

Recombinant DNA

Better understanding of genes, gene expression and the control mechanism

- Opportunities for new treatments of diseases and ailments
- Possibility of greatly improved crop yields
- Possibility of greatly improved production of food from domesticated animals

Recombinant DNA

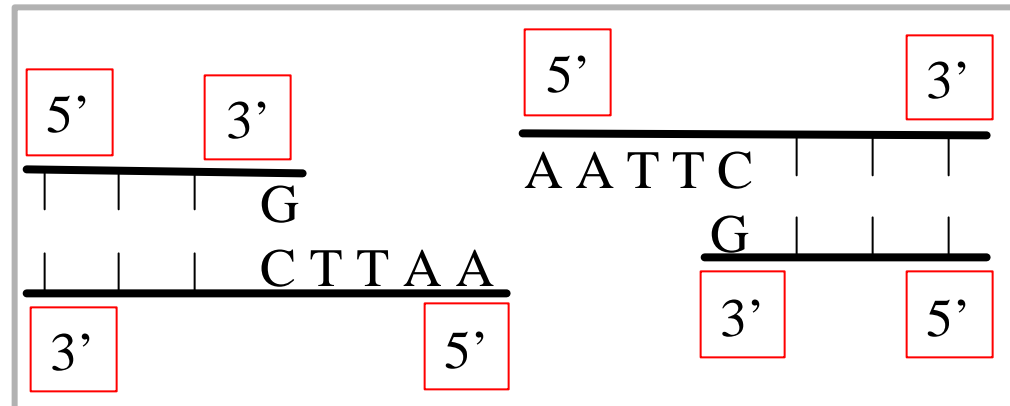
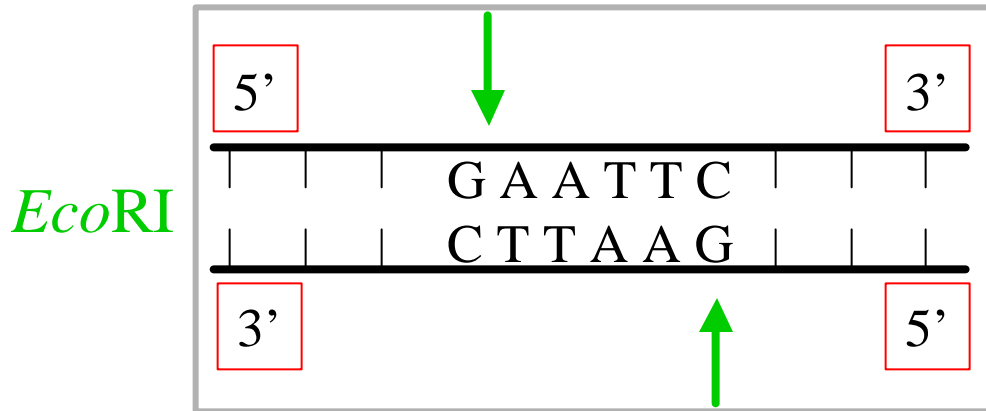
The new techniques of DNA/gene manipulation has centered on

- Isolation of DNA
- Amplification of DNA
- Sequencing of DNA
- Expression analysis of genes

Based on the insertion of a particular piece of foreign DNA into a
vector

Recombinant DNA Tools

1. Restriction endonucleases
cut DNA at a specific site



Recombinant DNA

Tools

1. Restriction endonucleases

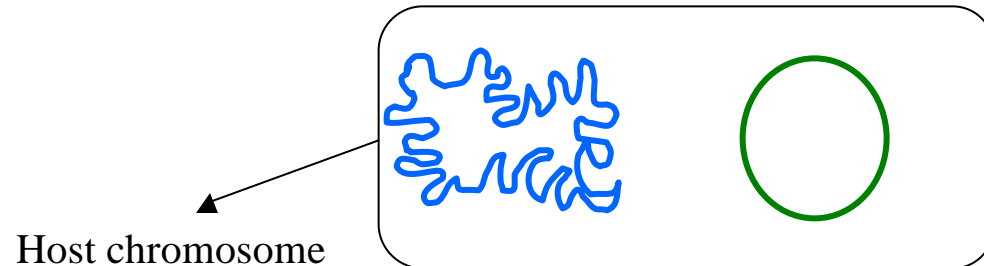
cut DNA at a specific site

2. Host organism

An organism in which multiple copies of the gene of interest will be made and studied

