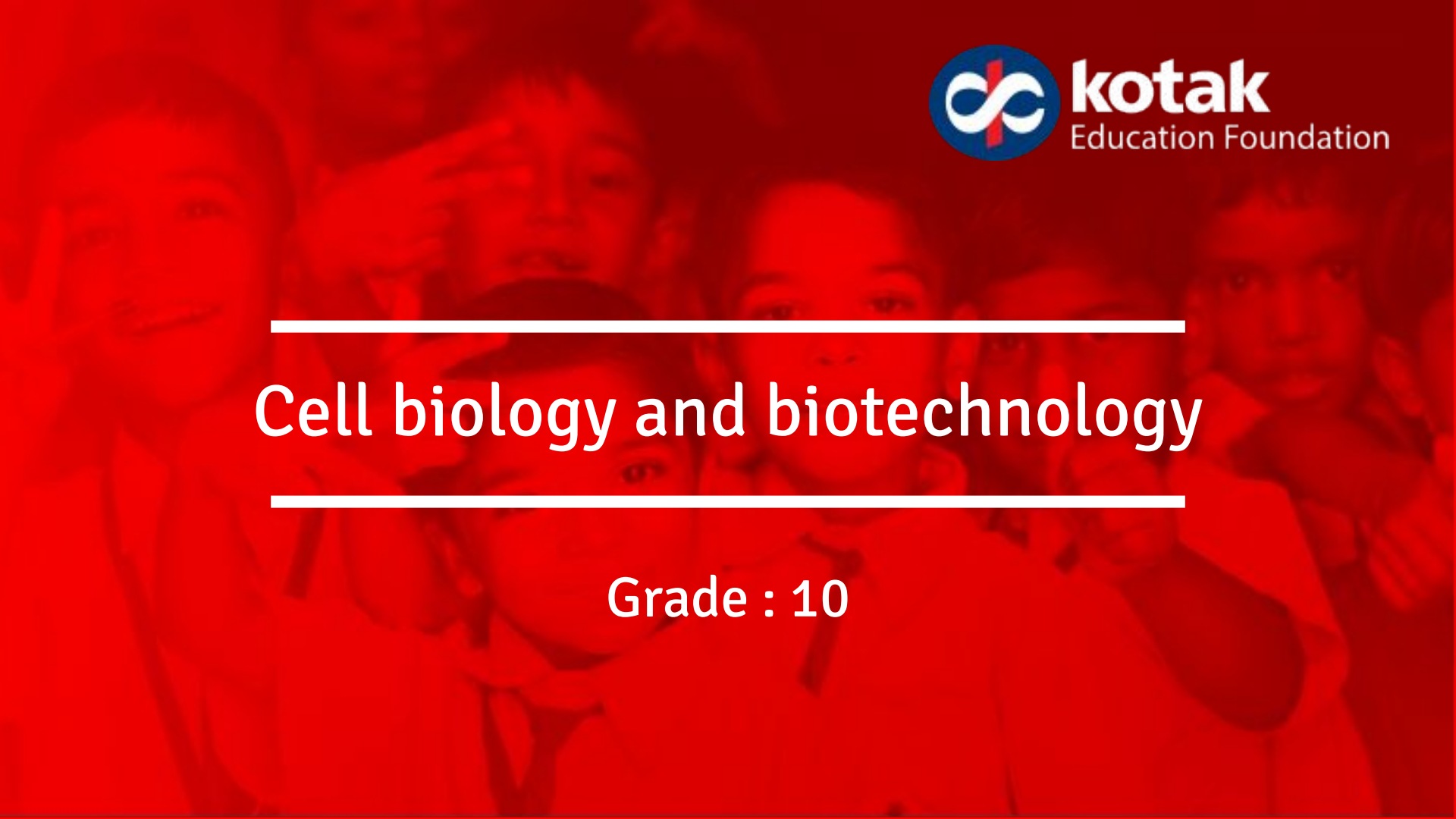

Cell biology and biotechnology

Grade : 10

Watch and learn

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What is a stem cell and what are its types?

