Commentary

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Molecular Biotechnology has Revolutionized Fields such as Gene Therapy

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Description

Provide a brief overview of Molecular Biotechnology and its significance in modern science and industry. Highlight its role in areas like medicine, agriculture, and environmental sustainability. Define Molecular Biotechnology and explain its scope, which encompasses the manipulation of biological molecules (DNA, RNA, proteins) for various applications. Trace the evolution of Molecular Biotechnology from its early roots to the present day, highlighting key breakthroughs and scientists who contributed significantly. Explain the concept of genetic engineering, detailing methods like PCR, restriction enzymes, and gene editing technologies (CRISPR/Cas9). Describe the process of creating recombinant DNA molecules and how they're used to modify organisms for specific purposes. Discuss techniques like Next-Generation Sequencing (NGS) and their applications in understanding genetic information. Explain how these technologies help in the study of proteins and metabolites, respectively, and their role in biotechnological applications. Detail how molecular biotechnology has revolutionized areas like gene therapy, personalized medicine, and the development of biopharmaceuticals. Explain how biotechnology is used to improve crop yields, develop disease-resistant plants, and create Genetically Modified Organisms (GMOs). Discuss applications in waste treatment, pollution control, and the development of biofuels. Explain how Molecular Biotechnology is used in industries like biofuels, textiles, and chemicals. Discuss the ethical dilemmas surrounding topics like genetic modification, cloning, and privacy concerns associated with genetic data.

Pollution Control

Explain the existing regulations governing molecular biotechnology and discuss the need for responsible research and development. Highlight upcoming technologies and trends in molecular biotechnology, such as synthetic biology, gene editing advancements, and CRISPR applications. Discuss current debates and challenges facing molecular biotechnology, including public perception, regulatory hurdles, and safety concerns. Summarize the key takeaways from the article, emphasizing the transformative potential of molecular biotechnology and the importance of continued research and responsible application. Prokaryotic Argonautes (pAgos) are an emerging class of programmable endonucleases that are believed to be more flexible than existing CRISPR–Cas systems and have significant potential for biotechnology. Current applications of pAgos include a myriad of molecular diagnostics and *in vitro* DNA assembly tools. However, efforts have historically been centered on thermophilic pAgo variants. To enable *in vivo* biotechnological applications such as gene editing, focus has shifted to pAgos from mesophilic organisms. We discuss what is known of pAgos, how they are being developed for various applications, and strategies to overcome current challenges to *in vivo* applications in prokaryotes and eukaryotes. The most important requirement for apple producers is to ensure the best possible apple quality after storage. Growers must comply with several regulations in the field of food and environmental safety. In the production of apples, it has been observed that financial losses are related to the occurrence of latent storage diseases caused by phytopathogenic fungi of the genus *Neofabraea* (bull's eye rot). Therefore, investors in this sector require new solutions supporting rational apple management, with a particular focus on pro-ecological methods of controlling *Neofabraea* spp. pathogenic representatives and methods for the early detection of these pathogens, especially when there are no symptoms of disease in the apple. This review summarizes the activities being undertaken to increase sustainable production in horticulture. What is more, the up-to-date significance of apple production and the various ways of counteracting bull's eye rot were also described. Next, biopreparations based on microorganisms in horticulture applications are characterized, with special attention being paid to the preparations preventing the development of *Neofabraea* spp. The various methods used to detect fungal phytopathogens are explored towards *Neofabraea* spp. detection using genetic markers. Finally, expectations and future directions in the quest for new biotechnological solutions in the area of the biocontrol and molecular diagnostics of *Neofabraea* spp. in apples were presented. In particular, the need for targeted biocontrol biopreparations and an early detection method of *Neofabraea* spp. in apples to evaluate the risk of the occurrence of apple bull's eye rot was highlighted.

Embryonic Cell Line

We explored the biotechnological applicability of a previously established olive flounder (Paralichthys olivaceus) embryonic cell line. Transfected cells showed strong green fluorescence 48 h after transfection, and pluripotency-related genes were

successfully transfected. In addition, cells were highly susceptible to and the expression of immune-related genes was induced during infection. Our results demonstrate that FGBC 8 cells are valuable research tools for assessing host–pathogen interactions and biotechnological applications. Artificial Intelligence (AI) and Molecular Biotechnologies (MB) are among the most promising, but also ethically hotly debated emerging technologies. In both fields, several ethics reports, which invoke lists of ethics principles, have been put forward. These reports and the principles lists are technology specific. This article aims to contribute to the ongoing debate on ethics of emerging technologies by comparatively analysing four european ethics reports from the two technology fields. Adopting a qualitative and in-depth approach, the article highlights how ethics principles from MB can inform AI ethics and vice versa. By synthesizing the respective ethical cores of the principles included in the analysed reports, the article derives, moreover, a unified list of principles for assessing emerging technologies. The suggested list consists of nine principles: autonomy; individual and social well-being and prevention of harm; reliability, safety and security; informational privacy; transparency; accountability; communication, participation and democracy; justice, fairness, and non-discrimination; sustainability. Biotechnology expands the breeding/genetic resources to a horticultural plant breeder. Even though genetically modified organisms or GMOs have had less impact with horticultural crops than agronomic crops, the potential is there to advance the development of disease-resistant crops. Biotechnology can aid the horticultural crop plant breeder with techniques that increase the efficiency of introducing resistance into their crop. The paper is a self-review of works on development of new approaches to formation of mimics of receptor and catalytic sites of biological macromolecules in the structure of highly cross-linked polymer membranes and thin films. The general strategy for formation of the binding sites in Molecularly Imprinted Polymer (MIP) membranes and thin films was described. A selective recognition of a number of food toxins, endocrine disruptors and metabolites is based on the results of computational modeling data for the prediction and optimization of their structure.