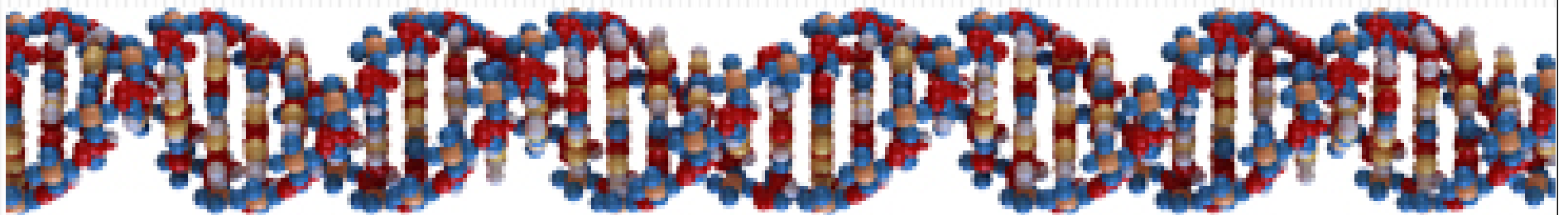


DNA/RNA

Replication issues

Sara Marvin
Kelly Anderson
Sereane Bowstring

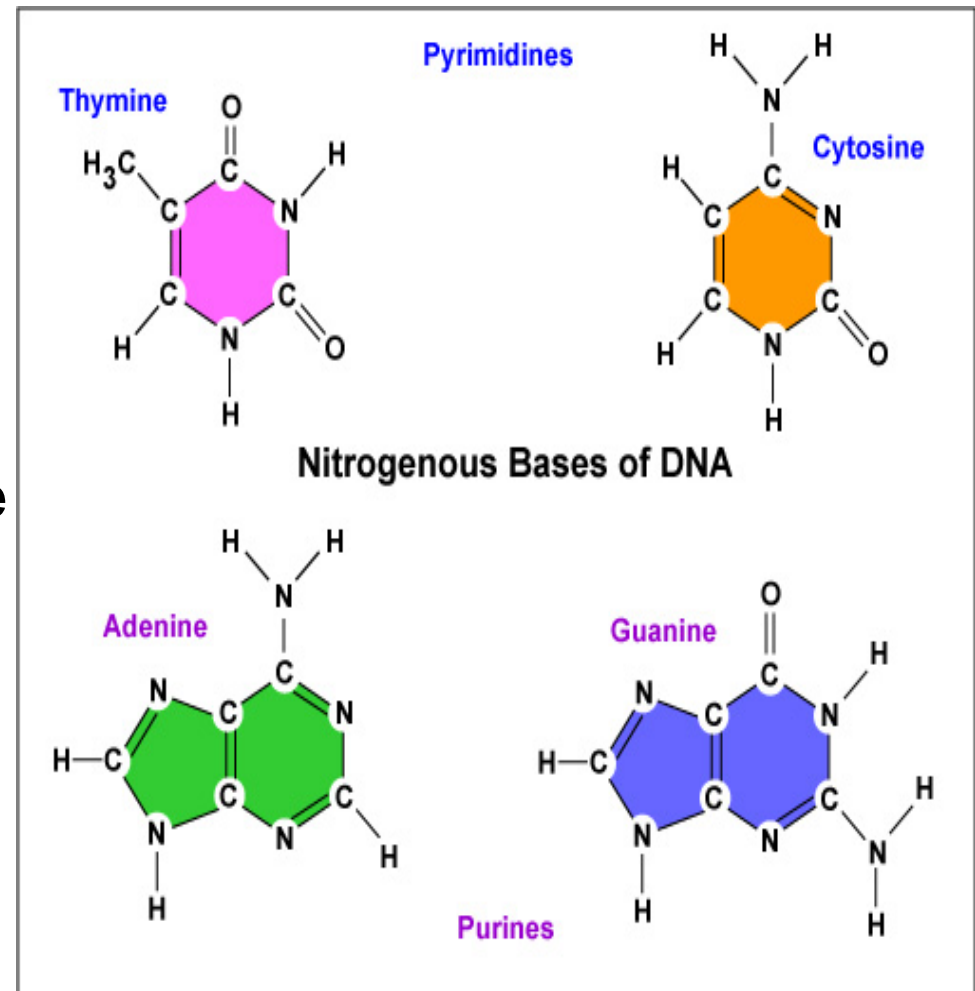


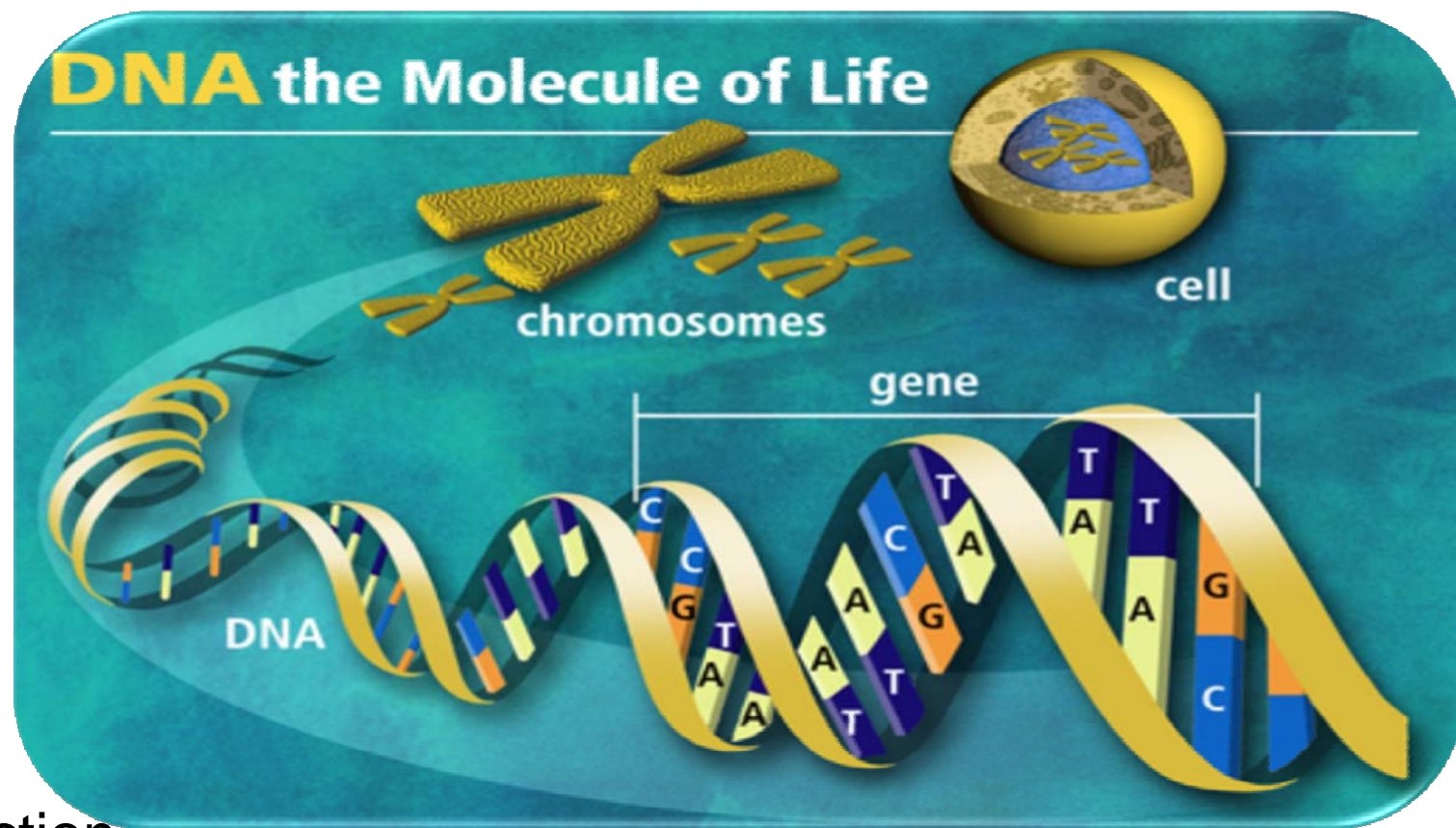
<http://dnaandna.com>

DNA - Deoxyribonucleic Acid

Structure:

