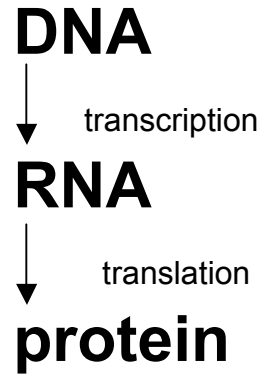
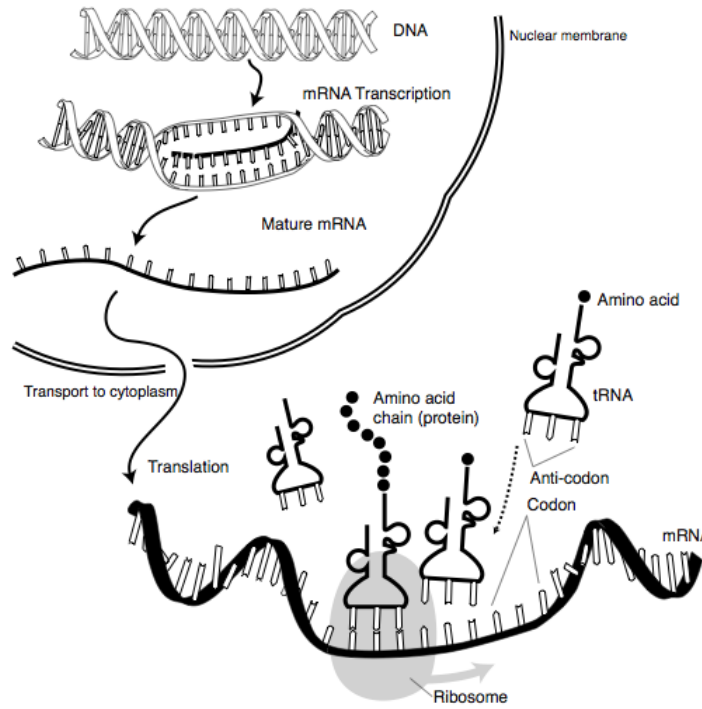
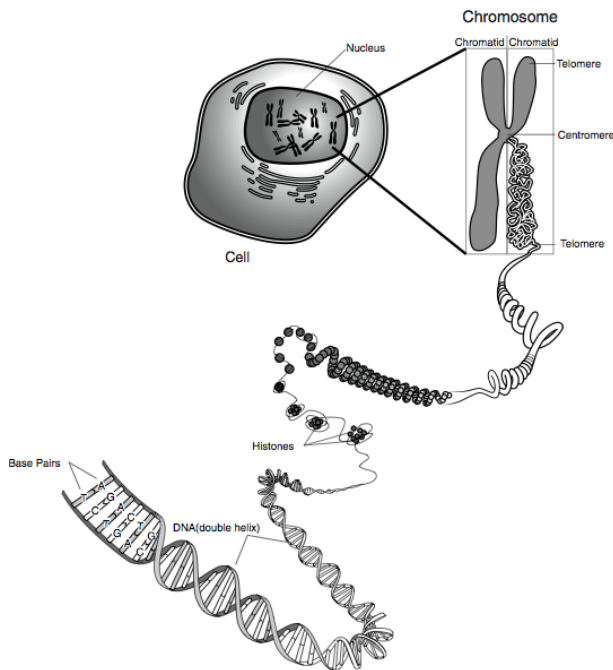


The Central Dogma

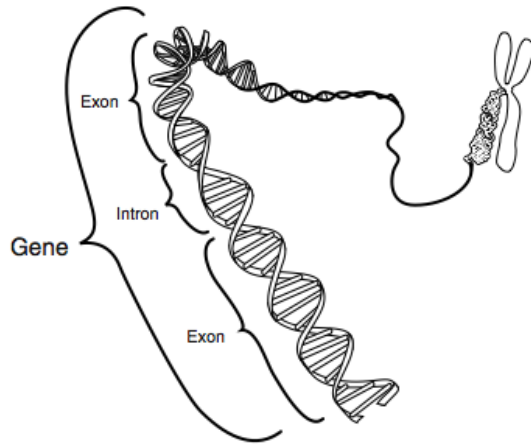
(not always true, but a good place to start!)



