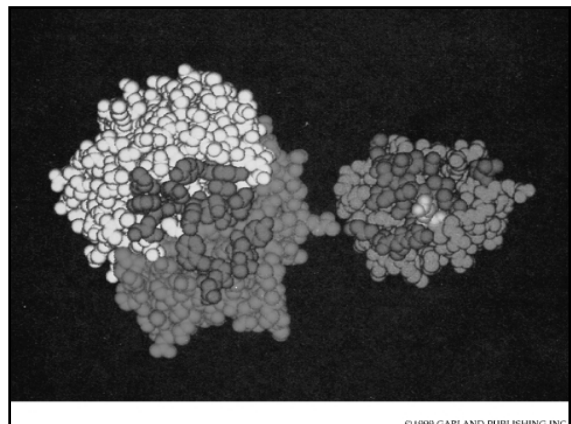
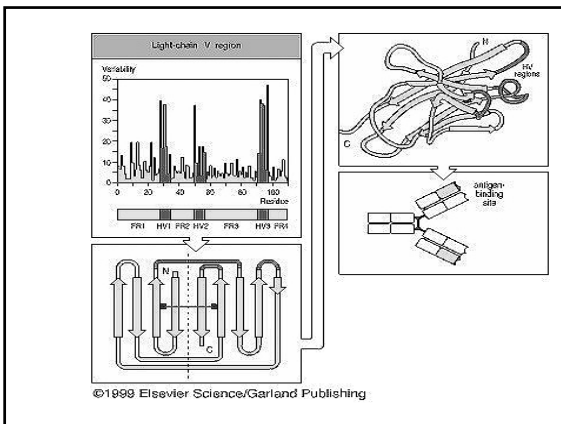
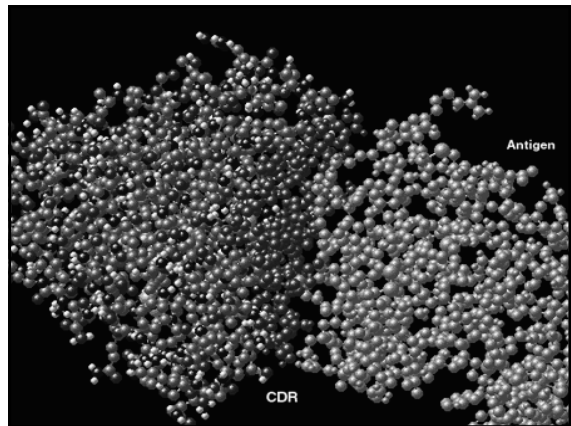
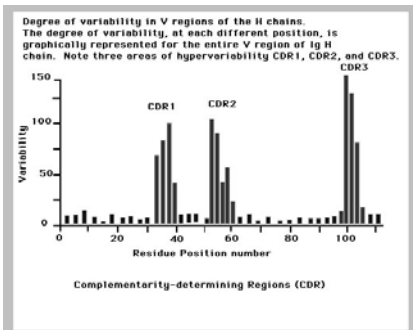




