WHAT IS CLAIMED IS:

~~1. A method for purifying proteins from a plurality of cells having cell walls, the method comprising:~~

~~a) perforating the cell walls of the plurality of cells;~~

~~b) separating an aqueous suspension of the plurality of cells to form a solids portion and a liquid portion;~~

~~c) filtering the liquid portion to form a filtrate and a retentate;~~

~~d) concentrating the retentate to form a protein composition; and~~

~~e) optionally pasteurizing the protein composition,~~

~~wherein each of a)-d), independently, are performed at a pH of about 8.5 and about 12.0, and/or wherein the method results in the liquid portion comprising at least about 50% by weight of the cytoplasmic proteins of the plurality of cells.~~

~~2. A method for purifying proteins from a plurality of cells, the method comprising:~~

~~a) treating an aqueous suspension of the plurality of cells with a base until the pH of the aqueous suspension is about 8.5 to about 12.0;~~

~~b) separating the aqueous suspension of the plurality of cells to form a solids portion and a liquid portion;~~

~~c) filtering the liquid portion to form a filtrate and a retentate;~~

~~d) concentrating the retentate to form a protein composition; and~~

~~e) optionally pasteurizing the protein composition,~~

~~wherein each of a)-d), independently, are performed at a pH of about 8.5 and about 12.0, and/or wherein the method results in the liquid portion comprising at least about 10% by weight of the cytoplasmic proteins of the plurality of cells.~~

~~3~~1. A method for purifying proteins from a plurality of cells having cell walls, the method comprising:

a) treating an aqueous suspension of the plurality of cells with a base until the pH of the aqueous suspension is about 8.5 to about 12.0;

b) optionally perforating the cell walls of the plurality of cells;

c) separating the aqueous suspension of the plurality of cells to form a solids portion and a liquid portion;

d) filtering the liquid portion to form a filtrate and a retentate;

e) concentrating the retentate to form a protein composition; and

f) optionally pasteurizing the protein composition,

wherein each of a)-e), independently, are performed at a pH of about 8.5 ~~and~~ to about 12.0, and/or wherein the method results in the liquid portion comprising at least about ~~50~~10% by weight of the cytoplasmic proteins of the plurality of cells.

~~4~~2. A method for purifying proteins from a plurality of cells having cell walls, the method comprising:

a) perforating the cell walls of the plurality of cells;

b) optionally treating an aqueous suspension of the plurality of cells with a base until the pH of the aqueous suspension is about 8.5 to about 12.0;

c) separating the aqueous suspension of the plurality of cells to form a solids portion and a liquid portion;

d) filtering the liquid portion to form a filtrate and a retentate;

e) concentrating the retentate to form a protein composition; and

f) optionally pasteurizing the protein composition,

wherein each of a)-e), independently, are performed at a pH of about 8.5 ~~and~~ to about 12.0, and/or wherein the method results in the liquid portion comprising at least about ~~50~~10% by weight of the cytoplasmic proteins of the plurality of cells.

~~5. A method for purifying proteins from a plurality of cells, the method comprising:~~

~~a) heating the plurality of cells to a temperature of about 50°C to about 85°C;~~

~~b) separating an aqueous suspension of the plurality of cells to form a solids portion and a liquid portion;~~

~~c) filtering the liquid portion to form a filtrate and a retentate;~~

~~d) concentrating the retentate to form a protein composition; and~~

~~e) optionally pasteurizing the protein composition,~~

~~wherein each of a)-d), independently, are performed at a pH of about 8.5 and about 12.0, and/or wherein the method results in the liquid portion comprising at least about 50% by weight of the cytoplasmic proteins of the plurality of cells.~~

~~6. A method for purifying a soluble protein from a plurality of cells having cell walls, the method comprising:~~

~~a) perforating the cell walls of the plurality of cells;~~

~~b) separating an aqueous suspension of the plurality of cells to form a solids portion and a liquid portion;~~

~~c) filtering the liquid portion to form a filtrate and a retentate;~~

~~d) concentrating the retentate to form a protein composition comprising the soluble protein; and~~

~~e) optionally pasteurizing the protein composition,~~

~~wherein each of a)-d), independently, are performed at a pH of about 8.5 and about 12.0, and/or wherein the method results in the liquid portion comprising at least about 50% by weight of the cytoplasmic proteins of the plurality of cells.~~

~~7~~3. The method of claim ~~6~~1 or claim 2, wherein the protein composition comprises a soluble protein, optionally wherein the soluble protein is a heme-containing protein.

