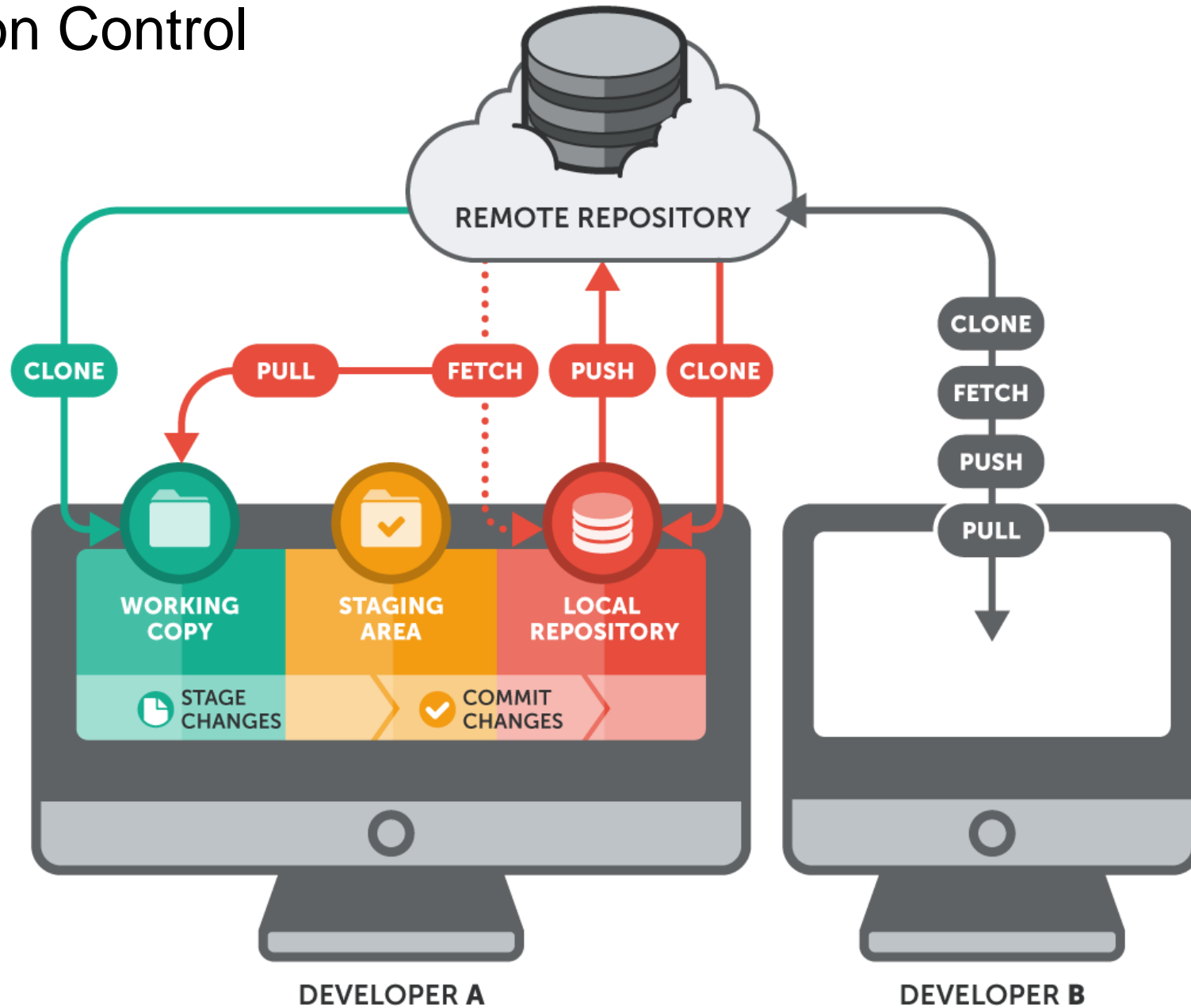# BI694
Bioinformatics & Phylogenetics

Winter Semester 2017

WEEK 6

Python Programming: BioPython

Genetics 101

git – Version Control

git – Version Control

$ git fetch   # should download f les without merging remote and local f les

$ git pull   # downloads remote and merges these with the local f les

What should you do?

