Claims:

~~1. A process for producing algae derived omega-3 comprising:~~

~~a. growing algae in media comprising heat-sterilized sugar-waste water for a sufficient time to create an algae culture;~~

~~b. stressing the algae;~~

~~c. harvesting the algae;~~

~~d. dewatering the algae to produce a dried biomass;~~

~~e. extracting total lipid from the dried biomass without the use of hexane, wherein said extraction is not a water-based extraction system; and~~

~~f. purifying omega-3 from the total lipid fraction.~~

~~2. The process of claim 1 wherein stressing the algae comprises subjecting the culture to nutrient limitation.~~

~~3. The process of claim 1 wherein harvesting the algae comprises a method selected from flocculation, centrifugation, microscreens, froth flotation, and combinations thereof.~~

~~4. The process of claim 1 wherein dewatering the algae comprises a method selected from centrifugation, gravity filtration, vacuum drum filtration, vacuum flatbed filtration, and combinations thereof.~~

~~5. The process of claim 1 wherein extracting the total lipid comprises:~~

~~a. contacting a dried biomass with an alcohol,~~

~~b. mixing the alcohol and dried biomass for a suitable time and temperature to enable a phase reaction to occur to produce a solid phase and an organic phase comprising lipids, and~~

~~c. moving the reaction mix to a separator capable of facilitating separation of the lipid fraction from solids, and moving the lipid fraction to a lipid tank.~~

~~6. The process of claim 5 wherein the alcohol is ethanol.~~

~~7. The process of claim 1 wherein purifying polyunsaturated fatty acids from a total lipid fraction is selected from the methods of supercritical CO2 purification, cryo-precipitation, and acetone purification, and wherein said purifying involves treatment of the total lipid fraction of claim 1 with reagents consisting of a coolant and either CO2 or acetone.~~

~~8. The process of claim 6 wherein the polyunsaturated fatty acid is omega-3.~~

~~9. A process of extracting total lipid from a biomass comprising:~~

a. contacting a dried biomass with an alcohol,

b. mixing the alcohol and dried biomass for a suitable time and at above room temperature to enable a phase reaction to occur to produce a solid phase and an organic phase comprising lipids, and

c. moving the reaction mix to a separator capable of facilitating separation of the lipid fraction from solids, and moving the lipid fraction to a lipid tank.

10. The process of claim 9 wherein the alcohol is ethanol.

11. A process for producing algae meal comprising:

a. growing algae in media comprising heat-sterilized sugar-waste water for a sufficient time to create an algae culture;

b. harvesting the algae; and

c. dewatering the algae to produce a dried biomass.

12. A system for producing a polyunsaturated fatty acid from an organism comprising:

a. an organism that produces a polyunsaturated fatty acid;

b. growth reactors suitable for growth of said microorganism to produce a culture;

c. a dewatering system suitable for reducing the water content of said culture to produce a dried biomass;

d. a reaction chamber adapted to facilitate a reaction between the dried biomass and an alcohol to produce a first component comprising lipids and at least a second component comprising biomass solids;

e. a separator adapted to separate the first and second components wherein the separator is operably linked to a lipid tank for collection of the first component; and

f. an alcohol tank operably linked to a distillation and condenser adapted for the recovery of alcohol for the reaction chamber.

13. The process of claim 1 wherein the algae are dried to a 20-30% dry mass.

14. The process of claim 10 wherein said treatment involves heating at 80°C for one hour with constant stirring.

15. A receptacle for the dewatering of algal biomass comprising

a. a filtering portion substantially permeable to water and substantially impermeable to algal biomass;

b. a side portion connected to said filter, the side portion and filter portion at least partially defining a volume therebetween;

wherein said side portion is movable between at least a first configuration and a second configuration, the volume of the first configuration being greater than the volume of the second configuration.

16. The receptacle of claim 15 wherein said portion can be repeatedly moved back and forth between said first and said second configuration.