~~8~~4. The method of ~~claim 6 or claim 7~~claim 3, wherein the soluble protein has a melting point, and method further comprises, before a), heating the plurality of cells to a temperature of about 10°C or about 5°C below the melting point of the soluble protein.

~~9~~5. The method of ~~any one of claims 6-8~~claim 3 or claim 4, wherein the soluble protein makes up at least about 30% by dry weight of the protein in the protein composition.

~~10. The method of any one of claims 1, 2, 5, or 6, wherein each of a)-d), independently, are performed at a pH of about 8.5 to about 12.0.~~

~~11. The method of claim 3 or claim 4, wherein each of a)-e), independently, are performed at a pH of about 8.5 to about 12.0.~~

~~12. The method of any one of claims 1, 2, 5, or 6, wherein each of a)-d), independently, are performed at a pH of about 9.0 to about 10.0.~~

~~13~~6. The method of ~~claim 3 or claim 4~~any one of claims 1-5, wherein each of a)-e), independently, are performed at a pH of about 9.0 to about 10.0; and/or wherein each of a)-e), independently, are performed at a temperature of less than or equal to about 12 °C.

~~14. The method of any one of claims 1, 2, 5, or 6, wherein each of a)-d), independently, are performed at a temperature of less than or equal to about 12 °C.~~

~~15. The method of claim 3 or claim 4, wherein each of a)-e), independently, are performed at a temperature of less than or equal to about 12 °C.~~

~~16. The method of claim 5, further comprising, between heating the plurality of cells and separating an aqueous suspension of the plurality of cells to form a solids portion and a liquid portion, treating the aqueous suspension of the plurality of cells with a base until the pH of the aqueous suspension is about 8.5 to about 12.0.~~

~~17. The method of any one of claims 2-4, wherein treating the aqueous suspension of the plurality of cells with a base until the pH of the aqueous suspension is between about 8.5 and 12.0 comprises treating the aqueous suspension of the plurality of cells with a base until the pH of the aqueous suspension is between about 8.5 and 12.0 for at least about 5 minutes.~~

~~18~~7. The method of any one of claims ~~1, 3, 4, or 6~~1-6, wherein perforating comprises treatment with a reductant, treatment with an enzyme, electroporation, or a combination thereof.

~~19~~8. The method of claim ~~18~~7, wherein treatment with the reductant comprises treatment with about 10 mM to about 500 mM reducing equivalents of the reductant; wherein the reductant is selected from the group consisting of cysteine, glutathione, bisulfite, and a combination thereof; and/or wherein the reductant is a food safe reductant.

~~20. The method of claim 18 or claim 19, wherein the reductant is selected from the group consisting of cysteine, glutathione, bisulfite, and a combination thereof.~~

~~21. The method of any one of claims 18-20, wherein the reductant is a food safe reductant.~~

~~22~~9. The method of any one of claims 1-~~21~~8, wherein the method results in the liquid portion comprising at least about 50% by weight of the cytoplasmic proteins of the plurality of cells.

~~23~~10. The method of any one of claims 1-~~22~~9, wherein the method results in at least about 25% by weight of the cells of the plurality of cells remaining intact.

~~24~~11. The method of any one of claims 1-~~23~~10, wherein the method does not comprise mechanical lysis of the plurality of cells, optionally wherein the protein composition comprises a higher proportion of cytosolic protein as compared to a similar method comprising mechanical lysis.

~~25. The method of claim 24, wherein the protein composition comprises a higher proportion of cytosolic protein as compared to a similar method comprising mechanical lysis.~~

~~26~~12. The method of any one of claims 1-~~25~~11, wherein the filtering is performed until the amount of sodium hydroxide required to adjust the pH of a 2% (w/v) suspension of the protein composition from pH 3 to pH 12 is less than or equal to 3 mmol.

~~27~~13. The method of any one of claims 1-~~26~~12, wherein H_2S is detectable in an amount of less than about 0.1 ppm in the headspace when L-cysteine is not added to the protein composition; and/or wherein H_2S is detectable in an amount of at least about 0.2 ppm in the headspace about 24 hours at 25 °C after about 25 mM L-cysteine is added to the protein composition.

