

# ANALYSIS OF COMPANY PATENT PORTFOLIOS

## I. BEYOND MEAT

### 1. FAMILY 1

#### 1.1. US Patent 9,526,267

##### 1.1.1. Original Filed Claims (representative)

1. A nutrient-dense meat structured protein product, wherein the nutrient-dense meat structured protein product has a moisture content of at least 30% by weight and wherein such nutrient-dense meat structured protein product, further, comprises a) protein fibers that are substantially aligned; and b) at least 5% by weight of a non-animal protein material.

22. A nutrient dense condiment comprising a base substrate selected from dry seasonings, an oil emulsion, a vinegar emulsion, pickled vegetables or fermented beans, grains or vegetables in combination with one or more nutrients selected from the group consisting of iron, omega-3 fatty acids, calcium, antioxidants or vitamin B-12.

28. A process for producing a nutrient-dense meat structured protein product comprising protein fibers that are substantially aligned, wherein the process comprises: a) combining a non-animal protein material and water with at least one heat stable nutrient to form a dough; b) shearing and heating the dough so as to denature the proteins in the protein material and produce protein fibers that are substantially aligned in a fibrous structure; and c) setting the dough to fix the fibrous structure previously obtained, thereby obtaining a nutrient-dense meat structured protein product having a moisture content of at least 30% by weight and comprising at least 5% by weight of a non-animal protein material and at least 0.25 mg of heat stable nutrient per ounce of the nutrient-dense meat structured protein product.

50. A process for preparing a nutrient dense condiment comprising mixing a base substrate selected from dry seasonings, an oil emulsion, a vinegar emulsion, pickled vegetables or fermented beans, grains or vegetables with one or more nutrients selected from the group consisting of iron, omega-3 fatty acids, calcium, antioxidants or vitamin B-12.

### **1.1.2. Relevant Prosecution Actions**

- Restriction requirement, and Applicant elected claims 1-21, 28-29 and 54 to product and process
- Claims rejected for anticipation and obviousness, but dependent claims 34-42 indicated as being allowable.
- Amended claims to include limitations of those claims indicated as being allowable.

### **1.1.3. Patented Claims (independent)**

1. A process for producing a nutrient-dense meat structured protein product comprising protein fibers that are substantially aligned, wherein the process comprises: a) combining a non-animal protein material and water with at least one heat stable nutrient to form a dough; b) shearing and heating the dough so as to denature the proteins in the protein material and produce protein fibers that are substantially aligned in a fibrous structure; c) setting the dough to fix the fibrous structure previously obtained, thereby obtaining a nutrient-dense meat structured protein product having a moisture content of at least 30% by weight and comprising at least 5% by weight of a non-animal protein material and at least 0.25 mg of heat stable nutrient per ounce of the nutrient-dense meat structured protein product; and d) as a post-processing step, adding at least one non-heat stable nutrient to the nutrient-dense meat structured protein product.

20. A process for producing a nutrient-dense meat structured protein product comprising protein fibers that are substantially aligned, wherein the process comprises: a) combining a non-animal protein material and water to form a dough; b) shearing and heating the dough so as to denature the proteins in the protein material and produce protein fibers that are substantially aligned in a fibrous structure; c) setting the dough to fix the fibrous structure previously obtained, thereby obtaining a protein fibrous product; and d) subjecting such protein fibrous product to at least one post-processing step wherein at least one non-heat stable nutrient is added to the protein fibrous product during such post-processing step so as to obtain a nutrient-dense meat structured protein product having a moisture content of at least 30% by weight and comprising at least 5% by weight of a non-animal protein material and at least one non-heat stable nutrient.

### **1.1.4. Observations**

Process claims rather easily granted. Product claims canceled. Allowed claims included limitation to "post-processing step".

## 1.2. [US20170099856](#)

### 1.2.1. **Original Published Claims -**

55. A nutrient-dense meat structured protein product, wherein the nutrient-dense meat structured protein product has a moisture content of at least 30% by weight and wherein such nutrient-dense meat structured protein product, further, comprises a) protein fibers that are substantially aligned; and b) at least 5% by weight of a non-animal protein material.

76. A nutrient dense condiment comprising a base substrate selected from dry seasonings, an oil emulsion, a vinegar emulsion, pickled vegetables or fermented beans, grains or vegetables in combination with one or more nutrients selected from the group consisting of iron, omega-3 fatty acids, calcium, antioxidants or vitamin B-12.

### 1.2.2. **Prosecution Actions**

- Claims rejected for anticipation and obviousness. For ingredients not specifically disclosed by reference in amounts claims, Examiner noted:

Claims 77 to 81 require particular amounts of nutrients in the condiment. In summary, applicant claims a formula for making a nutrient dense condiment products that use or eliminate common ingredients, and do not amount to invention in the constantly developing art of preparing food because there is no specific showing that establishes a coaction or cooperative relationship between the selected ingredients which produces a new, unexpected and useful function.

- Application was abandoned

### 1.2.3. **Observations**

While process claims were rather easily patented, product claims were abandoned.

## **2. FAMILY 2**

### **2.1. US 20170105438**

#### **2.1.1. Published Claims**

1. A meat-like food product, wherein the meat-like food product comprises at least about 25% by weight of one or more meat structured protein products bound together by at least about 0.1% by weight of one or more binding agents in a manner that produces meat-like food products that have one or more similar or superior attributes compared to animal meat.

48. An agent release system, wherein the agent release system imparts meat-like attributes to meat-like food product such that the meat-like food product simulates animal meat, wherein the agent release system comprises dispersed system components that comprise one or more agents to be released and wherein trigger conditions cause the release of at least one of the agents to be released from the dispersed system components.

71. A process for producing a meat-like food product, wherein the process comprises the step of coagulating one or more meat structured protein products using one or more binding agents in a manner such that the meat-like food product has one or more similar or superior attributes compared to animal meat and comprises at least about 25% by weight of one or more meat structured protein products and at least about 0.1% by weight of one or more binding agents.

#### **6.1.2. Prosecution Actions**

- Elected to prosecute product claims
- Claims rejected for various 112 reasons, and for obviousness, with the Examiner arguing, in part:

The agent to be released is an intended use of the product which does not determine the patentability of the product. In any event, Vrljic discloses the adipose replica containing plant oil which can be modified with flavoring or other agents to recapitulate the taste and smell of meat during and after cooking. Thus, it would have been obvious to one skilled in the art to add flavoring, aroma, coloring, tasting, protein etc.. or any components that are known to be associated with meat product to be released to optimize the meat replica product to be as close to actual meat as possible. Vrljic discusses the possible flavorings, odorants, aroma associated with meat product. Optimization so that the most closely resemble to real product is possible would have been within the skill of one in the art through routine experimentation. It would have been obvious to one skilled in the art to mix the

- Applicant amended claims and submitted Declaration evidence directed to the importance of the water-in-oil emulsion.
- Claims again rejected, with Examiner urging with respect to the Declarations:

In the response, applicant submits an affidavit to show the claimed water-in-oil emulsion is critical. However, the showing is not persuasive. While the affidavit shows different results are obtained with the different emulsions, the data is not sufficient to conclude that the different results are based solely on the emulsion. To show that it is the emulsion that gives the critical difference, every other factor has to be constant with only the emulsion as the changing variable. The instant specification does not establish any criticality to the emulsion being W/O or O/W and the affidavit also does not have any showing to show criticality between the two types. Table 1 states that sample A

- Final Rejection issued 2021-02-03
- Still Pending

## **2.2. US20180310599**

### **2.2.1. Published Claims (representative)**

79. A meat-like food product comprising: between about 25% and about 60% by weight of one or more meat structured protein products; and between about 0.25% to about 5% by weight of one or more binding agents for binding together the one or more meat structured protein products in a manner that produces a meat-like food product having one or more similar or superior attributes compared to animal meat.

106. An agent release system that imparts one or more meat-like attributes to a meat-like food product such that the meat-like food product simulates animal meat, wherein the agent release system comprises: a dispersed system component selected from the group consisting of i) an encapsulate, ii) a water-in-oil emulsion, and iii) a gel comprising at least one of a kinetically stabilized gel and a hardened gel; one or more agents to be released from the dispersed system component; wherein one or more trigger conditions cause the release of at least one of the one or more agents to be released from the dispersed system components; and wherein the agent release system comprises at least about 45% by weight of lipid.

### **2.2.2. Prosecution Actions**

- Pursued agent release system claims
- Claims rejected for various 112 reasons, and for obviousness, with the Examiner asserting, in part:

oil as an obvious matter of preference. Applicant has not established any criticality or unexpected result with respect to the claimed combination and proportion. Generally, difference in concentration doesn't amount to patentability in absence of showing of unexpected result or criticality. It would have been an obvious matter of preference to use any known emulsifier as the claimed emulsifier is well known. Jacobs discloses having the emulsion having small sizes to impart stability. Thus, it would have been obvious to one skilled in the art to determine the optimum sizes through routine experimentation to obtain the most optimum product. "Where general conditions of a claim are disclosed in the prior art it is not inventive to discover the optimum or workable ranges by routine experimentation."

In re Aller, 220 F.2d 454, 105 USPQ 233 (CCPA 1955). As to the imparting of meat-like color and the

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- Applicant amended claims
- Claims rejected again for obviousness, including new combination of prior art references.
- Still pending

### **2.2.4 Observations**

- Again, obtaining product claims is difficult if there is not new, novel ingredient and differences are amounts of known compounds/ingredients.

## 2.3. US20190037893

### 2.3.1. Published claims

79. A meat-like food product comprising: between about 25% and about 60% by weight of one or more meat structured protein products; and between about 0.25% to about 5% by weight of one or more binding agents for binding together the one or more meat structured protein products in a manner that produces a meat-like food product having one or more similar or superior attributes compared to animal meat.

106. An agent release system that imparts one or more meat-like attributes to a meat-like food product such that the meat-like food product simulates animal meat, wherein the agent release system comprises: a dispersed system component selected from the group consisting of i) an encapsulate, ii) a water-in-oil emulsion, and iii) a gel comprising at least one of a kinetically stabilized gel and a hardened gel; one or more agents to be released from the dispersed system component; wherein one or more trigger conditions cause the release of at least one of the one or more agents to be released from the dispersed system components; and wherein the agent release system comprises at least about 45% by **weight of lipid**.

### 2.3.2. Prosecution Actions

- Claims rejected for various 112 reasons, and for obviousness, with the Examiner asserting.
- Applicant responded with Declaration evidence.
- Examiner maintained obviousness rejection, urging, in part:

would have the same properties as shown in the affidavit. To show unexpected results as a means to define over the prior art, the showing must be a fair representation of the product being claimed and a sufficient number of examples demonstrating varying points in the ranges of ingredients claimed must be shown. One example with amounts of ingredients far different from the ranges claimed is not considered a sufficient representation of the claimed product. Product B is stated to be the Nishimura product. However, the affidavit states the product is prepared without forming in a mold per Nishimura's disclosure. If the product is not formed as exactly stated in the Nishimura disclosure, then the product cannot be stated to be Nishimura product. The comparison in properties is then not against the closest prior art. As to the remaining products, it is not clear the relevancy of the showing of such products because they are not the claimed product or the Nishimura product. The results of such products would not be significant in determining the unexpected results or criticality of the claimed product.

- Still pending after Final Rejection (2020-11-24)

### **3. FAMILY 3**

#### **3.1. US 20150296834**

##### **3.1.1. Published Claims (representative)**

1. A meat structured protein product, wherein the meat structured protein product has an alkaline pH of at least 7.05 and a moisture content of at least 30% by weight and wherein such meat structured protein product, further, comprises a) protein fibers that are substantially aligned; and b) at least 5% by weight of a non-animal protein material.

28. A process for producing a meat structured protein product comprising protein fibers that are substantially aligned, wherein the process comprises: a) combining a non-animal protein material and water with a pH adjusting agent to form a dough which has an alkaline pH of at least 7.05; b) shearing and heating the dough so as to denature the proteins in the protein material and produce protein fibers that are substantially aligned in a fibrous structure; and c) setting the dough to fix the fibrous structure previously obtained, thereby obtaining a meat structured protein product having a moisture content of at least 30% by weight and comprising at least 5% by weight of a non-animal protein material.

### **3.1.2. Prosecution Actions**

Case abandoned after two Office Actions rejecting the claims over prior art.  
Likely abandoned in favor of PCT/US15/26206

## **3.2. WO 2015/161099 = PCT/US15/26206**

### **3.2.1. Published Claims**

1. A meat structured protein product, wherein the meat structured protein product has an alkaline pH of at least 7.05 and a moisture content of at least 30% by weight and wherein such meat structured protein product, further, comprises

- a) protein fibers that are substantially aligned; and
- b) at least 5% by weight of a non-animal protein material.