Packaging DNA into chromosomes

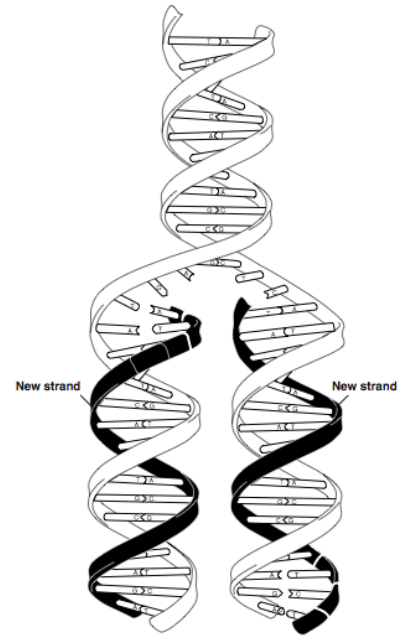
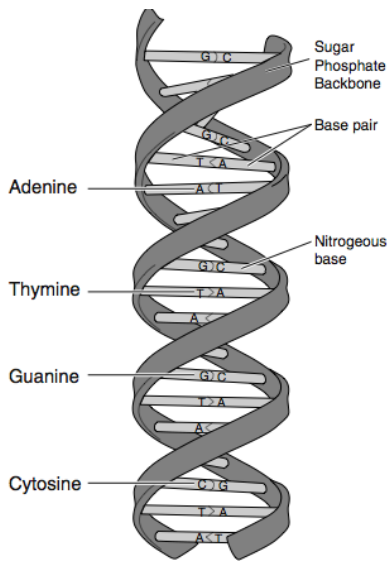
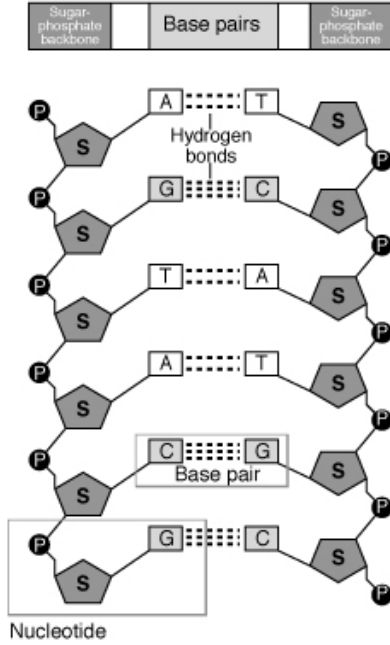


The slippery definition of a "gene"

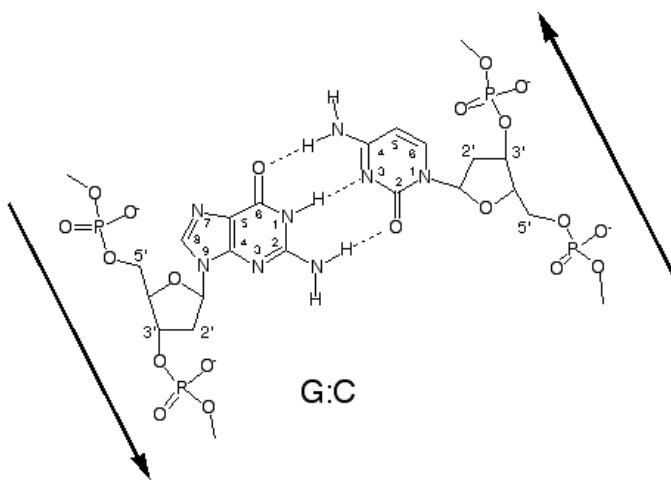
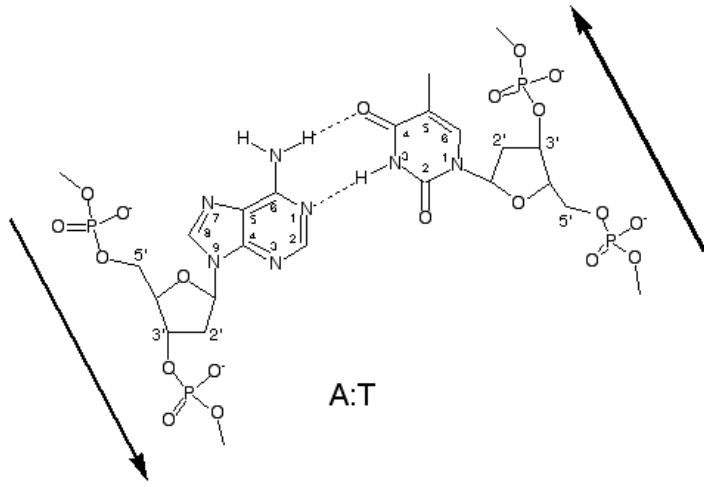


