[0011a] In a first aspect, the present disclosure provides a polynucleotide encoding a Myd variant polypeptide the amino acid sequence of which is modified from the amino acid sequence of SEQ ID NO:3 by substitution of 1-3 amino acids;

wherein the sequence position of the substitution and the substituted amino acids (AA) are selected from the following:

AA Position in SEQ ID NO: 3	AA in SEQ ID NO: 3	Possible AA Substitutions
3	D	A, F, H, I, K, L, N, R, V, W, Y
4	L	F, H, K, N, Q, R, W, Y
5	S	T
6	S	T
7	F	I, Q, W, Y
8	I	F, N, Q, V, Y
9	T	S
10	I	F, l, N, Q, V, Y
11	K	A, D, E, F, H, I, L, N, Q, V, W, Y
12	N	A, Q, V
13	N	Q, V
15	N	A, D, E, F, H, I, K, L, Q, R, V, W Y
16	H	A, D, E, F, I, K, L, N, Q, R, V, W, Y
17	V	D, E, F, H, K, N, Q, R, W, Y
18	F	I, L, Q, W
19	T	S
20	R	H
21	T	S
22	A	D, E, F, H, K, N, Q, R, W, Y
23	I	D, E, F, H, K, L, N, Q, R, V, W, Y
24	Y	C, F, Q, W
25	S	T
26	K	A
33	S	C
34	P	W, Y

35	E	A, F, H, I, K, L, N, Q, R, V, W, Y
37	Q	A, D, F, H, I, L, R, V, W, Y
38	L	D, E, F, H, K, N, Q, R, W, Y
39	S	M, T
40	I	F, L, N, Q, V, Y
41	S	T
43	G	A, E, F, H, I, K, N, Q, R, V, W, Y
44	K	A, D, E, F, H, I, L, N, Q, R, V, W, Y
45	W	F, Y
46	D	F, H, I , K, L, N, Q, R, V, W, Y
47	L	F, N, Q, Y
48	F	I, Q, W
49	I	C, D, F, N, Q, Y
50	L	F, N, Q, V, Y
51	K	A, D, E, F, H, I, L, N, Q, V, W, Y
52	D	F, H, I, K, L, N, Q, R, V, W, Y
53	I	F, H, K, N, Q, R, W, Y
54	L	F, H, K, N, Q, R, Y, W
55	S	M, T
56	I	F, H, K, N, Q, R, W, Y
57	R	A, F, H, I, L, N, Q, V, W, Y
59	T	S
60	S	T
62	Y	C, F, Q, W
63	Q	Q
64	Q	F, N, V, Y
65	Y	F, Q, W
66	R	H
67	V	F, N, Q
68	G	A, D, E, F, H, I, K, L, N, Q, R, V, W, Y
69	D	A, F, H, I, K, L, N, Q, R, V, W, Y
70	G	A, D, E, F, H, I, K, L, N, Q, R, V, W, Y
72	G	A, D, E, F, H, I, K, L, N, Q, R, W, Y
73	W	F, Q, Y

74	V	I, N, Q
75	R	H, K
76	V	I, N, Q,
77	T	S
78	F	I, Q, W
80	S	T
81	L	F, I, N, , V, Y
82	V	D, E, F, H, K, N, Q, R, Y, W
83	G	A, F, H, I, K, L, N, Q, R, V,W, Y
84	A	F, H, K, N, Q, R, W, Y
85	D	A, I, K, L, N, Q, R, V, W, Y
86	E	A, F, H, I, K, L, N, Q, R, V, W, Y
87	V	I, L, N, Q
88	A	N, V
89	E	A, F, H, I, K, L, N, Q, R,V, W, Y
90	W	F, Y
91	S	T
92	S	T
93	G	A
94	D	A, E, F, H, I, K, L, N, Q, R,V, W, Y
95	L	A, D, E, F, H, I, K, N, Q, R, V, W, Y
97	D	A, F, H, I, K, L, N, Q, R, V, W, Y
98	G	E, F, H, I, K, L, N, Q, R, V, W, Y
99	F	D, E, H, I, K, L, N, Q, R, V, W, Y
100	V	D, E, F, H, I, K, L, N, Q, R, W, Y
101	L	A, D, E, F, H, I, K, N, Q, R, V, W, Y
102	Q	A, D, F, H, I, L, R, V, W, Y
103	K	D, E, F, H, I, L, N, Q, V, W, Y
104	P	V
105	V	E, F, H, K, N, Q, R, W, Y
106	R	F, H, L, Q, Y
108	G	A, F, H, K, N, R, V, W, Y
110	R	E, F, H, I, L, N, Q, V, W, Y
111	P	A, F, H, I, K, L, N, Q, R, V, W, Y

