

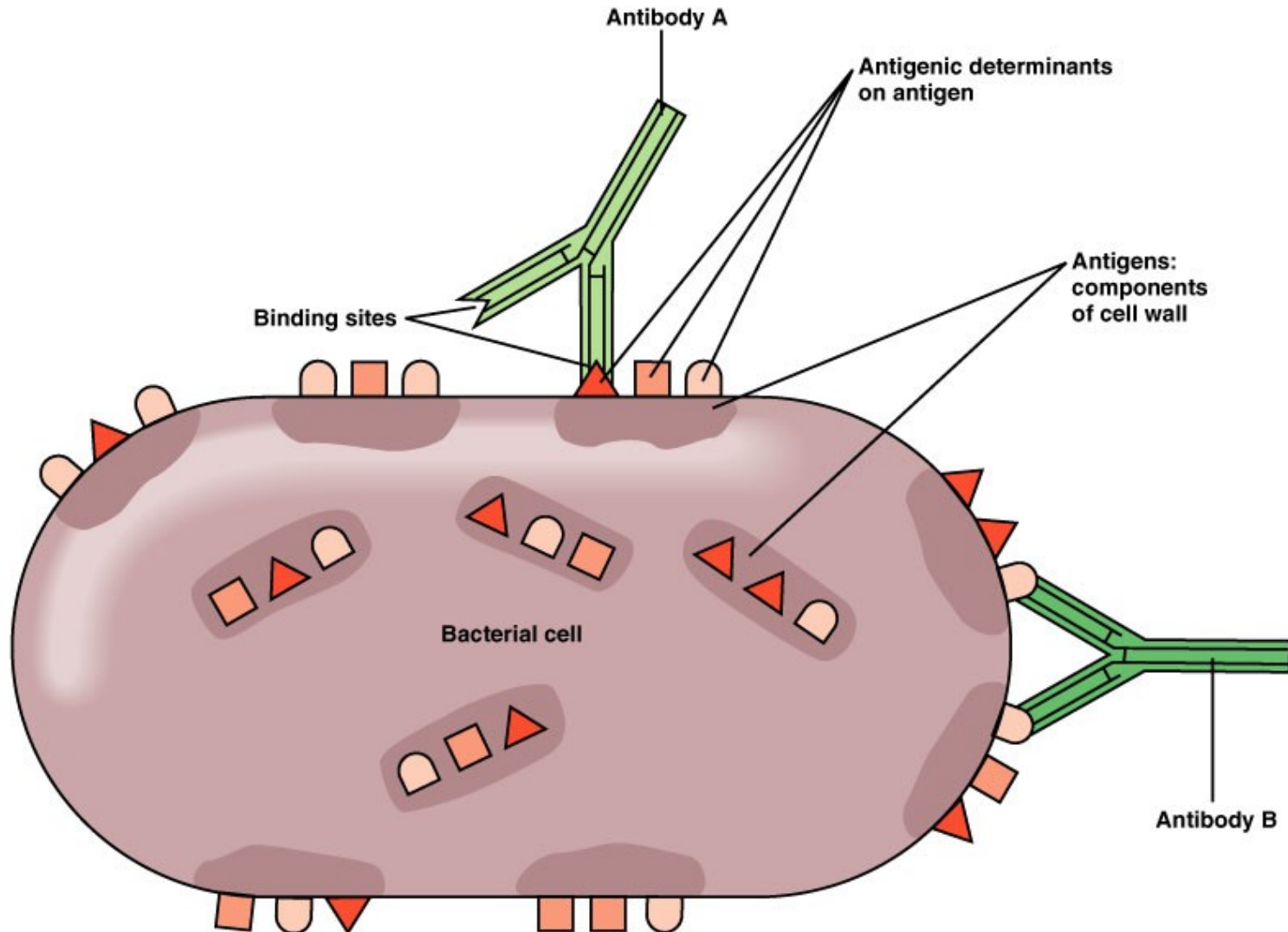
Immunoglobulins – structure and function

Production of immunoglobulins

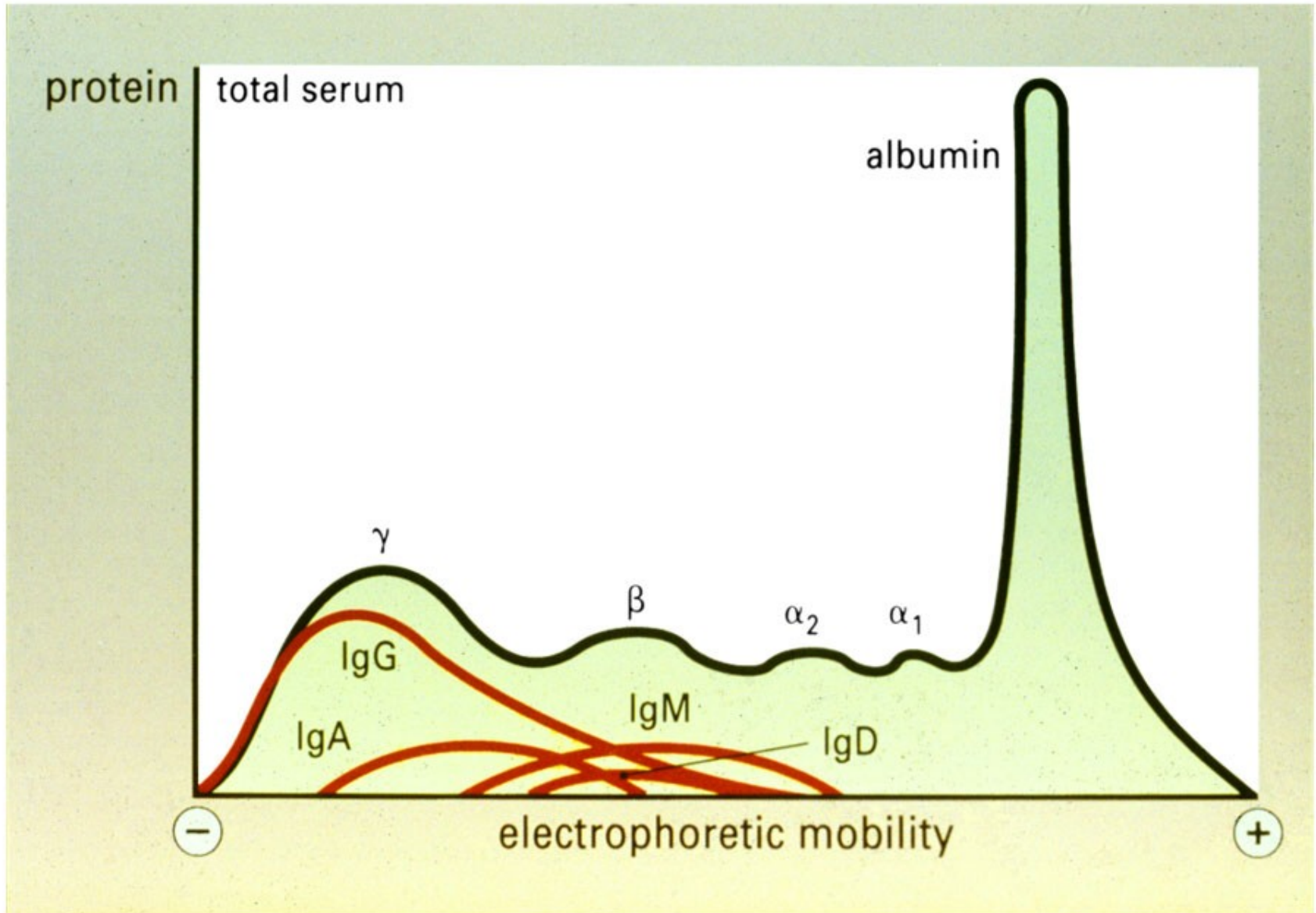
Genetic determination of immunoglobulin production