28. A process for producing a meat structured protein product comprising protein fibers that are substantially aligned, wherein the process comprises:

- a) combining a non-animal protein material and water with a pH adjusting agent to form a dough which has an alkaline pH of at least 7.05;
- b) shearing and heating the dough so as to denature the proteins in the protein material and produce protein fibers that are substantially aligned in a fibrous structure; and c)
- setting the dough to fix the fibrous structure previously obtained, thereby obtaining a meat structured protein product having a moisture content of at least 30% by weight and comprising at least 5% by weight of a non-animal protein material.

### **3.2.2. Prosecution Actions**

- US and other family members abandoned.

## 4. FAMILY 4

### 4.1. US2016-0073671

#### 4.1.1. Published Claims

1. A meat structured protein product, wherein the meat structured protein product has a moisture content of at least 30% by weight and wherein such meat structured protein product, further, comprises

- a) protein fibers that are substantially aligned; and
- b) at least 2% by weight of microbial biomass.

17. A process for producing a meat structured protein product comprising protein fibers that are substantially aligned, wherein the process comprises:

- a) combining water and a microbial biomass comprising microbial protein;
- b) shearing and heating the dough so as to denature the proteins in the microbial protein material and produce protein fibers that are substantially aligned in a fibrous structure; and
- c) setting the dough to fix the fibrous structure previously obtained, thereby obtaining a meat structured protein product having a moisture content of at least 30% by weight and comprising at least 2% by weight of microbial biomass.

#### 4.1.2. Prosecution Actions

- Elected to prosecution product claims instead of process claims.
- Claims rejected as obvious over prior art, with Examiner stating:

Therefore, Akin et al discloses addition of water to the extruded protein material in order to adjust water content of the product that results in meatlike properties such as "meatlike chewability, meatlike appearance, and sensory-textural properties of animal proteins". One of ordinary skill in the art would have been motivated to vary the moisture content in the meat structured protein product depending on the desired sensory-textural properties such as meatlike chewability, meatlike appearance, etc.

Further in regard to the concentration recitations, it is noted that:

Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (MPEP 2144.05, II A).

- Applicant submitted some claim amendments.

- Claims rejected again (Final Rejection) for obviousness, with Examiner basically repeated the same rejections and reasoning.
- Application abandoned in favor of PCT application 2016/044423 – still in PCT
- PCT Written Opinion asserted lack of Inventive Step
- PCT application apparently did not enter any national stage countries

## **5. FAMILY 5**

### **5.1. US20170035076A1**

#### **5.1.1. Published Claims**

**1.** A meat structured protein product, wherein the meat structured protein product comprises:

- a) at least about 0.01% by weight of cell wall material;
- b) protein fibers that are substantially aligned;
- c) a moisture content of at least about 30%; and
- d) at least about 5% by weight of a non-animal protein material.

**51.** A process for producing a meat structured protein product comprising protein fibers that are substantially aligned, wherein the process comprises:

- a) combining a non-animal protein material, water, and cell wall material to produce a dough;
- b) shearing and heating the dough so as to denature the proteins in the protein material and produce protein fibers that are substantially aligned in a fibrous structure; and
- c) setting the dough to fix the fibrous structure previously obtained, thereby obtaining a meat structured protein product comprising at least about 0.01% by weight of cell wall material; a moisture content of at least about 30%; and at least about 5% by weight of a non-animal protein material.

#### **5.1.2. Prosecution Actions**

- elected to pursue product claims
- claims rejected for anticipation and obviousness, with Examiner stating:

sentence, which discloses “additional sources may be included” to meet “nutrient requirement”). Thus, barring any unexpected results realized by the applicant for the claimed fiber in the claimed proportion in the structured protein composition of which there appears to be no evidence, it would have been obvious to one of ordinary skill in the art at the time of the effective filing date of the invention to use a specific fiber source (such as “yeast cell wall material” of claims 6-9 in the various relative amounts claimed) as long as the total fiber content is in the range disclosed by Swenson. The person of ordinary skill in the art would have been motivated to modify Swenson at least for the purpose of using known and commonly used fiber sources (either alone or in combination as taught by Swenson para 88) in specific proportions to arrive at a total fiber content (such as about 1% to about 10% as taught by Swenson para 88) to achieve the target nutrient requirements suited for the intended consumer (para 87, 1s sentence of Swenson).

- Applicant amended claims and urged that terms in claims, as understood by Applicant, are not taught in prior art.
- Awaiting next action by USPTO as of 2021-02-05.

## **6. FAMILY 6**

**6.1. [US 20120093994](#) (licensed from University of Missouri – see below for details).**

## **II. IMPOSSIBLE FOODS**

### **1. FAMILY 1**

#### **1.1. [US 9,011,949](#)**

##### **1.1.1. Original Published Claims [US20140127358](#)**

1. A composition comprising a non-dairy milk and a cross-linking enzyme.

##### **1.1.2. Prosecution Actions**

- Claims rejected over prior art.
- Applicant amended claims twice and submitted arguments.
- Case allowed with main claims:

1. A composition comprising a non-dairy milk having at least 85% of its insoluble solids removed and a cross-linking enzyme, wherein said non-dairy milk is selected from the group consisting of almond milk, cashew milk, brazilnut milk, chestnut milk, coconut milk, hazelnut milk, macadamia nut milk, pecan milk, pistachio milk, walnut milk, and combinations thereof.

## **1.2. US20150366233**

### **1.2.1. Published Claims**

31. A non-dairy milk comprising an emulsion, suspension, or colloidal solution of one or more purified plant proteins and one or more plant oils or fats.

60. A method for making a cheese replica, comprising: (a) combining (i) a non-dairy milk comprising an emulsion, suspension, or colloidal solution of one or more purified plant proteins and one or more plant oils or fats, with (ii) a lactic acid bacteria; and (b) draining or pressing the combination to separate curd from whey

### **1.2.2. Prosecution Actions**

- Claims rejected over prior art several times, amended several times, filed RCE.
- But rejections were maintained and case was abandoned.

## **1.3. US 2021-0030014**

### **1.3.1. Published Claims**

31. A method of preparing a non-dairy milk composition comprising: (a) providing an aqueous composition comprising one or more isolated, enriched, or purified plant proteins, one or more oils or fats, and a fermentable carbon source; (b) forming a colloidal suspension, solution, or emulsion from the aqueous composition; and (c) fermenting the colloidal suspension, solution, or emulsion using one or more microbes selected from the group consisting of *Penicillium camemberti*, *Geotrichum candidum*, *Penicillium roqueforti*, *Penicillium nalgiovensis*, *Verticillium lecanii*, *Kluyveromyces lactis*, *Saccharomyces cerevisiae*, *Candida utilis*, *Debaryomyces hansensii*, *Rhodospiridium infirmominiatum*, *Candida jefer*, *Cornybacteria*, *Micrococcus* sps., *Lactobacillus* sps., *Lactococcus*, *Staphylococcus*, *Halomonas*, *Brevibacterium*, *Psychrobacter*, *Leuconostocaceae*, *Streptococcus thermophilus*, *Pediococcus* sps., and *Propionibacteria*.

43. A non-dairy milk composition comprising: (a) a colloidal suspension, solution, or emulsion comprising one or more isolated, enriched, or purified plant proteins, and one

or more oils or fats; and (b) one or more microbes selected from the group consisting of *Penicillium camemberti*, *Geotrichum candidum*, *Penicillium roqueforti*, *Penicillium nalgiovensis*, *Verticillium lecanii*, *Kluyveromyces lactis*, *Saccharomyces cerevisiae*, *Candida utilis*, *Debaryomyces hansenii*, *Rhodospiridium infirmominiatum*, *Candida jefer*, *Cornybacteria*, *Micrococcus* sps., *Lactobacillus* sps., *Lactococcus*, *Staphylococcus*, *Halomonas*, *Brevibacterium*, *Psychrobacter*, *Leuconostocaceae*, *Streptococcus thermophilus*, *Pediococcus* sps., and *Propionibacteria*.

### **1.3.2. Prosecution Actions – Pending, awaiting first action.**

## **2. FAMILY 2**

### **2.1.1. US 9,700,067**

#### **2.1.2. Original Published Claims**

1. A food product comprising: a) an isolated and purified heme-containing protein or a highly conjugated heterocyclic ring complexed to iron ion; and b) one or more flavor precursor molecules selected from the group consisting of glucose, fructose, ribose, arabinose, glucose-6-phosphate, fructose 6-phosphate, fructose 1,6-diphosphate, inositol, maltose, sucrose, maltodextrin, glycogen, nucleotide-bound sugars, molasses, a phospholipid, a lecithin, inosine, inosine monophosphate (IMP), guanosine monophosphate (GMP), pyrazine, adenosine monophosphate (AMP), lactic acid, succinic acid, glycolic acid, thiamine, creatine, pyrophosphate, vegetable oil, algal oil, sunflower oil, corn oil, soybean oil, palm fruit oil, palm kernel oil, safflower oil, flaxseed oil, rice bran oil, cottonseed oil, olive oil, sunflower oil, canola oil, flaxseed oil, coconut oil, mango oil, linoleic acid, a free fatty acid, cysteine, methionine, isoleucine, leucine, lysine, phenylalanine, threonine, tryptophan, valine, arginine, histidine, alanine, asparagine, aspartate, glutamate, glutamine, glycine, proline, serine, tyrosine, glutathione, an amino acid derivative, a protein hydrolysate, a malt extract, a yeast extract, and a peptone.

21. A method of making a food product, the method comprising combining an isolated and purified heme-containing protein or a highly conjugated heterocyclic ring complexed to iron ion with one or more flavor precursor molecules to form a mixture, the one or more flavor precursor molecules selected from the group consisting of glucose, fructose, ribose, arabinose, glucose-6-phosphate, fructose 6-phosphate, fructose 1,6-diphosphate, inositol, maltose, sucrose, maltodextrin, glycogen, nucleotide-bound sugars, molasses, a phospholipid, a lecithin, inosine, IMP, GMP, pyrazine, AMP, lactic acid, succinic acid, glycolic acid, thiamine, creatine, pyrophosphate, sunflower oil,

canola oil, flaxseed oil, coconut oil, mango oil, a free fatty acid, cysteine, methionine, isoleucine, leucine, lysine, phenylalanine, threonine, tryptophan, valine, arginine, histidine, alanine, asparagine, aspartate, glutamate, glutamine, glycine, proline, serine, tyrosine, glutathione, an amino acid derivative, a hydrolyzed protein, a malt extract, a yeast extract, and a peptone; and heating the mixture.

### **2.1.3. Prosecution Actions**

- Elected product claims
- Claims rejected over prior art, with the Examiner asserting, in part:

Applicants cite several pieces of art directed to meat analogs and note that none of the references refer to iron or heme-containing protein as flavoring or coloring agents.

The fact that heme-containing protein has not been recognized as a flavoring or coloring agent is not germane to the rejection of record. Here, Proulx et al. teach that heme-containing protein, leghemoglobin is known to be used as an iron supplement in foods. Given Proulx et al. teach that iron deficiency is a major nutritional problem and that fortification of foods with iron has been a successful strategy from improving iron content, since Proulx et al. teach that bioavailability is higher from heme iron sources including, leghemoglobin from soy root nodules, it would have been obvious to one of ordinary skill in the art to have fortified the structured plant protein product of Hsieh et al., with leghemoglobin from soy root nodules, to obtain a product with improved nutritional status, i.e. bioavailable source of iron.

- Submitted several Declarations with experimental evidence to rebut prior art rejections, including arguments and experiments to assert:

19. In my opinion, Applicant's experiments in the '006 application and the Holz-Schietinger Declaration demonstrate that the addition of LegH to an aqueous thermal reaction mixture comprising ribose and cysteine has the surprising result of enhancing the formation of volatile compounds associate with a meaty aroma. Significantly, the 2,851-fold increase in

- Case ultimately allowed with main claims:

1. A ground beef-like food product comprising: a) 0.1%-5% by weight of a heme-containing protein comprising an amino acid sequence having at least 80% sequence identity to the polypeptide set forth in SEQ ID NO:4; b) a compound selected from

glucose, ribose, fructose, lactose, xylose, arabinose, glucose-6-phosphate, maltose, and galactose, and mixtures of two or more thereof; c) at least 10 mM of a compound selected from cysteine, cystine, selenocysteine, thiamine, methionine, and mixtures of two or more thereof; and d) 10% or more by weight of one or more plant proteins, wherein the ground beef-like food product contains no animal products, and wherein cooking the ground beef-like food product results in the production of at least two volatile compounds which have a beef-associated aroma.

## 2.2. US 9,943,096

### 2.2.1. Prosecution actions:

- Submitted Declaration evidence to rebut prior art rejections and urge importance of heme-containing protein on flavor generation.
- Claims ultimately granted with main claims:

1. A food flavor additive composition comprising: a) an isolated heme-containing protein; b) a compound selected from glucose, ribose, fructose, lactose, xylose, arabinose, glucose-6-phosphate, maltose, maltodextrin, and galactose, and mixtures of two or more thereof; and c) a compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof; wherein the flavor additive composition contains no animal products; and wherein cooking the food flavor additive composition results in the production of at least two volatile compounds which have a meat-associated aroma.

