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CRISPR: Shaping a New Tomorrow

Understanding the Potential of CRISPR

Subject: OOPC

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1 Introduction

1.1 What is CRISPR

CRISPR stands for Clustered Regualrly Interspaced Short Palindromic Repeats. It is a revolutionary gene-editing tool that allows precise modification of DNA, offering unprecedented potential for scientific and medical advancement.

1.2 How does CRISPR work

1. Scientists take a snippet of RNA (guide RNA or gRNA) and pair it with a Cas protein (usually Cas9).
2. The guide RNA leads the Cas protein to the target location on the subject's DNA.
3. The Cas protein cuts the DNA at this location.
4. The cell then can repair the broken DNA in 2 ways:
   (a) By gluing the two ends back together. This can sometimes introduce or remove new nucleotides which can alter the gene.
   (b) By using a piece of donor DNA as a template to insert the desired DNA modification

2 The Possibilities

This technology has the potential to revolutionize many fields including Medicine, Agriculture and even Biofuels.

2.1 Examples of the Uses

1. Treatment of a lot of ailments that occur because of genetic mutations. For Example:
   - Cystic Fibrosis
   - Sickle cell anemia
2. The Development of Crops with better resistance to pests and diseases.
3. Creation of biofuels which are more efficient and sustainable.
4. Choosing the characteristics of our offsprings.
   - We can choose the traits our children. Like eye color, height etc.
   - We can make them immune to specific diseases from birth.

3 The Concerns

3.1 Germline editing concerns

Germline editing with CRISPR raises complex questions about heritability, human enhancement and long-term consequences, demanding thoughtful deliberation.

3.2 Unintended Consequences

3.3 Ethical Concerns