Clonal selection theory

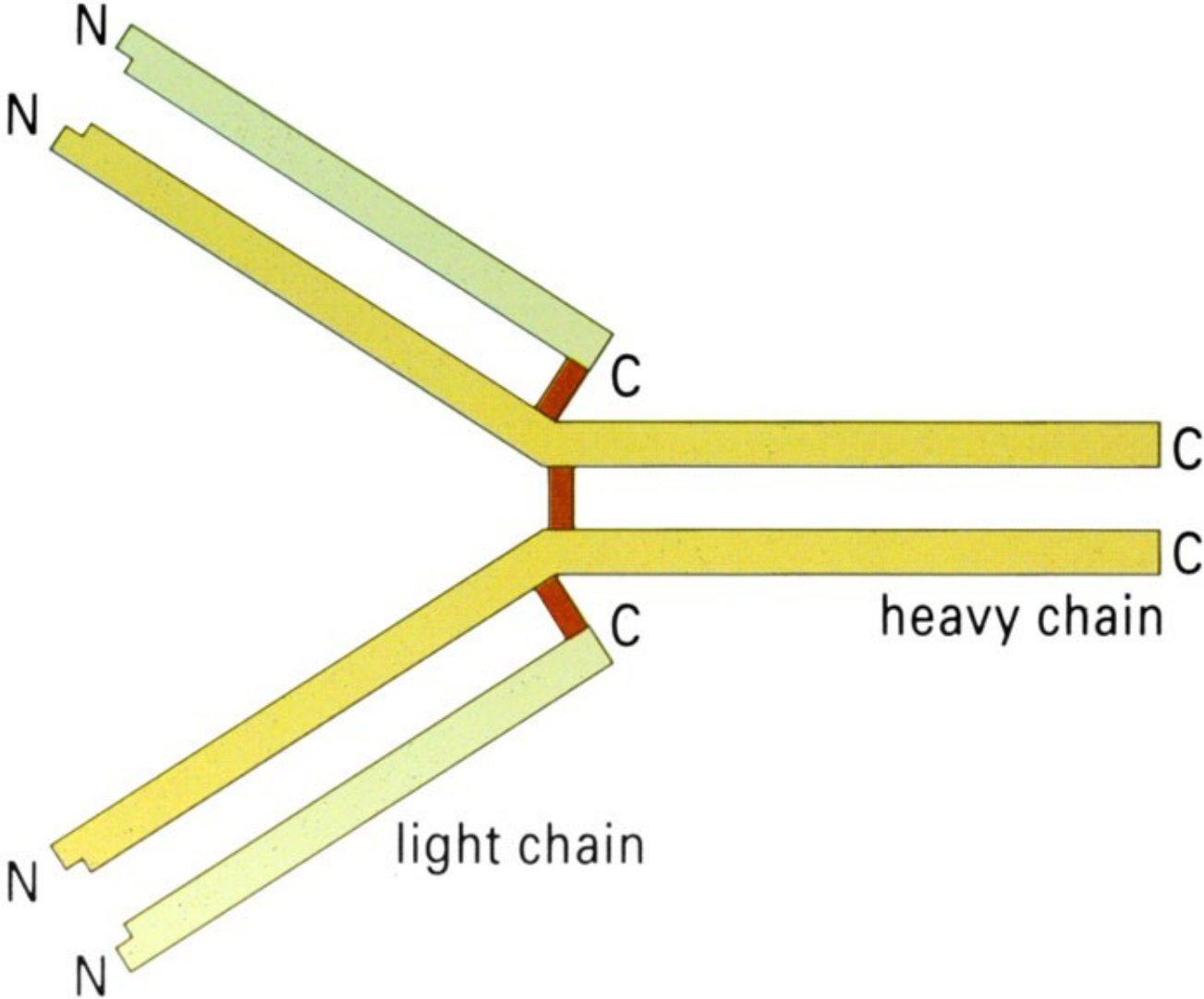
Antigen and epitope



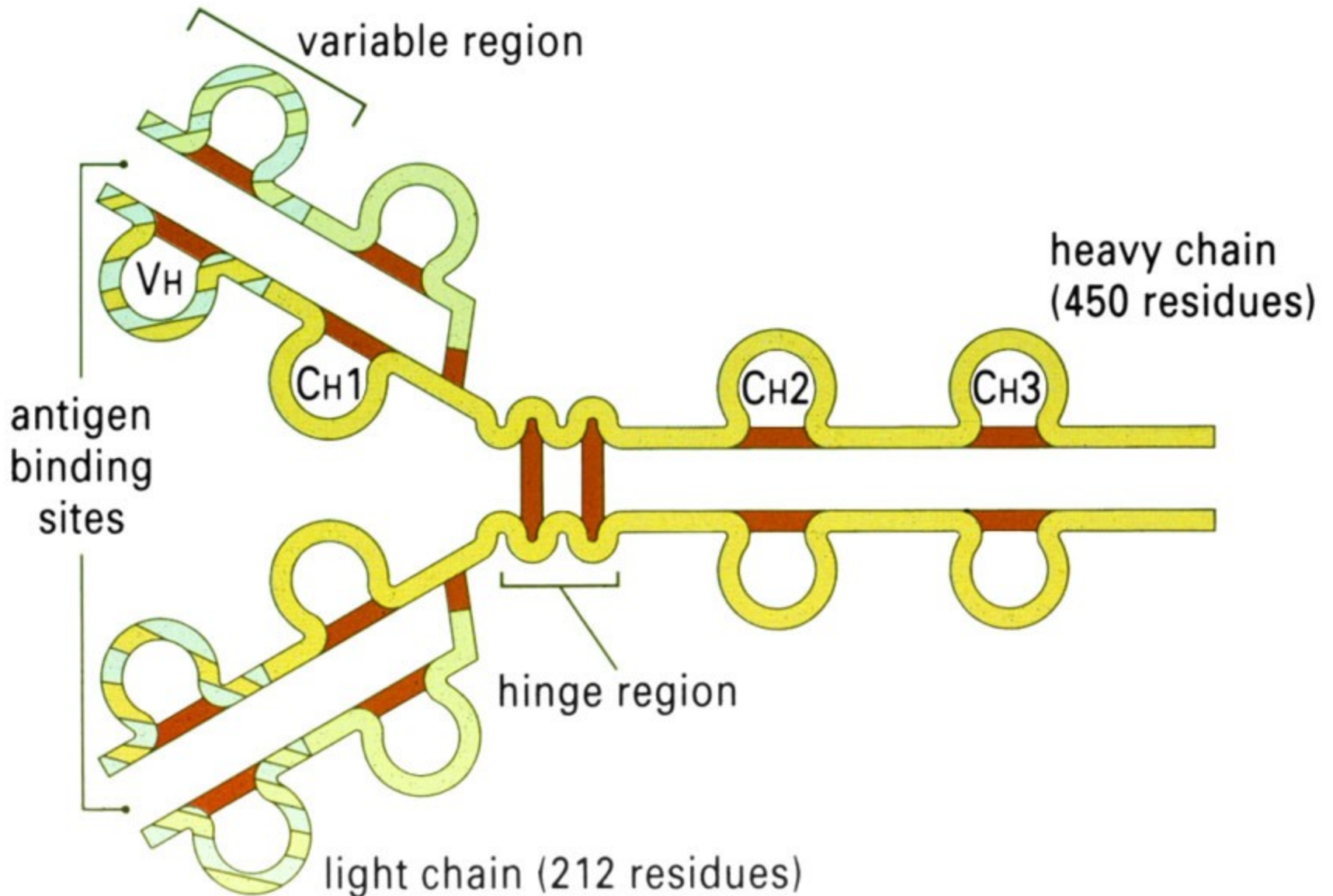
Distribution of the major human immunoglobulins



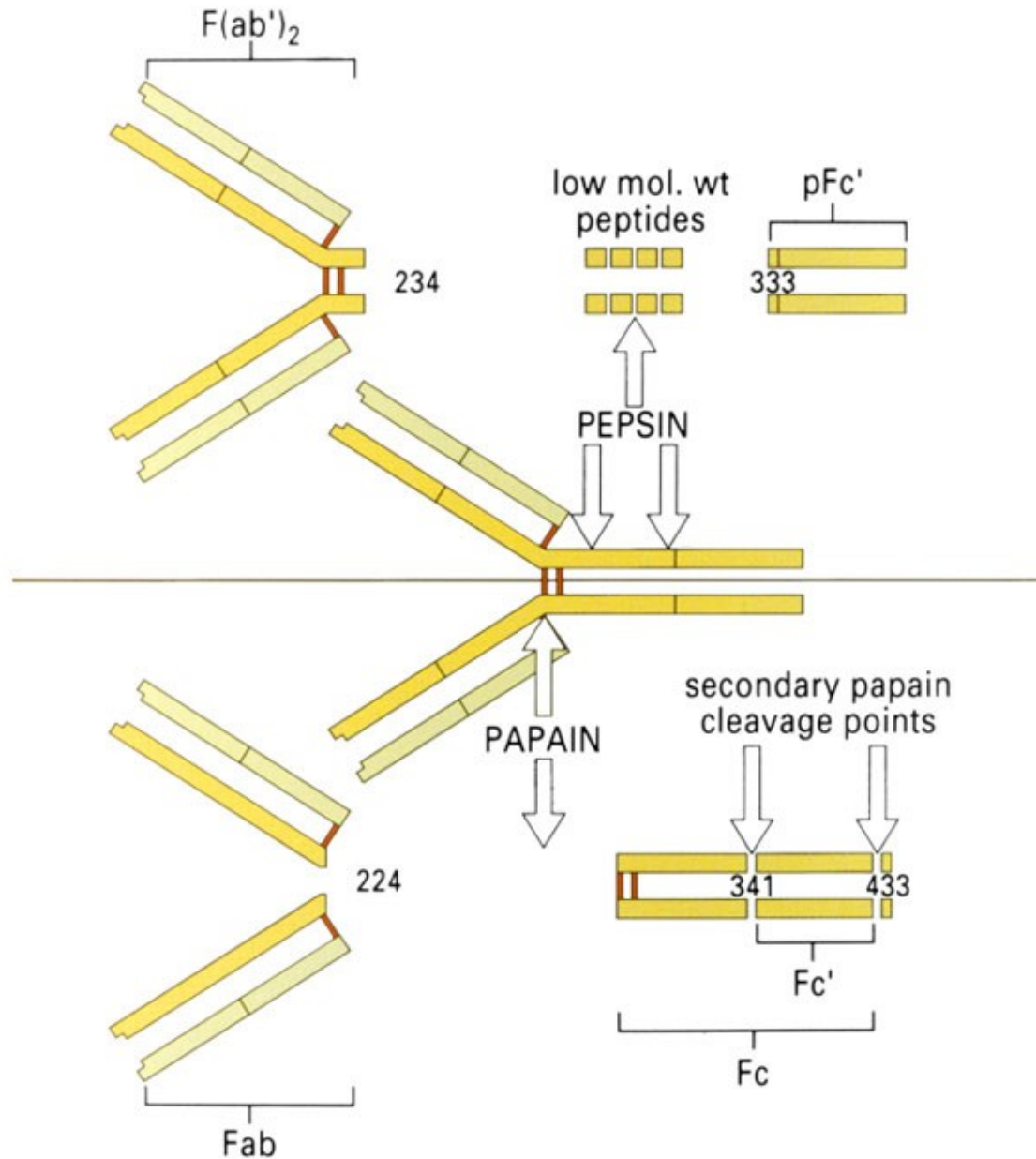
The basic chain structure of immunoglobulins