## 2.3. US 9,808,029

### 2.3.1. Prosecution Actions

- Applicant filed Track One Request, and First Action Interview Request.
- Filed with new set of claims to recite heme-containing compound.
- Claims rather easily granted:

1. A ground beef-like food product, comprising: a) 0.01%-5% by weight of a heme-containing protein; b) a compound selected from glucose, ribose, fructose, lactose, xylose, arabinose, glucose-6-phosphate, maltose, and galactose, and mixtures of two or more thereof; c) at least 1.5 mM of a compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof, and d) one or more plant proteins, wherein the ground beef-like food product contains no animal product; wherein cooking the ground beef-like food product results in the production of at least two volatile compounds which have a beef-associated aroma.

## 2.4. US 10,314,325

### 2.4.1 Prosecution Actions

- Claims rejected for various 112 reasons and double patenting (but not over prior art)
- Claims amended and submitted terminal disclaimers to overcome double patenting
- Claims then allowed:

1. A food product, comprising: a) a heme, wherein the heme is present in an amount equivalent to the amount of heme present in the food product when the food product contains a heme-containing protein in an amount of 0.01% to 5% by weight; b) a compound selected from glucose, ribose, fructose, lactose, xylose, arabinose, glucose-6-phosphate, maltose, and galactose, and mixtures of two or more thereof; c) at least 1.5 mM of a compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof; and d) one or more plant proteins, wherein the food product contains no animal product; and wherein cooking the food product results in the production of at least two volatile compounds selected from the group consisting of (1-ethyl-1-propenyl)-benzene, (E)-2-decenal, (E)-2-heptenal, (E)-2-hexenal, (E)-2-nonenal, (E)-2-octen-1-ol, (E)-2-octenal, (E)-2-tridecen-1-ol, (E)-3-penten-2-one, ...

22. A meat substitute, comprising: a) a heme, wherein the heme is present in an amount equivalent to the amount of heme present in the food product when the food product contains a heme-containing protein in an amount of 0.01% to 5% by weight; b) a compound selected from glucose, ribose, fructose, lactose, xylose, arabinose, glucose-6-phosphate, maltose, and galactose, and mixtures of two or more thereof; c) at least 1.5 mM of a compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof; and d) one or more plant proteins, wherein the meat substitute is in a form selected from the group consisting of a hot dog, a burger, ground meat, a sausage, a steak, a filet, a roast, a meatball, meatloaf, or bacon; and wherein the meat substitute contains no animal products; and wherein cooking the meat substitute in the production of at least two volatile compounds which have a meat-associated aroma.

## 2.5. US 10,327,464

### 2.5.1 Prosecution Actions

- Claims rejected for various 112 reasons and double patenting (but not over prior art)
- Claims amended and submitted terminal disclaimers to overcome double patenting

- Claims then allowed:

1. A food product, comprising: a) 0.01%-5% by weight of a heme-containing protein; b) a compound selected from glucose, ribose, fructose, lactose, xylose, arabinose, glucose-6-phosphate, maltose, and galactose, and mixtures of two or more thereof; c) at least 1.5 mM of a compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof; and d) one or more plant proteins, wherein the food product contains no animal products that contain heme; and wherein cooking the food product results in the production of at least two volatile compounds selected from the group consisting of (1-ethyl-1-propenyl)-benzene, (E)-2-decenal, (E)-2-heptenal, (E)-2-hexenal, (E)-2-nonenal, (E)-2-octen-1-ol, (E)-2-octenal, (E)-2-tridecen-1-ol, ...

23. A meat substitute, comprising: a) 0.01%-5% by weight of a heme-containing protein; b) a compound selected from glucose, ribose, fructose, lactose, xylose, arabinose, glucose-6-phosphate, maltose, and galactose, and mixtures of two or more thereof; c) at least 1.5 mM of a compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof; and d) one or more plant proteins, wherein the meat substitute is in a form selected from the group consisting of a hot dog, a burger, ground meat, a sausage, a steak, a filet, a roast, a meatball, meatloaf, or bacon; and wherein the meat substitute contains no animal products that contain heme; and wherein cooking the meat substitute product results in the production of at least two volatile compounds which have a meat-associated aroma.

## **2.5. US 20180199605**

### **2.6.1. Published claims**

31. A meat-like food product, comprising: a) 0.01%-5% by weight of a plant, yeast, fungal, or bacterial heme-containing protein; b) a compound selected from glucose, ribose, fructose, lactose, xylose, arabinose, glucose-6-phosphate, maltose, and galactose, and mixtures of two or more thereof; c) at least 1.5 mM of a compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof; and d) one or more plant proteins, wherein cooking the meat-like food product results in the production of at least two volatile compounds that have a meat-associated aroma.

### **2.6.2. Prosecution Actions**

- Claims rejected for various 112 reasons, over prior art and for double patenting.
- Amended claim to recite:

31. (Currently Amended) A meat-like-food product, comprising:

- a) 0.01%-5% by weight of a plant, yeast, fungal, algal, ciliate, archaeal, or bacterial heme-containing protein, wherein the heme-containing protein is free of animal heme-containing proteins;
- b) a compound selected from glucose, ribose, fructose, lactose, xylose, arabinose, glucose-6-phosphate, maltose, and galactose, and mixtures of two or more thereof;
- c) at least 1.5 mM of a compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof; and
- d) one or more plant proteins,

wherein cooking the meat-like food product results in the production of at least two volatile compounds that have a meat-associated aroma; and

wherein the meat-like food product is in a form selected from the group consisting of a hotdog, a burger, ground meat, a sausage, a steak, a filet, a roast, a meatball, a meatloaf, or bacon.

- Claim rejections maintained in Final Rejection (2021-02-08)

## 2.6. [US 20180199606](#)

### 2.7.1. **Published Claims**

31. A meat-like food product produced by a method comprising: providing one or more plant proteins; and combining, with the one or more plant proteins: a source of a heme-containing protein, wherein the source of the heme-containing protein comprises at least 60% of the heme-containing protein on a dry weight basis; a compound selected from glucose, ribose, fructose, lactose, xylose, arabinose, glucose-6-phosphate, maltose, and galactose, and mixtures of two or more thereof; a compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof in to a concentration of at least 1.5 mM; and wherein cooking the meat-like food product results in the production of at least two volatile compounds which have a meat-associated aroma.

### 2.7.2. **Prosecution Actions**

- Claims rejected for various 112 reasons, over prior art and for double patenting.
- Amended claim to recite:

31. (Currently Amended) A meat-like-food product produced by a method comprising:  
providing one or more plant proteins; and  
combining, with the one or more plant proteins:  
a source of composition comprising a heme-containing protein, wherein the heme-containing protein is free of animal heme-containing proteins and wherein the source of the heme-containing protein composition comprises at least 60% of the heme-containing protein on a dry weight basis;  
a compound selected from glucose, ribose, fructose, lactose, xylose, arabinose, glucose-6-phosphate, maltose, and galactose, and mixtures of two or more thereof;  
a compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof in to a concentration of at least 1.5 mM; [[and]]  
wherein cooking the meat-like-food-product results in the production of at least two volatile compounds which have a meat-associated aroma; and  
wherein the meat-like food product is in a form selected from the group consisting of a hotdog, a burger, ground meat, a sausage, a steak a filet, a roast, a meatball, a meatloaf, or bacon.

- Claim rejections maintained in Final Rejection (2021-02-08)

## **2.8. US 9,826,772**

### **2.8.1. Published Claims**

31. A ground beef-like food product, comprising: a) 0.1%-5% by weight of a heme-containing protein; b) a compound selected from glucose, ribose, fructose, lactose, xylose, arabinose, glucose-6-phosphate, maltose, and galactose, and mixtures of two or more thereof; c) at least 10 mM of a compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof; and d) one or more plant proteins, wherein the ground beef-like food product contains no animal product; wherein cooking the ground beef-like food product results in the production of at least two volatile compounds which have a beef-associate aroma.

### **2.8.2. Prosecution Actions:**

- Submitted Declaration to show importance of heme compound.
- Case allowed with granted claims:

1. A ground beef-like food product, comprising: a) 0.1%-5% by weight of a heme-containing protein; b) a compound selected from glucose, ribose, fructose, lactose, xylose, arabinose, glucose-6-phosphate, maltose, and galactose, and mixtures of two or more thereof; c) at least 10 mM of a compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof; and d) one or more plant proteins, wherein the ground beef-like food product contains no animal product; wherein cooking the ground beef-like food product results in the production of at least two volatile compounds which have a beef-associated aroma.

## **2.9. US10,314,325**

### **2.9.1. Published Claims**

31. A beef-like food product, comprising: a) a heme cofactor; b) a compound selected from glucose, ribose, fructose, lactose, xylose, arabinose, glucose-6-phosphate, maltose, and galactose, and mixtures of two or more thereof; c) at least 1.5 mM of a compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof; and d) one or more plant proteins, wherein the beef-like food product contains no animal product; wherein cooking the beef-like food product results in the production of at least two volatile compounds which have a beef-associated aroma.

### **2.9.2. Prosecution Actions**

- Claims rejected for 112 reasons, and for double patenting.
- Applicant amended claims and file terminal disclaimers.
- Case allowed and claims granted:

1. A food product, comprising: a) a heme, wherein the heme is present in an amount equivalent to the amount of heme present in the food product when the food product contains a heme-containing protein in an amount of 0.01% to 5% by weight; b) a compound selected from glucose, ribose, fructose, lactose, xylose, arabinose, glucose-6-phosphate, maltose, and galactose, and mixtures of two or more thereof; c) at least 1.5 mM of a compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof; and d) one or more plant proteins, wherein the food product contains no animal product; and wherein cooking the food product results in the production of at least two volatile compounds selected from the group consisting of (1-ethyl-1-propenyl)-benzene, (E)-2-decenal, (E)-2-heptenal, (E)-2-hexenal, (E)-2-nonenal, (E)-2-octen-1-ol, (E)-2-octenal, (E)-2-tridecen-1-ol, (E)-3-penten-2-one, ...

22. A meat substitute, comprising: a) a heme, wherein the heme is present in an amount equivalent to the amount of heme present in the food product when the food product

contains a heme-containing protein in an amount of 0.01% to 5% by weight; b) a compound selected from glucose, ribose, fructose, lactose, xylose, arabinose, glucose-6-phosphate, maltose, and galactose, and mixtures of two or more thereof; c) at least 1.5 mM of a compound selected from cysteine, cystine, thiamine, methionine, and mixtures of two or more thereof; and d) one or more plant proteins, wherein the meat substitute is in a form selected from the group consisting of a hot dog, a burger, ground meat, a sausage, a steak, a filet, a roast, a meatball, meatloaf, or bacon; and wherein the meat substitute contains no animal products; and wherein cooking the meat substitute in the production of at least two volatile compounds which have a meat-associated aroma.

**2.10. SN 17/081,908 – Pending, not yet published**

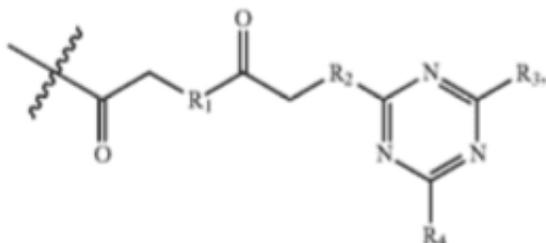
**2.11. SN 17/081,922 – Pending, not yet published**

### **3. FAMILY 3**

**3.1. US 9,737,875**

#### **3.1.1. Patented Claims**

1. A compound comprising the structure

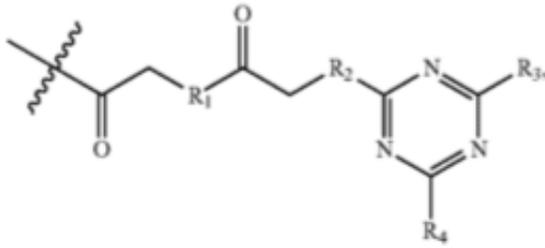


wherein the wavy line indicates the point of attachment to a substrate, optionally through a linker; wherein R.sub.1 is selected from the group consisting of 2-phenylpropylamine, 4-methylbenzylamine, 2-phenylethanamine, benzylamine, 3-phenylpropylamine, 4-(2-aminomethyl)benzenesulfonamide, ...

**3.2. US 9,833,768**

#### **3.2.1. Patented Claims**

1. A compound comprising the structure



wherein the wavy line indicates the point of attachment to a substrate, optionally through a linker; wherein R.sub.1 is selected from the group consisting of 2-phenylpropylamine, 4-methylbenzylamine, ...