New organism is formed from the zygote that is formed by union of male and female gamete. At the earliest stage of development, organism is in the form of a mass of cells. All the cells in that mass are almost alike. Those cells are called as stem cells.

https://youtu.be/-8xHWhg6YQA

https://youtu.be/9db44fBrWrE

https://youtu.be/K7D6iA7bZG0 (Uses of stem cells)

https://youtu.be/Gjhsa4GGh-Q (Hindi)

What is biotechnology and its benefits

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https://youtu.be/SnkHmwTKksQ (what is biotechnology)

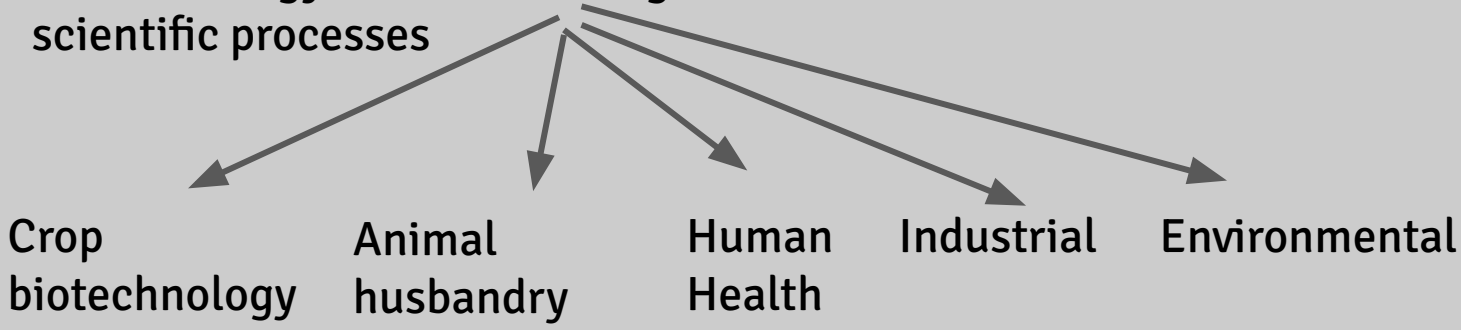
https://youtu.be/Idbv6he5Zjc (Commercial applications of biotechnology)

https://youtu.be/DIH6mbc3nkg (Human Health and biotechnology)