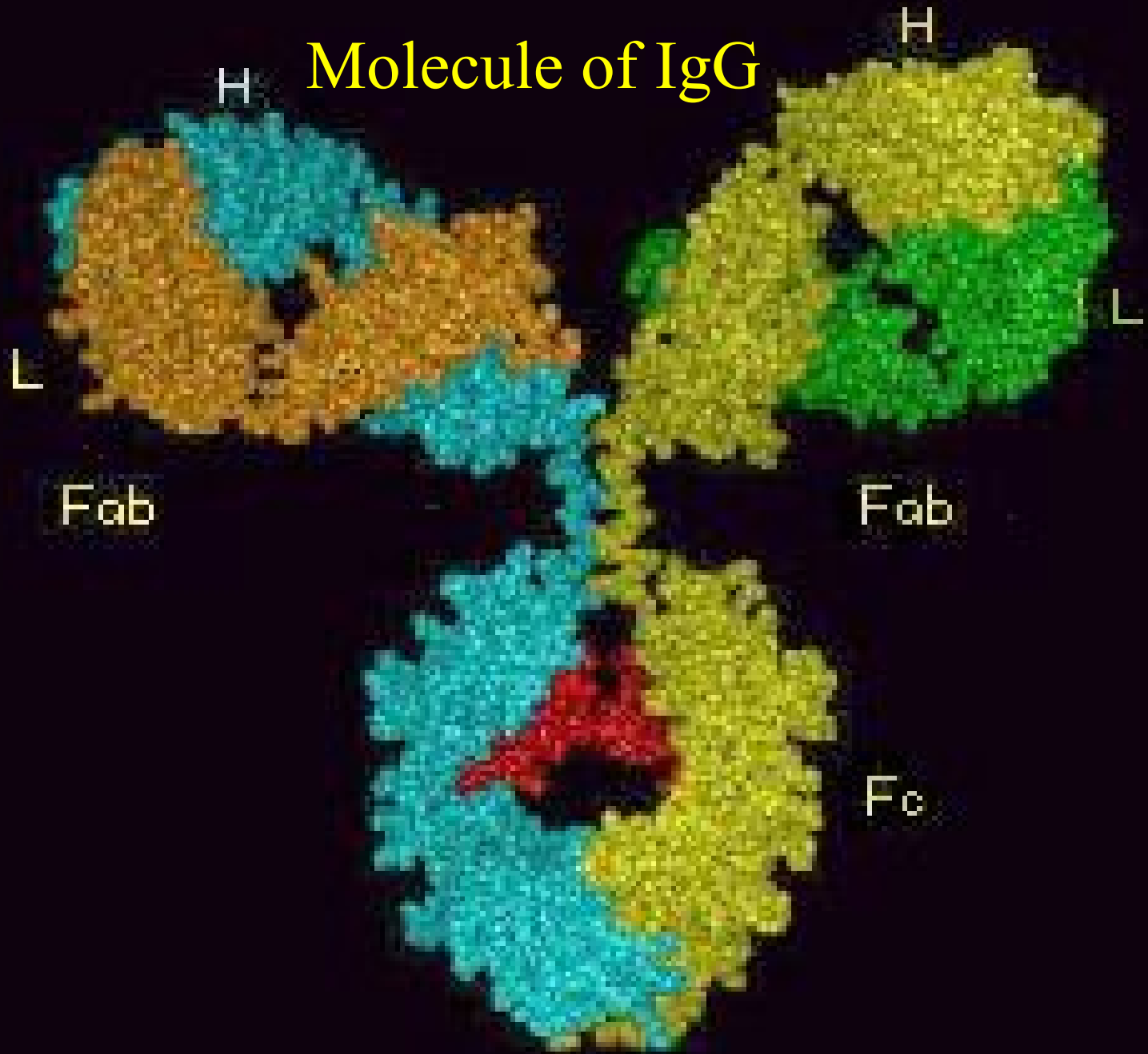
The basic structure of IgG1



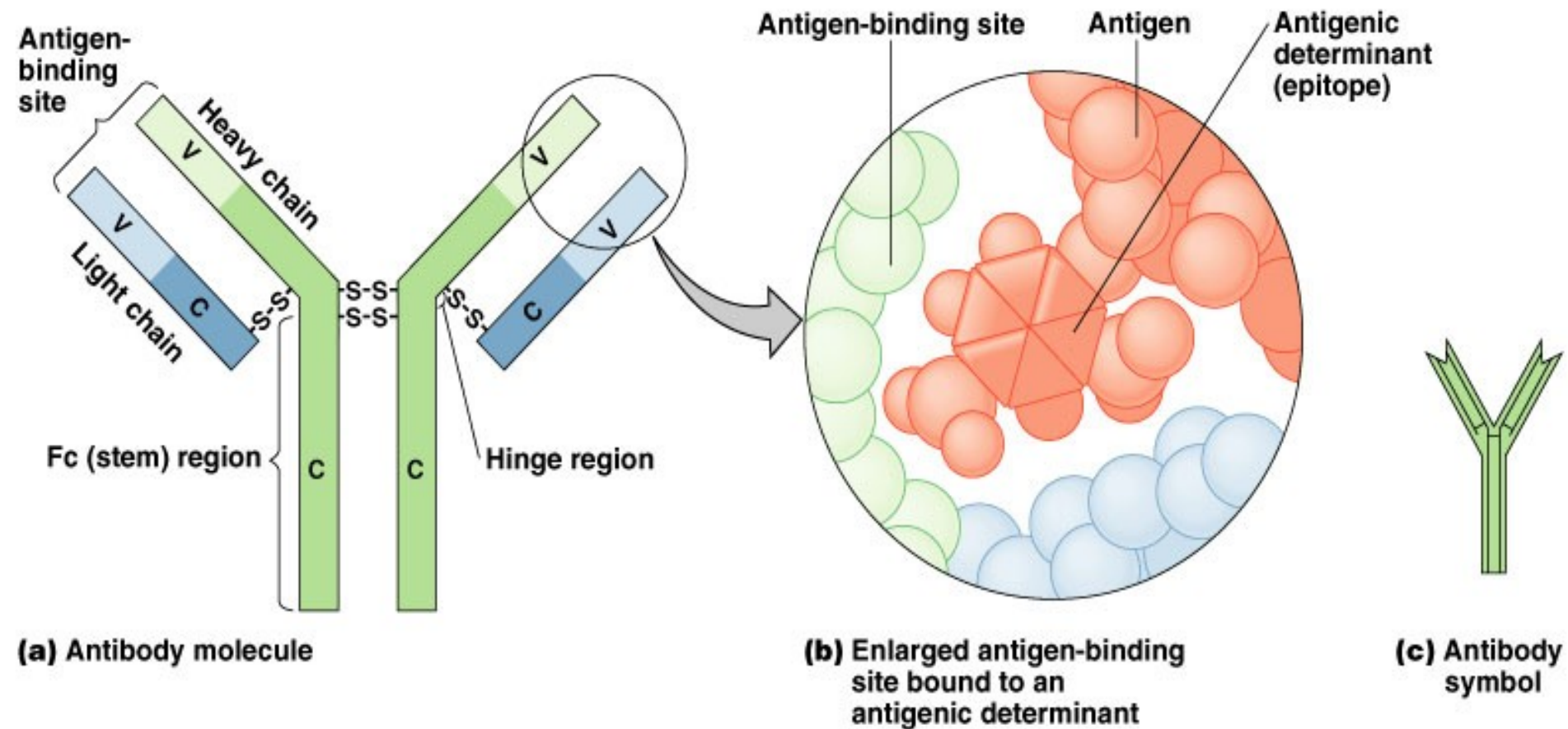
Enzymic cleavage of human IgG1



Molecule of IgG

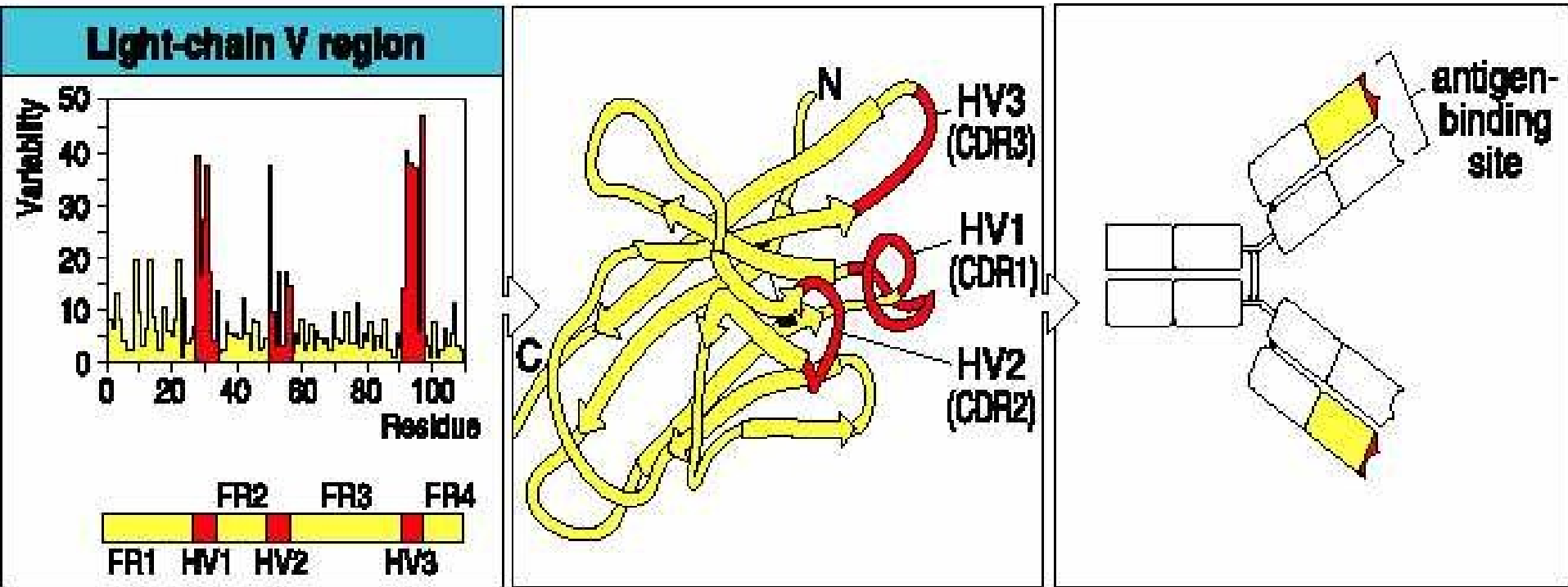


Hypervariable region of immunoglobulin molecule binds epitope of the antigen



Variable region of immunoglobulin molecule

Figure 2.7



The antibody combining site