## 4. FAMILY 4

### 4.1. US 9,938,327

#### 4.1.1. Published Claims

1. A methylotrophic *Pichia* yeast cell comprising: a nucleic acid molecule having at least 90% sequence identity to SEQ ID NO:5 and encoding a leghemoglobin polypeptide operably linked to a promoter element from *P. pastoris* and a Mxr1 transcriptional activator sequence from *P. pastoris*; and a nucleic acid molecule having at least 90% sequence identity to a sequence selected from the group consisting of SEQ ID NO:11, 12, 13, 14, 15, 16, 17, and 18 and encoding at least one polypeptide involved in heme biosynthesis operably linked to a promoter element from *P. pastoris* and a Mxr1 transcriptional activator sequence from *P. pastoris*.

#### 4.1.2. Prosecution Actions

- Claims rejected for obviousness
- Prior art excluded as being of common assignee, Impossible Foods.
- Claims allowed as published.

### 4.2. US 10,273,492

#### 4.2.1. Published Claims

1. A methylotrophic *Pichia* yeast cell comprising: a nucleic acid molecule encoding a heme-containing protein operably linked to a promoter element from *P. pastoris* and a Mxr1 transcriptional activator sequence from *P. pastoris*; and a nucleic acid molecule encoding at least one polypeptide involved in heme biosynthesis operably linked to a

promoter element from *P. pastoris* and a Mxr1 transcriptional activator sequence from *P. pastoris*.

#### **4.2.2. Prosecution Actions**

- Claims rejected for 112 reasons, and for double patenting.
- Made minor amendments to claims, submitted terminal disclaimers, claims granted:

1. A methylotrophic *Pichia* yeast cell comprising: a nucleic acid molecule encoding a heme-containing protein operably linked to a promoter element from *P. pastoris* and a Mxr1 transcriptional activator sequence from *P. pastoris*; and a nucleic acid molecule encoding at least one polypeptide involved in heme biosynthesis operably linked to a promoter element from *P. pastoris* and a Mxr1 transcriptional activator sequence from *P. pastoris*.

### **4.3. US 20180371469**

#### **4.3.1. Published Claims**

1. A nucleic acid construct comprising: a nucleic acid encoding a transcriptional activator operably linked to a promoter element comprising one or more recognition sequences for the transcriptional activator.

#### **4.3.2. Prosecution Actions**

- Restriction requirement issued (2020-12-21)

## **5. FAMILY 5**

### **5.1. US 20140220217**

#### **5.1.1. Published Claims**

163. A meat substitute product, comprising: a) a muscle replica; b) a fat tissue replica; and c) a connective tissue replica; wherein said muscle replica, fat tissue replica, and/or connective tissue replica are assembled in a manner that approximates the physical organization of meat.

#### **5.1.2. Prosecution Actions**

*Meat Substitute US Patent Landscape, Appendix 2, APRIL, 2021*

- Claims rejected over prior art.
- Claims amended to recite product contains iron containing protein with sequence information.
- Rejections maintained in Final Rejection
- Case abandoned

## 5.2. US 10,039,306

### 5.2.1. Published Claims

1. A method for imparting a beef-like flavor to a consumable product, comprising adding, to the consumable, an heterologous heme-containing protein, wherein, after cooking, a beef-like flavor is imparted to the consumable.

### 5.2.2. Prosecution Actions

- Claims rejected for obviousness.
- Numerous rejections and responses regarding obviousness rejections, including declaration evidence, and RCEs.
- Ultimately case allowed and claims granted:

1. A method for imparting a beef-like aroma to a meat replica matrix, wherein the meat replica matrix comprises one or more plant proteins, a sugar selected from glucose, ribose, sucrose, fructose, xylose, maltodextrin, and combinations thereof, and at least one sulfur compound selected from methionine, cysteine and thiamine, the method comprising adding 0.01%-5% (by weight of the meat replica matrix) of a non-animal heme-containing protein to the meat replica matrix, wherein, upon cooking of the meat replica matrix, at least two volatile compounds are generated that are associated with a beef-like aroma, thereby imparting a beef-like aroma to the meat replica matrix.

14. A method for making a meat replica matrix having a beef-like aroma, wherein the meat replica matrix comprises one or more plant proteins, a sugar selected from glucose, ribose, sucrose, fructose, xylose, maltodextrin, and combinations thereof, and at least one sulfur compound selected from methionine, cysteine and thiamine, the method comprising obtaining a non-animal heme-containing protein; and incorporating 0.01%-5% (by weight of the meat replica matrix) of the non-animal heme-containing protein into the meat replica matrix, wherein, upon cooking of the meat replica matrix, at least two volatile compounds are generated that are associated with a beef-like aroma.

### **5.3. US 10,863,761**

#### **5.3.1. Published Claims**

223. A meat replica product, comprising: a) a muscle replica comprising 0.1%-5% of a heme-containing protein, at least one sugar compound and at least one sulfur compound; b) a fat tissue replica comprising at least one plant oil; and c) a connective tissue replica; wherein said muscle replica, fat tissue replica, and connective tissue replica are assembled in a manner that approximates the physical organization of meat, wherein, upon cooking of the meat replica, two or more volatile compounds that are associated with a cooked meat aroma are produced in an increased amount relative to cooking a meat replica product lacking the heme-containing protein.

#### **5.3.2. Prosecution Actions**

- Claims rejected over prior art.
- Claims amended to recite presence of "denatured plant protein".
- Case allowed with granted claims:

1. A beef replica product, comprising: a) a muscle replica comprising 0.1%-5% of a heme-containing protein, at least one sugar compound and at least one sulfur compound; and b) a fat tissue replica comprising at least one plant oil and a denatured plant protein, wherein said muscle replica and fat tissue replica are assembled in a manner that approximates the physical organization of meat.

### **5.4. US 10,172,381**

#### **5.4.1. Published Claims**

31. A method for imparting a beef like aroma to a consumable product, comprising adding to the consumable product a heme-containing protein, wherein cooking the consumable product results in the production of at least two volatile compounds which have a beef-associated aroma; and wherein the consumable product is white meat.

48. A consumable product prepared by a process of: a. adding to the consumable product a heme-containing protein; b. heating the consumable product, wherein the consumable product is white meat; and wherein heating the consumable product results

in the production of at least two volatile compounds which have a beef-associated aroma.

#### **5.4.2. Prosecution Actions**

- Elected method claims.
- Claims rejected for 112 reasons and over prior art.
- Claims amended and then granted:

1. A method for imparting a beef-associated aroma to ground chicken, comprising adding a non-animal heme-containing protein to raw ground chicken to a final concentration of about 0.5% to about 1% (wt/wt), thereby producing heme protein-added, raw ground chicken, wherein cooking the heme protein-added, raw ground chicken results in the production of an increased amount of at least two volatile compounds that have a beef-associated aroma relative to the amount of the two volatile compounds produced upon cooking raw ground chicken lacking the added heme protein.

7. A method for imparting a beef-associated aroma to ground chicken, comprising adding a non-animal heme-containing protein to raw ground chicken to a final concentration of about 0.1% to about 1% (wt/wt), thereby producing heme protein-added, raw ground chicken, wherein cooking the heme protein-added, raw ground chicken results in the production of an increased amount of at least two volatile compounds that have a beef-associated aroma relative to the amount of the two volatile compounds produced upon cooking raw ground chicken lacking the added heme protein.

### **5.6. US20190116855**

#### **5.6.1. Published Claims**

2. A food product comprising: raw ground white meat; and 0.01% to about 5% (by weight of the food product) of a non-animal heme-containing protein, wherein cooking the food product results in the production of an increased amount of at least two volatile compounds that have a beef-associated aroma relative to the amount of the two volatile compounds produced upon cooking raw ground white meat lacking the non-animal heme-containing protein.

13. A food product comprising: raw ground white meat; and 0.01% to about 5% (by weight of the food product) of a **non-animal heme-containing protein**, wherein cooking the food product results in the production of an increased amount of at least two volatile compounds relative to the amount of the two volatile compounds produced upon cooking raw ground white meat lacking the non-animal heme-containing protein, and wherein the two volatile compounds are selected from the group consisting of selected from the group consisting of (E)-2-decenal; (E)-2-heptenal; (E)-2-hexenal; (E)-2-nonenal; (E)-2-octenal; (E)-4-octene; (E,E)-2,4-decadienal; (E,E)-2,4-heptadienal; (E,E)-2,4-nonadienal; (E,E)-3,5-octadien-2-one; (E,Z)-2,6-nonadienal; (Z)-2-decenal; (Z)-2-heptenal; ...

### **5.6.2. Prosecution Actions**

- Claim rejected for minor 112 reasons.
- Arguments submitted against 112 rejection, claims allowed as published.

(2021-01-29)

## **5.7. US2019-0200658**

### **5.7.1. Published Claims**

2. A meat replica matrix comprising: one or more plant proteins; a sugar selected from glucose, ribose, sucrose, fructose, xylose, maltodextrin, and combinations thereof; at least one sulfur compound selected from methionine, cysteine, and thiamine; and 0.01%-5% (by weight of the meat replica matrix) of a **non-animal heme-containing protein**, wherein, upon cooking of the meat replica matrix, at least two volatile compounds are generated that are associated with a meat-like aroma.

15. A meat replica matrix comprising: one or more plant proteins; a sugar selected from glucose, ribose, sucrose, fructose, xylose, maltodextrin, and combinations thereof; at least one sulfur compound selected from methionine, cysteine, and thiamine; and 0.01%-5% (by weight of the meat replica matrix) of a **non-animal heme-containing protein**, wherein, upon cooking of the meat replica matrix, at least two volatile compounds are generated, and wherein the at least two volatiles are selected from the group consisting of. (E)-2-decenal; (E)-2-heptenal; (E)-2-hexenal; (E)-2-nonenal; (E)-2-octenal; (E)-4-octene; (E,E)-2,4-decadienal;

### **5.7.1. Prosecution Actions**

- Claims rejected for minor 112 reasons, and for double patenting.
- Claims amended to overcome 112 rejections, and case allowed (2021-01-27) with claims:

2. A meat replica matrix comprising: one or more plant proteins; a sugar selected from glucose, ribose, sucrose, fructose, xylose, maltodextrin, and combinations thereof; at least one sulfur compound selected from methionine, cysteine, and thiamine; and 0.01%-5% (by weight of the meat replica matrix) of a **non-animal heme-containing protein**, wherein, upon cooking of the meat replica matrix, at least two volatile compounds are generated that are associated with a **beef**-like aroma.

15. A meat replica matrix comprising: one or more plant proteins; a sugar selected from glucose, ribose, sucrose, fructose, xylose, maltodextrin, and combinations thereof; at least one sulfur compound selected from methionine, cysteine, and thiamine; and 0.01%-5% (by weight of the meat replica matrix) of a **non-animal heme-containing protein**, wherein, upon cooking of the meat replica matrix, at least two volatile compounds are generated, and wherein the at least two volatiles are selected from the group consisting of. (E)-2-decenal; (E)-2-heptenal; (E)-2-hexenal; (E)-2-nonenal; (E)-2-octenal; (E)-4-octene; (E,E)-2,4-decadienal;

**5.8. SN 17/081,938** – Pending, not yet published

**5.9. US 10,798,958**

#### **5.9.1. Published Claims**

2. A method of making a meat replica, comprising: combining an isolated plant protein with a **heme-containing protein**, water, and at least one flavor precursor selected from alanine, arginine, asparagine, aspartate, cysteine, glutamic acid, glutamine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, threonine, tryptophan, tyrosine, valine, glucose, ribose, thiamine, IMP, GMP, lactic acid, creatine, and L-taurine, to produce a meat dough; combining the meat dough with: an edible fibrous component comprising a plant protein extrudate; a carbohydrate-based gel, wherein the carbohydrate-based gel comprises agar, pectin, carrageenan, konjac, methylcellulose, a modified starch, guar gum, locust bean gum, xanthan gum, or mixtures thereof; and a fat, wherein the fat comprises corn oil, soy oil, peanut oil, canola oil, sunflower oil, flax seed oil, palm oil, palm kernel oil, coconut oil, or a mixture thereof, thereby making a meat replica.

#### **5.9.2. Prosecution Actions**

- First action allowance of claims as published.

1. A method of making a meat replica, comprising:

combining an isolated plant protein with a heme-containing protein, water, and at least one flavor precursor selected from alanine, arginine, asparagine, aspartate, cysteine, glutamic acid, glutamine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, threonine, tryptophan, tyrosine, valine, glucose, ribose, thiamine, IMP, GMP, lactic acid, creatine, and L-taurine, to produce a meat dough;

combining the meat dough with:

an edible fibrous component comprising a plant protein extrudate;

a carbohydrate-based gel, wherein the carbohydrate-based gel comprises agar, pectin, carrageenan, konjac, methylcellulose, a modified starch, guar gum, locust bean gum, xanthan gum, or mixtures thereof; and

a fat, wherein the fat comprises corn oil, soy oil, peanut oil, canola oil, sunflower oil, flax seed oil, palm oil, palm kernel oil, coconut oil, or a mixture thereof, thereby making a meat replica.