$ git stash   # run the stash command in your folder to set your modif ed aside

$ git pull   # pulls f les from the cloud into your local folder and merges remote with local;
                     # this may overwrite changes you made in you local folder

$ git stash pop   # overwrite f les that came from upstream with the f les you set aside earlier

$ git stash show   # shows the f les that were reverted to your local f les

Install BioPython – we will need it later

```
sudo apt-get install python-biopython
```
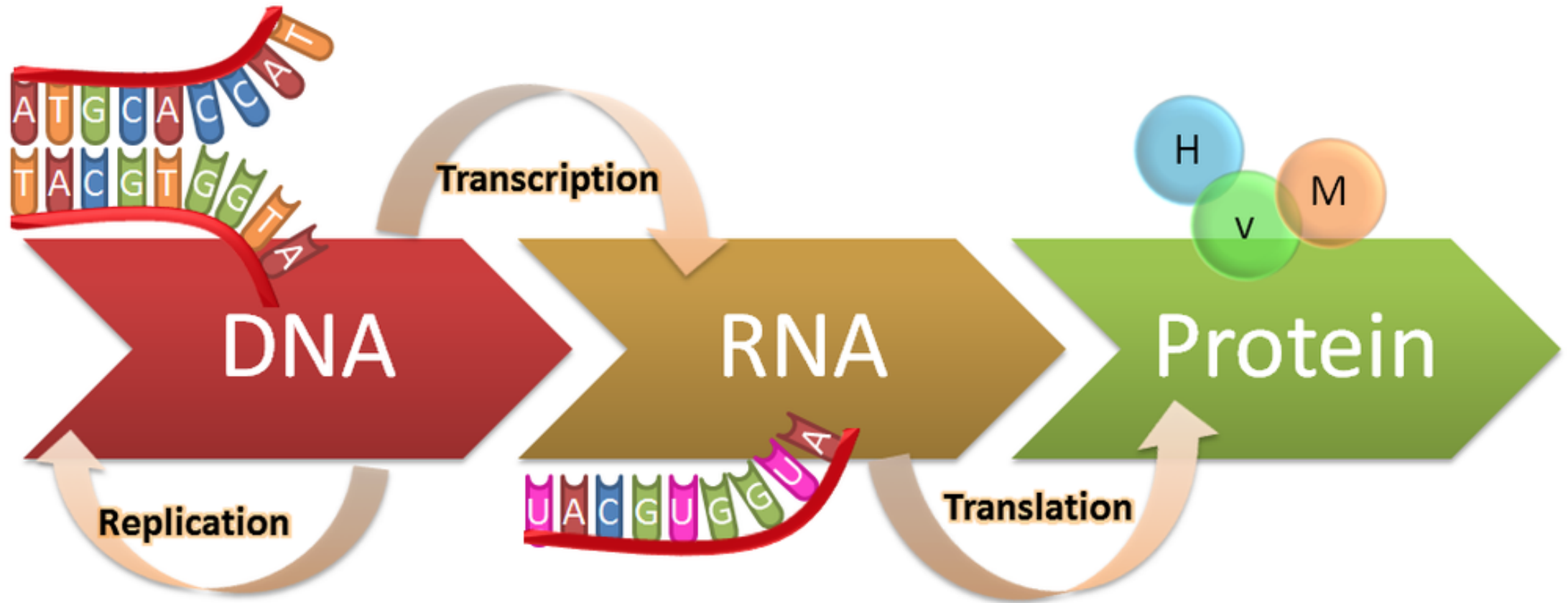