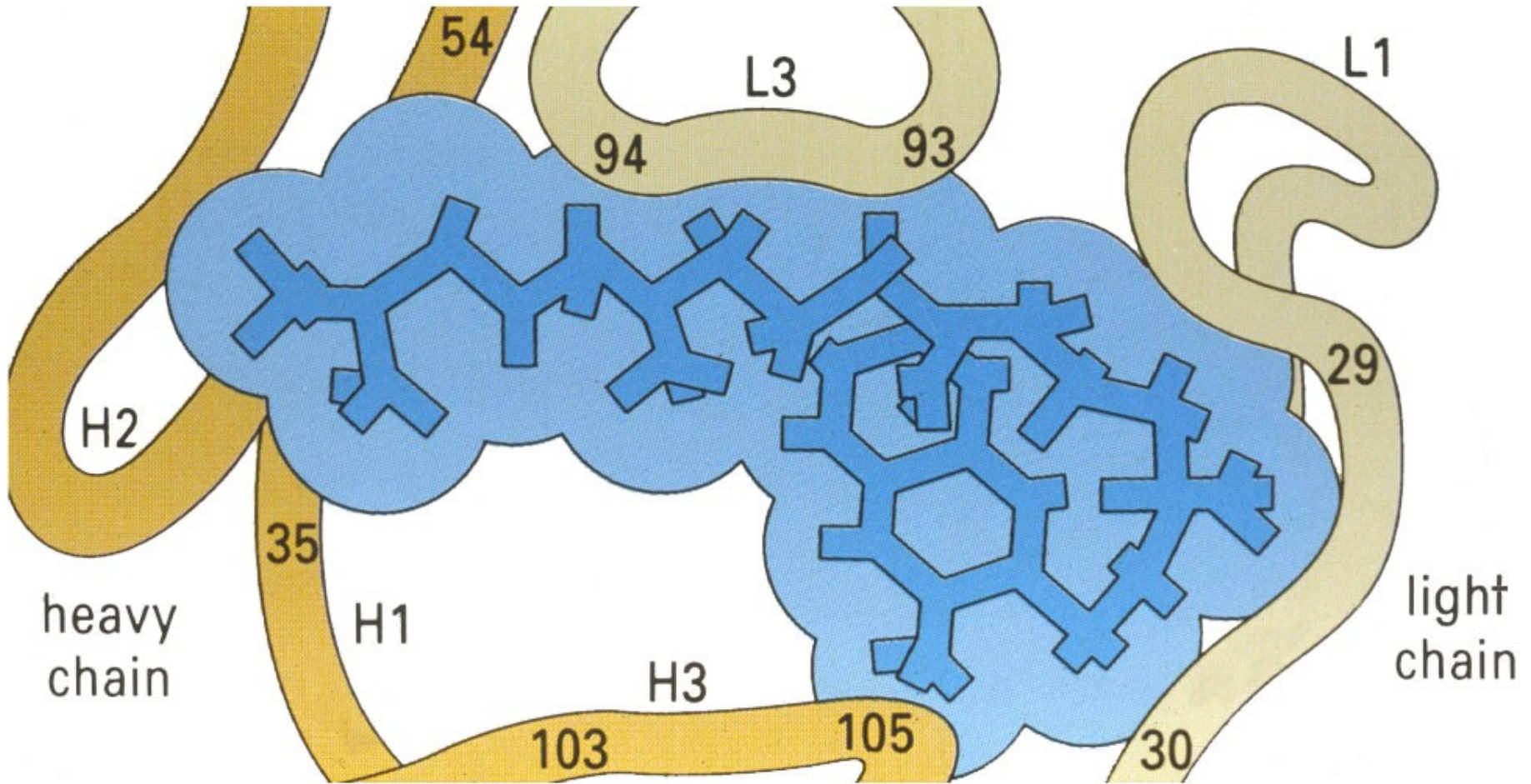


Figure 5: V(D)J Recombination

Germline configuration



D to J recombination



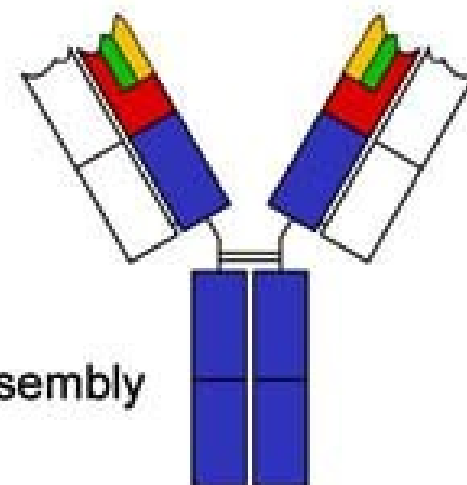
V to DJ recombination



transcription, splicing



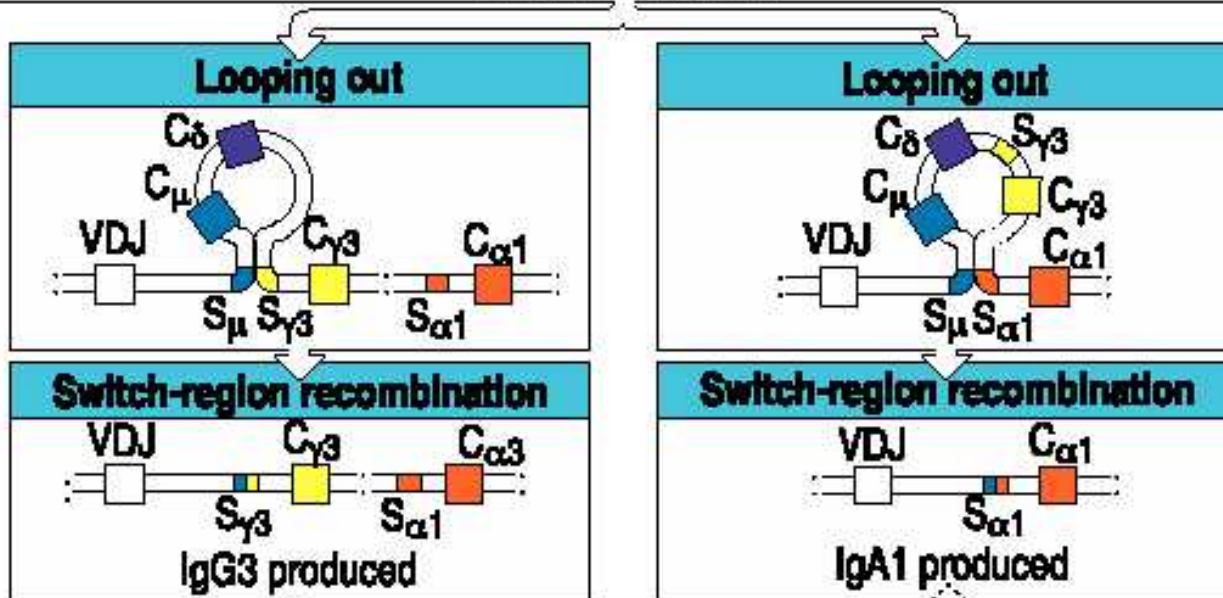
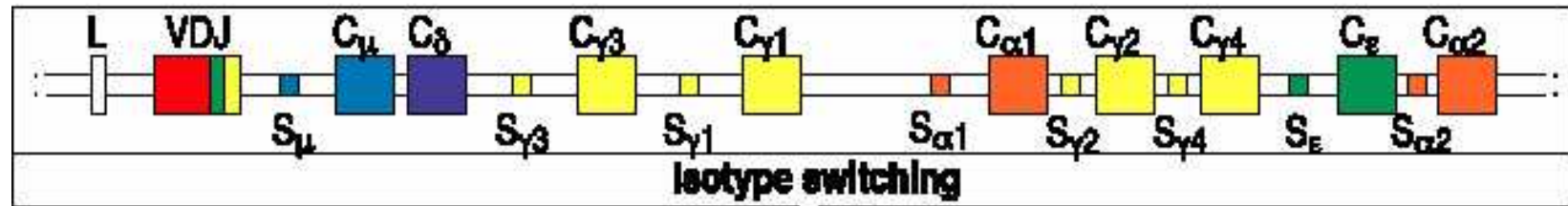
translation, assembly



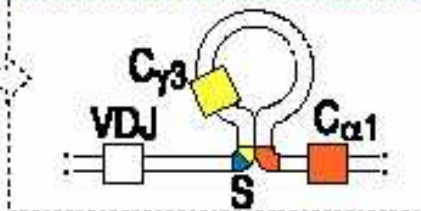
(adapted from Janeway 2001)