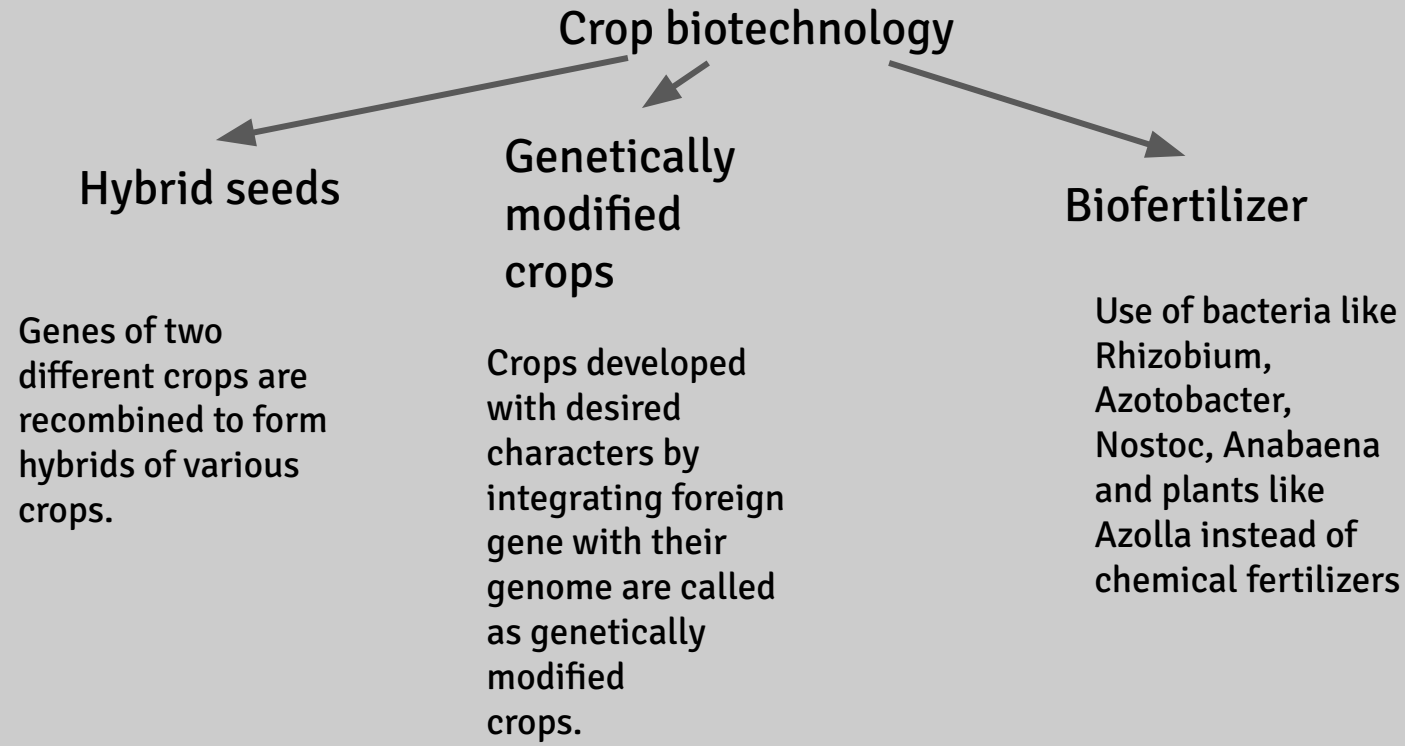
https://youtu.be/ppFc8BorgyE (Bioremediation)

Read and learn

Biotechnology: the use of living cells and bacteria in industrial and scientific processes



Crop Biotechnology



Genetically modified crops

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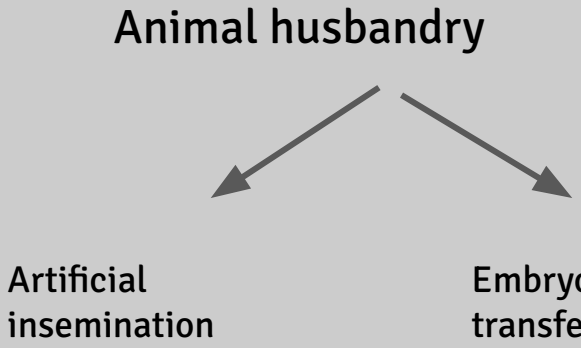
Genetically modified crops

- Gene isolated from the bacterium **Bacillus thuringiensis** and integrated with the genome of cotton.
- This produces toxin which is fatal for bollworm in leaves and bolls of cotton.
- If bollworm feeds on leaves, the toxin destroys its alimentary canal and the bollworm dies.

- BT Brinjal variety is developed by using the gene isolated from Bacillus thuringiensis.
- This improved variety of brinjal kills the pest in same way as the Bt cotton does.

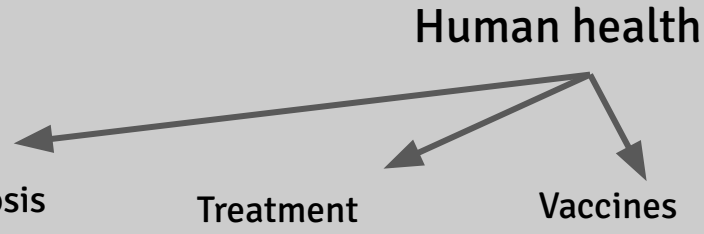
- Golden rice: A gene synthesizing the vitamin A (Beta carotene) has been introduced in this variety of rice.
- As compared to the normal variety, this variety contains 23 times more amount of beta carotene.

