

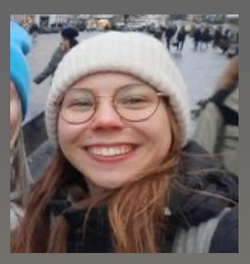

SCAN ME

Discovering the Diverse Applications of Methanogens

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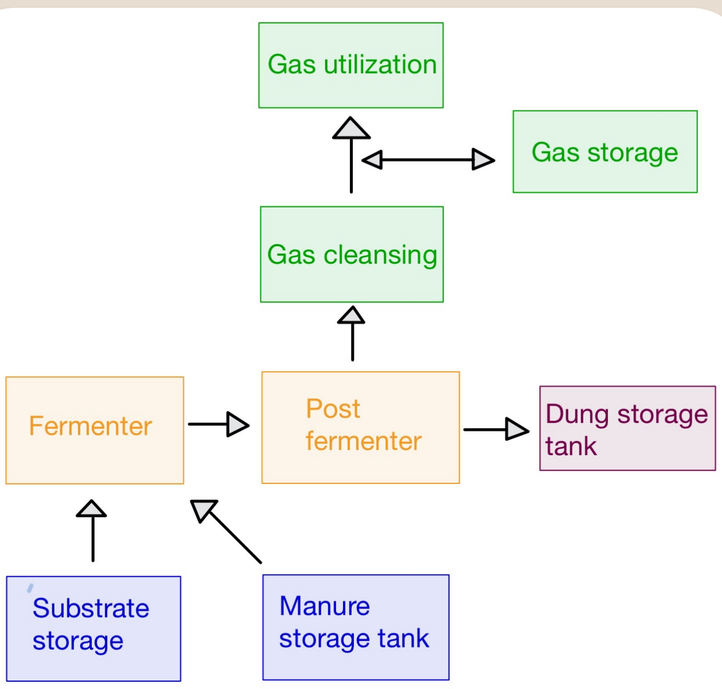
Background

$CO_2 + 4H_2 \rightarrow CH_4 + 2H_2O$

Methanogens are utilized in various industrial applications due to their ability to produce methane as a byproduct of their metabolism, to break down complex organic compounds and for operating under anaerobic conditions (5).

1. Methane as biogas

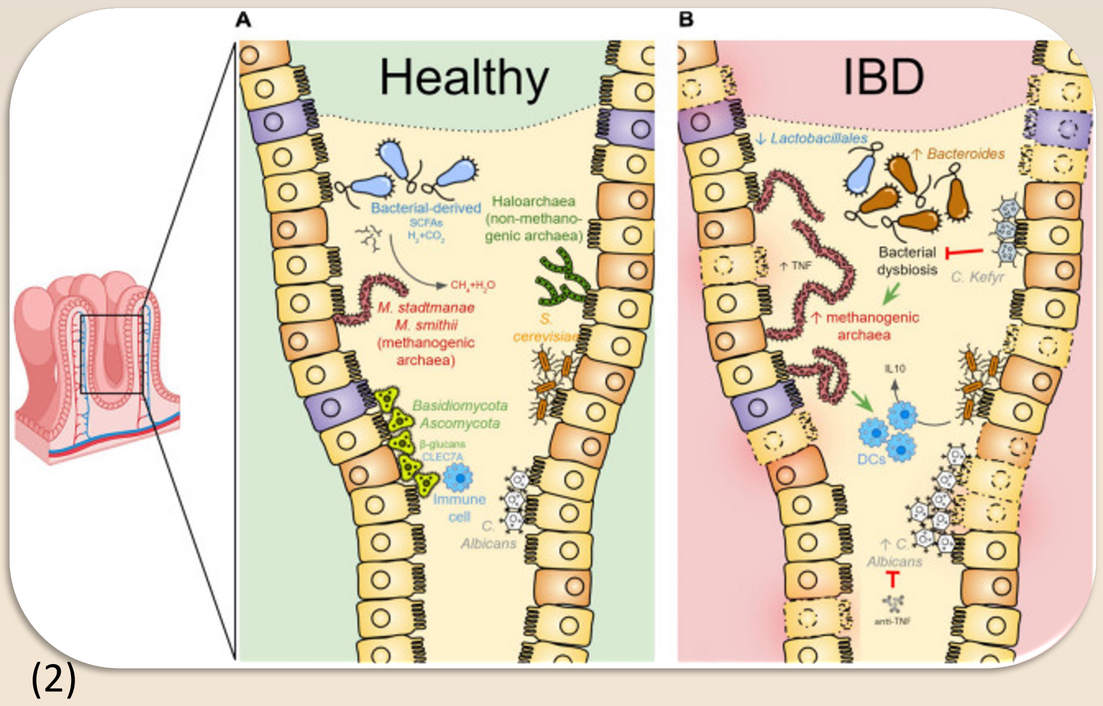
Biogas production through anaerobic digestion is a promising renewable energy source that uses local resources, reduces greenhouse gas emissions, and offers multiple benefits (3).