Not always encoding a Protein, can encode RNA or control expression

Deoxyribonucleic Acid (DNA)



DNA replication



DNA polarity :
5' and 3'

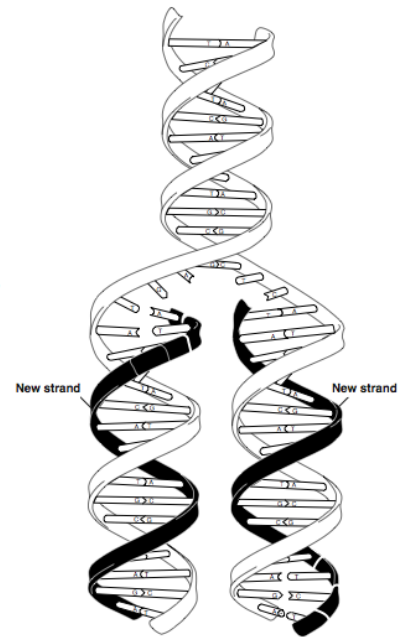
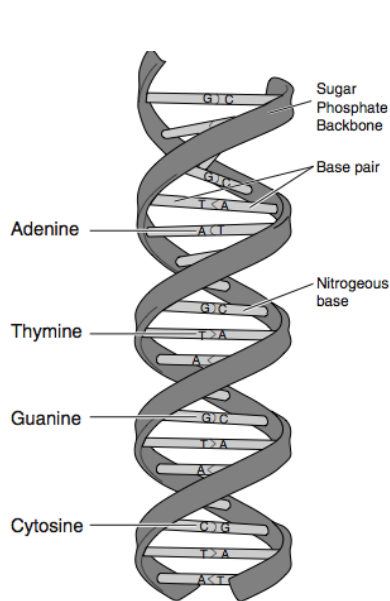
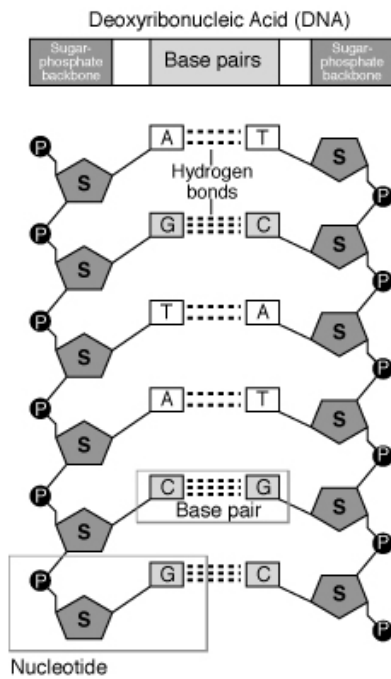
Designations are based on positions in the sugar backbone.

Strands pair through hydrogen bonding:

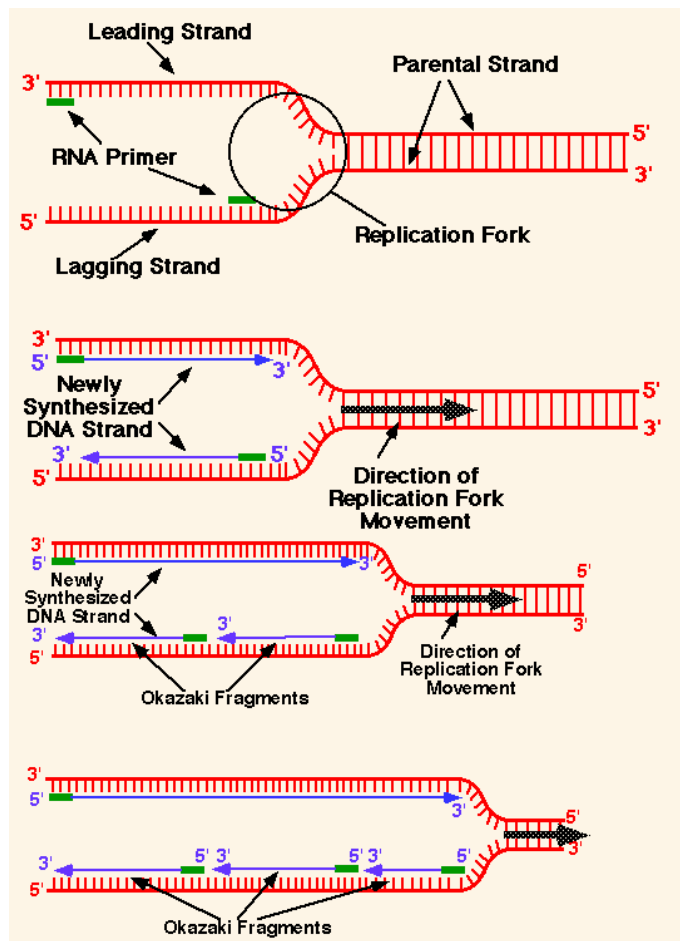
G-C 3 H bonds
A-T 2 H bonds

H bonds weak: Strands can be melted apart with heat or other forces. GC pairings stronger than AT pairings.

Structure of DNA vs RNA



DNA replication



Replication is 5'→3' only:
opposite directions for the
2 strands.

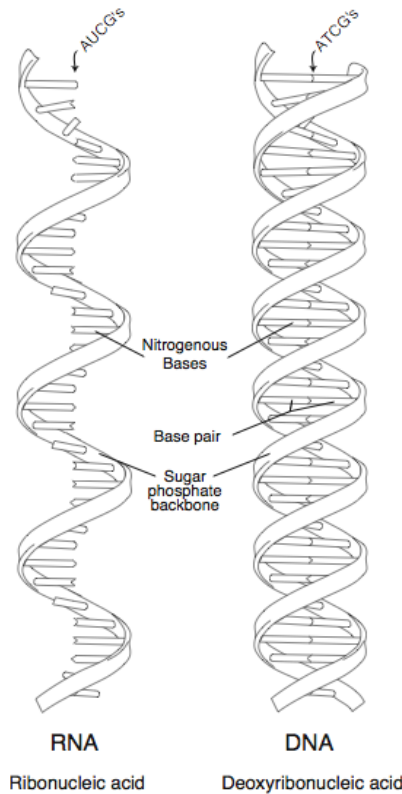
RNA primer required.

Okazaki fragments must
be ligated (joined)

Structure of DNA vs RNA

Nucleotide bases similar

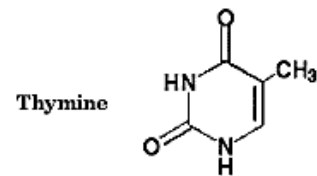
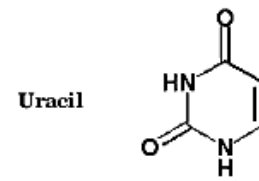
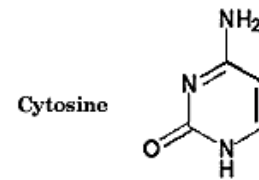
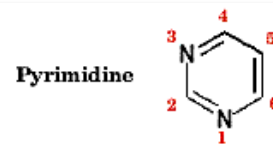
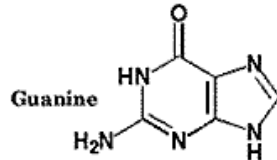
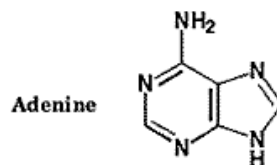
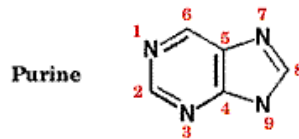
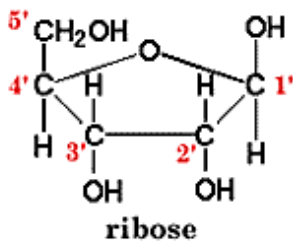
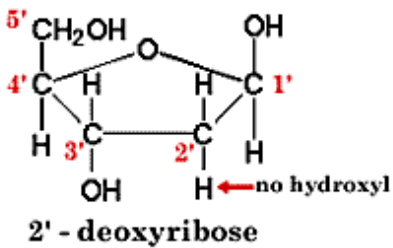
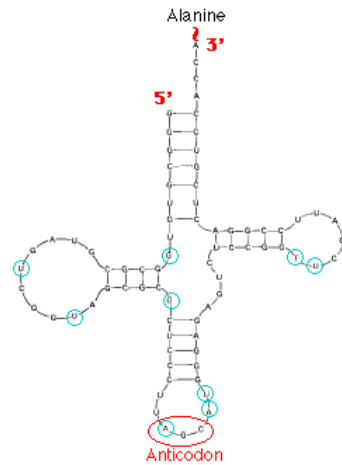
Difference in sugar of backbone