Reading a File using a While Loop

```
Line = File.readline()
while Line:
    do something
    Line = File.readline()
```
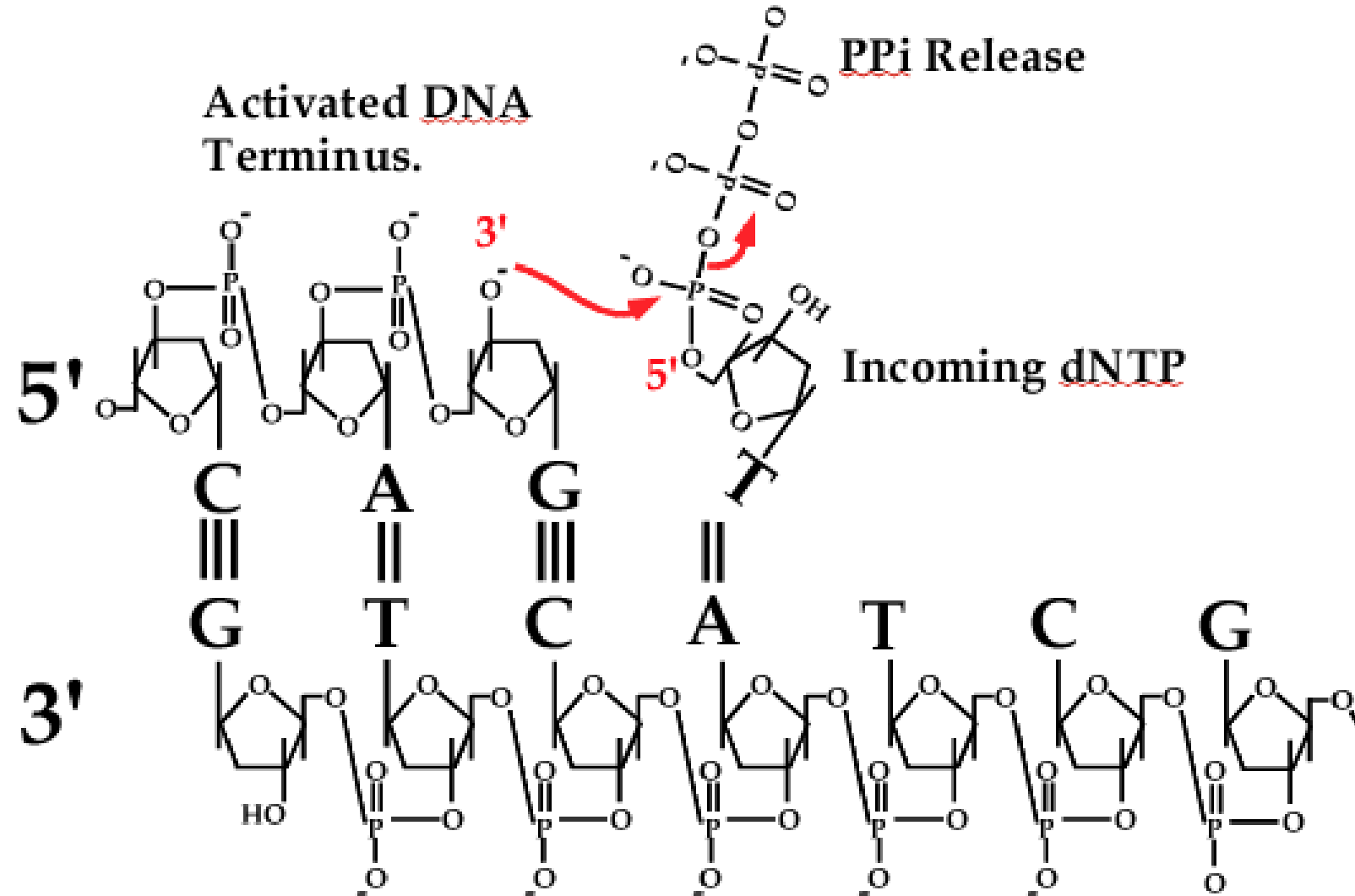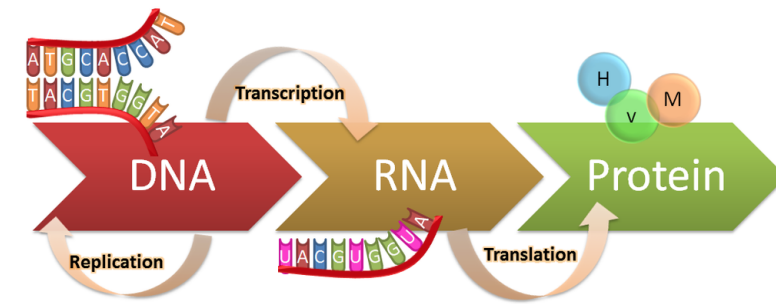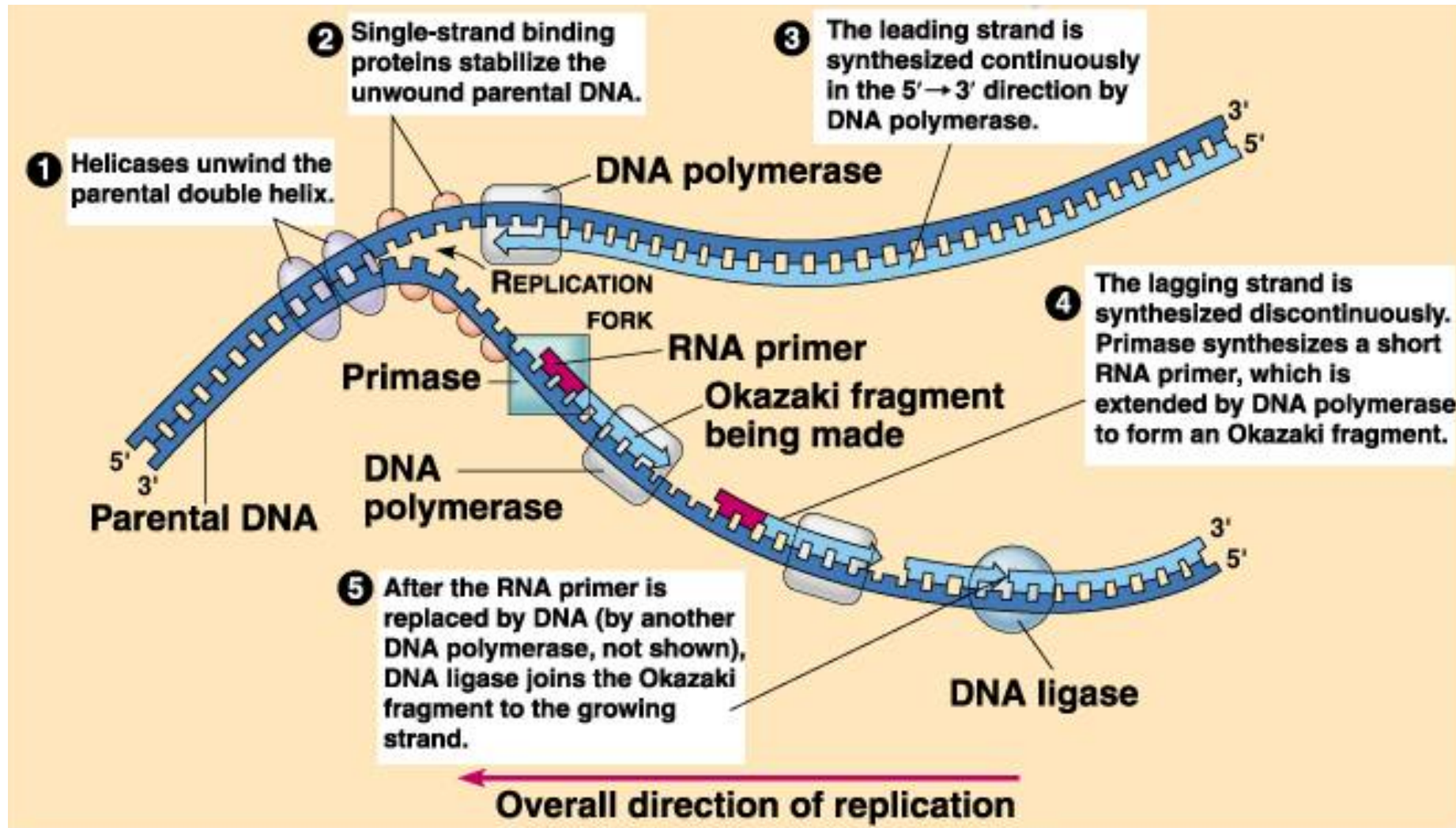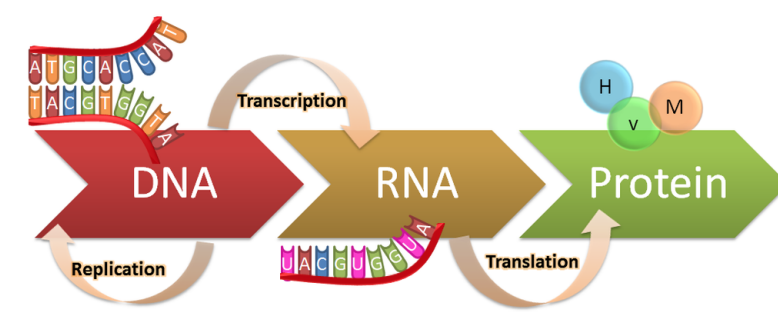
DNA   RNA   Protein