112	L	F, N, Q. Y
113	Q	F, N, V, Y
114	A	N, V
116	F	I, Q, W, Y
117	E	A, F, H, I, K, L, N, Q, R, V, W, Y
118	A	N
120	K	F, H, L, N, Q, V, Y
121	Q	F, H, I, K, L, N, R, V, W, Y

wherein the methionine at position 1 of the amino acid sequence is optionally absent;

wherein the encoded polypeptide optionally has a protein tag; and

wherein the encoded polypeptide has sweet-taste modulation activity or optionally has sweet taste.**[0011b]** In a second aspect, the disclosure provides an expression cassette or vector comprising the polynucleotide of the invention.

[0011c] In a third aspect, the disclosure provides a host cell transformed with the expression cassette or vector of the second aspect.

[0011d] In a fourth aspect, the disclosure provides a method of producing a protein having sweet-taste modulation activity and/or having sweet taste comprising:

culturing a host cell of the third aspect in a medium under conditions for protein expression.

[0011e] In a fifth aspect, the present disclosure provides a Myd variant polypeptide wherein:
the polypeptide has the amino acid sequence of SEQ ID NO:3 with 1-3 amino acid substitutions;
wherein the methionine at position 1 of the amino acid sequence is optionally absent;
wherein the polypeptide optionally has a protein tag;
wherein the polypeptide has sweet-taste modulation activity or optionally has sweet taste and
wherein the positions of and the amino acid (AA) substitutions are selected from the following:

AA Position in SEQ ID NO: 3	AA in SEQ ID NO: 3	Possible AA Substitutions
3	D	A, F, H, I, K, L, N, R, V, W, Y
4	L	F, H, K, N, Q, R, W, Y
5	S	T
6	S	T
7	F	I, Q, W, Y

8	I	F, N, Q, V, Y
9	T	S
10	I	F, l, N, Q, V, Y
11	K	A, D, E, F, H, I, L, N, Q, V, W, Y
12	N	A, Q, V
13	N	Q, V
15	N	A, D, E, F, H, I, K, L, Q, R, V, W Y
16	H	A, D, E, F, I, K, L, N, Q, R, V, W, Y
17	V	D, E, F, H, K, N, Q, R, W, Y
18	F	I, L, Q, W
19	T	S
20	R	H
21	T	S
22	A	D, E, F, H, K, N, Q, R, W, Y
23	I	D, E, F, H, K, L, N, Q, R, V, W, Y
24	Y	C, F, Q, W
25	S	T
26	K	A
33	S	C
34	P	W, Y
35	E	A, F, H, I, K, L, N, Q, R, V, W, Y
37	Q	A, D, F, H, I, L, R, V, W, Y
38	L	D, E, F, H, K, N, Q, R, W, Y
39	S	M, T
40	I	F, L, N, Q, V, Y
41	S	T
43	G	A, E, F, H, I, K, N, Q, R, V, W, Y
44	K	A, D, E, F, H, I, L, N, Q, R, V, W, Y
45	W	F, Y
46	D	F, H, I , K, L, N, Q, R, V, W, Y
47	L	F, N, Q, Y
48	F	I, Q, W
49	I	C, D, F, N, Q, Y
50	L	F, N, Q, V, Y