Dr. Elvin Kabat, Columbia University

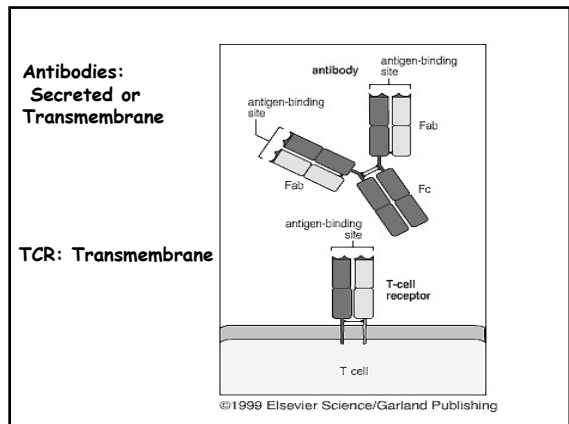
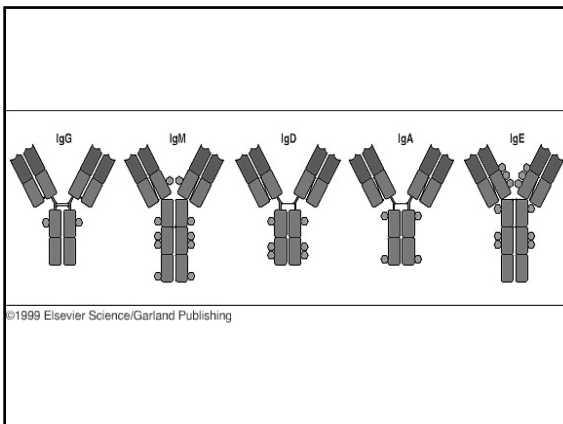
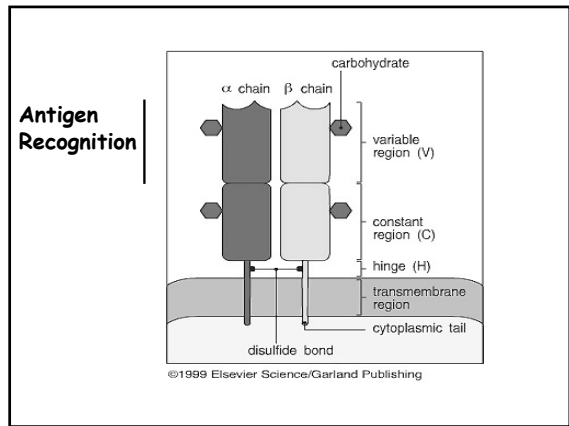
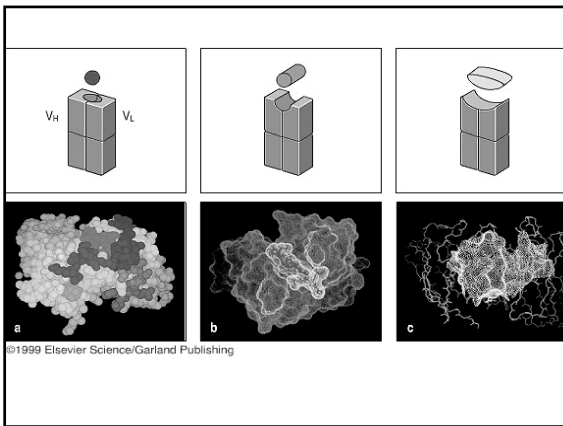
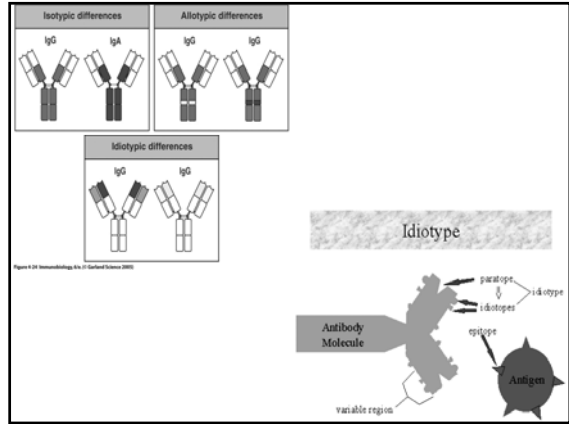


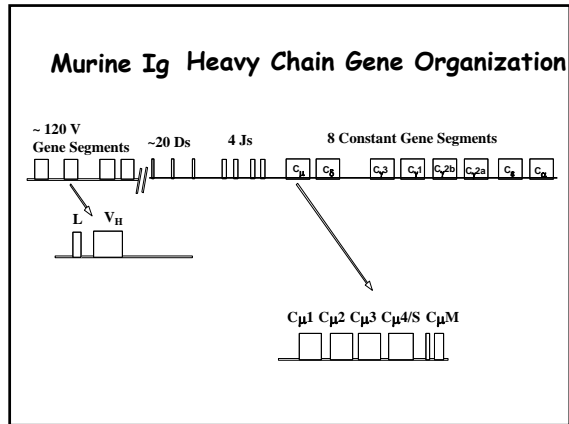
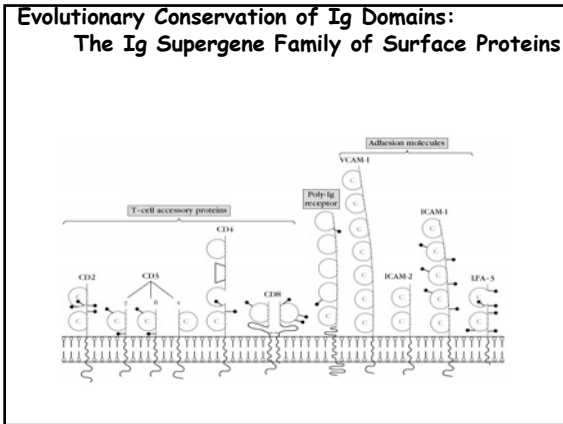
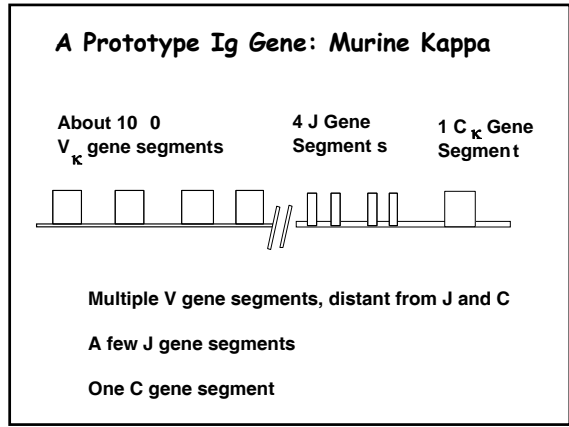
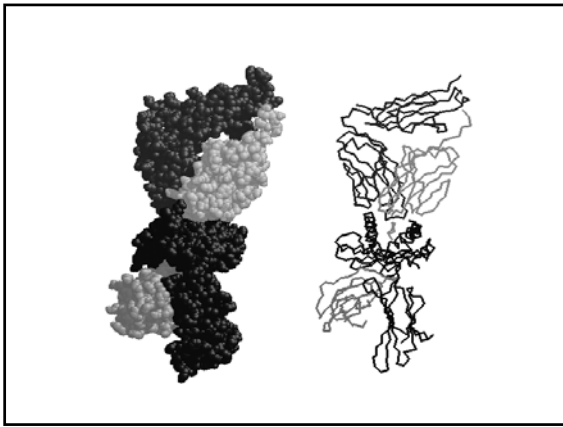
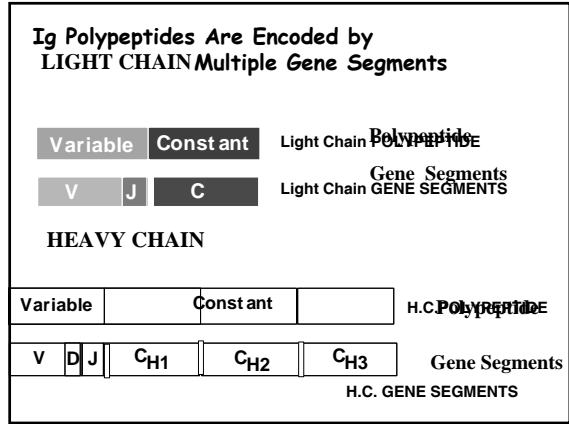
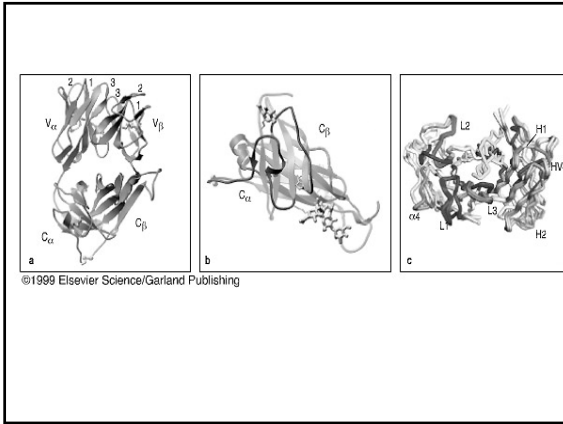
Hypervariable (HV) or Complementarity Determining Regions (CDRs)