Animal husbandry



helps to improve both, the quantity and quality of animal products.

Biotechnology in human health(V. Imp)



Diagnosis of Diabetes , heart diseases, AIDS

Insulin hormone production
Somatotropin hormones

Injectible
Edible

Interferon: small sized protein molecule used in treatment of viral diseases. These are produced in blood.
Nowadays, with the help of biotechnology, transgenic E. coli are used for production of interferon

Industrial and Environmental biotechnology

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Industrial biotechnology

Alcohol production from transgenic yeast

Environmental biotechnology

Composting

Bioremediation: Bioremediation means either absorption or destruction of toxic chemicals and harmful pollutants with the help of plants and microorganisms

The **Pseudomonas bacteria** are useful for cleaning the hydrocarbon and **oil pollutants** from soil and water.

The fern **Pteris vitata** can absorb the **arsenic** from the soil.

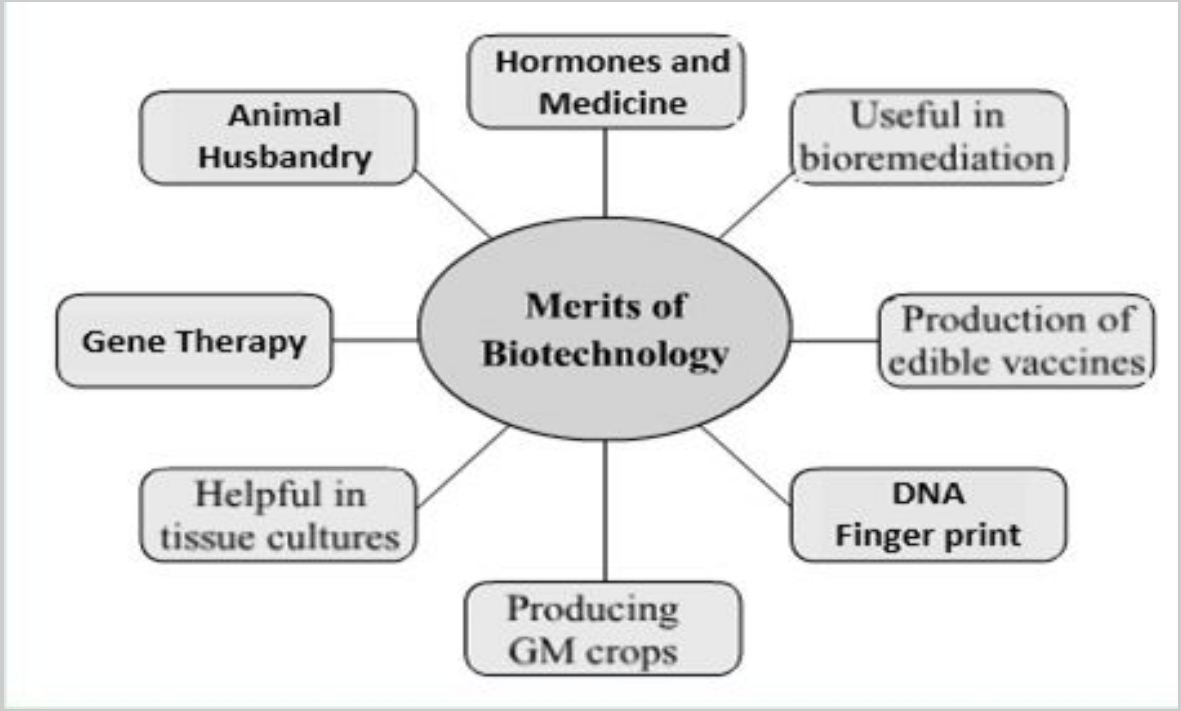
Genetically modified variety of **Indian mustard** can absorb **selenium** from soil.

Sunflower can absorb **uranium and arsenic.**

The bacterium **Deinococcus radiodurans** is highly **radiation resistant organism**. It has been genetically modified and used **to absorb the radiations from radioactive debris.**

Grasses like alfalfa, clover and rye are used in phyto-remediation.