## **5.10. US 10,172,380**

### **5.10.1. Published Claims**

114. A meat replica composition comprising: about 5%-88% by weight of a meat dough, wherein the meat dough comprises an edible fibrous component; about 5% to about 35% by weight of one or more non-animal fats; about 0.00001% to about 10% by weight of a flavoring agent; about 0% to about 15% by weight of a binding agent; about 0.01% to about 4% by weight of a **heme-containing protein**; and about 0.0001% to 10% by weight of a Cucumis juice, puree, or extract.

### **5.10.2. Prosecution Actions**

- Claims rejected for obviousness.
- prior art does not disclose use of heme-containing protein.
- Case allowed and claims granted:

1. A meat replica composition comprising: about 5%-88% by weight of a meat dough, wherein the meat dough comprises an edible fibrous component; about 5% to about 35% by weight of one or more non-animal fats; about 0.00001% to about 10% by weight of a flavoring agent; about 0% to about 15% by weight of a binding agent; about 0.01% to about 4% by weight of a **heme-containing protein**; and about 0.0001% to 10% by weight of a Cucumis juice, puree, or extract.

## 5.11. US 2019-0133162

### 5.11.1. Published Claims

2. A meat replica comprising: about 5% to about 88% by weight of a meat dough, wherein the meat dough comprises an isolated plant protein; about 15% to about 40% by weight of an edible fibrous component; about 5% to about 35% by weight of a fat; and about 0.1% to about 18% by weight of a carbohydrate-based gel; wherein, after cooking the meat replica to an internal temperature of 160.degree. F., the meat replica is firmer than the meat replica before cooking.

### 5.11.2. Prosecution Actions

- Claims rejected for obviousness and double patenting.
- Applicant submitted terminal disclaimer and argued over prior art.
- Pending - Awaiting next action by USPTO

## 6. FAMILY 6

### 6.1. US 10,689,656

#### 6.1.1. Published Claims

1. A methylotrophic yeast cell comprising a recombinant nucleic acid molecule, wherein the recombinant nucleic acid molecule comprises an exogenous nucleic acid encoding a transcriptional activator operably linked to at least one methanol-inducible promoter element.

30. A methylotrophic Pichia yeast cell comprising a recombinant nucleic acid molecule, wherein the recombinant nucleic acid molecule comprises: a nucleic acid encoding a Mxr1 transcriptional activator sequence from P. pastoris; a nucleic acid encoding a member of the globin family (PF00042); and a nucleic acid encoding at least one polypeptide involved in heme biosynthesis.

#### 6.1.2. Prosecution Actions

- Claims rejected for 112 reasons, over prior art, and for double patenting.
- Claims amended to overcome prior art, and urged some prior excluded as from same assignee.
- Rejections for 112 reasons and double patenting maintained.
- Minor amendments made to claims, submitted terminal disclaimer.
- Case allowed with granted claims.

1. A methylotrophic yeast cell comprising a recombinant nucleic acid molecule, wherein the recombinant nucleic acid molecule comprises a first exogenous nucleic acid encoding a **methanol expression regulator 1 (Mxr1) transcriptional activator** operably linked to at least one methanol-inducible promoter element comprising a sequence to which the Mxr1 transcriptional activator binds, wherein the recombinant nucleic acid molecule comprises a second exogenous nucleic acid encoding a heterologous polypeptide operably linked to at least one methanol-inducible promoter element.

26. A methylotrophic Pichia yeast cell comprising a recombinant nucleic acid molecule, wherein the recombinant nucleic acid molecule comprises: a nucleic acid encoding a **Mxr1 transcriptional activator sequence** from P. pastoris; a nucleic acid encoding a member of globin family PF00042; and a nucleic acid encoding at least one polypeptide involved in heme biosynthesis, wherein each nucleic acid is operably linked to a methanol-inducible promoter element, wherein the methanol-inducible promoter element comprises at least one sequence to which a Mxr1 transcriptional activator binds.

## **7. FAMILY 7**

### **7.1. US 10,087, 434**

#### **7.1.1. Published Claims**

1. A method for purifying a pea albumin protein, comprising: extracting a disintegrated pea biomass to remove solids and generate a protein suspension; adding salt to the protein suspension; adjusting the pH of the protein suspension to a pH of 2 to 10; dialyzing the protein suspension against a polyethylene glycol (PEG) solution, or subjecting the protein suspension to ultrafiltration using a permeable membrane to separate the protein suspension on one side of the membrane from a permeate on the other side of the membrane, wherein PEG is present on the permeate side of the membrane; and subjecting the dialyzed or ultrafiltered protein solution to one or more concentrating or filtering steps to generate a product phase that contains the pea albumin protein.

16. A purified pea albumin protein, obtained by a method comprising: extracting a disintegrated pea biomass to remove solids and generate a protein suspension; adding salt to the protein suspension; adjusting the pH of the protein suspension to a pH of 2 to 10; dialyzing the protein suspension against a polyethylene glycol (PEG) solution, or subjecting the protein suspension to ultrafiltration using a permeable membrane to

separate the protein suspension on one side of the membrane from a permeate on the other side of the membrane, wherein PEG is present on the permeate side of the membrane; and subjecting the dialyzed or ultrafiltered protein solution to one or more concentrating or filtering steps to generate a product phase that contains the purified pea albumin protein.

### **7.1.2. Prosecution Actions**

- Claims rejected for obviousness and double patenting.
- Elected method claims.
- Argued over prior art rejections.
- Examiner dropped prior art rejections, maintained double patenting.
- Terminal disclaimer filed to overcome double patenting.
- Case allowed with granted claims:

1. A method for purifying a pea albumin protein, comprising: extracting a disintegrated pea biomass to remove solids and generate a protein suspension; adding salt to the protein suspension; adjusting the pH of the protein suspension to a pH of 2 to 10; dialyzing the protein suspension against a polyethylene glycol (PEG) solution, or subjecting the protein suspension to ultrafiltration using a permeable membrane to separate the protein suspension on one side of the membrane from a permeate on the other side of the membrane, wherein PEG is present on the permeate side of the membrane; and subjecting the dialyzed or ultrafiltered protein solution to one or more concentrating or filtering steps to generate a product phase that contains the pea albumin protein.

## **7.2. US 10,287,568**

### **7.2.1. Published Claims**

1. A method for purifying a protein from a biomass, comprising: extracting the biomass with an aqueous solution and, optionally, a flocculant, to generate an extraction slurry that contains bulk solids and an extract; removing solids from the extraction slurry; adding a hydrophilic polymer to the extraction slurry; optionally adjusting the pH of the extraction slurry to a pH of 2 to 10; collecting the extract and adding salt to form a two-phase mixture; separating the two-phase mixture to generate a hydrophilic polymer phase and a product phase; and collecting and filtering the product phase to generate a filtered product phase that contains the protein.

### **7.2.2. Prosecution Actions**

- Claims rejected for 112 reasons, obviousness and double patenting.

- Elected method claims.
- Amended claims and argued over prior art rejections.
- Examiner dropped prior art rejections, maintained 112 rejections and double patenting.
- Amended claims, and terminal disclaimer filed to overcome double patenting.
- Case allowed with granted claims:

1. A method for purifying a protein from a biomass, comprising: extracting the biomass with an aqueous solution and, optionally, a flocculant, to generate an extraction slurry that contains bulk solids and an extract; removing solids from the extraction slurry; adding a hydrophilic polymer to the extraction slurry, wherein the hydrophilic polymer is immobilized, and wherein the hydrophilic polymer comprises polyethylene glycol (PEG), butylene glycol, hexylene glycol, glycerin, diglycerin, diethylene glycol, dipropylene glycol, or a mixture thereof; and separating protein from the immobilized hydrophilic polymer to generate a product phase that contains the protein

### **7.3. US 10,093,913**

#### **7.3.1. Published Claims**

1. A method for purifying a soybean 7S protein, comprising: extracting a disintegrated soybean biomass to remove solids and generate a protein suspension; adding salt to the protein suspension; adjusting the pH of the protein suspension to a pH of 2 to 10; dialyzing the protein suspension against a polyethylene glycol (PEG) solution, or subjecting the protein suspension to ultrafiltration using a permeable membrane to separate the protein suspension on one side of the membrane from a permeate on the other side of the membrane, wherein PEG is present on the permeate side of the membrane; and subjecting the dialyzed or ultrafiltered protein solution to one or more concentrating or filtering steps to generate a product phase that contains the soybean 7S protein.

16. A purified soybean 7S protein, obtained by a method comprising: extracting a disintegrated soybean biomass to remove solids and generate a protein suspension; adding salt to the protein suspension; adjusting the pH of the protein suspension to a pH of 2 to 10; dialyzing the protein suspension against a polyethylene glycol (PEG) solution, or subjecting the protein suspension to ultrafiltration using a permeable membrane to separate the protein suspension on one side of the membrane from a permeate on the other side of the membrane, wherein PEG is present on the permeate side of the membrane; and subjecting the dialyzed or ultrafiltered protein solution to

one or more concentrating or filtering steps to generate a product phase that contains the purified soybean 7S protein.

### **7.3.2. Prosecution Actions**

- Elected method claims
- Claims rejected for obviousness and double patenting.
- Argued over prior art and filed terminal disclaimer.
- Case allowed with granted claims:

1. A method for purifying a soybean 7S protein, comprising: extracting a disintegrated soybean biomass to remove solids and generate a protein suspension; adding salt to the protein suspension; adjusting the pH of the protein suspension to a pH of 2 to 10; dialyzing the protein suspension against a polyethylene glycol (PEG) solution, or subjecting the protein suspension to ultrafiltration using a permeable membrane to separate the protein suspension on one side of the membrane from a permeate on the other side of the membrane, wherein PEG is present on the permeate side of the membrane; and subjecting the dialyzed or ultrafiltered protein solution to one or more concentrating or filtering steps to generate a product phase that contains the soybean 7S protein.

## **8. FAMILY 8**

### **8.1. US2016-0340411**

#### **8.1.1. Published Claims**

19. A recombinant plant or plant cell producing a heme-containing polypeptide, said plant comprising at least one exogenous nucleic acid encoding a heme-containing polypeptide, wherein said plant or plant cell is from a species other than *Nicotiana*.

27. A method of producing a heme-containing polypeptide, said method comprising growing a recombinant plant, said recombinant plant comprising at least one exogenous nucleic acid encoding said heme-containing polypeptide, wherein said plant is from a species other than *Nicotiana*, and purifying said heme-containing polypeptide from a tissue of said plant.

40. A composition comprising: (a) a purified heme-containing polypeptide; and (b) a component of a recombinant plant cell, other than a Nicotiana plant cell, that does not occur naturally with the heme-containing polypeptide.

### **8.1.2. Prosecution Actions**

- Elected plant claims.
- Claims rejected under 101, as anticipated, and for obviousness.
- Claims amended.
- Rejections for obviousness maintained and case abandoned.

## **8.2. US 2017-0342131**

### **8.2.1. Published Claims**

1. A cell comprising an exogenous nucleic acid molecule comprising, in the 5' to 3' direction, a promoter sequence operably linked to a nucleic acid encoding a signal peptide operably linked to a nucleic acid encoding a heme-containing polypeptide having at least 80% sequence identity to SEQ ID NO:4.

### **8.2.2. Prosecution Actions**

- Claims rejected over prior art.
- Claims amended.
- Claims rejected over prior art and for double patenting.
- Rejections maintained.
- Case abandoned.

## **8.3. US 2017-0342132**

### **8.3.1. Published Claims**

1. A cell comprising an exogenous nucleic acid molecule comprising, in the 5' to 3' direction, a promoter sequence operably linked to a nucleic acid encoding a signal peptide operably linked to a nucleic acid encoding a heme-containing polypeptide.

### **8.3.2. Prosecution Actions**

- Claims rejected for obviousness and double patenting.
- Awaiting Applicant response.

## **8.4. USSN 17/081,798 - Not yet published**

## **9. FAMILY 9**

### **9.1. US 2020-0340000**

#### **9.1.1. Published Claims**

1. A cell comprising: a first exogenous nucleic acid construct comprising a nucleotide sequence encoding an aminolevulinate synthase (ALAS) protein operably linked to a first promoter element, wherein the ALAS comprises at least a first heme responsive motif (HRM), and wherein the ALAS comprises a mutation in the first HRM; and a second exogenous nucleic acid construct comprising a nucleotide sequence encoding a heme-binding protein, wherein the second exogenous nucleic acid construct comprising a nucleotide sequence encoding the heme-binding protein is operably linked to the first promoter element or is operably linked to a second promoter element.