51	K	A, D, E, F, H, I, L, N, Q, V, W, Y
52	D	F, H, I, K, L, N, Q, R, V, W, Y
53	I	F, H, K, N, Q, R, W, Y
54	L	F, H, K, N, Q, R, Y, W
55	S	M, T
56	I	F, H, K, N, Q, R, W, Y
57	R	A, F, H, I, L, N, Q, V, W, Y
59	T	S
60	S	T
62	Y	C, F, Q, W
63	Q	Q
64	Q	F, N, V, Y
65	Y	F, Q, W
66	R	H
67	V	F, N, Q
68	G	A, D, E, F, H, I, K, L, N, Q, R, V, W, Y
69	D	A, F, H, I, K, L, N, Q, R, V, W, Y
70	G	A, D, E, F, H, I, K, L, N, Q, R, V, W, Y
72	G	A, D, E, F, H, I, K, L, N, Q, R, W, Y
73	W	F, Q, Y
74	V	I, N, Q
75	R	H, K
76	V	I, N, Q,
77	T	S
78	F	I, Q, W
80	S	T
81	L	F, I, N, , V, Y
82	V	D, E, F, H, K, N, Q, R, Y, W
83	G	A, F, H, I, K, L, N, Q, R, V,W, Y
84	A	F, H, K, N, Q, R, W, Y
85	D	A, I, K, L, N, Q, R, V, W, Y
86	E	A, F, H, I, K, L, N, Q, R, V, W, Y
87	V	I, L, N, Q
88	A	N, V

89	E	A, F, H, I, K, L, N, Q, R,V, W, Y
90	W	F, Y
91	S	T
92	S	T
93	G	A
94	D	A, E, F, H, I, K, L, N, Q, R,V, W, Y
95	L	A, D, E, F, H, I, K, N, Q, R, V, W, Y
97	D	A, F, H, I, K, L, N, Q, R, V, W, Y
98	G	E, F, H, I, K, L, N, Q, R, V, W, Y
99	F	D, E, H, I, K, L, N, Q, R, V, W, Y
100	V	D, E, F, H, I, K, L, N, Q, R, W, Y
101	L	A, D, E, F, H, I, K, N, Q, R, V, W, Y
102	Q	A, D, F, H, I, L, R, V, W, Y
103	K	D, E, F, H, I, L, N, Q, V, W, Y
104	P	V
105	V	E, F, H, K, N, Q, R, W, Y
106	R	F, H, L, Q, Y
108	G	A, F, H, K, N, R, V, W, Y
110	R	E, F, H, I, L, N, Q, V, W, Y
111	P	A, F, H, I, K, L, N, Q, R, V, W, Y
112	L	F, N, Q. Y
113	Q	F, N, V, Y
114	A	N, V
116	F	I, Q, W, Y
117	E	A, F, H, I, K, L, N, Q, R, V, W, Y
118	A	N
120	K	F, H, L, N, Q, V, Y
121	Q	F, H, I, K, L, N, R, V, W, Y

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[0011f] In a sixth aspect, the present disclosure provides a Myd variant polypeptide expressed in a host cell of the invention.

[0011g] In a seventh aspect, the present disclosure provides a composition, comprising a combination of:

(a) a product for oral administration, wherein the product differs from Mattirolomyces terfezioides truffle, and

(b) a flavor modulating composition comprising one or more variant Myd polypeptide of the fifth aspect;

wherein the combination exhibits flavor modulation compared to the product for oral administration.

[0011h] In an eighth aspect, the present disclosure provides a method for modulating the taste of a product for oral administration, comprising:

combining a product for oral administration with an effective amount of one or more Myd variant polypeptides of the fifth aspect, wherein the product for oral administration differs from *Mattirolomyces terfezioides* truffle, and wherein the combination has flavor modulation compared to the product for oral administration.

[0011i] In a ninth aspect, the present disclosure provides a method of modifying/changing at least one organoleptic property of a product for oral administration, comprising combining a product for oral administration with an effective amount of one or more Myd variant polypeptides of the fifth aspect, wherein the product for oral administration differs from *Mattirolomyces terfezioides* truffle, and wherein the combination exhibits an organoleptic property different from the product for oral administration.