DNA   Replication

Activated DNA Terminus.

PPi Release

3'

5'

Incoming dNTP

5'
C   A   G
||| || |||
G   T   C   A   T   C   G
3'

HO

DNA Replication

① Helicases unwind the parental double helix.

② Single-strand binding proteins stabilize the unwound parental DNA.

③ The leading strand is synthesized continuously in the 5'→3' direction by DNA polymerase.

④ The lagging strand is synthesized discontinuously. Primase synthesizes a short RNA primer, which is extended by DNA polymerase to form an Okazaki fragment.

⑤ After the RNA primer is replaced by DNA (by another DNA polymerase, not shown), DNA ligase joins the Okazaki fragment to the growing strand.

DNA polymerase

REPLICATION FORK

RNA primer

Okazaki fragment being made

Primase

DNA polymerase

5'
3'

Parental DNA

DNA ligase

3'
5'

3'
5'

Overall direction of replication

RNA   Transcription

RNA polymerase

3' DNA
5'

Promoter — Sigma factor

Terminator

Attachment of RNA polymerase

3'
5'

Template DNA strand

Unzipping of DNA, movement of RNA polymerase

(a) Initiation of transcription

3'
5'

Growing RNA molecule

Template DNA strand

(b) Elongation of the RNA transcript

RNA polymerase released

3'
5'

RNA transcript released

C-G rich stem-loop

UUUUUUUU

CGGCGGTCAAGGCGACCGCCCGTAAAAAA

Rho termination protein

Rho protein moves along RNA

3'

