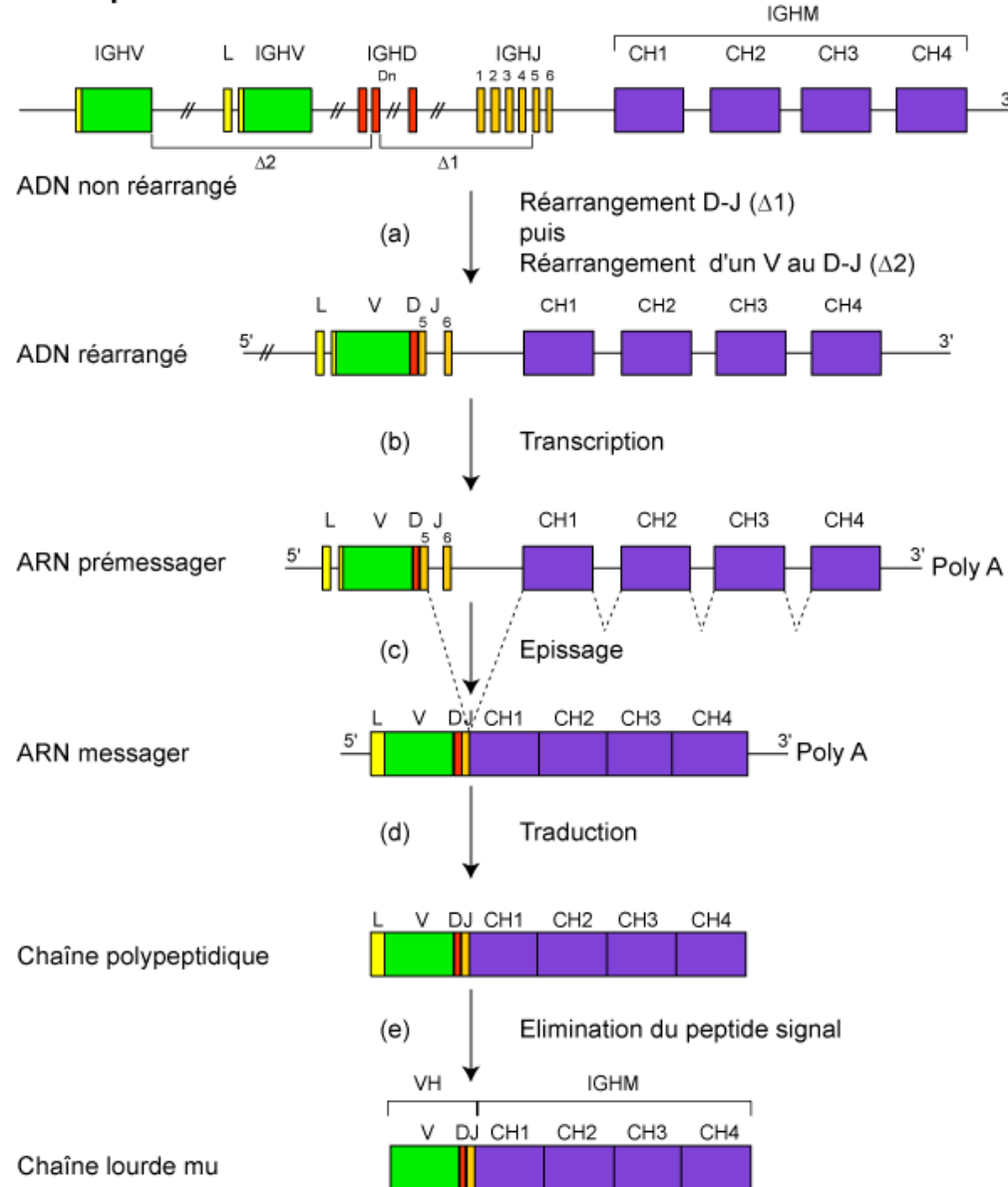
Human IGK locus

Chromosome 2p11.2

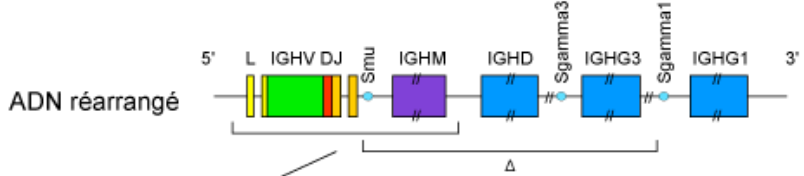


Synthèse d'une chaîne lourde mu d'immunoglobuline

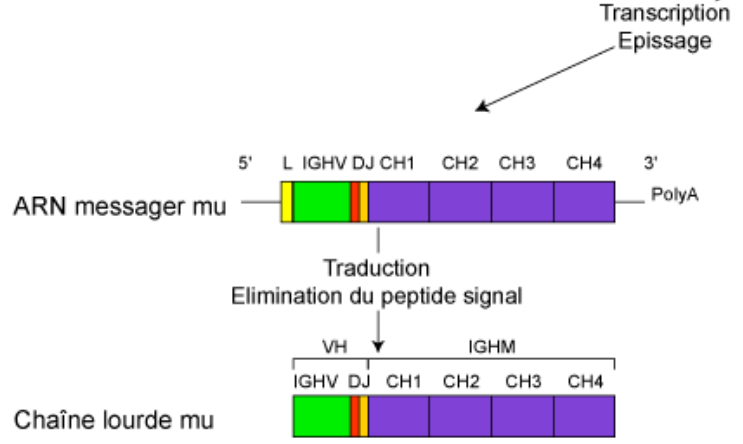