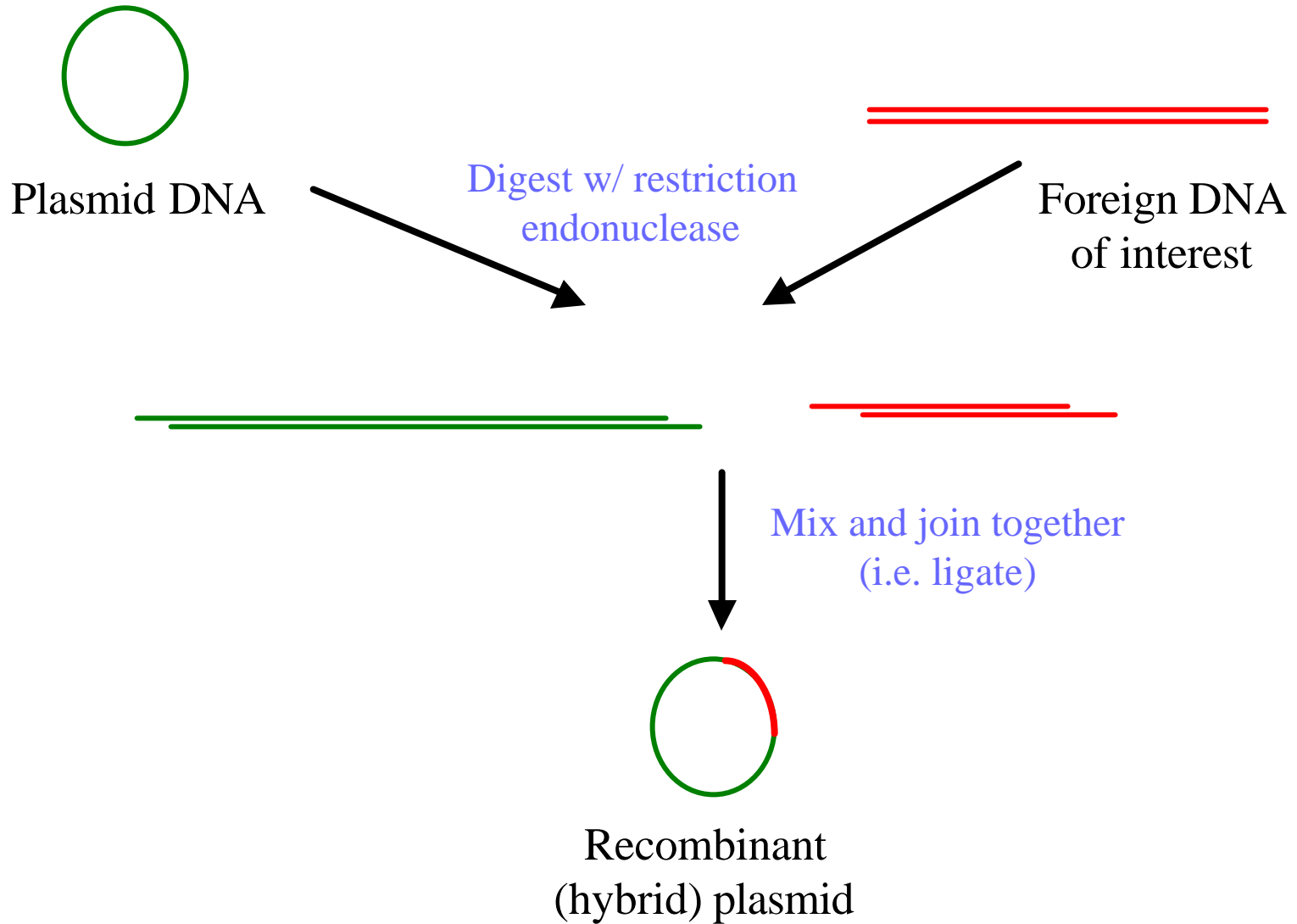
3. Vector (plasmid or phage)