(c) Termination of transcription

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Transcription

DNA   RNA   Protein

H V M

Replication

Translation

RNA   Transcription

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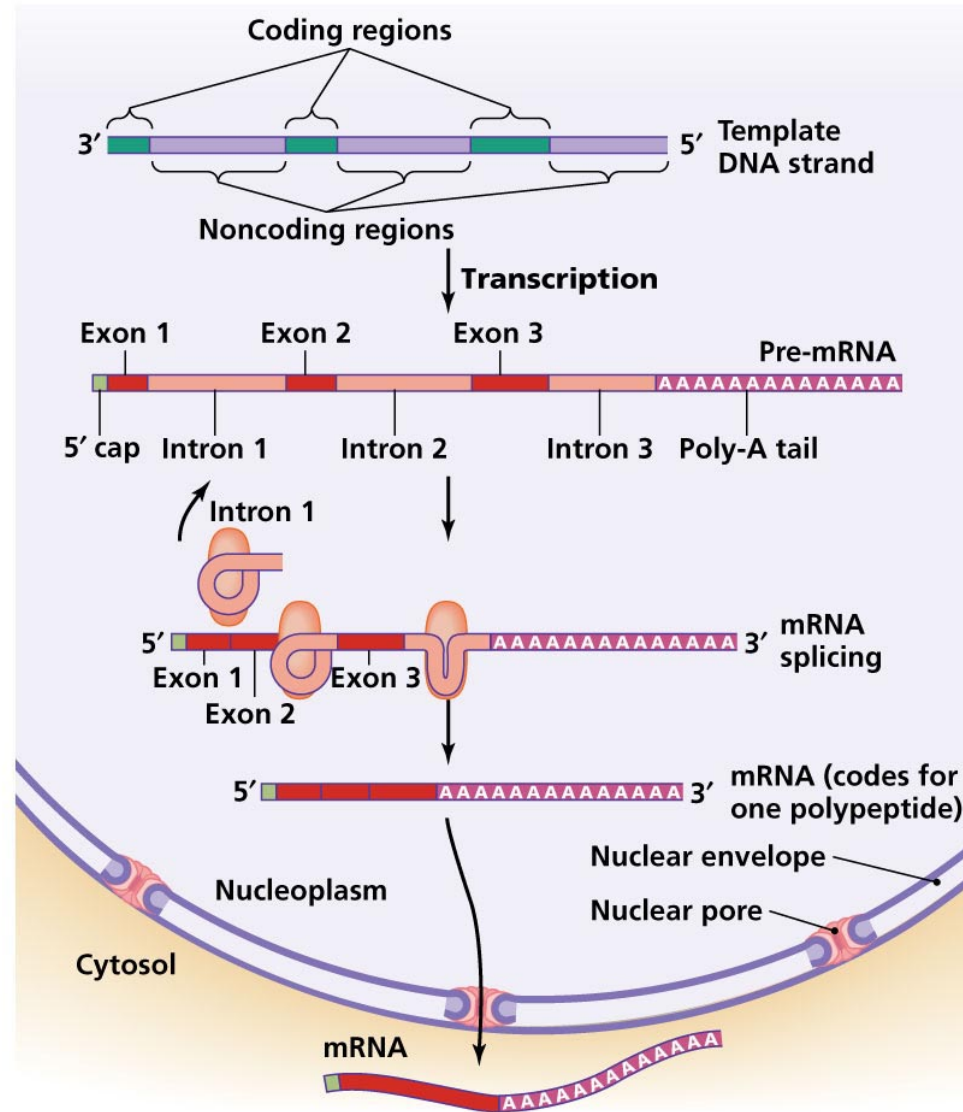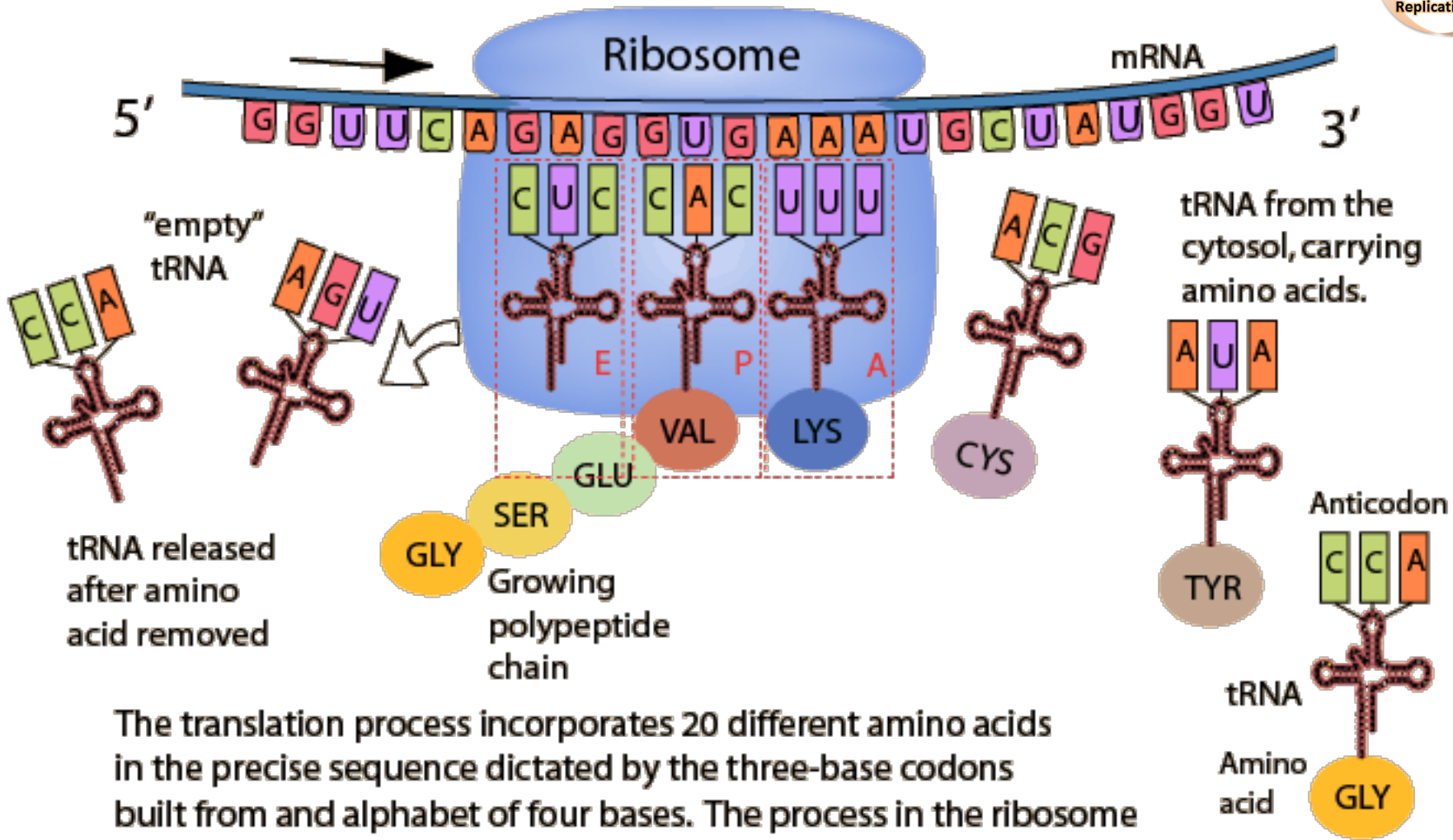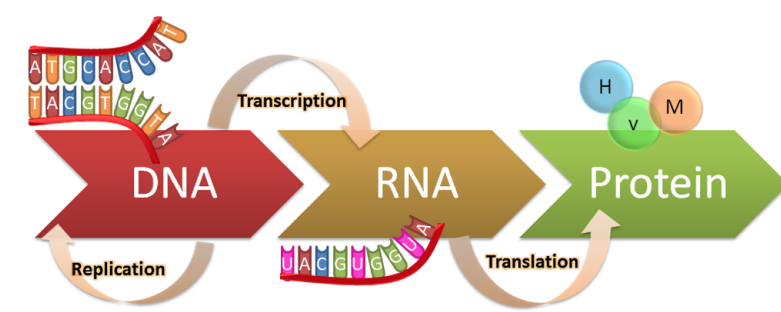
RNA   Translation

The translation process incorporates 20 different amino acids in the precise sequence dictated by the three-base codons built from and alphabet of four bases. The process in the ribosome builds the polypeptide chains tha will become proteins.

BioPython – let's work through some examples

http://biopython.org/wiki/Seq