Isotype switching

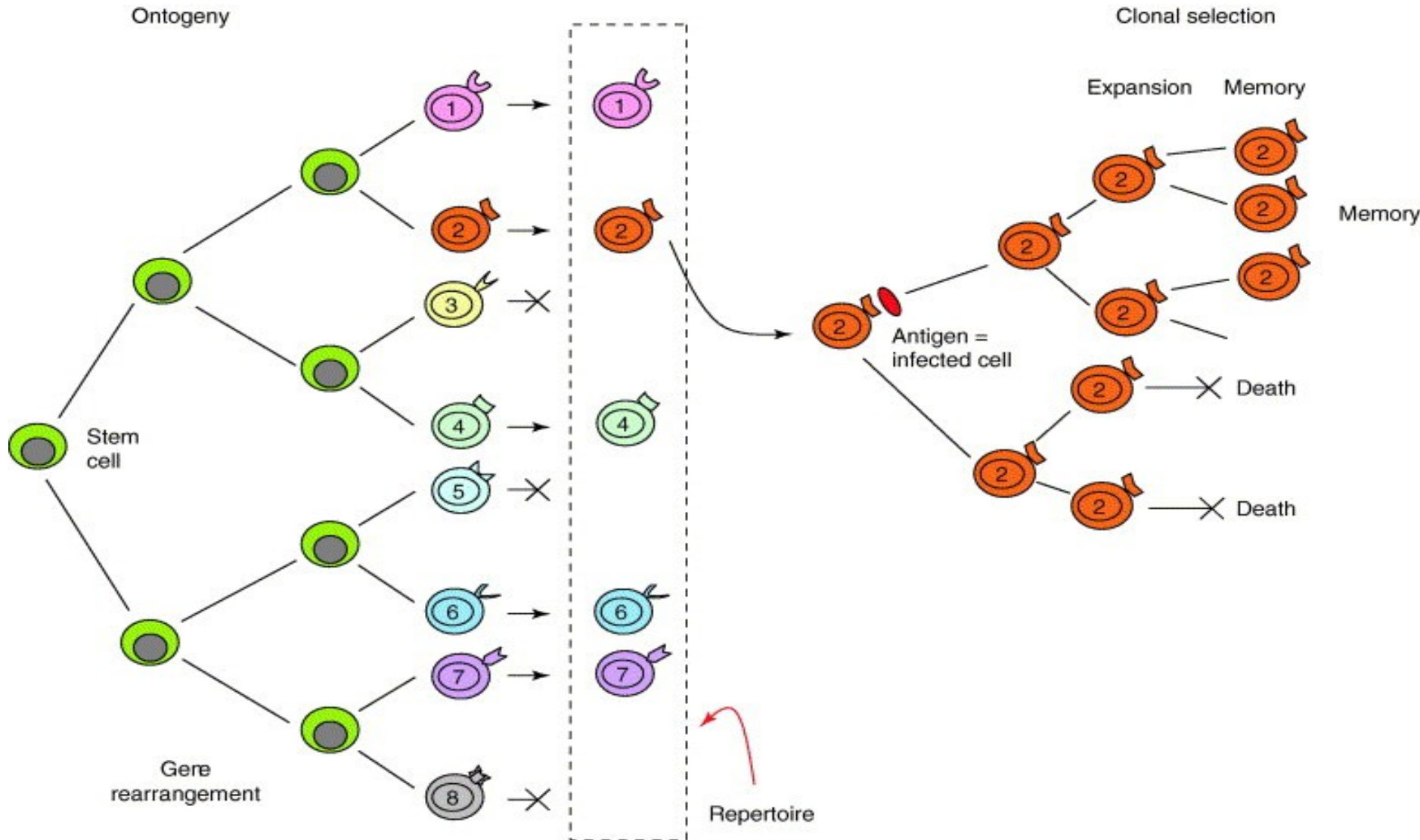
Figure 2.26



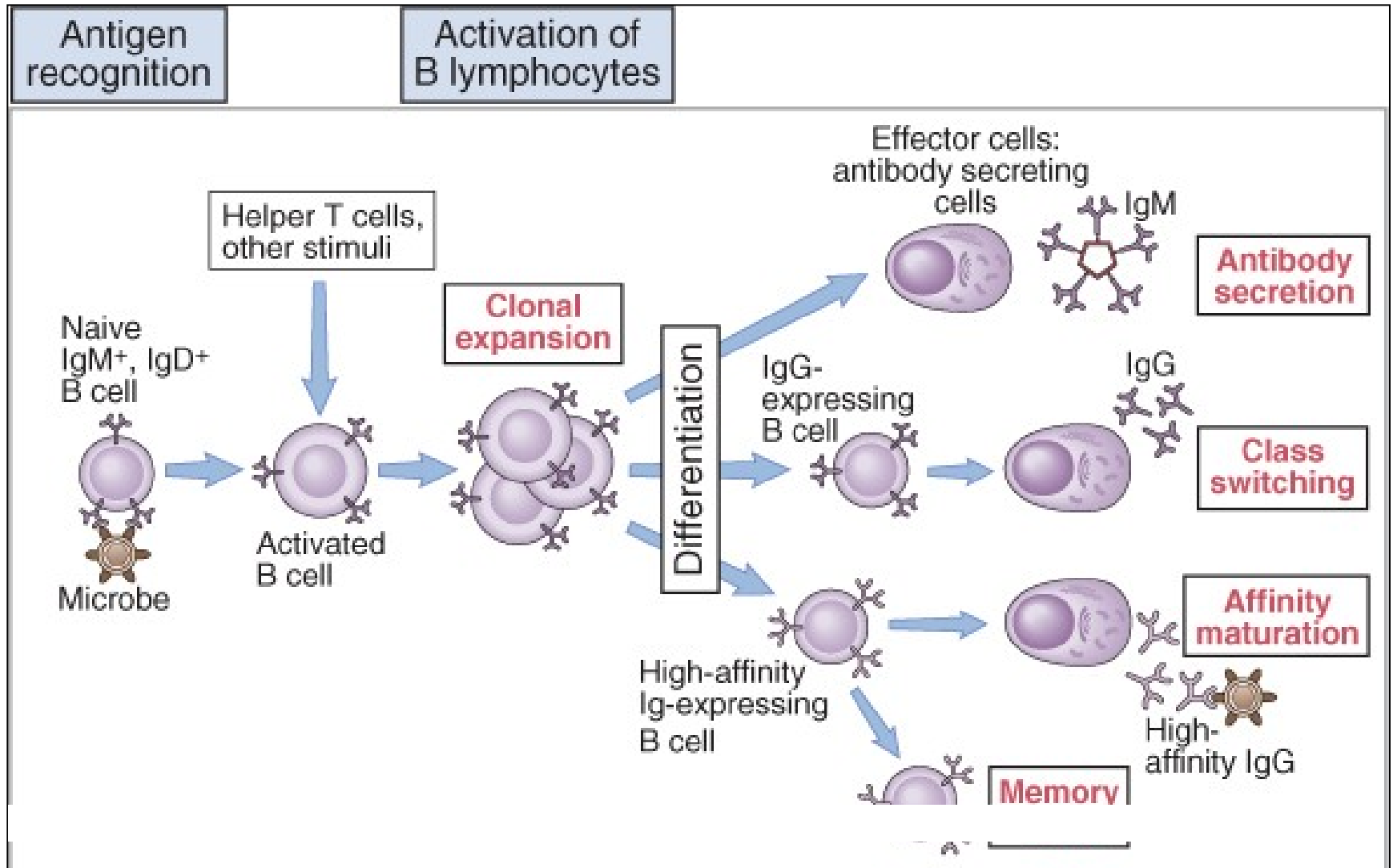
A further switch occurs



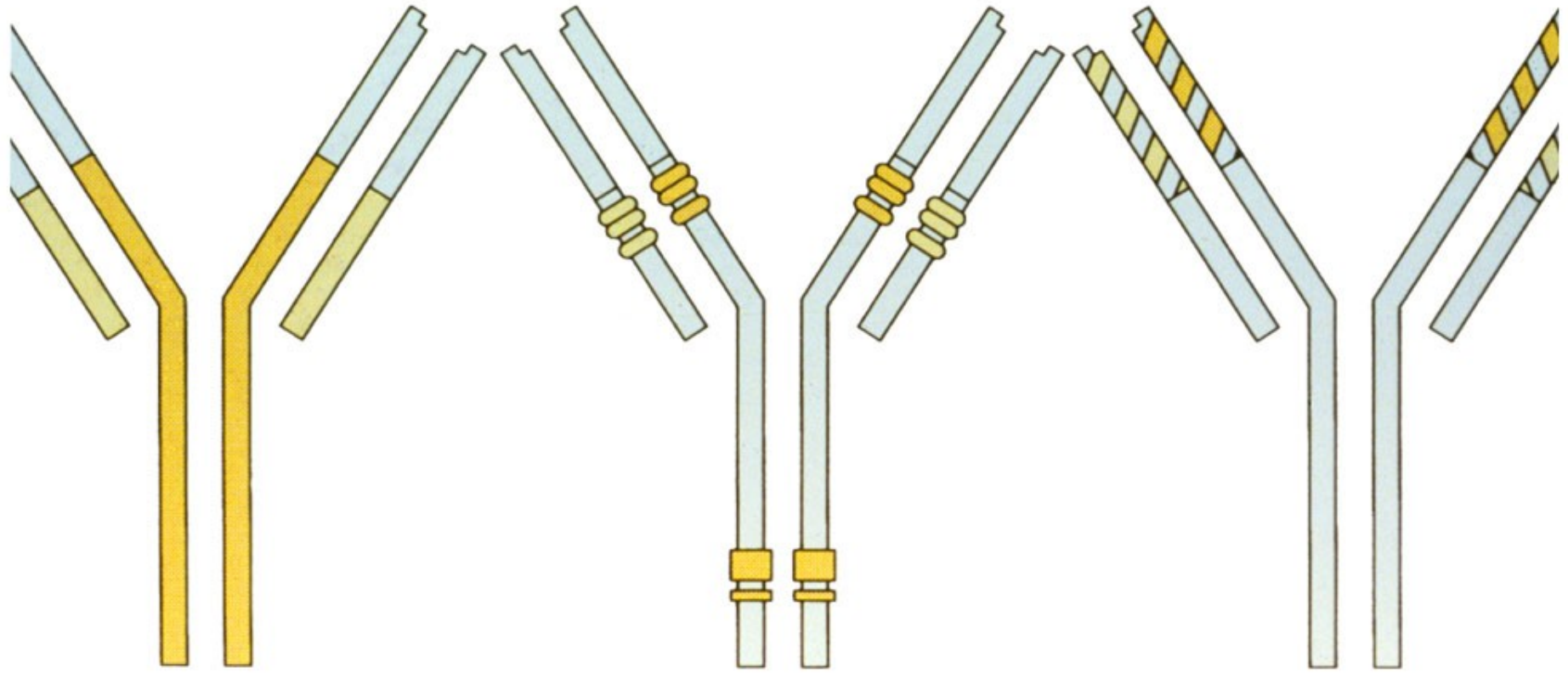
Clonal selection theory



Activation and differentiation of B-lymphocytes



Antibody variants



isotypic

allotypic

idiotypic

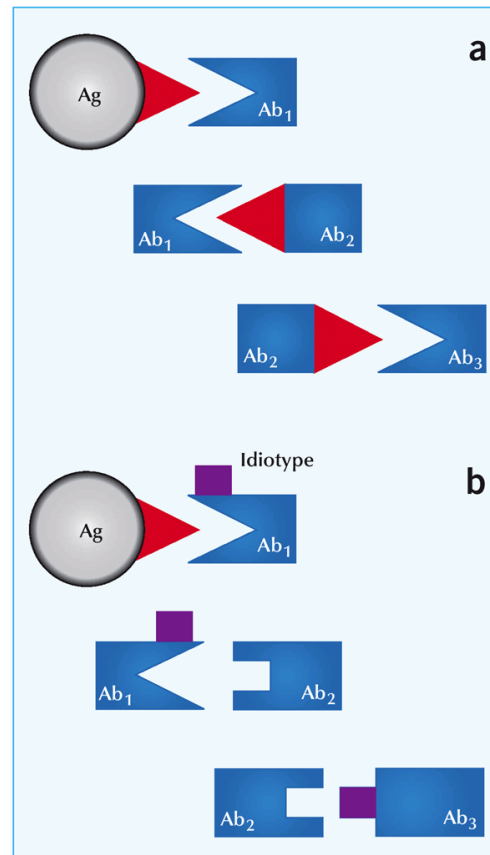
Isotype

- The class or subclass of an immunoglobulin.
- Antigenic determinants are on constant part of immunoglobulin molecule.

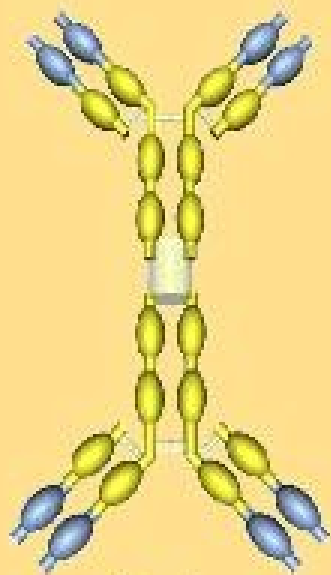
Idiotype

- An antigenic determinant on the variable region of a specific antibody.