A DNA that can transmit and make multiple copies of the gene of interest

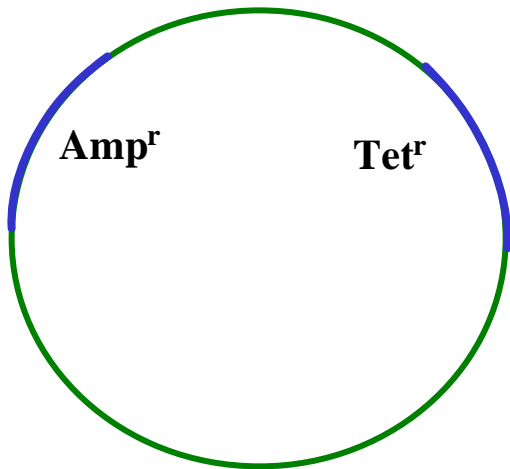


Escherichia coli (E. coli)

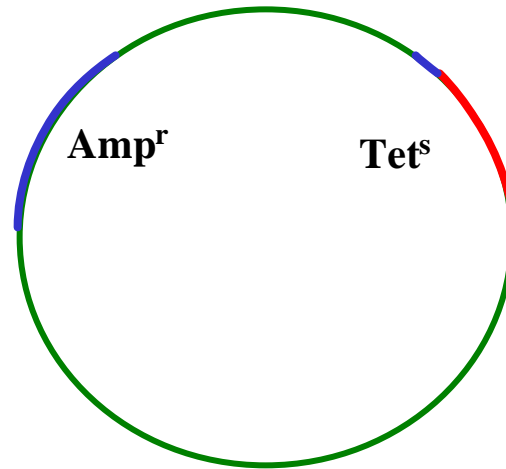
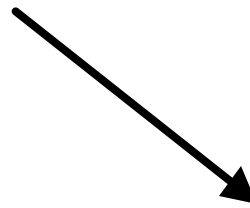
Recombinant DNA Protocol



