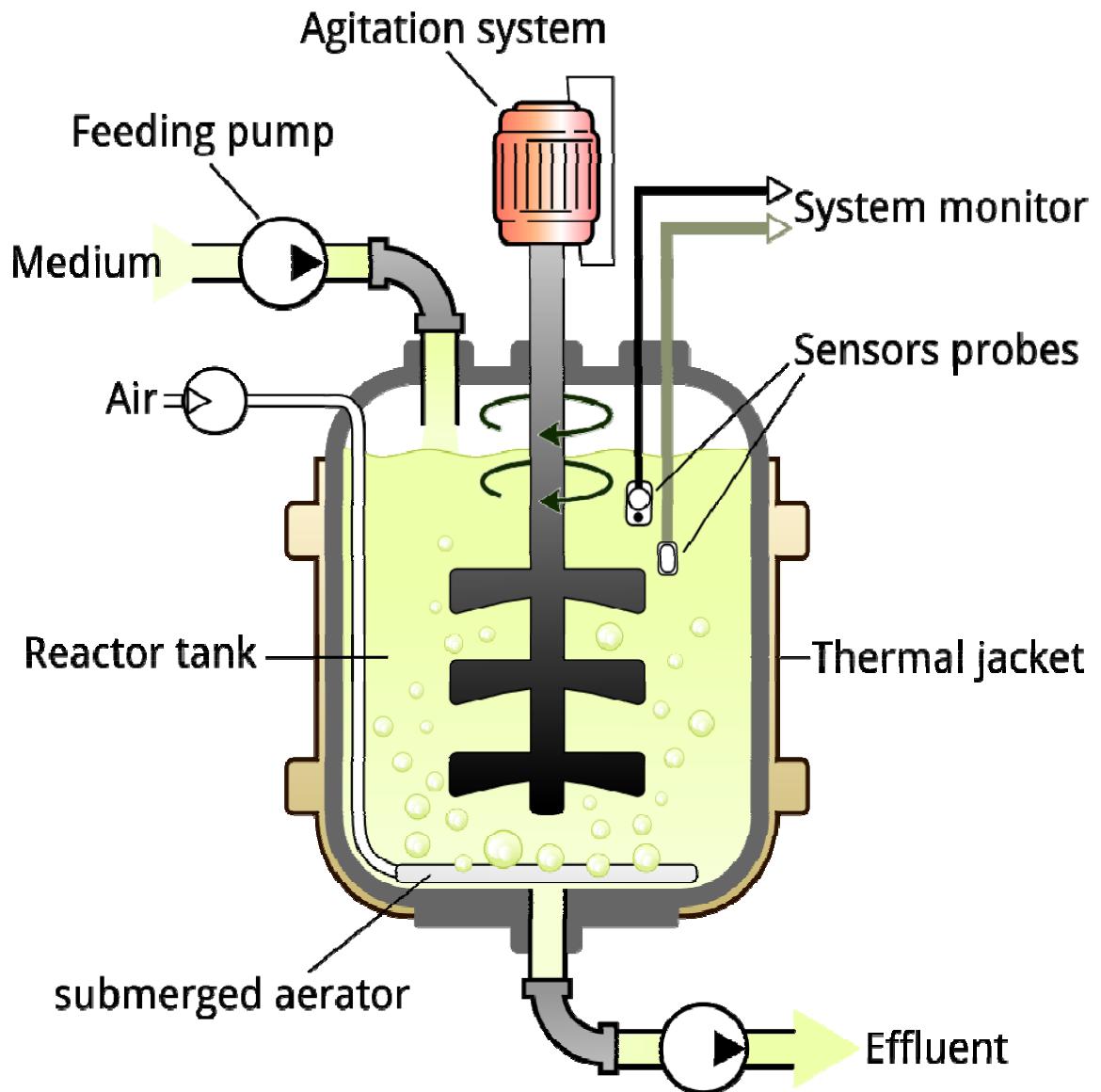


## A. SCHEMATIC STRUCTURE OF A BIOREACTOR



The original page is located at:

[https://commons.wikimedia.org/wiki/User\\_talk:YassineMrabet](https://commons.wikimedia.org/wiki/User_talk:YassineMrabet).

[http://upload.wikimedia.org/wikipedia/commons/thumb/e/ee/Bioreactor\\_principle.svg/1000px-Bioreactor\\_principle.svg.png](http://upload.wikimedia.org/wikipedia/commons/thumb/e/ee/Bioreactor_principle.svg/1000px-Bioreactor_principle.svg.png)

[User:[YassineMrabet](#) – From: [Wikimedia Commons](#), the free media repository]

## **B. SCALE-UP PRODUCTION**

1. Basic research laboratory:  $1 \times 10^6 - 1 \times 10^7$  cells per culture – Χρήση multi-surface flasks

2. Simple bench-top stirrer cultures:  $1 \times 10^9 - 1 \times 10^{10}$  cells per culture – Χρήση large stirrer flasks – Capacity: 1-10 L

3. Large - scale cultures:  $1 \times 10^{10} - 1 \times 10^{12}$  cells per culture – Χρήση:

- Floor-standing, laboratory - scale controlled fermentor / (wave) bioreactor
- Bench-top apparatus

Capacity: 10 - 100 L, may increase 100- 1000 L

4. Full – scale industrial production: Χρήση bioreactors, capacity from 5.000 – 20.000 L (και περισσότερο)

- Fed-batch STRs (stirrer tank reactors)