Merits of Biotechnology (Imp)



Use of stem Cell (v.v.v.imp)

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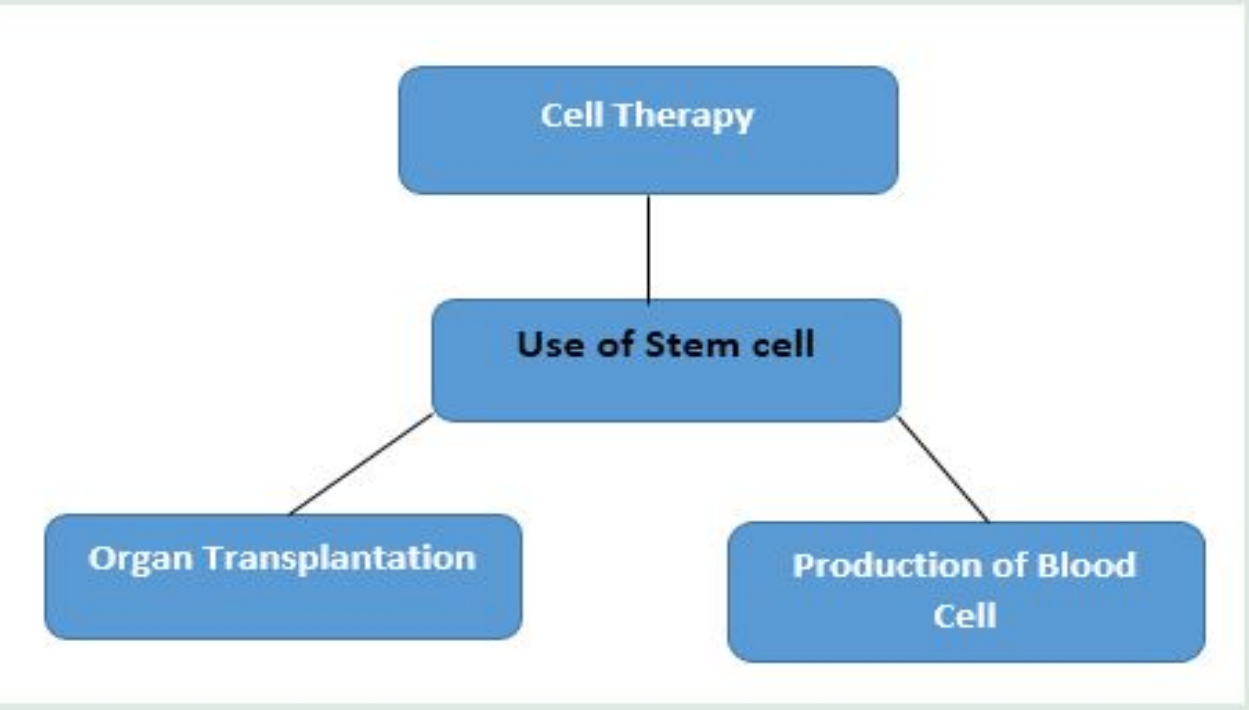

Vaccine

1. Insulin: Diabetes :: Interleukin: **Cancer**
2. Interferon: **Viral infection**:: Erythropoietin: Anemia
3. **Somatostatin**: Dwarfness :: Factor VIII: Hemophilia
4. White revolution: Dairy :: Blue revolution: **Aquatic organisms**

- Vaccine is the 'antigen' It is given to person or even to animals for acquiring immunity against particular pathogens or diseases.

Fill in the blanks

Methods like artificial insemination and embryo transplant are mainly used for **Animal Husbandry.**

b. **Stem cell reaserch** is the revolutionary event in biotechnology after cloning.

c. The disease related with the synthesis of insulin is **diabetes.**

d. Government of India has encouraged the **Pisciculture (Aquaculture)** for improving the productivity by launching NKM-16.