Recombinant DNA Protocol



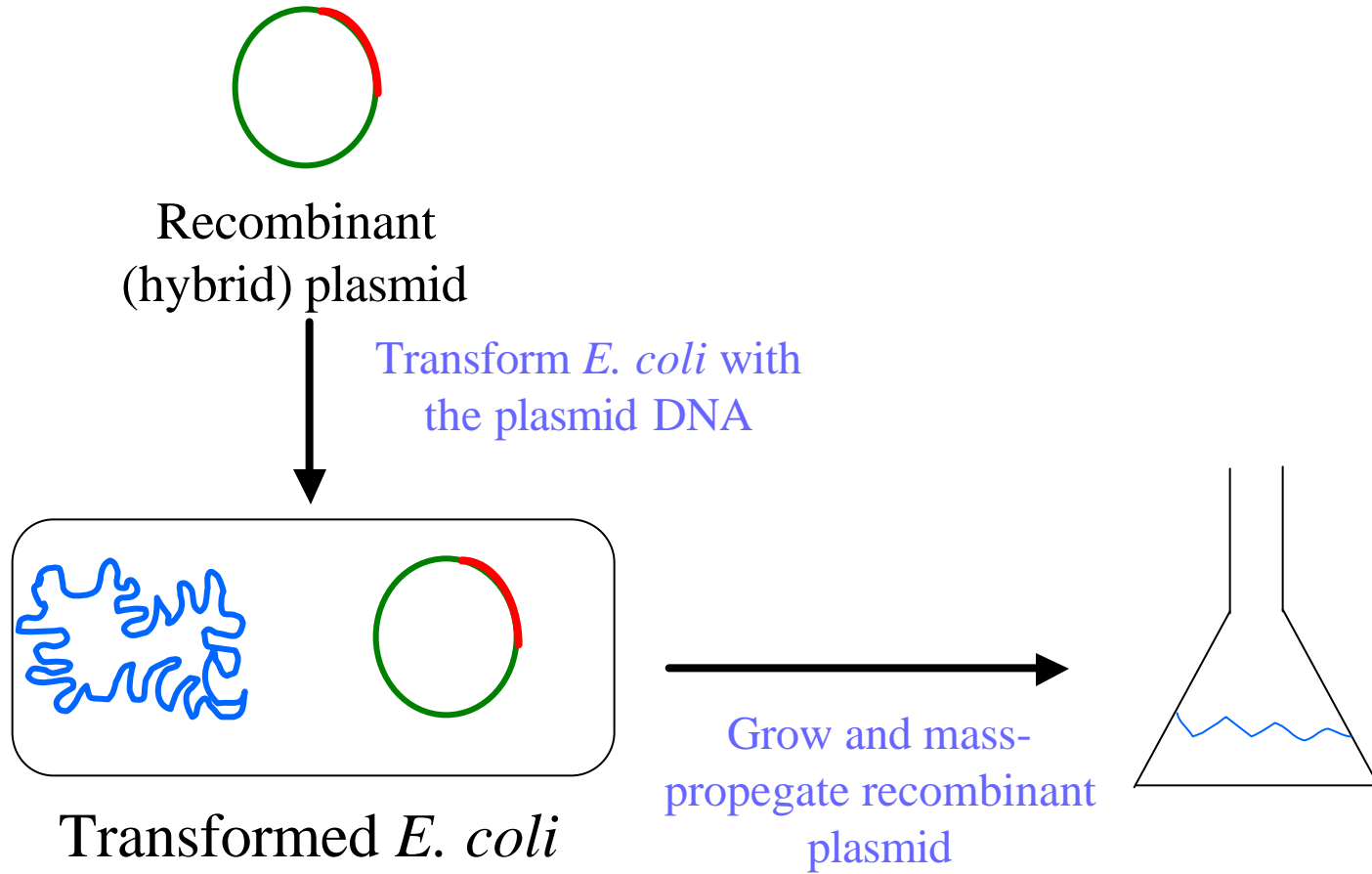
Plasmid DNA



Recombinant
(hybrid) plasmid

Antibiotic resistance genes such as ampicillin and tetracycline can be used to select recombinant plasmids

