

5.3 Genetic Modification

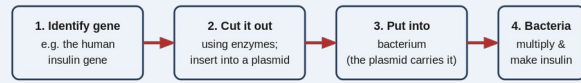
Mr Curran · practical-science.com

1. KEY VOCABULARY

TERM	MEANING
Genetic modification	Transferring a gene from one organism into another.
Gene	A section of DNA that codes for a characteristic.
Enzyme	Used to cut the required gene out of the DNA.
Plasmid	A small ring of bacterial DNA used to carry the gene.
Transgenic	An organism that contains a gene from another species.

2. THE PROCESS

GENETIC MODIFICATION — moving a gene between organisms



The transferred gene is the same code in any organism — so a bacterium can read a human gene.

Uses: insulin for diabetes · crops resistant to pests or herbicides · crops with added vitamins.

Concerns: effects on wild species and biodiversity; ethical questions; long-term safety.

3. MAKING INSULIN — AN EXAMPLE

1. The human insulin gene is identified and cut out using enzymes.
2. It is inserted into a bacterial plasmid.
3. The plasmid is put back into a bacterium.
4. The bacteria multiply and produce large amounts of insulin.

4. USES OF GM

- bacteria making human insulin for people with diabetes
- crops resistant to pests, disease or herbicides
- crops with added nutrients (e.g. extra vitamin A)

5. BENEFITS & CONCERNS

Benefits: large quantities of medicine made cheaply; higher crop yields; crops that need fewer pesticides.

Concerns: possible effects on wild species and biodiversity; ethical objections; uncertainty about long-term safety.

6. THE WHY

Why a bacterium can use a human gene: the genetic code is universal — the same DNA bases mean the same thing in every organism, so a bacterium can 'read' a human gene.

Why plasmids are used: they are small, easy to cut open and re-seal, and bacteria take them up readily.

7. COMMON EXAM MISTAKES

- ✗ "GM and selective breeding are the same thing."
- ✓ GM transfers a specific gene directly; selective breeding just chooses parents.
- ✗ "The insulin is made by the human gene itself."
- ✓ The bacteria make the insulin, using the inserted gene as the instructions.
- ✗ "A plasmid is a type of enzyme."
- ✓ A plasmid is a ring of DNA; enzymes are used to cut the gene.

8. SELF-CHECK · cover & quiz

Can you...

1. Define genetic modification?
2. Describe the steps of making insulin using bacteria?
3. State the role of enzymes and of plasmids?
4. Give three uses of genetic modification?
5. Give one benefit and one concern of GM?
6. Explain why a bacterium can use a human gene?