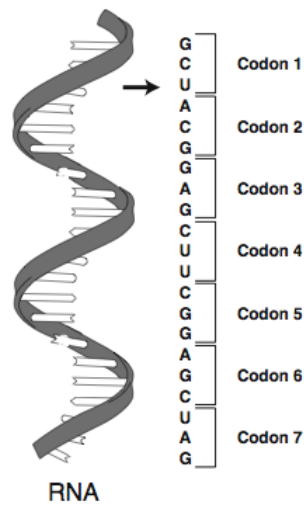
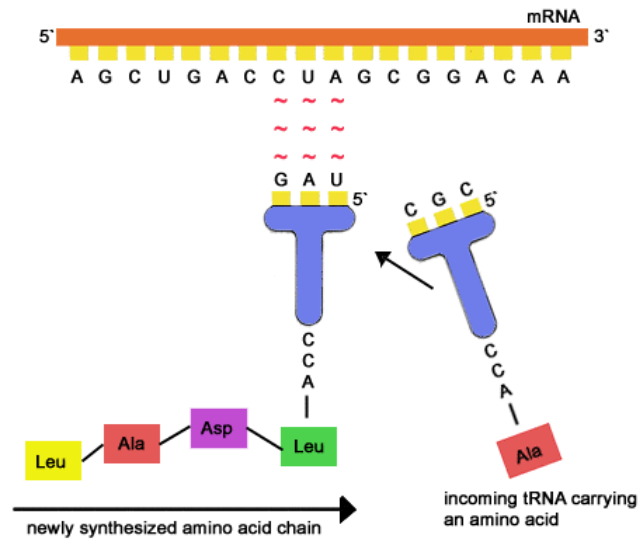
DNA usually paired with "sister" strand

RNA usually unpaired but can pair with itself or with other RNA or DNA.

tRNA for Alanine:



The genetic code and translation

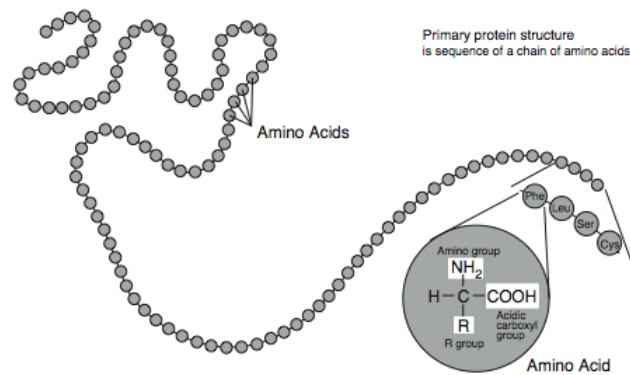


	T	C	A	G
T	TTT Phe (F) TTC " TTA Leu (L) TTG "	TCT Ser (S) TCC " TCA " TCG "	TAT Tyr (Y) TAC " TAA Ter TAG Ter	TGT Cys (C) TGC " TGA Ter TGG Trp (W)
C	CTT Leu (L) CTC " CTA " CTG "	CCT Pro (P) CCC " CCA " CCG "	CAT His (H) CAC " CAA Gln (Q) CAG "	CGT Arg (R) CGC " CGA " CGG "
A	ATT Ile (I) ATC " ATA " ATG Met (M)	ACT Thr (T) ACC " ACA " ACG "	AAT Asn (N) AAC " AAA Lys (K) AAG "	AGT Ser (S) AGC " AGA Arg (R) AGG "
G	GTT Val (V) GTC " GTA " GTG "	GCT Ala (A) GCC " GCA " GCG "	GAT Asp (D) GAC " GAA Glu (E) GAG "	GGT Gly (G) GGC " GGA " GGG "

