

CHAPTER 33 : ANTIBODY STRUCTURE

Vertebrate Immune System Single goal:

Distinguish self from non-self

Protect from microorganisms, viruses, bacteria, and parasites

Two hallmarks:

Specificity

Memory

Two related strategies:

Humoral immune response

Cellular immune response

Antigens:

- foreign macromolecule capable of eliciting an immune response
- antibody specificity is not for an entire antigen
- antigenic determinant called an epitope
- small foreign molecules may elicit an immune response if attached to a macromolecule e.g DNP-BSA

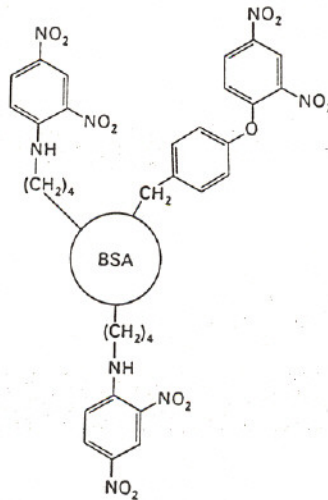


Figure 14-2
Dinitrophenylated bovine serum albumin (DNP-BSA) is an effective immunogen.

- macromolecule (carrier) & small molecule (haptenic determinant)

Antibodies:

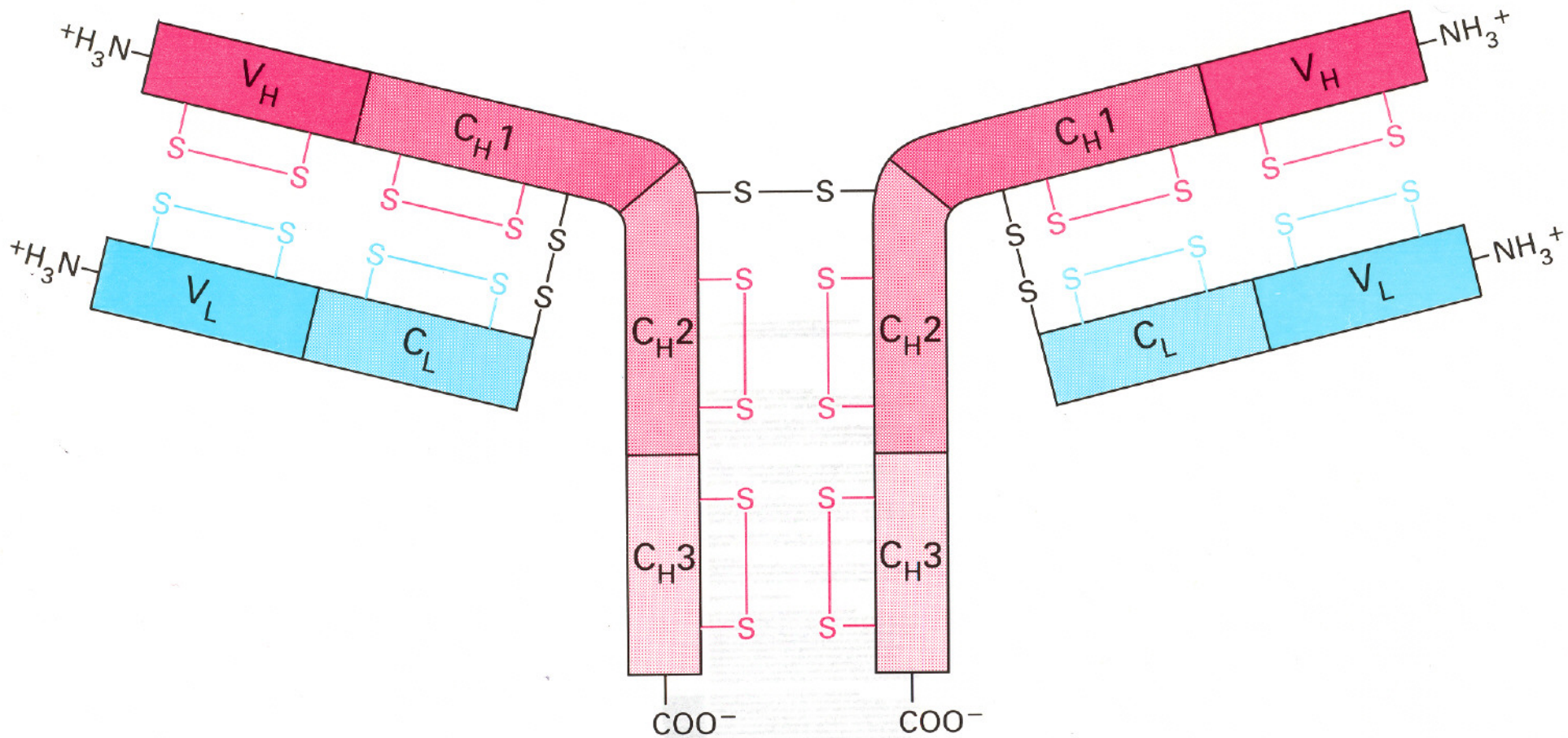
- recognition elements of humoral immune response
- secreted from plasma cells derived from B-lymphocytes
- are immunoglobulin (Ig) proteins
- five classes of antibodies formed (IgG, IgM, IgA, IgD and IgE)
- formed by the combination of heavy, and light Ig chains