- ✓ DNA is found in the nucleus of cells
- ✓ Holds genetic material that determines the shape, size and growth of an organism
- ✓ Double stranded helix made up of nucleotides – four bases; Adenine, Thymine, Guanine and Cytosine
- ✓ For encoding genetic information, the central feature of DNA structure is the A-T and G-C base pairing.





Function:

<http://www.paternityexperts.com/basicgenetics.html>

- ✓ Directs order of linking amino acids in protein construction
- ✓ Order of nucleotides determine order of amino acids for protein synthesis, also known as the **genetic code**
- ✓ Must be able to replicate and must direct protein synthesis for it to play a role in inheritance

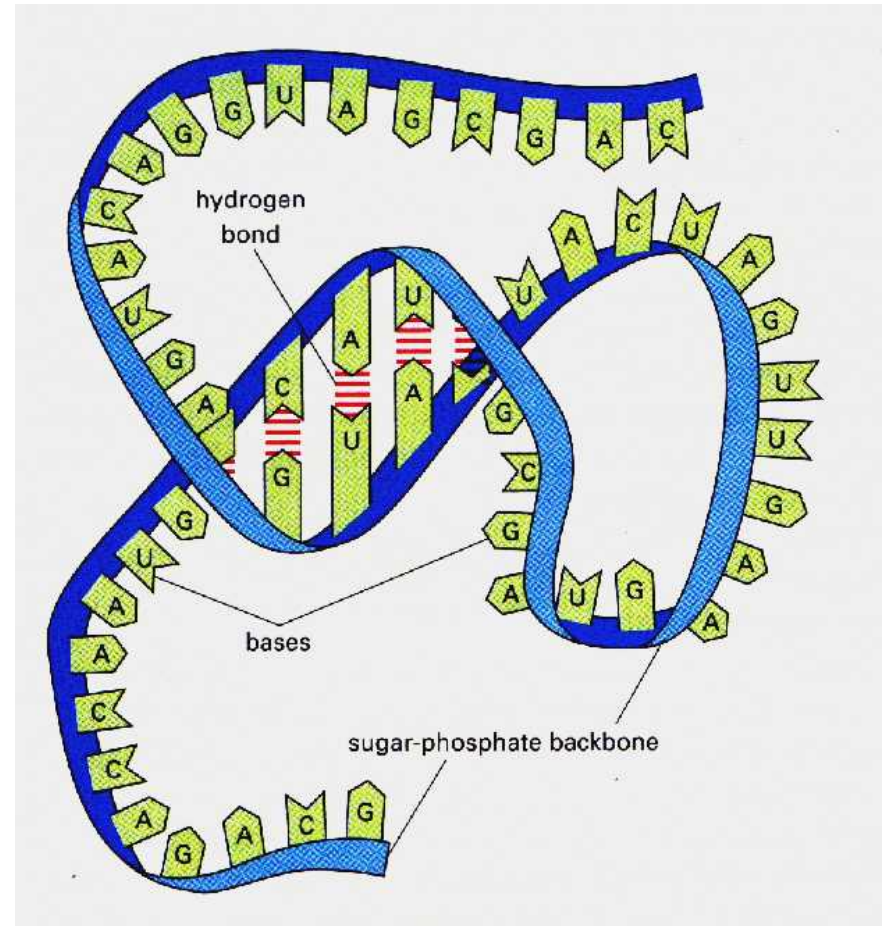
RNA – Ribonucleic Acid

Structure:

- ✓ Single stranded molecules similar to DNA
- ✓ Four base pairing: Adenine, Guanine, Cytosine and Uracil (replaces Thymine)