~~28. The method of any one of claims 1-27, wherein H_2S is detectable in an amount of at least about 0.2 ppm in the headspace about 24 hours at 25 °C after about 25 mM L-cysteine is added to the protein composition.~~

~~29. The method of any one of claims 1-28, wherein the protein composition comprises at least about 35%, on a dry weight basis, of compounds larger than 5 kDa.~~

~~30~~14. A protein composition prepared by the method of any one of claims 1-~~29~~13.

~~31~~15. Use of a protein composition prepared by the method of any one of claims 1-~~29~~ 14 in a food, a beverage, or a supplement.

~~32~~16. A protein composition comprising:

a plurality of functional proteins,

wherein the protein composition has one or more of the following features:

wherein the protein composition has a buffering capacity of less than about 3.0 mmol NaOH per gram dry solids;

wherein heating a 10% (w/v) suspension of the protein composition to at least about 95 °C results in a gel with a storage modulus of at least about 100 Pa; and

wherein H_2S is detectable in an amount of less than about 0.1 ppm in the headspace after about 24 hours at 25 °C when L-cysteine is not added to 5 mL of a 2% (w/v) suspension of the protein composition at pH 7.0 and/or wherein H_2S is detectable in an amount of at least about 0.2 ppm in the headspace after about 24 hours at 25 °C and after about 25 mM L-cysteine is added to 5 mL of a 2% (w/v) suspension of the protein composition at pH 7.0.

~~33. A protein composition comprising:~~

~~a plurality of functional proteins,~~

~~wherein heating a 10% (w/v) suspension of the protein composition to at least about 95 °C results in a gel with a storage modulus of at least about 100 Pa.~~

~~34. A protein composition comprising:~~

~~a plurality of functional proteins,~~

~~wherein H_2S is detectable in an amount of less than about 0.1 ppm in the headspace after about 24 hours at 25 °C when L-cysteine is not added to 5 mL of a 2% (w/v) suspension of the protein composition at pH 7.0.~~

~~35. The protein composition of claim 34, wherein H_2S is detectable in an amount of at least about 0.2 ppm in the headspace after about 24 hours at 25 °C and after about 25 mM L-cysteine is added to 5 mL of a 2% (w/v) suspension of the protein composition at pH 7.0.~~

~~36. The protein composition of any one of claims 32-35, wherein the protein composition is a low-flavor protein composition.~~

~~37~~17. The protein composition of ~~any one claims 32-36~~claim 16, wherein the plurality of functional proteins comprises at least about 50% by dry weight cytosolic protein.

~~38~~18. The protein composition of ~~any one of claims 32-37~~claim 16 or claim 17, wherein the protein composition can stabilize an oil-in-water emulsion; and/or wherein the protein composition can stabilize an air-in-water emulsion.

~~39. The protein composition of any one of claims 32-38, wherein the protein composition can stabilize an air-in-water emulsion.~~

~~40~~19. The protein composition of any one of claims ~~32-39~~16-18, wherein at least about 30% by dry weight of the protein composition comprises an abundant protein, optionally wherein the abundant protein is a heme-containing protein.

~~41. The protein composition of claim 40, wherein the abundant protein is a heme-containing protein.~~

~~42. The protein composition of any one of claims 32 or 34-41, wherein the protein composition transitions to a gel upon heating to 65 °C.~~

~~43. The protein composition of any one of claims 32-42, wherein at least about 40%, on a dry weight basis, of the protein composition comprises compounds larger than 5 kDa.~~

~~44~~20. The protein composition of any one of claims ~~32-43~~16-19, wherein the protein composition does not comprise one or more compounds selected from the group consisting of cysteine, 1-hexanol, 2-butylfuran, 2-methyl-2-pentenal, 3-octanone, ethyl acetate, 2-ethyl-furan, 2-pentyl-furan, pyrazine, 1-decanol, acetophenone, 1-nonanol, 2,5-dimethyl-pyrazine, dodecanal, benzeneacetaldehyde, nonanal, butyrolactone, octanal, 2-decanone, hexanal, 2-nonanone, benzaldehyde, heptanal, 2-octanone, furfural, 2-heptanone, and pentanal.