Five classes of antibodies:

Class	Serum (Mg/mL)	Mass (kDa)	Chain Structure	Function
IgG	12	150	$\kappa_2\gamma_2 / \lambda_2\gamma_2$	Principle in serum
IgA	3	180-500	$\kappa_2\gamma_2 / \lambda_2\gamma_2$	Primarily in external secretion
IgM	1	950	$\kappa_2\gamma_2 / \lambda_2\gamma_2$	First formed following immune challenge
IgD	0.1	175	$\kappa_2\gamma_2 / \lambda_2\gamma_2$	Unknown
IgE	0.001	200	$\kappa_2\gamma_2 / \lambda_2\gamma_2$	Parasites / allergic reactions

Immunoglobulin G (IgG)

- Subunit structure: light (L) and heavy (H) chains
- IgG L₂H₂ homodimer
- L chain 25 kDa , H chain 50 kDa connected by disulfide bond
- variable (N-terminal ~108 residues) and constant regions (C-terminal)
- antigen-binding sites formed by three hypervariable regions (complementarity determining regions CDRs) in both L and H chains



IgG consists of homologous domains

Figure 14-11, page 368

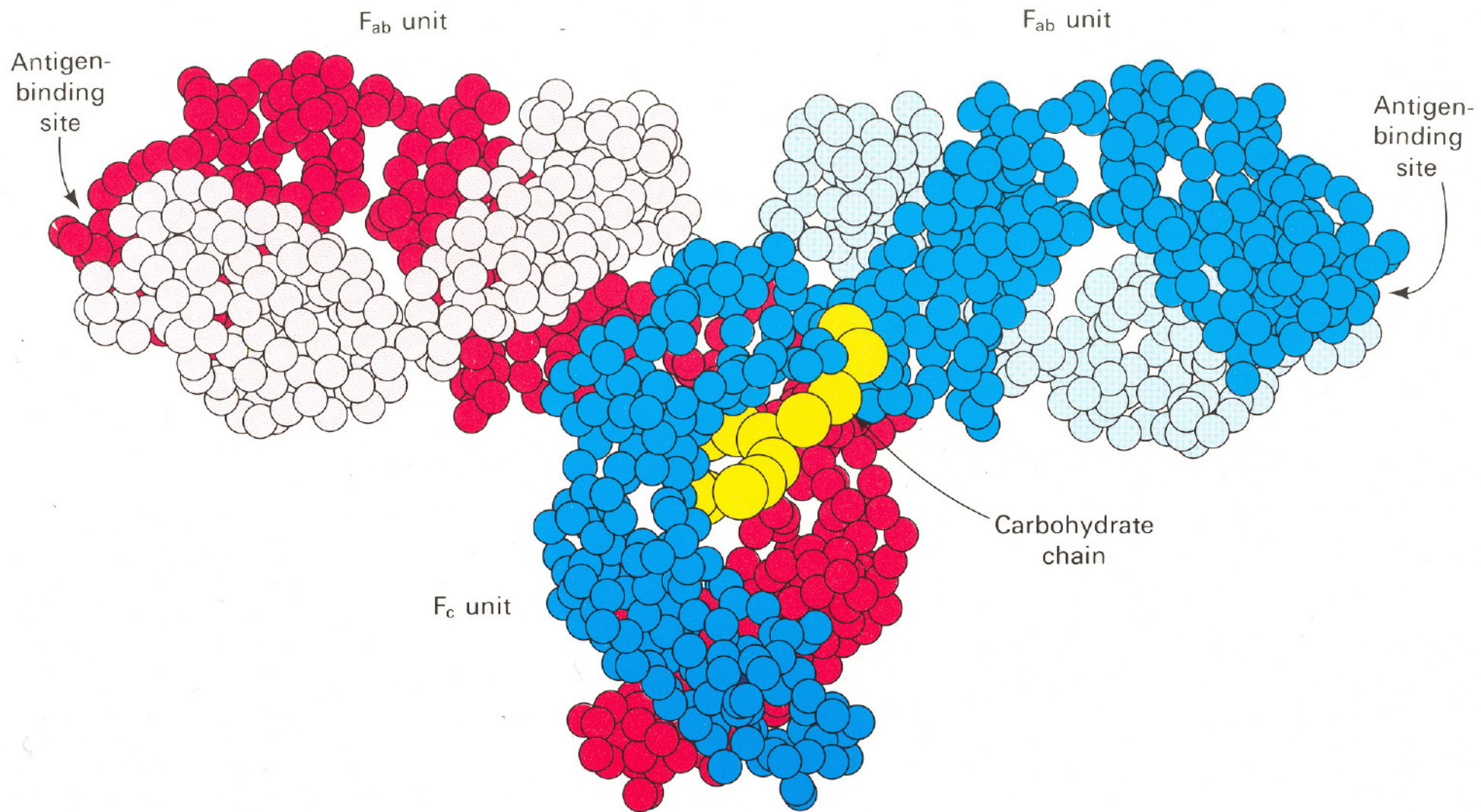


Figure 14-23, page 376

3D structure of an IgG molecule