All information for eukaryotic cell survival and function is stored in the nucleus as DNA. The processes of transcription and translation allow the cell to communicate genetic information as messenger RNA (mRNA), which is then used as a blueprint to build proteins.

### Transcription: From DNA to mRNA

1. **Initiation**: RNA polymerase binds at the promoter region of a specific gene to open the DNA double helix.
2. **Elongation**: Base-pairs (A-U, C-G) are added in the 5' to 3' direction. 
   - **Note**: In RNA, uracil replaces thymine as the base-pair for adenosine.
3. **Termination**: mRNA is released.
4. **Processing**:
   - Prevent degradation: add 5' cap + poly-A tail
   - Splicing: remove introns and join exons

### Translation: mRNA to protein

- **Note**: 3 nucleotides, referred to as a **codon**, encode one amino acid, carried to the ribosome by a tRNA molecule.

Ribosomes are composed of a large and small subunit that come together to form 3 sites:
- **A**: A tRNA molecule carrying a specific amino acid binds to the corresponding mRNA codon
- **P**: An amino acid is added to the growing polypeptide chain
- **E**: tRNA is released from the ribosome

**Memory Trick**: APE
- **A** = Acceptor, **P** = Polypeptide, **E** = Exit