(3)

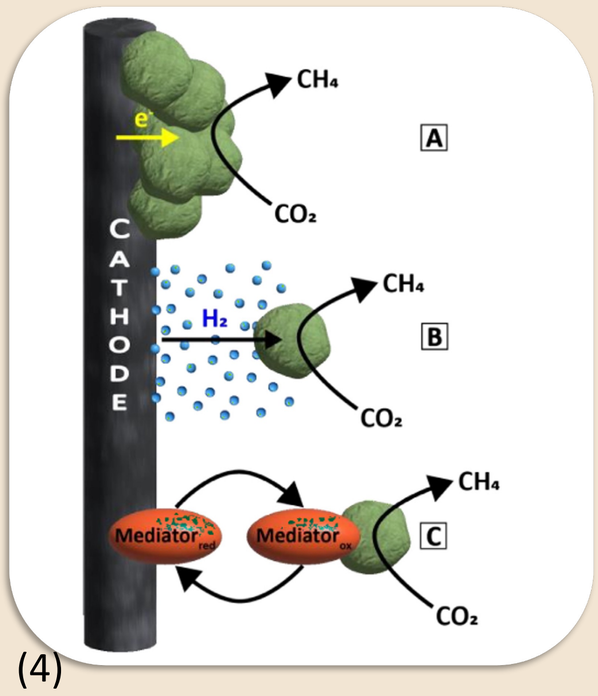
2. Methanogens and IBD

Research highlights the crucial role of the gut microbiome in Inflammatory Bowel Disease development (1, 2). Studying methanogens may provide insight in understanding the disease mechanisms (1, 2).



(2)

3. Bioelectrochemical Methane Production



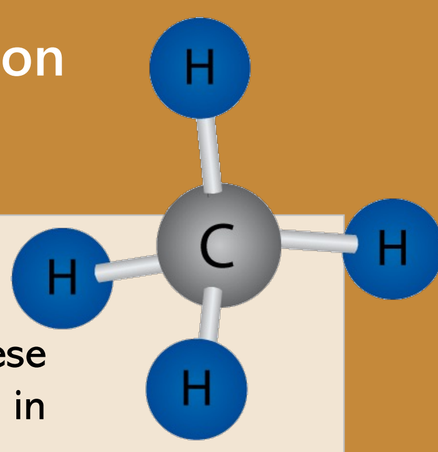
(4)

Excess electricity of renewable sources and CO2 can be turned into methane, a natural gas which can supply the world with energy (4).

Bioelectrochemical methane production is sustainable and CO2 neutral and has potential to reduce the use of fossil fuels (4).

Other industrial applications(5)

- Isoprenoids
- Amino acid production
- Food production
- Bioremediation



Conclusion

Methanogens have been identified as promising candidates for many industrial applications, yet several of these applications are still in the starting phase and further research is required to optimize and scale up their use in practical settings (5).

References:
1. Seyedian, S.S., Nokhostin, F. and Malamir, M.D. (2019) “A review of the diagnosis, prevention, and treatment methods of inflammatory bowel disease,” *Journal of medicine and life*, 12(2), pp. 113–122.
2. Houshyar, Y. *et al.* (2021) “Going Beyond Bacteria: Uncovering the Role of Archaeome and Mycobiome in Inflammatory Bowel Disease,” *Frontiers in physiology*, 12, p. 783295.
3. Penz, L. (2012). Role of methanogens in biogas production plants. BSc Thesis in English 23p. Faculty of Science, University of South Bohemia, České Budějovice, Czech Republic.
4. van Eerten-Jansen, M.C.A.A. *et al.* (2015) “Analysis of the mechanisms of bioelectrochemical methane production by mixed cultures,” *Journal of chemical technology and biotechnology (1986)*, 90(5), pp. 963–970.
5. Pfeifer K, Ergal İ, Koller M, Basen M, Schuster B, Rittmann SKMR. Archaea Biotechnology. Biotechnol Adv. 2021 Mar 1;47:107668.