IGH 14q32.33



Commutation de classe IgM-IgG : recombinaison Smu-Sgamma

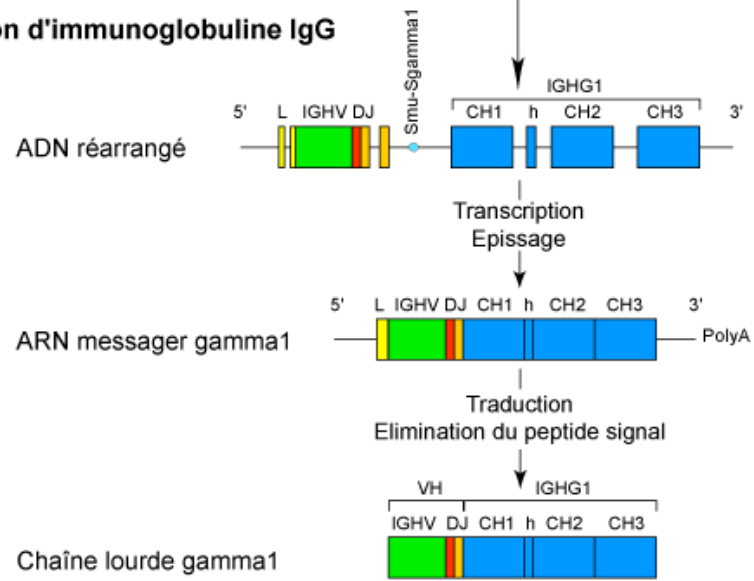


Production d'immunoglobuline IgM

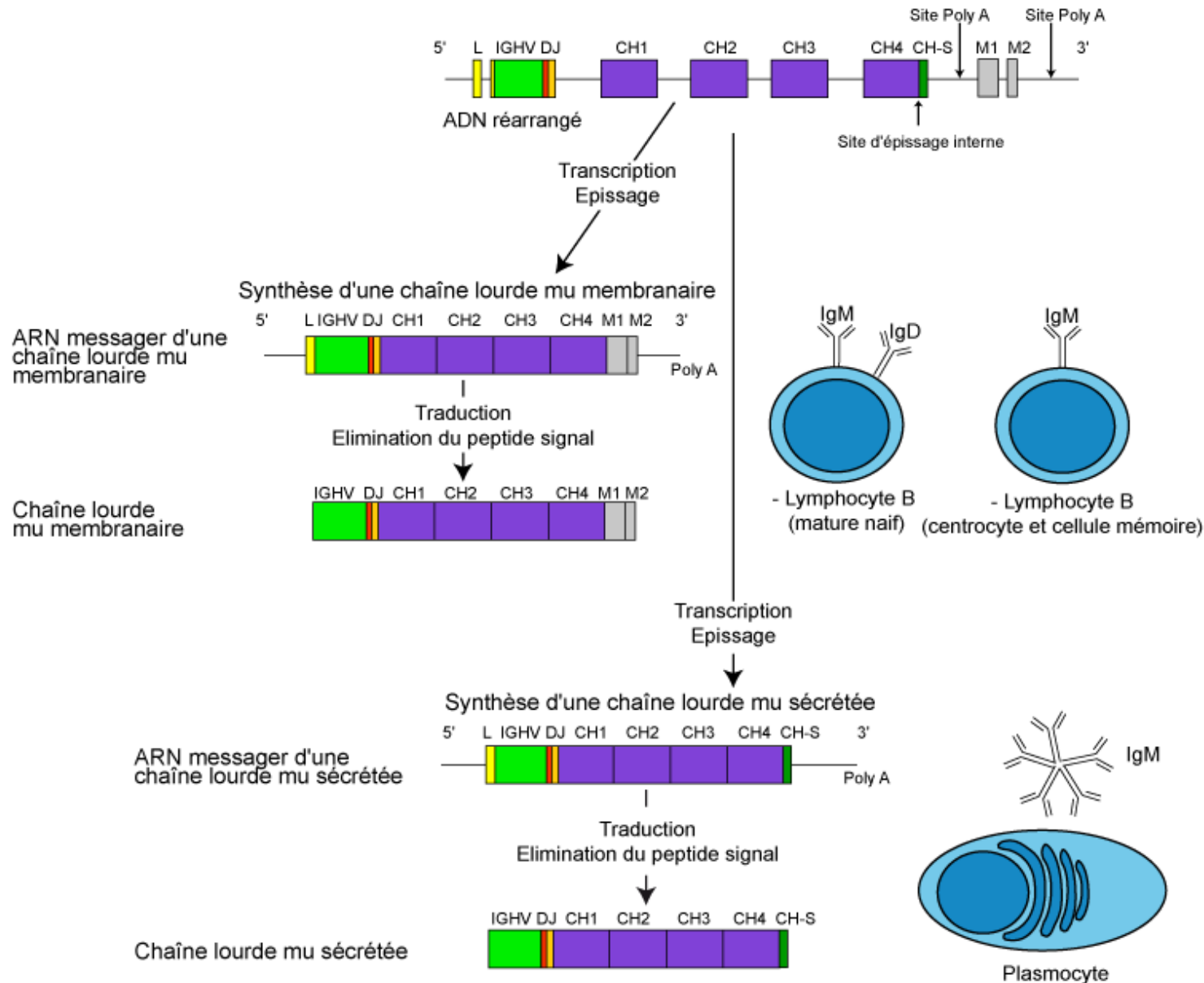


COMMUTATION DE CLASSE ou "SWITCH" Recombinaison Smu-Sgamma1

SWITCH ou commutation de classe: Production d'immunoglobuline IgG



Synthèse d'une chaîne lourde mu membranaire (lymphocyte B) et d'une chaîne lourde mu sécrétée (plasmocyte)