Recombinant DNA Protocol

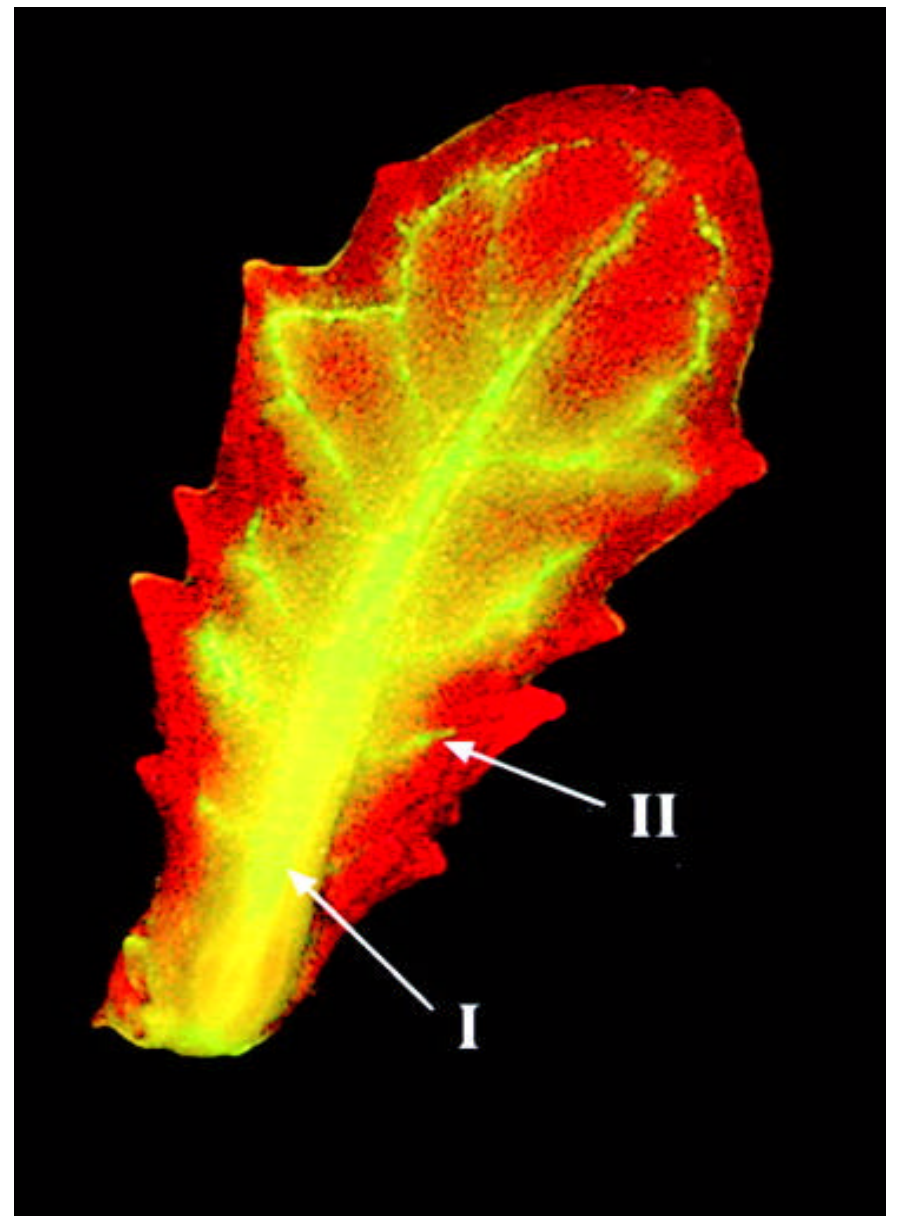
