CLAIMS

What is claimed is:

1. A method comprising:

providing a minimal medium to a bioreactor;

inoculating the minimal medium in the bioreactor with an inoculum including chemoautotrophic and/or photoautotrophic cells; and

cultivating, chemoautotrophically, the inoculum to grow a biomass in the bioreactor by providing a gaseous input into the bioreactor until a cell density of the biomass in the medium meets a threshold, whereby the minimal medium is enriched during the cultivation to become an enriched medium.

2. The method of claim 1 wherein the inoculum also includes heterotrophic cells.

3. The method of claim 2 wherein the inoculum includes photoautotrophic cells and the cultivating is performed in the absence of light within the bioreactor.

4. The method of claim 1, 2, or 3 wherein the inoculum includes chemoautotrophic cells and the gaseous input comprises CH_4 and O_2.

5. The method of claim 4 wherein the chemoautotrophic cells include cells of *Methylococcus capsulatus*.

6. The method of claim 1-4 or 5 wherein the gaseous input comprises CO.

7. The method of claim 1-4 or 5 wherein the gaseous input comprises CO_2 and H_2S.

8. The method of claim 1-4 or 5 wherein the gaseous input comprises CO_2, H_2 and O_2.

9. The method of claim 1-7 or 8, wherein the inoculum includes cells of *Cupriavidus necator*, cells of *Rhodobacter capsulatus*, or cells of both.

10. The method of claim 1-7 or 8 wherein the inoculum includes cells of a carboxydotroph.

11. The method of claim 1-7 or 8, wherein the inoculum includes cells of *Rhodococcus opacus*.

12. The method of claim 1-10 or 11 further comprising destroying cells in the enriched medium so as to release their contents into the enriched medium.

13. The method of claim 1-11 or 12 wherein the enriched medium includes one or more of a growth factor, a hormone, an antibiotic, an amino acid, a peptide, a protein, a vitamin, a colorant, a carotenoid, a fatty acid, or an oil.

14. The method of claim 1-12 or 13 further comprising separating the insoluble biomass from the enriched medium.

15. The method of claim 14 wherein the enriched medium, after separation, includes at least 1 gram of D-glucose per liter.

16. The method of claim 14 or 15 further comprising cultivating cells of a heterotroph in the enriched medium separated from the biomass, thereby depleting the enriched medium.

17. The method of claim 16 wherein the heterotroph cells are derived from a cell line of a multicellular aquatic organism.

18. The method of claim 1-16 or 17 wherein the minimal medium comprises a gel.

19. The method of claim 1-17 or 18 wherein the minimal medium is added to the bioreactor together with a growth support for the cells.

20. An enriched medium produced by any of the methods of claims 1-19.