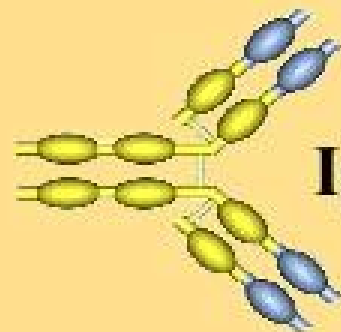
Interaction Idiotype-antiidiotype



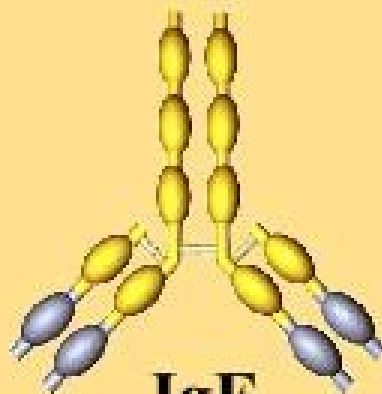
Shoenfeld Y: *Nature Medicine* **10**, 17 - 18 (2004)



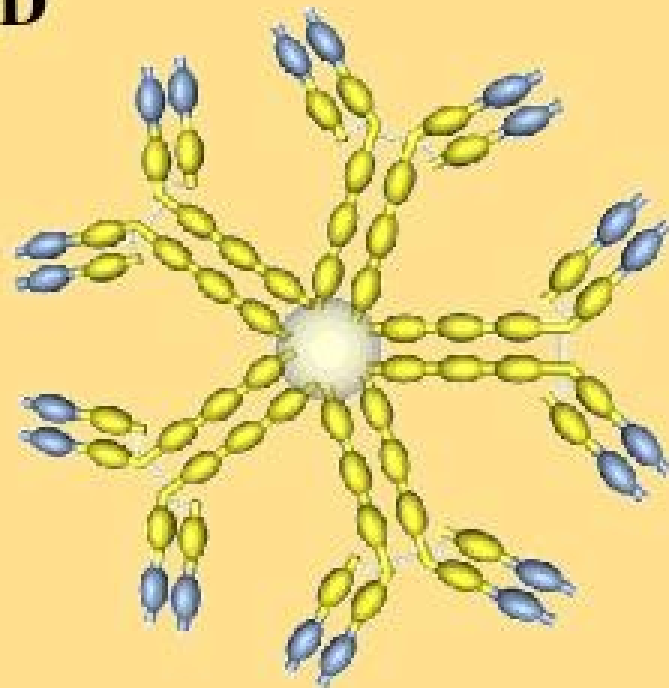
IgA



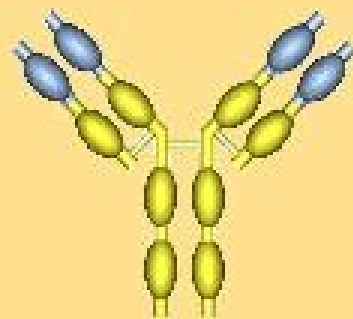
IgD



IgE

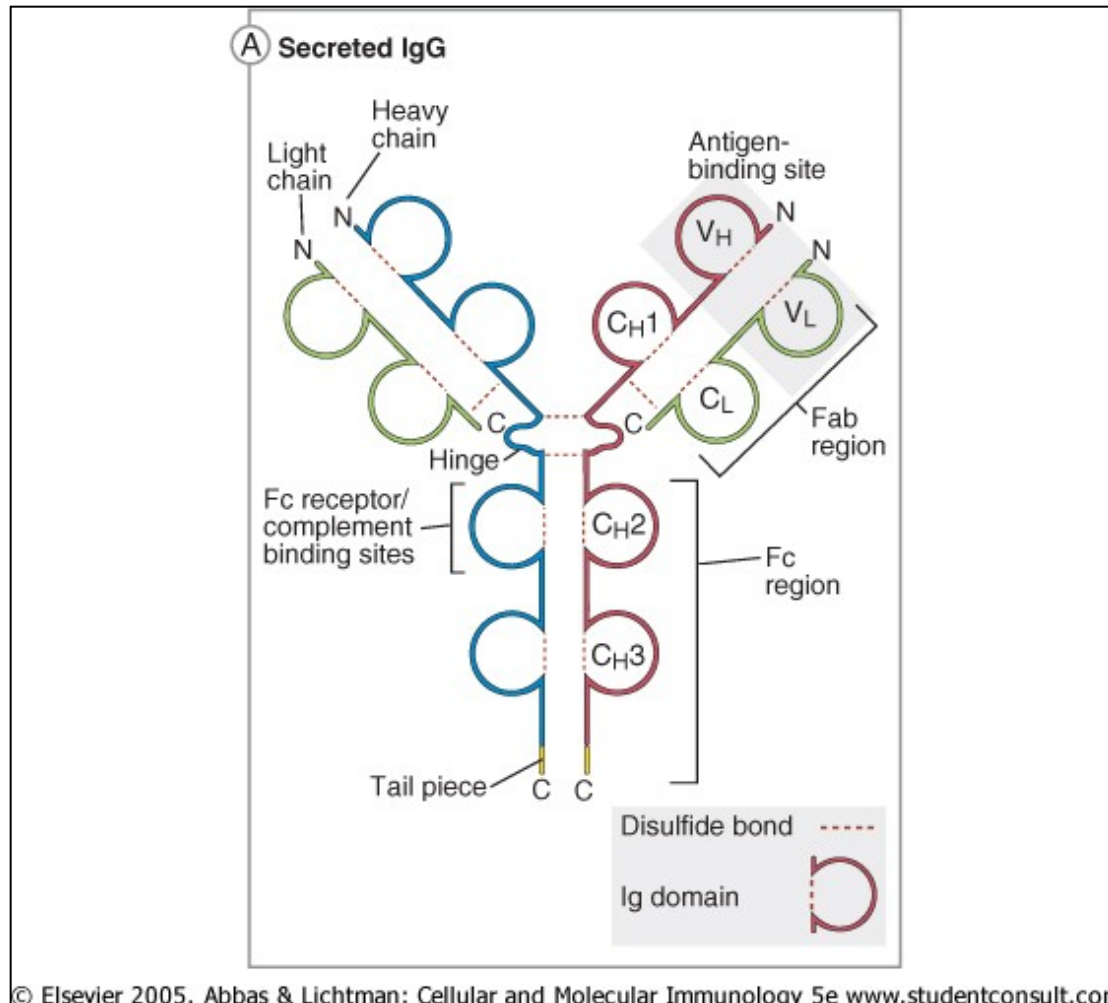


IgM

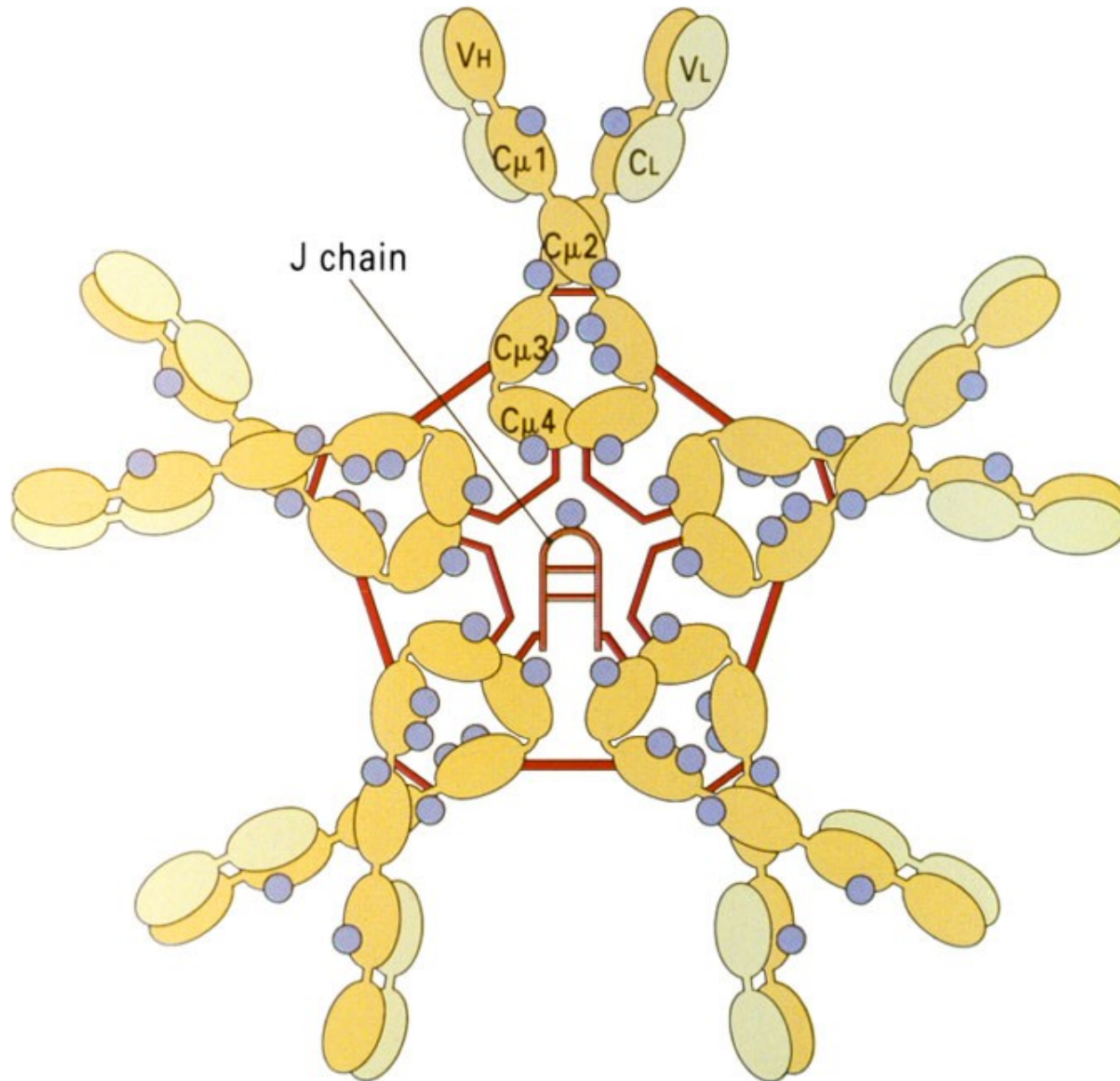