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



V-GENE

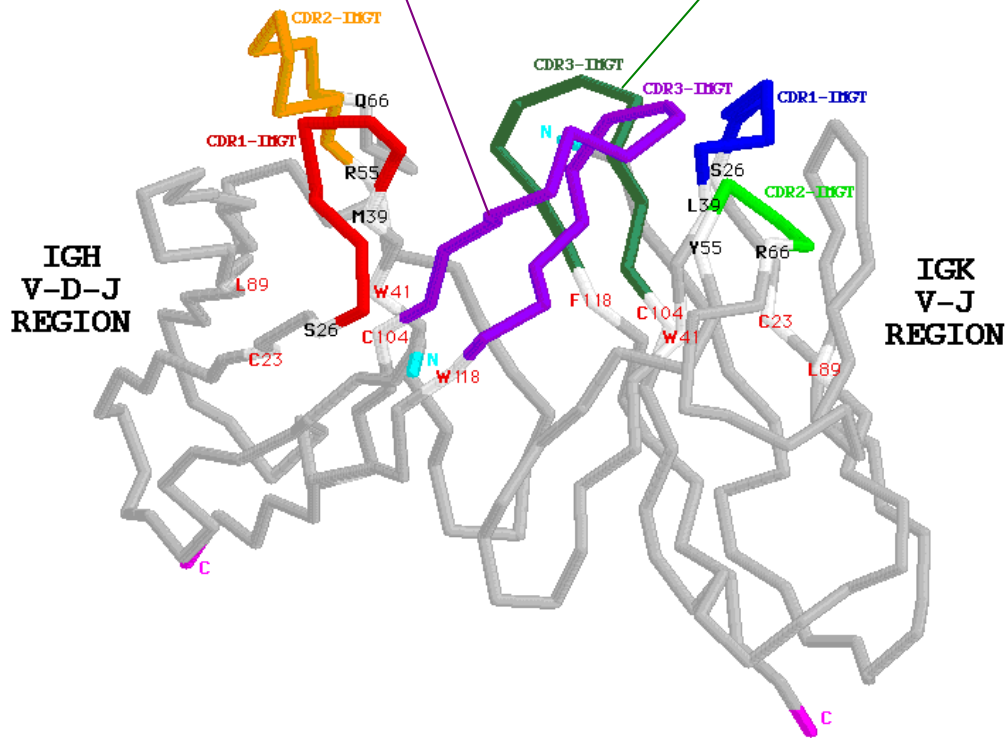
JUNCTION

J-GENE

IMGT/JunctionAnalysis

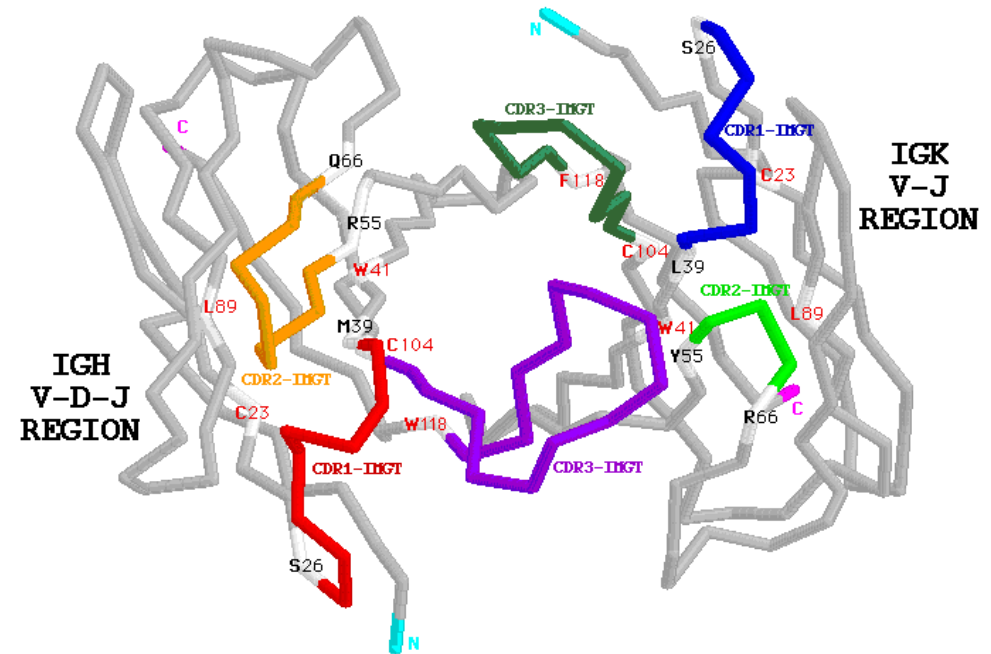
Junctions of the V-DOMAINS

VH V-KAPPA
V-D-J junction V-J junction



Side view

VH V-KAPPA



View from above

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

3'V-REGION

N-REGION

D-REGION

N-REGION

5'J-REGION