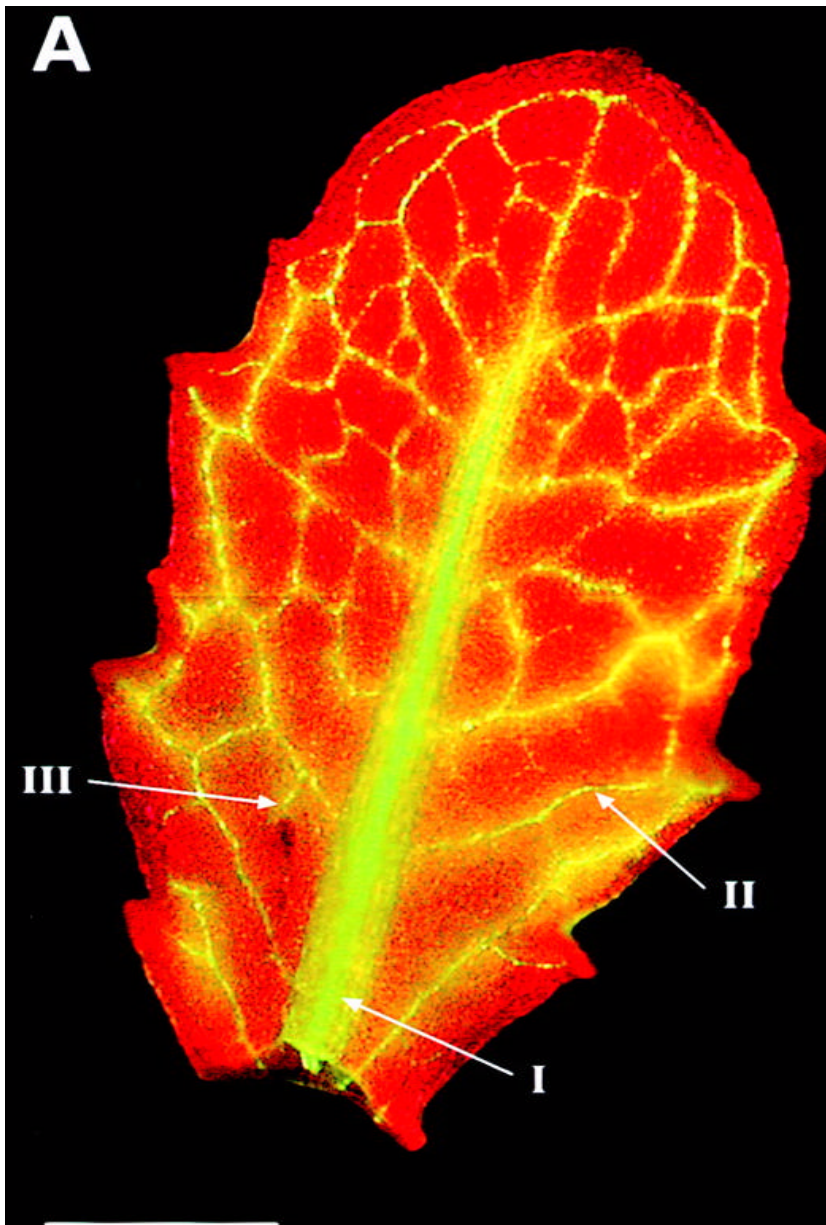