17. A method of dewatering an algal biomass comprising the steps of

a. providing a receptacle according to claim 15 or 16 wherein the side portion of the receptacle is in a first configuration;

b. depositing a volume of liquid comprising an algal biomass into said receptacle;

c. gravity-dewatering said algal biomass such that at least some of said liquid passes through said filter portion;

d. moving the side portion of said receptacle to a second configuration, wherein when in the second configuration the receptacle has an interior with a smaller volume compared to when the side portion is in said first configuration; and

e. subjecting at least said filter portion of said receptacle to at least one of the steps selected from: subjecting said filter portion to a vacuum such that said algal biomass does not substantially pass through said filter; subjecting said filter portion of said receptacle to heat; subjecting said filter portion of said receptacle to microwaving; subjecting said filter portion of said receptacle to solar radiation; subjecting said filter portion of said receptacle to steam; and subjecting said filter portion of said receptacle to a spray.

18. The method of claim 17 further comprising removing said algal biomass from said filter portion.

19. An apparatus for the dewatering of algal biomass comprising:

a. the receptacle of claim 15;

b. a course;

c. a station to move said side portion of said receptacle to a first configuration;

d. an algal biomass depositor;

e. a gravity dewatering station;

~~f. a station to move said side portion of said receptacle a second configuration; and~~

~~g. at least one station selected from: a gravity dewatering station, a vacuum dewatering station, an indirect heat station, a microwave station, a solar radiation station, a steam station, a spray station, and a station for removal of algal biomass from said filter;~~

~~wherein said stations are arranged sequentially along said course.~~

~~20. The apparatus of claim 19 wherein access of said receptacle to at least one of said stations is facilitated by the movement of said side portion of said receptacle to said second configuration.~~

1. A process for producing algae derived omega-3 comprising:

a. growing heterotrophic algae in media comprising heat-sterilized waste water containing sugar for a sufficient time to create an algae culture;

b. harvesting the algae;

c. dewatering the algae to produce an algae biomass that is substantially dried using a vacuum filtration unit comprising:

i. at least one collapsible gravity dewatering filter assembly comprising a filter that is permeable to water and substantially impermeable to algae biomass, and further comprising collapsible sides connected to said filter, said filter and said sides at least partially define a volume there between, such that the filter assembly is configured to contain a regulated quantity of algae and water in a gravity dewatering zone, and further wherein the sides of the filter assembly collapsed after at least a portion of the water is removed from the algae by gravity dewatering;

ii. a vacuum zone that receives the filter assembly with collapsed sides and further separates the water from the algae; and

iii. a drying zone;

wherein the filter assembly moves between each zone;

d. extracting total lipid from the dried biomass without the use of hexane, said extracting step comprising:

i. adding ethanol to said dried biomass to make an ethanol-biomass mixture;

ii incubating the ethanol-biomass mixture between about 60º C. and about 80º C. for a time to allow extraction of the total lipid from the biomass;

iii. collecting the ethanol and total lipid; and

iv. separating a total lipid fraction from the ethanol; and

e. purifying omega-3 from the total lipid fraction.

2. The process of claim 1, further comprising stressing the algae by subjecting the culture to nutrient limitation prior to step (b).

3. The process of claim 1 wherein harvesting the algae comprises a method selected from flocculation, centrifugation, microscreens, froth flotation, and combinations thereof.

4. The process of claim 1, wherein the separating step is performed in a separator capable of facilitating separation of the lipid fraction from solids, and the lipid fraction is subsequently moved to a lipid tank.

5. The process of claim 1 wherein purifying omega-3 from the total lipid fraction is selected from the methods of supercritical CO2 purification, cryo-precipitation, and acetone purification, and wherein said purifying involves treatment of the total lipid fraction of claim 1 with reagents consisting of a coolant and either CO2 or acetone.

6. The process of claim 1 wherein the algae are dried to a 20-30% dry mass.

7. The method of claim 1, wherein the ethanol is recovered and reused.

8. The method of claim 1, further comprising collecting the biomass after step (d)(ii).

9. The method of claim 8, further comprising processing the biomass for purification of oils, amino acids, and/or pigments.

10. The method of claim 8, wherein the biomass is processed for use as an additive in animal feed, pet food, and/or aqua feed.

11. The method of claim 1, wherein the algae remains associated with the filter in the vacuum zone.