CLAIMS

We claim:

1. A method for producing a food product, said method comprising:

(a) processing microorganism cells that are harvested from a culture medium to produce a protein product, wherein said protein product comprises one or more of single cell protein, cell lysate, protein concentrate, protein isolate, protein extract, protein hydrolysate, free amino acids, peptides, and oligopeptides; and

(b) processing the protein product to produce a food product.

2. A food product comprising a protein product produced from microorganisms, wherein said protein product comprises one or more of single cell protein, cell lysate, protein concentrate, protein isolate, protein extract, protein hydrolysate, free amino acids, peptides, and oligopeptides.

3. The method of claim 1 or the food product of claim 2, wherein the food product is a meat analogue product, optionally wherein the meat analogue product comprises one or more physical characteristics and/or functional properties of meat, comprising texture, flavor, aroma, and/or appearance.

4. The method of claim 3 or the food product of claim 3, wherein the meat analogue product comprises:

(i) at least about 10% of the protein product by weight; or

(ii) a heme compound, optionally wherein the heme compound is a heme-containing polypeptide, and/or wherein the heme compound is produced by the same microorganism from which the protein product is produced; or

(iii) about 5% to about 30% lipid by weight, about 0.5% to about 10% carbohydrate by weight, and/or about 0.5% to about 5% edible fiber by weight, optionally wherein the meat analogue product comprises at least about 30% moisture content by weight.

5. The method of claim 3 or the food product of claim 3, wherein a hydrogel, a lipogel, and/or an emulsion is included in the meat analogue product as an agent release system, optionally wherein the agent release system promotes release of a coloring agent, a flavor agent, a fatty acid, a leavening agent, and/or a gelling agent during cooking of the meat analogue product.

6. The method of claim 1, or the food product of claim 2, wherein the food product:

(i) is a food item, a food ingredient, a nutritional product, an animal feed product, or a pet food product; or

(ii) is a vegetarian or vegan food product; or

(iii) is an organic food product, a pesticide-free food product, a herbicide-free food product, a fungicide-free food product, an antibiotic-free food product, or a non-genetically-modified (non-GMO) food product; or

(iv) is a probiotic food product or a prebiotic food product; or

(v) comprises no animal protein or fat; or

(vi) comprises a dairy product, a dairy replacement product, a bakery product, a confection, a health or protein bar, a protein powder, a sports and/or energy drink, a protein shake, or a smoothie; or

(vii) wherein the food product comprises one or more plant protein source, optionally wherein the plant protein source comprises one or more of pea, rice, glutinous rice, wheat, gluten, soy, hemp, canola, and buckwheat; or

(viii) comprises an insect or algae protein source.

7. The method of claim 1 or the food product of claim 2, wherein the food product is a meat product, and wherein the protein product is incorporated into the meat product as a meat extender, optionally wherein the protein product replaces at least about 10% of meat in the meat product.

8. The method of claim 1, wherein the protein product is:

(i) textured for incorporation into a meat or meat analogue product; or

(ii) formed into fibers, thermally extruded, and/or coagulated into a gel.

9. The method of claim 1 or the food product of claim 2, wherein the microorganism is a chemoautotrophic microorganism, optionally wherein the chemoautotrophic microorganism is an oxyhydrogen microorganism, further optionally wherein the oxyhydrogen microorganism is a *Cupriavidus* microorganism, even further optionally wherein the oxyhydrogen microorganism comprises *Cupriavidus necator* DSM 531 or DSM 541.

10. The method of claim 1 or the food product of claim 2, wherein the microorganism is a lactic acid bacterial microorganism, optionally wherein:

(i) the lactic acid bacterium comprises one or more of *Lactococcus*, *Lactobacillus*, *Enterococcus*, *Streptococcus*, and *Pediococcus* bacteria; and/or

(ii) the lactic acid bacterium is a generally recognized as safe (GRAS) bacterium.

11. The method of claim 1 or the food product of claim 2, wherein the microorganism is a *Fusarium*, a *Rhizopus*, or an *Aspergillus* fungal microorganism, optionally wherein:

(i) the fungal microorganism comprises one or more of *Fusarium venenatum*, *Rhizopus oligosporus*, *Rhizopus oryzae*, *Aspergillus oryzae*, or *Aspergillus sojae*; and/or

(ii) the fungal microorganism is a GRAS fungal microorganism.

12. The method of claim 1, wherein step (a) comprises: (i) freeing organic molecules from the microorganism cells, via excretion, secretion, or cell lysis, or a combination thereof, wherein the organic molecules comprise proteins; and (ii) treating the freed organic molecules to hydrolyze peptide bonds between at least a portion of amino acids in at least a portion of the proteins, thereby

producing a hydrolysis protein product that comprises polypeptides comprising 20 to 50 amino acids, oligopeptides comprising 2 to 20 amino acids, and/or free amino acids.

13. The method of claim 1, wherein step (b) comprises combining the protein product with other edible ingredients to form the food product, optionally wherein the other edible ingredients comprise one or more of: apple cider, apple cider vinegar, baking powder, baking soda, beans, beef, beet juice, beet powder, black pepper, brown sugar, butter, canola oil, caramel, carrot fiber, carrots, cashews, cheese, chicken, chocolate, citrus, citrus extract, coconut oil, condensed milk, dairy, egg, egg substitute, fish, flour, garbanzo bean, garlic powder, honey, liquid smoke, maple syrup, margarine, monosodium glutamate, mustard powder, oil, olive oil, onion powder, paprika, pork, potato, potato starch, rice flour, salt, sodium benzoate, soy protein, soy oil, soy sauce, spices, spirulina, sugar, sunflower oil, tomato juice, tomato powder, tomato sauce, tomatoes, turmeric, vanilla, vinegar, vitamins and minerals, walnuts, water, wheat, wheat flour, wheat gluten, xanthan gum, yeast, and yeast extract.

14. A food product prepared by the method of any of claims 1 or 3-13.

15. The food product of claim 2, wherein the food product further comprises one or more of: apple cider, apple cider vinegar, baking powder, baking soda, beans, beef, beet juice, beet powder, black pepper, brown sugar, butter, canola oil, caramel, carrot fiber, carrots, cashews, cheese, chicken, chocolate, citrus, citrus extract, coconut oil, condensed milk, dairy, egg, egg substitute, fish, flour, garbanzo bean, garlic powder, honey, liquid smoke, maple syrup, margarine, monosodium glutamate, mustard powder, oil, olive oil, onion powder, paprika, pork, potato, potato starch, rice flour, salt, sodium benzoate, soy protein, soy oil, soy sauce, spices, spirulina, sugar, sunflower oil, tomato juice, tomato powder, tomato sauce, tomatoes, turmeric, vanilla, vinegar, vitamins and minerals, walnuts, water, wheat, wheat flour, wheat gluten, xanthan gum, yeast, and yeast extract.