10. A method of producing a heme-binding protein in a cell comprising: expressing a first exogenous nucleic acid construct comprising a nucleotide sequence encoding an aminolevulinate synthase (ALAS) protein operably linked to a first promoter element, wherein the ALAS comprises at least a first heme responsive motif (HRM), and wherein the ALAS comprises a mutation in the first HRM; and expressing a second exogenous nucleic acid construct comprising a nucleotide sequence encoding a heme-binding protein, wherein the second exogenous nucleic acid construct comprising a nucleotide sequence encoding the heme-binding protein is operably linked to the first promoter element or is operably linked to a second promoter element.

**9.1.2. Prosecution Actions** – Pending, Awaiting first action.

## **10. FAMILY 10**

### **10.1. US 2014-0193547**

#### **10.1.1. Published Claims**

1. A food product comprising a protein content, wherein one or more isolated and purified proteins accounts for 10% or more of said protein content by weight, wherein said isolated and purified proteins are from a non-animal source, and wherein said food product accurately mimics the taste, texture, or color of a meat product derived from animal sources.

13. A meat substitute product, comprising: a) a muscle replica; b) a fat tissue replica; and c) a connective tissue replica; wherein said muscle replica, fat tissue replica, and/or connective tissue replica comprise a protein content, wherein one or more isolated and purified proteins account for 10% or more of said protein content by weight and are from a non-animal source, and wherein said muscle replica, fat tissue replica, and/or connective tissue replica are assembled in a manner that approximates the physical organization of meat.

23. A food product comprising one or more isolated and purified iron-containing proteins, wherein said isolated and purified proteins are from a non-animal source, and wherein said food product is configured for consumption by an animal.

#### **10.1.2. Prosecution Actions**

- Elected food product claims (23+)
- Claims rejected for obviousness.
- Claims amended to recite the product "contains no animal products".
- Claims allowed.
- Filed RCE
- Claims rejected for obviousness.
- Argued over prior art urging that prior art does not disclose meat substitute without the inclusion of any animal products.
- Examiner issued new obviousness rejection.
- Claims amended to focus on product with heme-iron-containing compound.
- Claims rejected for obviousness and double patenting.
- Application abandoned in favor of continuation.

### **10.2. US2015-0289541**

#### **10.2.1. Published Claims**

2. A consumable food product comprising an isolated iron-containing protein and an isolated plant protein.

#### **10.2.2. Prosecution Actions**

- Added claims to meat substitute product

18. A meat substitute product comprising an isolated iron-containing protein.

- Claims rejected for obviousness.

- Amended claims to recite the iron-containing protein was "a plant heme", and argued unpredictability of adding plant heme.
- Examiner maintained obviousness rejection.
- Amended claims to recite feature of "at least two volatile compounds which have a beef-associate aroma" and submitted various declaration evidence.
- Examiner maintained obviousness rejections.
- Amended claims to further defined aroma feature, and submitted more declaration evidence.
- Examiner maintained obviousness rejections
- Applicant requested pre-appeal brief request for review.
- Rejections maintained for appeal
- Filed RCE, with some claim amendments.
- Examiner maintained prior art rejections (2020-11-16)
- Application still pending, awaiting Applicant response.

### **10.3. US2019-0008192**

#### **10.3.1. Published Claims**

31. A meat replica food product comprising: a heme-iron-containing protein; 10% or more by weight of a plant protein; a sugar; and a sulfur compound, an amino acid, or a combination thereof; wherein the meat replica food product contains no animal myoglobin, wherein cooking the meat replica food product results in the production of at least two volatile compounds that have a meat-associated aroma as compared to a corresponding meat replica food product lacking the heme-iron-containing protein.

#### **10.3.2. Prosecution Actions**

- Claims rejected for obviousness and double patenting.
- Claims amended to recite heme contained in amount to "mimic the color of beef..."
- Rejections maintained in Final Rejection (2020-10-02)
- Still pending

## **11. FAMILY 11**

### **11.1. US 2015-0305361**

#### **11.1.1. Published Claims**

1. A non-dairy cheese replica comprising a coacervate comprising one or more isolated and purified proteins from a non-animal source.

22. A non-dairy cheese replica comprising: (a) a solidified mixture of one or more isolated and purified proteins from a non-animal source and one or more isolated plant based lipids, or (b) a solidified non-dairy milk, nut milk, and one or microbes; and optionally comprising one or more sugars, divalent cations, isolated enzymes, or isolated amino acids, wherein said non-dairy cheese replica has (i) an increased creamy texture; (ii) an improved melting characteristic; or (iii) an increased stretching ability, relative to a corresponding cheese replica lacking said one or more microbes, sugars, divalent cations, isolated enzymes, isolated amino acids or plant based lipids.

24. A non-dairy cheese replica comprising: (a) a solidified mixture of one or more isolated and purified proteins from a non-animal source and one or more isolated plant based lipids; or (b) a solidified non-dairy milk, nut milk, and one or microbes; and optionally comprising one or more sugars, divalent cations, isolated enzymes, or isolated amino acids, wherein said non-dairy cheese replica has: (i) increased creamy, milky, buttery, fruity, cheesy, free fatty acids, sulfury, fatty, sour, floral, or mushroom flavor or aroma notes; or (ii) reduced nutty, planty, beany, soy, green, vegetable, dirty, or sour flavor or aroma notes; relative to a corresponding cheese replica lacking said one or more microbes, sugars, divalent cations, isolated enzymes, isolated amino acids or plant-based lipids.

26. A ricotta cheese replica comprising a solidified nut milk, *Lactococcus lactis lactis*, and *Lactococcus lactis cremoris*.

#### **11.1.2. Prosecution Actions**

- Prosecution took 6 years, with filing of 4 RCEs.
- Claims rejected over prior art.
- Applicant filed numerous responses, with Declaration evidence.
- Claims allowed, will grant as:

26. (Previously Presented) A ricotta cheese replica comprising:
- (a) a solidified nut milk comprising 15% or less of insoluble solids from a starting nut milk,
  - (b) a transglutaminase enzyme,
  - (c) *Lactococcus lactis lactis*, and
  - (d) *Lactococcus lactis cremoris*,

wherein the transglutaminase enzyme was added to the nut milk at an amount between 0.001% and 0.05% weight/volume, and wherein the *Lactococcus lactis lactis* and *Lactococcus lactis cremoris* were added to said nut milk comprising 15% or less of insoluble solids milk at 0.02 g/L.

- (c) *Lactococcus lactis lactis*,

wherein the transglutaminase enzyme was added to said nut milk comprising 15% or less of insoluble solids milk at an amount between 0.001% and 0.05% weight/volume, and wherein the *Lactococcus lactis lactis* was added to said nut milk comprising 15% or less of insoluble solids milk at 0.02 g/L.

32. (Previously Presented) A ricotta cheese replica comprising:
- (a) a solidified nut milk comprising 15% or less of insoluble solids from a starting nut milk,
  - (b) a transglutaminase enzyme, and

- (c) *Lactococcus lactis lactis*,

wherein the transglutaminase enzyme was added to said nut milk comprising 15% or less of insoluble solids milk at an amount between 0.001% and 0.05% weight/volume, and wherein the *Lactococcus lactis lactis* was added to said nut milk comprising 15% or less of insoluble solids milk at 0.02 g/L.

## **11.2. [USSN 17/156,458](#) – pending, not yet published.**

### **III. JUST (EAT JUST)**

#### **1. FAMILY 1**

##### **1.1. USSN 09/581,912**

###### **1.1.1. Published Claims (WO 1999031222)**

1. A process for production of a meat product said process comprising the culturing in vitro of animal cells in medium free of hazardous substances for humans on an industrial scale thereby providing three dimensional animal muscle tissue suited for human and/or animal consumption, optionally followed by further processing steps of the cell culture to a finished food product analogous to known processes for meat comprising food products without requiring deboning, removal of offal and/or tendon and/or gristle and/or fat, preferably said meat product comprising solidified cell tissue, said cells being selected from muscle cells, somite cells and stem cells.

16. A meat product, consisting of in vitro produced animal cells in a three dimensional form i.e. comprising multiple cell layers of animal cells in three dimensions, said meat product being free of fat, tendon, bone and gristle, said cells being selected from muscle cells, stem cells or somite cells.

###### **1.1.2. Prosecution Actions**

- Prosecuted claims to meat product.
- Claims rejected for 112 reasons, and for anticipation and obviousness over prior art.
- Applicant basically argued over the prior art.
- Rejections were maintained.
- Case abandoned.

##### **1.2. US 7,270,829**

###### **1.2.1. Published Claims**

1. A meat product, consisting of in vitro produced animal cells in a three dimensional form, said meat product being free of fat, tendon, bone and gristle, wherein said cells being selected from muscle cells, stem cells or somite cells, and wherein the product is suitable for at least one of human and animal consumption.

###### **1.2.2. Prosecution Actions**

- Interview with Examiner, apparently discussed changing claims to product-by-process.

- Case allowed with granted claims:

1. A meat product **produced by the process** comprising: culturing in vitro non-human animal cells selected from the group consisting of muscle cells, somite cells and stem cells, in a medium free of hazardous substances for humans, thereby producing a three dimensional animal muscle tissue, processing the three dimensional animal muscle tissue to provide a finished meat product wherein deboning, removal of offal and/or tendon and/or gristle and/or fat is not required, said finished meat product comprises solidified muscle cell tissue as the protein source, wherein the finished meat product is suitable for at least one of human and animal consumption, and wherein the finished meat product is in a form selected from the group consisting of sausage, spread, cooked puree, pureed baby food, biscuit, dried granules, tablet, capsule, powder, pickled meat product, smoked meat product, dried meat product and cooked meat product.

### **1.2.3. Observations**

- Pure product claims were abandoned, in favor of product by process claims.

## **2. FAMILY 2**

### **2.1. US 6,835,390**

#### **2.1.1. Granted claims:**

1. A **method** of providing nutrition to a subject comprising providing the subject with a non-human meat product **produced by the following steps**: culturing non-human muscle cells ex vivo; seeding the non-human muscle cells onto a support structure; and growing the non-human muscle cells to produce said non-human meat product, wherein said non-human meat product is suitable for consumption, and wherein said subject consumes said non-human meat product to obtain nutrition therefrom.

## **3. FAMIL 3**

### **3.1. US 10,321,705**

#### **3.1.1. Published Claims:**

62. A purified mung bean protein isolate comprising a mung bean protein content of at least 60% by weight of the isolate; a globulin-type protein content of at least 50% by weight of the plant protein; a reduced oxidative enzyme activity relative to an otherwise

unmodified source of the mung bean protein; and one or more modulated organoleptic properties that differ from the otherwise unmodified source of the mung bean protein.

### **3.1.2. Prosecution Actions**

- Claims rejected for 112 reasons, and over prior art.
- Amended claims to include process limitations
- Prior art rejections maintained.
- Claims amended to delete process limitations, and to add further characterizations for mung bean protein isolate.
- Prior art rejections dropped, but some 112 rejections remain.
- Interview with Examiner resulted in agreement for some amendments to claims
- Case allowed with granted claims:

1. **An egg substitute** comprising: (a) a mung bean protein composition, wherein the mung bean protein composition comprises a mung bean protein content of at least 60% by weight, wherein the mung bean protein content comprises at least 50% by weight of globulin protein, wherein the globulin protein comprises 8S and 11S globulin; a reduced oxidative enzyme activity relative to an otherwise unmodified plant source of the mung bean protein; and one or more modulated organoleptic properties that differ from the otherwise unmodified plant source of the mung bean protein; and (b) a phosphate selected from the group consisting of disodium phosphate (DSP), sodium hexametaphosphate (SHMP), and tetrasodium pyrophosphate (TSPP); wherein the egg substitute has one or more organoleptic properties similar to an egg and at least one functional property similar or equivalent to a corresponding functional property of an egg, wherein the at least one functional property comprises emulsification, water binding capacity, foaming, gelation, crumb density, structure forming, texture building, cohesion, adhesion, elasticity, springiness, solubility, viscosity, fat absorption, flavor binding, coagulation, leavening, aeration, creaminess, film forming property, sheen addition, shine addition, freeze stability, thaw stability, or color.

## **4. FAMILY 4**

### **4.1. US 2014-0356507**

#### **4.1.1. Published Claims**

1. A composition comprising (i) protein in an amount up to 80% by dry weight, and (ii) fat in amount from 5% to 15% by dry weight; wherein said composition is essentially egg-free, and wherein said composition provides binding, moisturizing, leavening, and/or emulsifying properties similar to an egg.

57. A method of preparing an edible emulsion, comprising using as a 1:1 replacement per egg, a composition comprising 44-47% by weight yellow pea flour, 44-47% by weight modified starch, 3-5% by weight mixture of guar gum and xanthan gum, and 3-5% by weight carboxymethylcellulose.