IgG

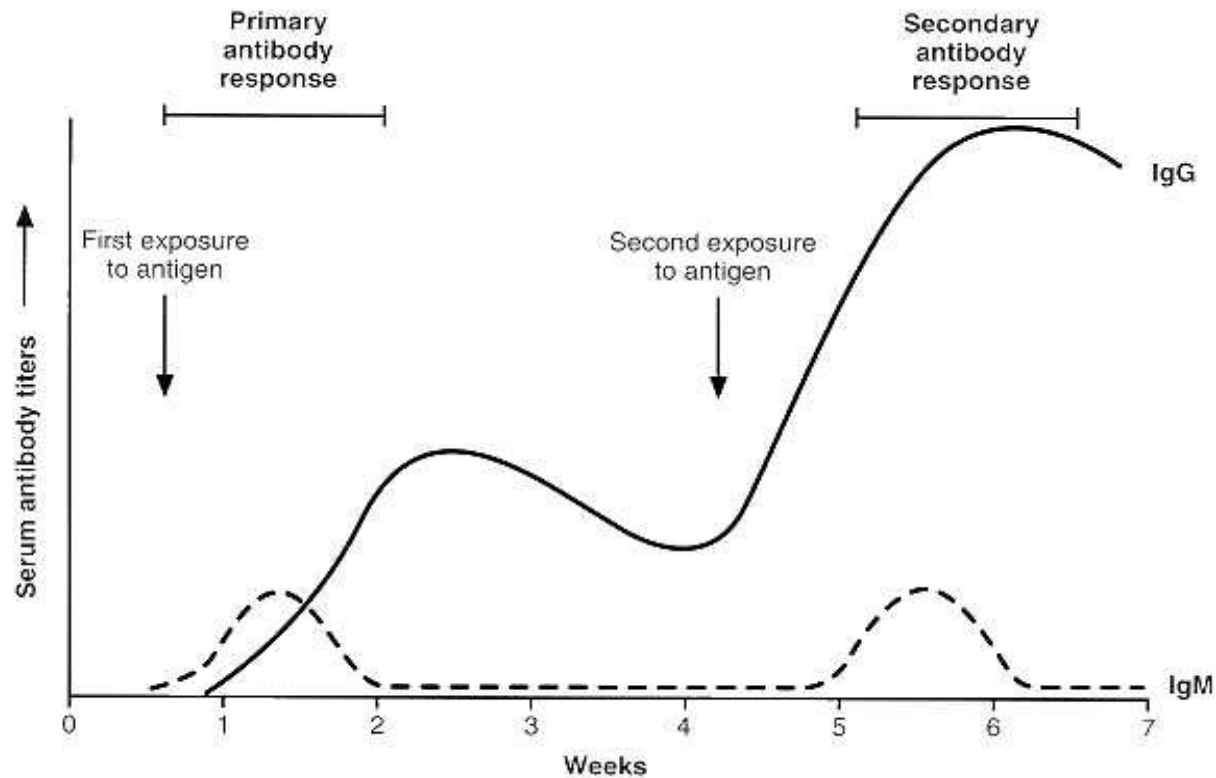
IgG

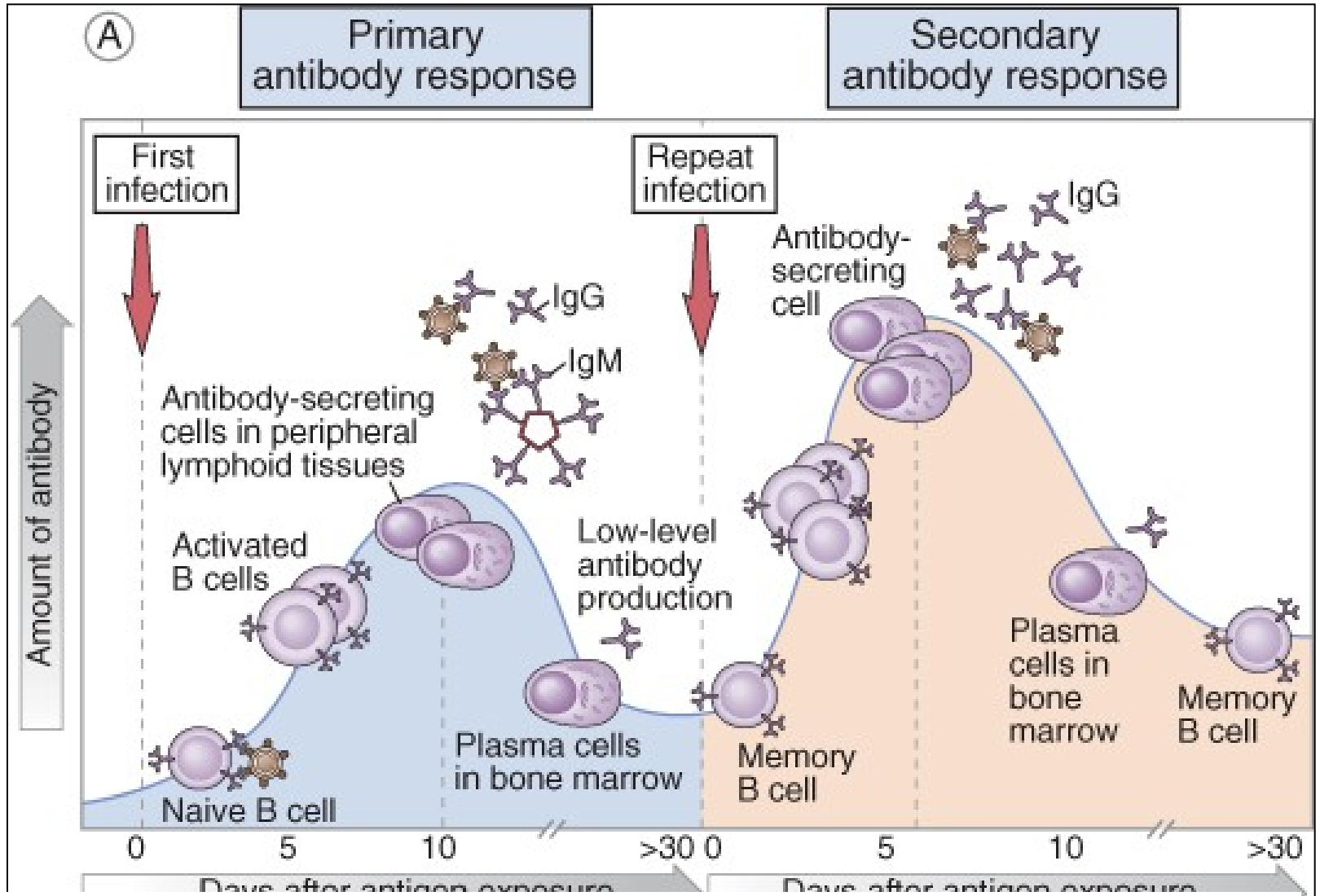


Structure of human IgM



Primary and secondary immune response





Expression of surface immunoglobulins on B-cells

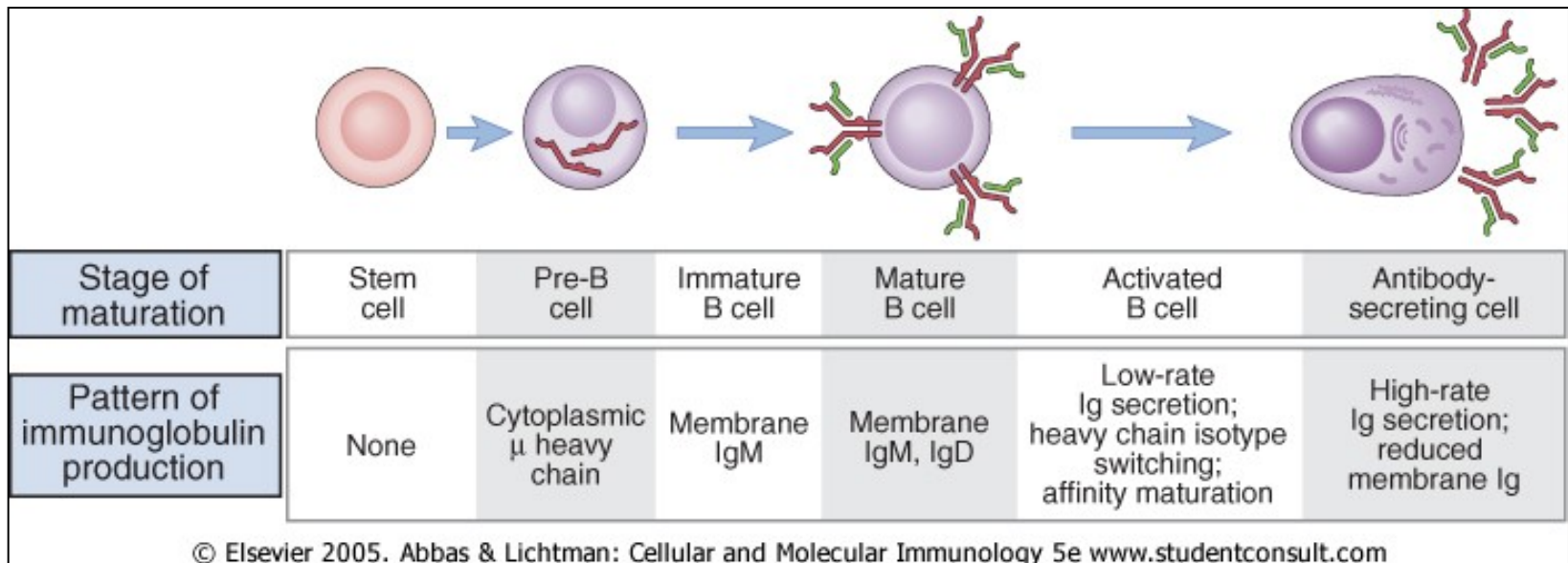
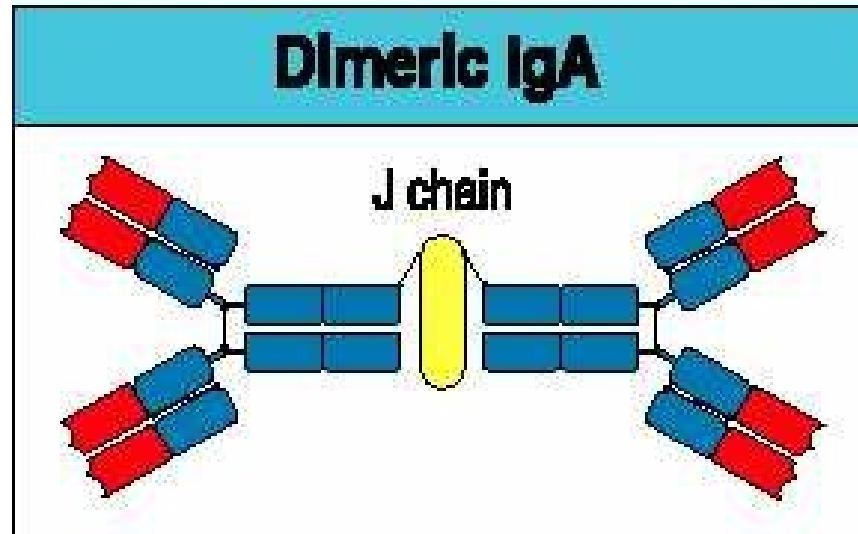
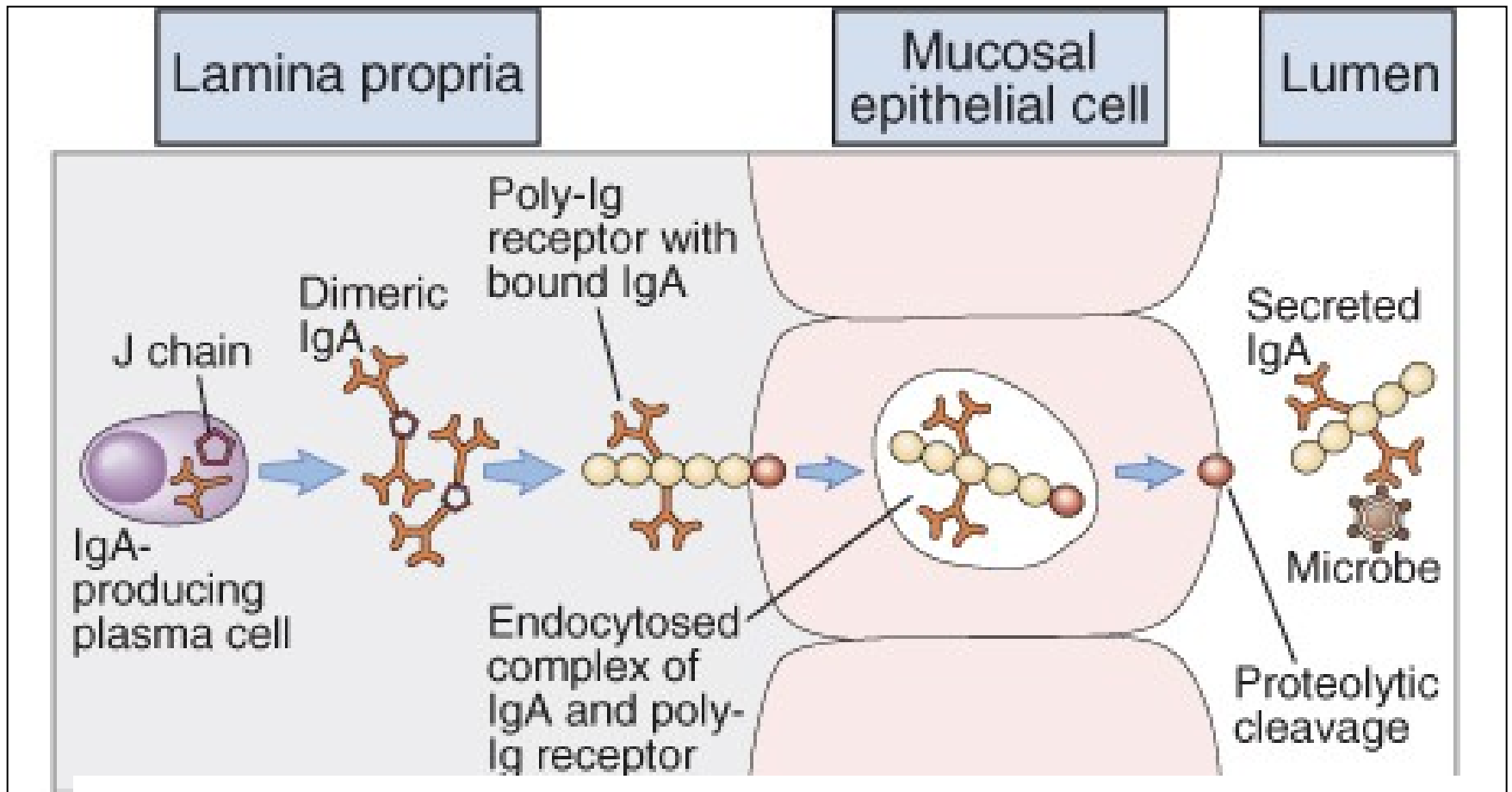