[0011j] The invention provides variants of MYD1 (also referred to as mycodulcein, and Honey Truffle Sweetener protein (HTS protein)). Polypeptides of the invention exhibit flavor-modifying properties

and, in particular, modulate sweet taste and perception, either alone, or in combination with food, beverages, dietary supplements, or pharmaceuticals. In embodiments, Myd1 variants of the invention can provide sweet-taste to materials, such as food, beverages, dietary supplements, or pharmaceuticals that are ingested. In embodiments, Myd1 variants of the invention can reduce the sourness, bitterness or astringency of foods and drinks. In embodiments, Myd1 variants of the invention can exhibit enhancement of the taste of foods and drinks, namely a taste-modifying activity. In embodiments, Myd1 variants, can exhibit in addition to sweet-taste modulation activity, enhanced thermal stability compared to native forms of HTS protein. In embodiments, Myd1 variants can exhibit flavor-modifying properties. In embodiments, Myd1 variants, can exhibit in addition to flavor modifying properties, enhanced thermal stability compared to native forms of HTS protein. In an embodiment, the invention provides naturally-occurring Myd proteins. In an embodiment, the invention provides variant Myd proteins other than naturally-occuring proteins.

[0012] Naturally-occuring Myd protein exists as two isoforms; HTS-1 (SEQ ID NO:3) and HTS-2 (SEQ ID NO:141), as isolated from *Mattirolomyces* terfeziodes. The relative amounts of HTS-1 and HTS-2 isolated from *Mattirolomyces* terfeziodes range from about 40% to 60% by weight HTS-2 to 60% to 40% by weight HTS-1. In embodiments, the invention provides non-naturally occurring sweet proteins which include non-naturally occurring mixtures of the two isoforms HTS-1 and HTS-2. In embodiments, the invention provides sweet protein generated by recombinant expression of the coding sequence of SEQ ID NO:2 or a codon-optimized version of the coding sequence of SEQ ID NO:2 in a non-native host (e.g., a host other than *Mattirolomyces terfezioides* truffle), as well as methods of generating sweet protein by recombinant expression.

[0013] In an embodiment the encoded polypeptide is the polypeptide having the amino acid sequence of SEQ ID NO:3 (also designated as the HTS-1 isoform). In an embodiment the encoded polypeptide is the polypeptide having the amino acid sequence of SEQ ID NO:3, except that the methionine at position 1 in SEQ ID NO:3 is absent, designated hereinafter as the polypedptide having the amino acid sequence of SEQ ID NO:141(also designated as the HTS-2 isoform). In embodiments, the encoded polypeptide is the polypeptide having amino acid sequence SEQ ID NO:5 which is the HTS-1 isoform with a $(His\text{-}tag)_6$. In embodiments, the encoded polypeptide is the polypeptide having amino acid sequence SEQ ID NO:142 which is the HTS-2 isoform with a $(His\text{-}tag)_6$.

[0014] Accordingly, one example of the invention provides a polynucleotide (e.g., isolated polynucleotide) encoding a polypeptide, wherein the encoded polypeptide has a sweet-taste modulation activity and which is different in amino acid sequence from the polypeptide of SEQ ID NO:3 or optionally different from the polypeptide of SEQ ID NO:141. In embodiments, the encoded polypeptide is selected from the group consisting of: (a) a polypeptide sequence selected from the

group consisting of the amino acid sequences of a variant listed in Table 8; Table 9 or Table 10 (b) a polypeptide having at least 80% sequence identity to a polypeptide sequence selected from the group consisting of the amino acid sequences of a variant listed in Table 8, Table 9 or Table 10; and (c) a polypeptide sequence modified from the polypeptide sequence selected from the group consisting of the amino acid sequences of a variant listed in Table 8, Table 9 or Table 10 by deletion, insertion, substitution, or addition of no more than 24 amino acids, and wherein the polypeptide sequence is different from that of SEQ ID NO:3 and optionally different from that of SEQ ID NO:141. In an embodiment, the polynucleotide encoding the polypeptide is other than the polynucleotide of SEQ ID NO:2. In an embodiment, the polynucleotide encoding the polypeptide is the polynucleotide of SEQ ID NO:2 which is codon optimized for expression in a bacterium, yeast or fungus. In an embodiment, the polynucleotide encoding the polypeptide is the polynucleotide of SEQ ID NO:6 with optional His-tag which is codon optimized for expression in *E. coli*. In an embodiment, the polynucleotide encoding the polypeptide is the polynucleotide of SEQ ID NO:7 with optional His-tag which is codon optimized for expression in *Saccharomyces cerevisiae*.