#### **4.1.2. Prosecution Actions**

- Elected to prosecute claims to product.
- Claims rejected for 112 reasons, and over prior art
- Claims amended to recite the composition as a "pea protein" and modified starch.
- Basic rejections maintained.
- Claims amended to exclude "wheat protein"
- Prior art rejections maintained, with Examiner, in part, asserting:

is readily available. It would have been obvious to use pea flour, pea concentrate or pea isolate depending on the concentration of protein wanted. This would have been an obvious matter of choice. It would have been obvious to hydrate the pea protein to form matrix for easier uniform mixing with other ingredients to make the composition. It would have been obvious to select a particular ratio of protein to starch in Satou as a matter of optimization. Satou discloses the protein is in amount of .1-25% and the starch in amount of up to 30%; the ratio claimed can be selected from the ranges disclosed in Satou. In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). It would have been obvious to one ordinary skill in the art to select any portion of the disclosed ranges including the instantly claimed ranges from the ranges disclosed in prior art reference, particularly in view of the fact that; "The

- Prosecution continued with Applicant adding several more limitations to claims to define what proteins were not contained, but rejections maintained.
- Case ultimately abandoned.

## **4.2. US 2017-0042204**

### **4.2.1. Published Claims**

58. A composition for use in the production of a baked food product, said composition comprising: a) 50-99% by dry weight of one or more plant flours, wherein the plant is selected from the group consisting of garbanzo, fava bean, sorghum, lentil, and lima bean; and b) one or more gums; wherein said composition functionally replaces egg in part or in whole in the baked food product.

### **4.2.2. Prosecution Actions**

- Claims rejected over prior art.
- Case abandoned.

## **4.3. US 2019-0364948**

### **4.3.1. Published Claims**

80. A liquid composition for use as an emulsifying agent in the production of a food product, said composition comprising: (i) pre-hydrated pea protein; and (ii) a modified starch; wherein said composition has about 60% to about 100% of the emulsifying properties of a natural egg; wherein said composition does not comprise wheat protein, does not comprise soy protein, and does not comprise cellulose; and wherein the pre-hydrated pea protein provides a thicker emulsion when the liquid composition is used in food preparation compared to when the pea protein is not pre-hydrated.

81. A liquid composition for use as an emulsifying agent in the production of a food product, said composition comprising (i) pre-hydrated pea protein; and (ii) a modified starch, wherein said pea protein and said modified starch are in a weight ratio ranging from 7:3 to 3:7; wherein said composition does not comprise wheat protein, does not comprise soy protein, and does not comprise cellulose; and wherein the pre-hydrated pea protein provides a thicker emulsion when the liquid composition is used in food preparation compared to when the pea protein is not pre-hydrated.

### **4.3.2. Prosecution Actions**

- Claims rejected for 112 reasons and over prior art.
- Claims somewhat amended to define nature of pea protein.
- Rejections maintained, with Examiner asserting, in part:

Boursier discloses the weight ratio of the pea protein to the starch hydrolyzates is between 99:1 and 1:99. In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). It would have been obvious to one ordinary skill in the art to select any portion of the disclosed ranges including the instantly claimed ranges from the ranges disclosed in prior art reference, particularly in view of the fact that; "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in the disclosed set of percentages ranges is the optimum combination of percentages", In re Peterson, 65 USPQ2d 1379 (CAFC 2003). It would have been obvious to obtain the pea protein from yellow pea as an obvious matter of preference. For instance, it would have been

- Awaiting response by Applicant

## **5. FAMILY 5**

### **5.1. US 2017-0265505**

#### **5.5.1. Published Claims**

1. A purified adzuki bean protein isolate comprising an adzuki bean protein content of at least 60% by weight; a globulin-type protein content of at least 50% by weight of the plant protein; a reduced oxidative enzyme activity relative to an otherwise unmodified source of the plant protein; and one or more modulated organoleptic properties that differ from the otherwise unmodified source of the adzuki bean protein.

31. A method for producing a purified adzuki bean protein isolate comprising: (a) extracting one or more adzuki bean proteins from a source of adzuki bean protein in an aqueous solution at a pH between about 6.5-10.0; (b) precipitating the adzuki bean protein at a pH near its isoelectric point of a globulin-rich fraction, or a pH between about 5.0-6.0; or fractionating and concentrating the plant protein using microfiltration or ultrafiltration; and (c) recovering a purified adzuki bean protein isolate comprising an adzuki bean protein content of at least 60% by weight; a globulin-type protein content of at least 50% by weight of the adzuki bean protein; a reduced oxidative enzyme activity relative to an otherwise unmodified source of the adzuki bean protein; and one

or more modulated organoleptic properties that differ from the otherwise unmodified source of the adzuki bean protein.

### **5.5.2. Prosecution Actions**

- Claims rejected for 112 reasons and for anticipation and obviousness.
- Claims amended but prior art rejections maintained.
- Several more rounds of claim amendments and rejections, with current main claim:

1. **(Currently Amended)** A food or beverage composition comprising an egg substitute, the egg substitute comprising an adzuki bean composition wherein:

(a) ~~an adzuki bean protein composition, wherein~~ the adzuki bean composition comprises

an adzuki bean protein content of at least 60% by weight;

a globulin-type protein content of at least 50% by weight of the plant protein, wherein the globulin protein comprises IIS globulin;

a reduced oxidative enzyme activity relative to an otherwise unmodified source of the plant protein; and

one or more modulated organoleptic properties that differ from the otherwise unmodified source of the adzuki bean protein; and

(b) a phosphate selected from the group consisting of disodium phosphate (DSP), sodium hexamethaphosphate (SHMP), and tetrasodium pyrophosphate (TSPP);

wherein the food or beverage composition is selected from the group consisting of an edible egg-free emulsion, egg analog, egg-free scrambled eggs, egg-free patty, egg-free pound cake, egg-free angel food cake, egg-free yellow cake, egg- and dairy-free cream cheese, egg-free pasta dough, egg-free custard, egg-free ice cream, and dairy-free milk, cream cheese, pasta dough, pasta, milk or milk-like beverage, a food product comprising said milk or milk-like beverage, custard, ice cream, frozen desert, meat replicas, deli meat replicas, emulsified extruded meats, sausages, fish cake replicas, dips, fillings, spreads, chips, and crackers; and

wherein the egg substitute has a foaming capacity greater than egg white; or wherein the egg substitute has a foam stability greater than egg; or wherein the egg substitute has a gelation onset temperature lower than egg; or wherein the viscosity of the egg substitute is higher than egg; or wherein the egg substitute has a yield stress greater than egg.

- Rejections maintained, awaiting Applicant's Response.

## **6. FAMILY 6**

### **6.1. US 2019-0191735**

#### **6.1.1. Published Claims (application awaiting first action)**

1. A purified mung bean protein isolate comprising a mung bean protein content of at least 60% by weight; a globulin-type protein content of at least 50% by weight of the plant protein; a reduced oxidative enzyme activity relative to an otherwise unmodified source of the plant protein; and one or more modulated organoleptic properties that differ from the otherwise unmodified source of the mung bean protein.

57. A method for producing a purified protein isolate comprising: a. extracting one or more plant protein from a source in an aqueous solution at a pH between about 6.5-10.0; b. precipitating the plant protein at pH near its isoelectric point of a globulin-rich fraction or a pH between about 5.2-6.0; or fractionating and concentrating the plant protein using microfiltration or ultrafiltration; c. recovering the purified protein isolate comprising a plant protein content of at least 60% by weight; a globulin-type protein content of at least 50% by weight of the plant protein; a reduced oxidative enzyme activity relative to an otherwise unmodified source of the plant protein; and one or more modulated organoleptic properties that differ from the otherwise unmodified source of the mung bean protein; and d. modifying the mung protein with transglutaminase in the extraction step a. or the recovery step b.

## **7. FAMILY 7**

### **7.1. US 2020-00352195**

#### **7.1.1. Published Claims**

138. An egg substitute comprising: (a) a mung bean protein composition, wherein the mung bean protein composition comprises a mung bean protein content of at least 60% by weight, wherein the mung bean protein content comprises at least 50% by weight of globulin protein, wherein the globulin protein comprises 8S and 11S globulin; a reduced oxidative enzyme activity relative to an otherwise unmodified plant source of the mung bean protein; and one or more modulated organoleptic properties that differ from the otherwise unmodified plant source of the mung bean protein; and (b) transglutaminase

in an amount of at least or about 0.0005% up to about 0.0125% (5-125 parts per million); wherein the egg substitute has one or more organoleptic properties similar to an egg and at least one functional property similar or equivalent to a corresponding functional property of an egg, wherein the at least one functional property comprises emulsification, water binding capacity, foaming, gelation, crumb density, structure forming, texture building, cohesion, adhesion, elasticity, springiness, solubility, viscosity, fat absorption, flavor binding, coagulation, leavening, aeration, creaminess, film forming property, sheen addition, shine addition, freeze stability, thaw stability, or color.

### **7.1.2. Prosecution Actions**

- Claims rejected over prior art.
- Awaiting Response by Applicant

## **8. FAMILY 8**

### **8.1. US 2020-0392461**

#### **8.1.1. Published Claims**

61. A method of producing an avian cell food product in-vitro, the method comprising the steps of: a. culturing a population of avian cells in vitro in a growth medium capable of maintaining the avian cells, said growth medium comprising less than 2% fetal bovine serum; b. recovering the avian cells; and c. formulating the recovered avian cells into an edible food product.

79. A method of preparing a food product, the food product comprising avian cells cultivated in vitro, the method comprising: a. conditioning water with phosphates to prepare conditioned water; b. hydrating a plant protein isolate, with the conditioned water to produce hydrated plant protein; c. contacting cell paste and hydrated plant protein to produce a cell and protein mixture; d. heating the cell and protein mixture in steps, wherein the steps comprise at least one of: i. ramping up the temperature of the cell and protein mixture to a temperature between 40-65.degree. C.; ii. maintaining the temperature of the cell and protein mixture at a temperature between 40-65.degree. C. for at least 15 minutes; iii. ramping up the temperature of the cell and protein mixture to a temperature between 60-85.degree. C. to prepare a pre-cooking product; iv. optionally, cooling the cell and protein mixture to a temperature of a temperature between 5-15.degree. C. to prepare a pre-cooking product; e. optionally adding an oil at steps (i), (ii), (iii), (iv) or to the pre-cooking product; and f. optionally, cooking the pre-cooking product to prepare the avian food product.

81. A food product produced from avian fibroblasts cultivated in vitro, the food product comprising: a. a cell paste, the cell paste content in an amount of at least 25% by weight, and wherein the cell paste is made from avian fibroblast cells cultivated in vitro; b. a mung bean protein, the mung bean protein content in an amount of at least 15% by weight; c. a fat, the fat content in an amount of at least 1% by weight; and d. a water, the water content in an amount of at least 20% by weight.

### **8.1.2. Prosecution Actions**

- Awaiting first Office Action by USPTO.

## **9. FAMILY 9**

### **9.1. US 20190364948**

#### **9.1.1. Published Claims:**

**80.** A liquid composition for use as an emulsifying agent in the production of a food product, said composition comprising:

- (i) pre-hydrated pea protein; and
- (ii) a modified starch;

wherein said composition has about 60% to about 100% of the emulsifying properties of a natural egg;

wherein said composition does not comprise wheat protein, does not comprise soy protein, and does not comprise cellulose; and

wherein the pre-hydrated pea protein provides a thicker emulsion when the liquid composition is used in food preparation compared to when the pea protein is not pre-hydrated.

**81.** A liquid composition for use as an emulsifying agent in the production of a food product, said composition comprising (i) pre-hydrated pea protein; and (ii) a modified starch, wherein said pea protein and said modified starch are in a weight ratio ranging from 7:3 to 3:7;

wherein said composition does not comprise wheat protein, does not comprise soy protein, and does not comprise cellulose; and

wherein the pre-hydrated pea protein provides a thicker emulsion when the liquid composition is used in food preparation compared to when the pea protein is not pre-hydrated.

### **9.1.2. Prosecution Actions**

- Claims rejected for 112 reasons and over prior art.
- Final rejection issued 01/01/2021.
- Awaiting Response to OA.

## **IV. MEMPHIS MEATS**

### **1. FAMILY 1**

#### **1.1. US 2020-0165569**

##### **1.1.1. Published Claims**

1. A method for increasing the culture density of a metazoan cellular biomass comprising: a. culturing a metazoan cellular biomass in a cultivation infrastructure; and b. inhibiting the HIPPO signaling pathway in the cellular biomass.

##### **1.1.2. Prosecution Actions**

- Awaiting first Office Action by USPTO.