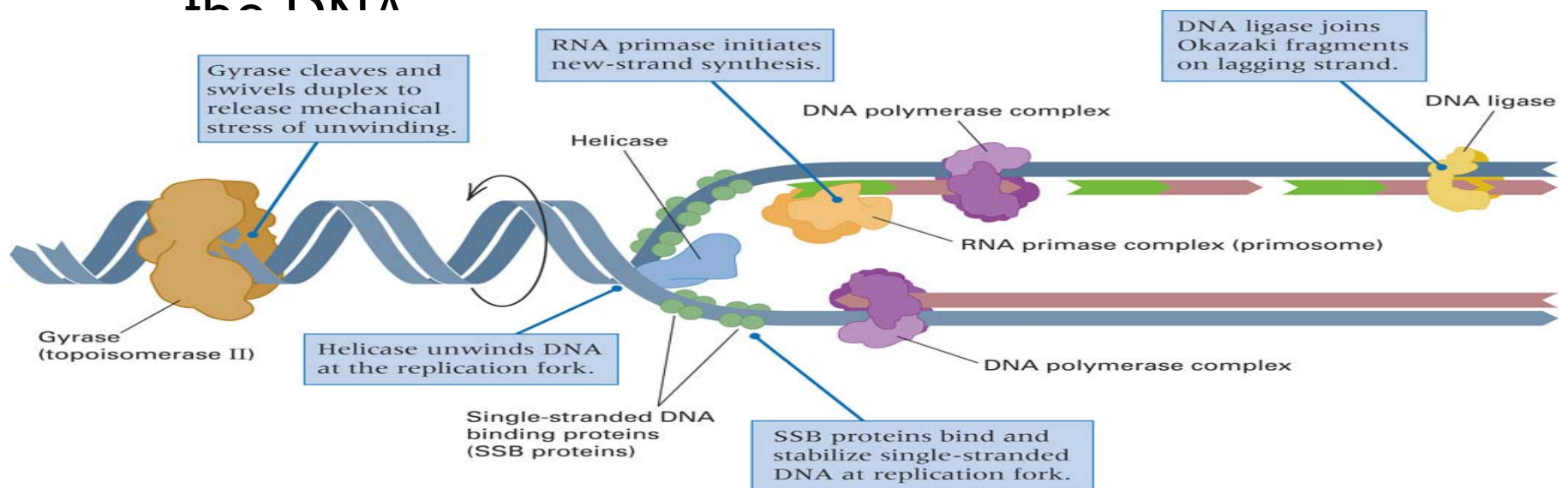
Function:

- ✓ Convert genetic information in DNA into proteins.



Replication of DNA and RNA

- ✓ DNA must unwind and break weak hydrogen bonds between base pairs prior to replication which creates the template for synthesis of new strands and never repairs back to original strand.
- ✓ RNA nucleotides bind to the template strands of the DNA



RNA World

- ✓ It was once thought that RNA was the carrier of genetic information, not DNA.
- ✓ RNA acted as a genetic code and catalyst for various reactions involved in metabolism and for its own assembly.
- ✓ Ribozymes enable the catalyst of RNA
- ✓ “Without cells, RNA can evolve just like natural populations of organisms.” *Dr. Niles Lehman*

Problems with RNA World:

- ✓ High level of Cytosine in original RNA which results in a high level of Guanine in the replicate.
- ✓ A very specific activation agent was necessary in lab experiments.
- ✓ Many think the successful replications in lab involved too much scientist interference.

Experiments for RNA World

Stanley Miller and Michael P. Robertson, University of California San Diego; Synthesized cytosine and uracil under plausible prebiotic conditions.

Researchers at Massey University in New Zealand; developed a picture of a hypothetical RNA-based organism that was more in line with a eukaryote than that of a single, circular chromosome of a prokaryote.

“Jerry Joyce has shown how diverse populations of RNA can undergo selection and evolution to generate new sequences and functions” *Dr. Niles Lehman*

Summary of Origin and Evolution of Life