Figure 2.29

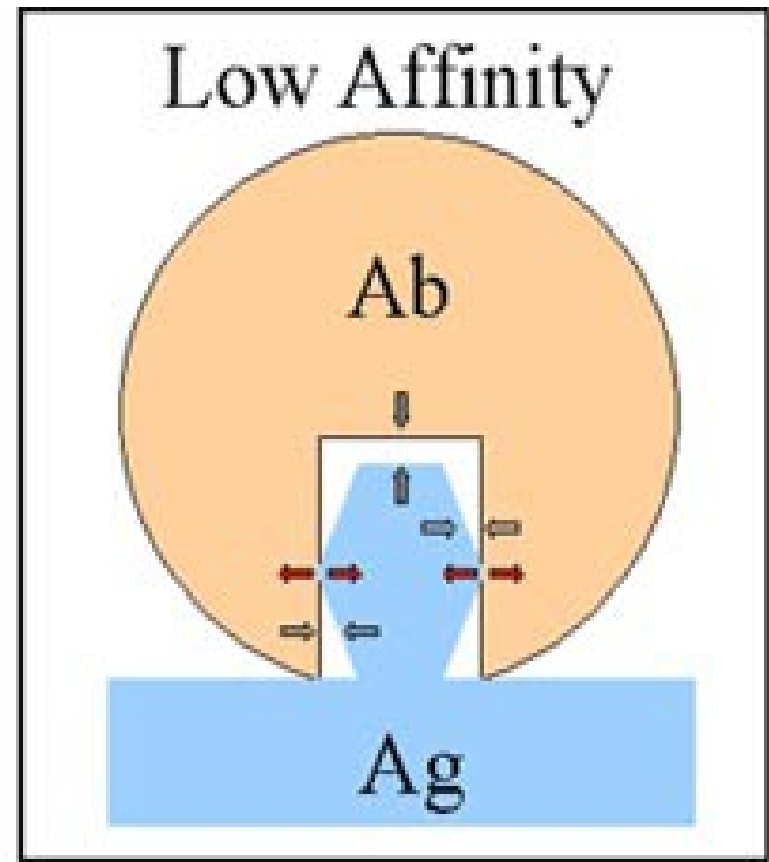
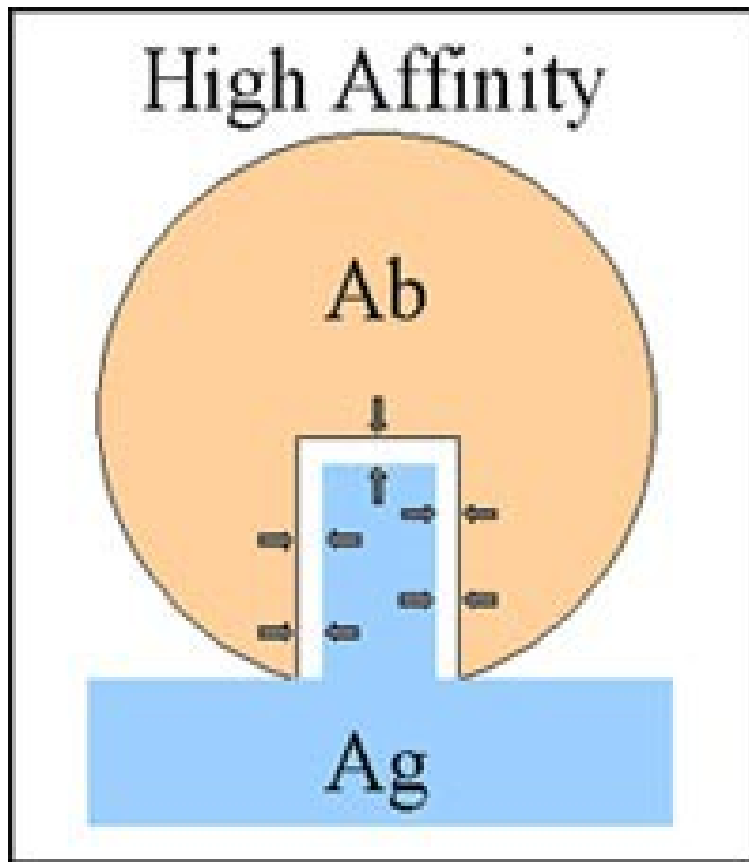


Formation of Secretory IgA



- **Affinity:** The strength of the binding between a single site of an antibody (one variable region) and an epitope.
- **Avidity:** The overall strength of interaction between antibody and antigen. The avidity depends on affinity and the valency of interactions.

Antibody affinity



Antibody affinity



High Affinity

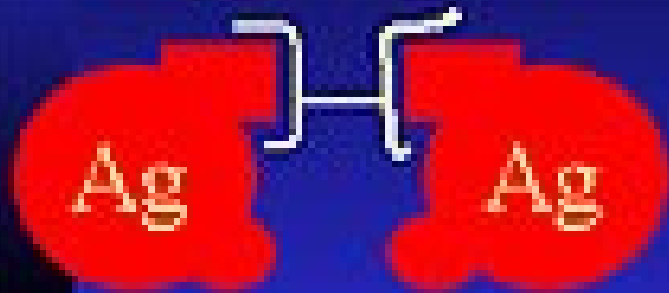


Moderate
Affinity

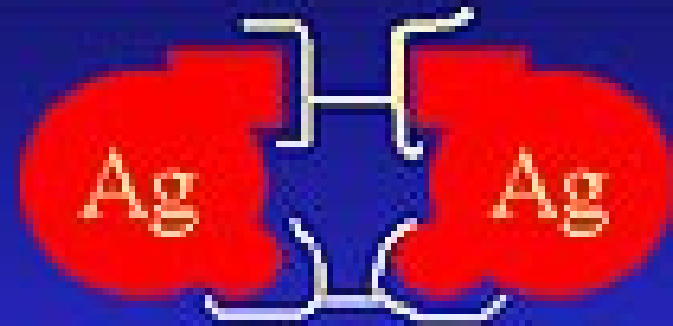


Low Affinity

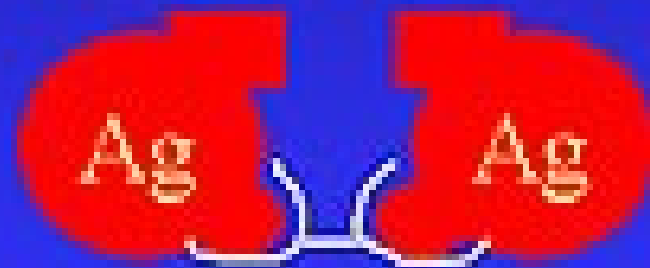
Antibody Avidity



Moderate
Avidity



High
Avidity



Moderate
Avidity

Biological functions of immunoglobulin molecules

- Activation of complement system (IgG, IgM)
- Opsonization (particularly IgG)
- Neutralization of antigens (IgG, IgA, IgM)
- Adherence interference (IgA, IgG)
- Antibody dependent cellular cytotoxicity (ADCC)
- Agglutination, precipitation (IgG, IgM)
- Mast cells degranulation (IgE)
- Transport through placenta (IgG)
- Immunoregulation (mainly IgG)

Antibody dependent cellular cytotoxicity (ADCC)