### **2. FAMILY 2**

#### **2.1. US 20190024079**

##### **2.1.1. Published Claims**

1. A process for extending the replicative capacity of a metazoan somatic cell population comprising: decoupling retinoblastoma protein inhibition of cell division cycle advancement during replicative senescence by abrogating cyclin-dependent kinase inhibitor ("CKI")-mediated stabilization of a retinoblastoma protein using genetic amendment; maintaining telomerase activity by transducing the metazoan somatic cell population with a genetic construct (SEQ ID NO 11) directing ectopic expression of functional telomere reverse transcriptase ("TERT") protein; maintaining a bank of cells that is a master cell bank having the genetic amendment and ectopic expression of TERT protein; cultivating cells from the master cell bank in an ex vivo milieu that is a cultivated cell biomass; and harvesting the cultivated cell biomass for dietary consumption.

18. A clonal cell line of a metazoan somatic cell population derived by a process comprising: decoupling retinoblastoma protein inhibition of cell division cycle advancement during replicative senescence by abrogating CM-mediated stabilization of a retinoblastoma protein using genetic amendment; maintaining telomerase activity by transducing the metazoan somatic cell population with a genetic construct (SEQ ID NO

11) directing ectopic expression of functional TERT protein; maintaining a bank of cells that is a master cell bank having the genetic amendment and ectopic expression of TERT protein; cultivating cells from the master cell bank in an *ex vivo* milieu that is a cultivated cell biomass; harvesting the cultivated cell biomass for dietary consumption; and wherein the clonal cell line has indefinite replicative capacity for scalable applications in the industrial production.

### **2.1.2. Prosecution Actions**

- Canceled original claims and added new claims:

35. (New) A method for cultivating metazoan cell biomass for dietary consumption, the method comprising:

- (a) providing a metazoan somatic cell population;
- (b) inactivating a gene encoding an inhibitor of cyclin-dependent kinase 4 (CDK4) in the metazoan somatic cell population and/or;
- (c) ectopically expressing a polynucleotide encoding telomere reverse transcriptase (TERT) in the metazoan somatic cell population; and
- (d) cultivating the metazoan somatic cell population in an *ex vivo* milieu to obtain a cultivated cell biomass; and
- (e) harvesting the cultivated cell biomass for dietary consumption.

55. (New) A clonal cell line of a metazoan somatic cell population obtained by a method comprising:

- (a) inactivating a gene encoding an inhibitor of cyclin-dependent kinase 4 (CDK4) in the metazoan somatic cell population and/or;
  - (b) ectopically expressing a polynucleotide encoding telomere reverse transcriptase (TERT) in the metazoan somatic cell population;
- wherein the clonal cell line has indefinite replicative capacity.

- Claims indicated as allowable where directed to specific TERT sequence, other claims rejected under 101 and over prior art.
- Awaiting Response by Applicant.

### **3. FAMILY 3**

#### **3.1. US 2016-0251625**

##### **3.1.1. Published Claims**

1. A method for producing cultured muscle tissue, the method comprising: modifying a self-renewing cell line of an animal species with a myogenic transcription factor to produce a myogenic-transcription-factor-modified cell line, and inducing said modified cell line by exogenous regulation to maintain the cell line in self-renewal process or advance the cell line to myogenic differentiation process.

##### **3.1.2. Prosecution Actions**

- Application Abandoned before first substantive action.

### **4. FAMILY 4**

#### **4.1. US 2016-0227830 (US Pat. 10,920,196, to issue 2/16/2021)**

##### **4.1.1. Published Claims**

1. A method for producing cultured muscle tissue, the method comprising: modifying a self-renewing cell line of an animal species with a myogenic transcription factor to produce a myogenic-transcription-factor-modified cell line, and inducing said modified cell line by exogenous regulation to maintain the cell line in self-renewal process or advance the cell line to myogenic differentiation process.

##### **4.1.2. Prosecution Actions**

- Claims rejected for various 112 reasons, over prior art, and double patenting.
- After a series of several rejections and responses, claims were allowed:

**1. (Currently Amended)** An *in vitro* method for producing a cultured meat product for dietary consumption, the method comprising:

modifying ~~[[an]] a porcine~~ induced pluripotent stem cell line comprising pluripotency genes POU5F1 and KLF4 ~~from a livestock, poultry, game, or aquatic animal species~~ with an inducible MYOD1 transcription factor to produce an inducible MYOD1-transcription-factor-modified porcine cell line;

inducing myogenic differentiation of said modified cell line by exogenous regulation, comprising contacting said modified cell line with an inducer of MYOD1 expression, and further with an inhibitor of DNA methylation, wherein the inhibitor is 5-Aza-Cytidine or 5-Aza-2'-deoxycytidine, wherein the differentiated modified cell line forms myocytes and multinucleated myotubes, both comprising myonuclei, and wherein greater than 50% of the total myonuclei are within the multinucleated myotubes; and

culturing the myocytes and multinucleated myotubes to generate skeletal muscle fibers, thereby producing a cultured meat product for dietary consumption.

**28. (Previously Presented)** A cultured meat product for dietary consumption produced by the *in vitro* method of claim 1, wherein the skeletal muscle fibers comprise an inducible vector encoding a MYOD1 myogenic transcription factor.

## **SWEET EARTH (NESTLE)**

### **1. FAMILY 1**

#### **1.1. US 2016-0106121**

##### **1.1.1. Published Claims**

1. A process for making a simulated bacon product, comprising: (1) mixing dry ingredients for bacon seasoning in a container, and storing the mixed ingredients; (2) mixing adzuki beans, liquid smoke and water, and storing the mixture; (3) mixing buckwheat groats, water and liquid smoke, and storing the mixture; (4) processing the mixture from step (2) to a smooth texture, and storing the processed mixture; (5) processing the mixture from step (3) to a smooth texture, and storing the processed mixture; (6) combining the processed mixtures from steps (4) and (5), adding additional wet ingredients, blending, and storing for later use; (7) preparing a topping sauce by adding liquid smoke and olive oil to dry ingredients including bacon seasoning; (8)

adding mixture from step (6) to dry ingredients including at least wheat gluten flour, mix to dough; (9) separating dough into loaves of a predetermined size, and placing the loaves into individual cooking baskets, and baskets into cooking skillets, then cooking for a predetermined time and temperature; (10) placing loaves into slicer, and slicing into bacon strips; (11) adding topping sauce from step (7) to bacon slices; and (12) packaging and labeling slices for distribution and sale.

6. A simulated bacon product, comprising: strips of simulated bacon cut from a loaf prepared by mixing dry ingredients for bacon seasoning in a container, and storing the mixed ingredients, mixing adzuki beans, liquid smoke and water, and storing the mixture, mixing buckwheat groats, water and liquid smoke, and storing the mixture, processing the adzuki bean mixture to a smooth texture, and storing the processed mixture, processing the buckwheat groats mixture to a smooth texture, and storing the processed mixture, combining the processed adzuki bean and groats mixtures and adding additional wet ingredients, blending, and storing for later use, preparing a topping sauce by adding liquid smoke and olive oil to dry ingredients including bacon seasoning, adding the mixture of the processed beans and groats mixtures to dry ingredients including at least wheat gluten flour, and mixing to a to dough texture, separating the dough into loaves of a predetermined size, and placing the loaves into individual cooking baskets, and baskets into cooking skillets, then cooking for a predetermined time and temperature, placing the loaves into a slicer, and slicing into bacon strips, adding the topping sauce to the bacon slices, and packaging and labeling the slices for distribution and sale.

### **1.1.2. Prosecution Actions**

- Elected to prosecute product claims to simulated bacon product.
- Claims rejected for obviousness over prior art.
- Response amended claims "adding an assembly phase because applicant's simulated bacon depends upon the topping sauce and the packaging in order to present a realistic simulated bacon product."
- Examiner maintained prior art rejections.
- Response added re-written product claims focused on adzuki beans, liquid smoke, water and wheat gluten flour.
- Examiner maintained prior art rejections.
- Response argued against obviousness and submitted Declarationa evidence, basically focused on unexpected use of Adzuki beans.
- After more rounds of rejections and responses, case was abandoned.

## **1.2. US 2017-0020160**

### **1.2.1. Published claims**

1. A process for making a simulated bacon product, comprising: (1) mixing dry ingredients for bacon seasoning in a container, and storing the mixed ingredients; (2) mixing adzuki beans, liquid smoke and water, and storing the mixture; (3) mixing buckwheat groats, water and liquid smoke, and storing the mixture; (4) processing the mixture from step (2) to a smooth texture, and storing the processed mixture; (5) processing the mixture from step (3) to a smooth texture, and storing the processed mixture; (6) combining the processed mixtures from steps (4) and (5), adding additional wet ingredients, blending, and storing for later use; (7) preparing a topping sauce by adding liquid smoke and olive oil to dry ingredients including bacon seasoning; (8) adding mixture from step (6) to the dry ingredients including at least wheat gluten flour, mix to dough; (9) separating dough into loaves of a predetermined size, and placing the loaves into individual cooking baskets, and baskets into cooking skillets, then cooking for a predetermined time and temperature; (10) placing loaves into slicer, and slicing into bacon strips; (11) adding topping sauce from step (7) to bacon slices; and (12) packaging and labeling slices for distribution and sale.

### **1.2.2. Prosecution Actions**

- Claims rejected over prior art.
- Response argued and submitted Declaration evidence focused on importance and non-obviousness of using adzuki beans.
- Awaiting next USPTO action.

## **1.3. US 2020-0268016**

### **1.3.1. Published Claims**

1. A product comprising: simulated bacon slices comprising, as ingredients, (i) a mixture of Adzuki beans, liquid smoke and water, (ii) a mixture of buckwheat groats, water and liquid smoke, and (iii) wheat gluten flour; and a topping sauce comprising mixed bacon seasoning, coconut oil and liquid smoke; the simulated bacon slices with the topping sauce packaged and labeled as a simulated bacon product.

### **1.3.2. Prosecution Actions**

- Claims rejected over prior art.
- Response argued and submitted Declaration evidence focused on importance and non-obviousness of using adzuki bean and buckwheat groats.
- Awaiting next USPTO action.

## **PRIME ROOTS**

### **1. FAMILY 1**

#### **1.1. US2020-0399570**

##### **1.1.1. Published Claims**

1. A method of separating one or more components from a mold-fermented composition, comprising: providing a mold-fermented composition; separating a first separation composition from the mold-fermented composition during the process of producing the final mold-fermented composition; and isolating or separating a second separation composition from the first separation composition, the second separation composition comprising one or more separation components; wherein the one or more separation components are selected from the group consisting of mold, starch, yeast, residual undigested protein, or a combination thereof.

14. A food product comprising: a second separation composition comprising one or more separation components, the second separation composition produced by: providing a mold-fermented composition; separating a first separation composition from the mold-fermented composition during the process of producing the mold-fermented composition; and isolating or separating the second separation composition from the first separation composition; wherein the one or more separation components are selected from the group consisting of mold, starch, yeast, residual undigested protein, or a combination thereof.

##### **1.1.2. Prosecution Actions**

- Restriction requirement issued.
- Awaiting response by Applicant

## **UNIVERSITY OF MISSOURI**

### **1.1. FAMILY 1**

##### **1.1.1. Published Claims**

1. A structured plant protein product comprising protein fibers that are substantially aligned, wherein the protein fibers comprise: (a) dry ingredients that comprise: (i) a protein component that comprises a plant-derived protein material, wherein the protein component is at an amount that is no more than about 90% by weight of the dry

ingredients; (ii) a carbohydrate component at an amount that is in the range of about 2 to about 50% by weight of the dry ingredients; and (iii) a lipid component at an amount that is in the range of about 0.1 to about 5% by weight of the dry ingredients; and (b) wet ingredients that comprise water; and wherein the structured plant protein product has a moisture content that is at least about 50% by weight of the structured plant protein product.

33. A meat analog composition comprising a structured plant protein product, wherein the structured plant protein product comprises protein fibers that are substantially aligned, wherein the protein fibers comprise: (a) dry ingredients that comprise: (i) a protein component that comprises a plant-derived protein material, wherein the protein component is at an amount that is no more than about 90% by weight of the dry ingredients; (ii) a carbohydrate component at an amount that is in the range of about 2 to about 50% by weight of the dry ingredients; and (iii) a lipid component at an amount that is in the range of about 0.1 to about 5% by weight of the dry ingredients; and (b) wet ingredients that comprise water; and wherein the structured plant protein product has a moisture content that is at least about 50% by weight of the structured plant protein product.

### **1.1.2. Prosecution Actions**

- Elected to prosecute process claims
- Claims rejected over prior art
- Applicant urged that prior art did not teach that the carbohydrate component comprises edible fiber.
- Pror art rejections maintained.
- Applicant's response submitted Declaration to assert long felt need in the art and commercial success (licensed to Beyond Meats).
- Examiner issued new prior art rejection.
- Responded to rejections, but new office action maintained rejections.
- Case was abandoned.