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 also including heterotrophic 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 density of 0.5 grams cell dry weight per liter (CDW/L), 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.~~

2~~3~~. The method of claim 1~~2~~ wherein the inoculum includes photoautotrophic cells and the cultivating is performed in the absence of light within the bioreactor.

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

4~~5~~. The method of claim 3~~4~~ wherein the chemoautotrophic cells include cells of *Methylococcus capsulatus*.

56. The method of claim 1-34 or 45 wherein the gaseous input comprises CO.

67. The method of claim 1-34 or 45 wherein the gaseous input comprises CO_2 and H_2S.

78. The method of claim 1-34 or 45 wherein the gaseous input comprises CO_2, H_2 and O_2.

89. The method of claim 1-67 or 78, wherein the inoculum includes cells of *Cupriavidus necator*, cells of *Rhodobacter capsulatus*, or cells of both.

910. The method of claim 1-67 or 78 wherein the inoculum includes cells of a carboxydotroph.

101. The method of claim 1-67 or 78, wherein the inoculum includes cells of *Rhodococcus opacus*.

112. The method of claim 1-190 or 101 further comprising destroying cells in the enriched medium so as to release their contents into the enriched medium.

123. The method of claim 1-101 or 112 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.

143. The method of claim 1-112 or 123 further comprising separating the insoluble biomass from the enriched medium.

145. The method of claim 134 wherein the enriched medium, after separation, includes at least 1 gram of D-glucose per liter.

156. The method of claim 134 or 145 further comprising cultivating cells of a heterotroph in the enriched medium separated from the biomass, thereby depleting the enriched medium.

167. The method of claim 156 wherein the heterotroph cells are derived from a cell line of a multicellular aquatic organism.

178. The method of claim 1-156 or 167 wherein the minimal medium comprises a gel.

189. The method of claim 1-167 or 178 wherein the minimal medium is added to the bioreactor together with a growth support for the cells.

1920. An enriched medium produced by any of the methods of claims 1-189.