The Genetic Code

A	R	N	D	C	Q	E	G	H	I	L	K	M	F	P	S	T	W	Y	V
Ala	Arg	Asn	Asp	Cys	Gln	Glu	Gly	Hs	Ile	Leu	Lys	Met	Phe	Pro	Ser	Thr	Trp	Tyr	Val
5' GCA	CGA	AAC	GAC	UGC	CAA	GAA	GGA	CAC	AUA	CUA	AAA	AUG	UUC	CCA	UCA	ACA	UGG	UAC	GUA 3'
	C	U	U	U	G	G	C	U	C	C	G	U	U	C	C	C		U	C
	G	U					G		U	G	U			G	G	G			G
	U						U			U				U	U	U			U
		or								or					or				
		AGA								UUA					AGC				
		G								G					U				

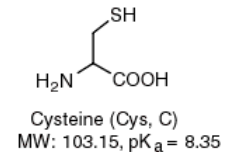
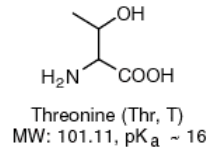
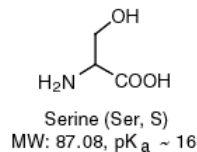
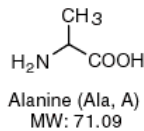
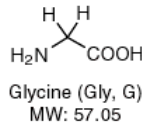
Protein amino acids and polypeptides



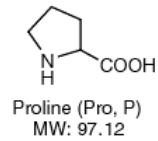
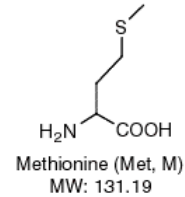
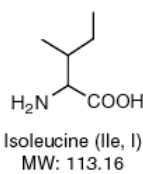
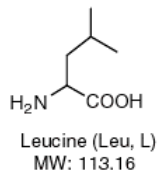
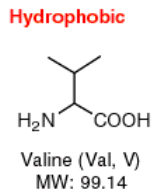
Amino Acid Structures

Each amino acid is accompanied by its three- and one-letter code, residue molecular weight (actual molecular weight minus water) and side-chain pK_a where appropriate.

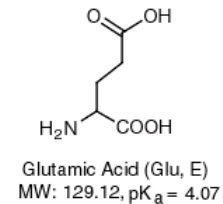
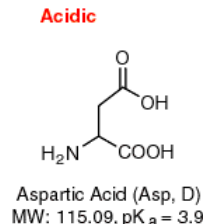
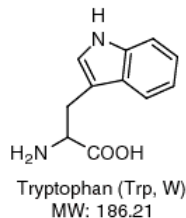
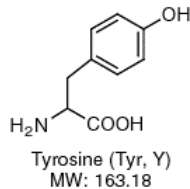
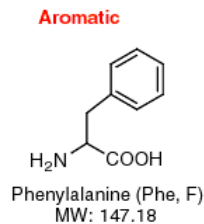
Small



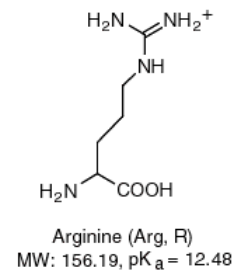
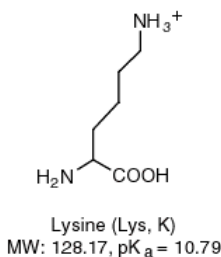
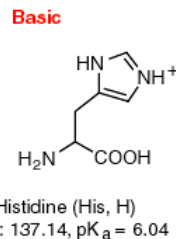
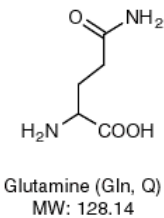
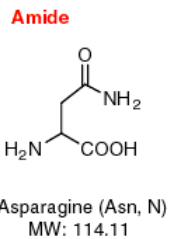
Nucleophilic



Hydrophobic



Aromatic



Amide

Basic