E. coli doubles in #s every 20 minutes

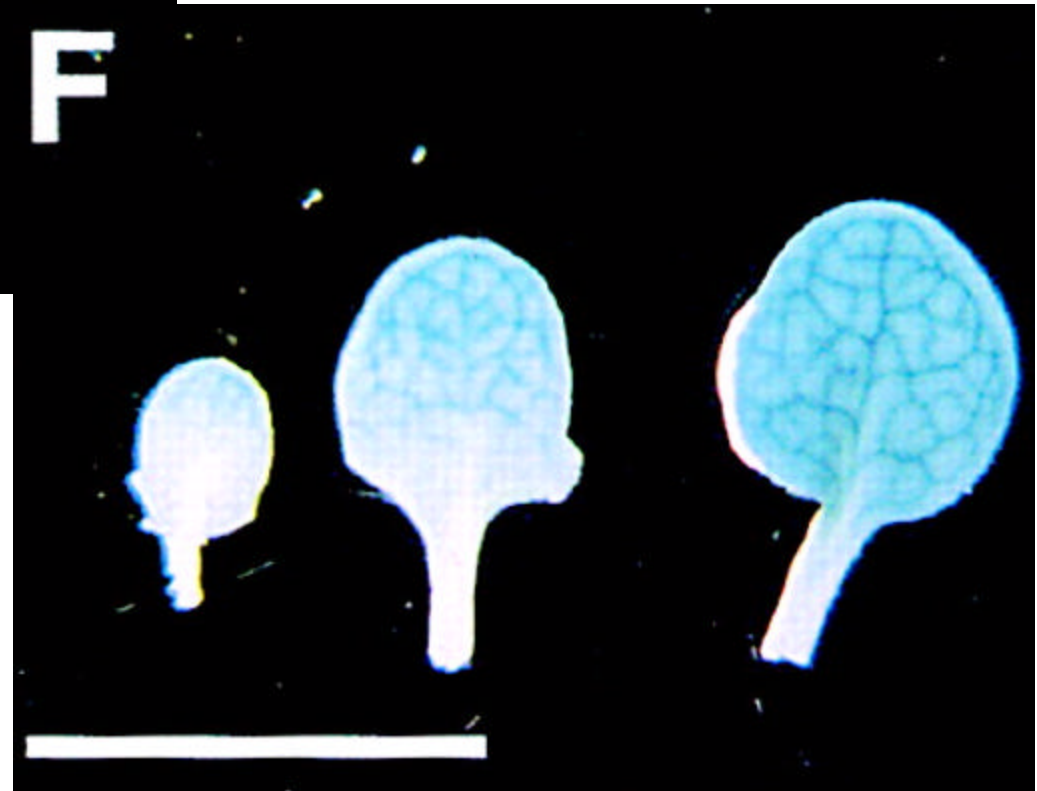
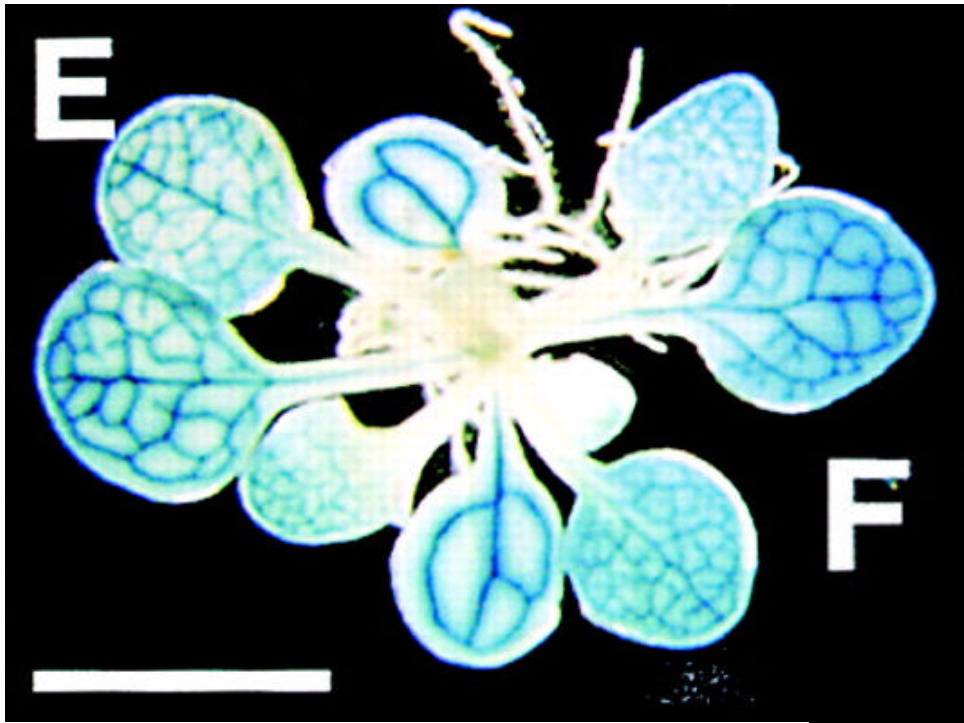
Recombinant DNA

➤ The genetic code is universal

Recombinant DNA and transgenic technologies are based on the fact that all organisms utilize the same DNA codons to specify the same amino acids.



The “Green Florescent Protein” gene was isolated from jelly fish



The β -glactocidase (i.e. blue stain) gene was isolated form bacteria

Drugs Produced Using Recombinant DNA Technology

| Drug | Use |
|---------------------------|--|
| Insulin | Allows cells to take up glucose in treatment of diabetes |
| Interleukin-2 | Treats kidney cancer |
| Deoxyribonuclease (DNase) | Thins pus in lungs of people with cystic fibrosis |
| Human growth hormone | Promotes growth of muscle and bone in people with very short stature due to hormone deficiency |
| Superoxide dismutase | Prevents further damage to heart muscle after heart attach |
| Factor VIII | Promotes blood clotting in treatment of hemophilia |