tgtgcgaaa ga



tacc



agcatattgtg

gtggtgactgctat

tcc



gat



acaactggttcg

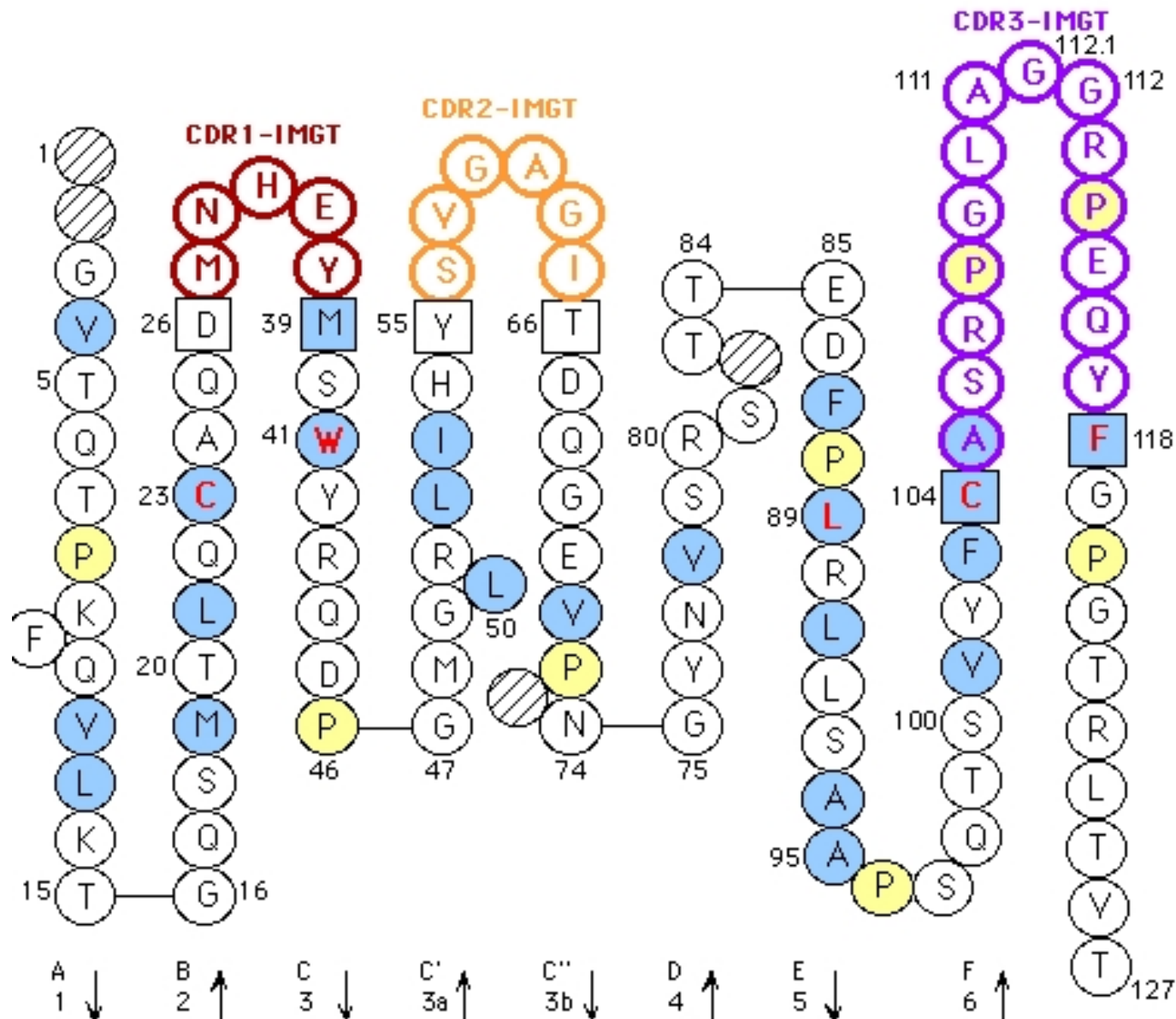
actcctgg

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

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		K	R	
Medium	138-154	V				H	E	
Small	108-117		C	P	T		D	
Very small	60-90	A		G	S		N	
		Aliphatic		Sulfur	Hydroxyl	Basic	Acidic	Amide
		Nonpolar			Uncharged	Charged	Uncharged	Polar