~~45~~21. A food, a beverage, or a supplement comprising the protein composition of any one of claims ~~32-44~~16-20.

~~46~~22. A method for treating a plurality of cells having cell walls, the method comprising:

perforating the cell walls of the plurality of cells, optionally wherein the perforating is performed at a pH of about 8.5 to about 12.0., optionally wherein the perforating is performed at a temperature of less than or equal to about 12 °C; optionally wherein the method further comprises, after the perforating, heating the plurality of cells to at least about 60 °C

wherein treatment of a supernatant of the plurality of cells with a mannosidase yields less than about 30 µg/mL detectable mannose in the supernatant, wherein the supernatant is prepared using a 10% (w/v) suspension of the plurality of cells, after being incubated at 50°C for 10 minutes at pH 10.5 and centrifuged to remove solids.

~~47~~23. A method for treating a plurality of cells, the method comprising:

treating an aqueous suspension of the plurality of cells with a base until the pH of the aqueous suspension is about 8.5 to about 12.0, optionally wherein the treating is performed at a temperature of less than or equal to about 12 °C;

wherein treatment of a supernatant of the plurality of cells with a mannosidase yields less than about 30 µg/mL detectable mannose in the supernatant, wherein the supernatant is prepared using a 10% (w/v) suspension of the plurality of cells, after being incubated at 50°C for 10 minutes at pH 10.5 and centrifuged to remove solids.

~~48~~24. A method for treating a plurality of cells, the method comprising:

heating the plurality of cells to a temperature of about 50°C to about 85°C, optionally wherein the heating is performed at a pH of about 8.5 to about 12.0, optionally wherein the method further comprises, after heating the plurality of cells, treating a aqueous suspension of the plurality of cells with a base until the pH of the aqueous suspension is about 8.5 to about 12.0, optionally wherein when the plurality of cells has

cell walls, the method further comprises, after heating the plurality of cells, perforating the cell walls of the plurality of cells;

wherein treatment of a supernatant of the plurality of cells with a mannosidase yields less than about 30 µg/mL detectable mannose in the supernatant, wherein the supernatant is prepared using a 10% (w/v) suspension of the plurality of cells, after being incubated at 50°C for 10 minutes at pH 10.5 and centrifuged to remove solids.

4925. The method of any one of claims ~~46-48~~22-24, wherein less than about 200 µg/mL beta glucan is detectable in a soluble phase, wherein the soluble phase is prepared using a 10% (w/v) suspension of the plurality of cells, after being incubated at 50 °C for 10 minutes at pH 12.0.

~~50. The method of claim 46, wherein the perforating is performed at a pH of about 8.5 to about 12.0.~~

~~51. The method of claim 48, wherein the heating is performed at a pH of about 8.5 to about 12.0.~~

~~52. The method of claim 46, wherein the perforating is performed at a temperature of less than or equal to about 12 °C.~~

~~53. The method of claim 47, wherein the treating is performed at a temperature of less than or equal to about 12 °C.~~

~~54. The method of claim 48, further comprising after heating the plurality of cells, treating the aqueous suspension of the plurality of cells with a base until the pH of the aqueous suspension is about 8.5 to about 12.0.~~

~~55. The method of claim 48, wherein when the plurality of cells has cell walls, the method further comprises, after heating the plurality of cells, perforating the cell walls of the plurality of cells.~~

~~56. The method of claim 47, wherein treating the aqueous suspension of the plurality of cells with a base until the pH of the aqueous suspension is about 8.5 to about 12.0 comprises treating the aqueous suspension of the plurality of cells with a base until the pH of the aqueous suspension is between about 8.5 and 12.0 for at least about 3 minutes.~~

~~57. The method of claim 46, wherein the method further comprises, after the perforating, heating the plurality of cells to at least about 60 °C.~~

~~58. The method of claim 46, wherein perforating comprises treatment with a reductant, treatment with an enzyme, electroporation, or a combination thereof.~~

~~59. The method of claim 58, wherein treatment with the reductant comprises treatment with about 10 mM to about 500 mM reducing equivalents of the reductant.~~

~~60~~26. A composition comprising the plurality of cells prepared by the method of any one of claims ~~46-59~~22-26.