Non-covalent forces	Origin	
Electrostatic forces	Attraction between opposite charges	$-\text{NH}_3^+ \quad \text{OOC}^-$
Hydrogen bonds	Hydrogen shared between electronegative atoms (N,O)	$\begin{array}{c} \text{N} \quad \text{H} \quad \text{O} \\ \delta^- \quad \delta^+ \quad \delta^- \end{array} \text{---} \text{C}$
Van der Waals forces	Fluctuations in electron clouds around molecules oppositely polarize neighboring atoms	$\begin{array}{c} \delta^+ \quad \delta^- \\ \delta^- \quad \delta^+ \end{array}$
Hydrophobic forces	Hydrophobic groups interact unfavorably with water and tend to pack together to exclude water molecules. The attraction also involves van der Waals forces	$\begin{array}{c} \text{H}_2\text{O} \quad \text{H}_2\text{O} \\ \delta^+ \quad \delta^- \quad \delta^- \quad \delta^+ \\ \text{H} \quad \text{O} \quad \text{C} \quad \text{H} \\ \delta^- \quad \delta^+ \\ \text{H} \quad \text{H} \end{array}$

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Human Ig Loci

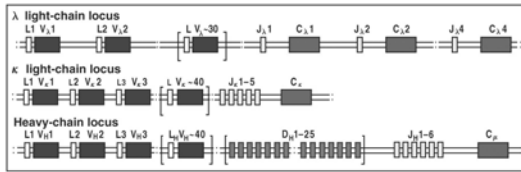
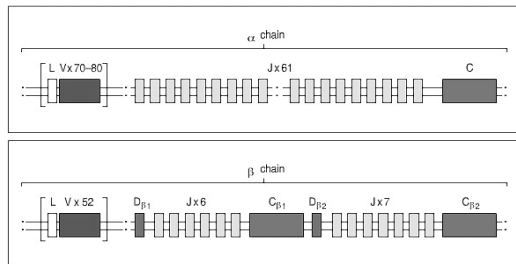


Figure 4-4 Immunobiology, 6/e. (© Garland Science 2005)

SUMMARY

1. Antibodies are comprised of 2 heavy and 2 light chain polypeptides.
2. N-terminal variable regions of antibodies recognize antigen and C-terminal heavy chain constant regions eliminate antigen.
3. Heavy and light chains are comprised of multiple Ig domains that have a characteristic beta pleated sheet structure.
4. Hypervariable amino acids in loops between beta sheets of variable regions contact antigen.
5. T cell receptors are comprised on one alpha and one beta chain and resemble Fab fragments of antibodies.
6. Genes encoding antibodies and TCRs are comprised of multiple V, D, J and C gene segments.

TCR Alpha and Beta Loci



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TCR Delta and Gamma Loci