[0015] In an embodiment, the encoded polypeptide is a polypeptide having the amino acid sequence of SEQ ID NO:3, except that the methionine at position 1 in SEQ ID NO:3 is absent, presented herein as the polypedptide having the amino acid sequence of SEQ ID NO:141. In an embodiment, the encoded polypeptide is a polypeptide other than the polypeptide having the amino acid sequence of SEQ ID NO:141. In embodiments, the encoded polypeptide exhibits sweet taste. In embodiments, the encoded polypeptide exhibits sweet taste, when present in a composition at a concentration of 30 ppm or higher. In embodiments, the encoded polypeptide exhibits sweet taste, when present in a composition at a concentration of 40 ppm or higher.

[0016] In a related example, the invention provides a polynucleotide (e.g., isolated polynucleotide) encoding a polypeptide, wherein the encoded polypeptide has flavor modifying properties, and which is different in amino acid sequence from polypeptide SEQ ID NO:3 and optionally from SEQ ID NO:141. In embodiments, the encoded polypeptide is selected from the group consisting of: (a) a polypeptide sequence selected from the group consisting of the amino acid sequences of a variant listed in Table 8; (b) a polypeptide having at least 80% sequence identity to a polypeptide sequence selected from the group consisting of the amino acid sequences of a variant listed in Table 8; and (c) a polypeptide sequence modified from the polypeptide sequence selected from the group consisting of the amino acid sequences of a variant listed in Table 8, by deletion, insertion, substitution, or addition of no more than 24 amino acids, and wherein the polypeptide sequence is different from that of SEQ ID NO:3 and optionally from SEQ ID NO:141. In embodiments, the encoded polypeptide is a polypeptide selected from the group consisting of the amino acid sequences of a variant listed in Table

8, that is other than a variant listed in Table 9 or Table 10. In an embodiment, the polynucleotide encoding the polypeptide is a polynucleotide other than the polynucleotide of SEQ ID NO:2. In an embodiment, the encoded polypeptide is a polypeptide having the amino acid sequence of SEQ ID NO:141. In an embodiment, the encoded polypeptide is a polypeptide other than the polypeptide having the amino acid sequence of SEQ ID NO:141. In embodiments, the encoded polypeptide does not exhibit sweet taste. In embodiments, the encoded polypeptide does not exhibit sweet taste when present in a composition at a concentration of 30 ppm or higher. In embodiments, the encoded polypeptide does not exhibit sweet taste when present in a composition at a concentration of 40 ppm or higher. In embodiments, the encoded polypeptide only exhibits sweet taste when present in a composition at a concentration of 30 ppm or higher.

[0017] In another example of the invention, amino acid mutations of HTS polypeptide and protein variants are summarized in Table 8. The mutations of Table 8 are identified relative to the amino acid sequence of SEQ ID NO:3. Thus, a polypeptide having an amino acid sequence of a variant listed in Table 8 will have the amino acid sequence of SEQ ID NO:3, but with one or more site mutations identified in Table 8. Mutants of Table 8 also include those in which the methionine at position 1 of the protein is absent. In a related example, the invention provides HTS polypeptide and protein variants, wherein the variants have the single site mutations of Table 8 relative to the amino acid sequence of SEQ ID NO:3 and in addition wherein the methionine at position 1 in SEQ ID NO:3 is absent.

[0018] In another example of the invention, amino acid mutations of HTS polypeptide and protein variants are summarized in Table 9. The mutations of Table 9 are identified relative to the amino acid sequence of SEQ ID NO:3. Thus, a polypeptide having an amino acid sequence of a variant listed in Table 9 will have the amino acid sequence of SEQ ID NO:3, but with one or more site mutations identified in Table 9. Mutants of Table 9 also include those in which the methionine at position 1 of the protein is absent. In a related example, the invention provides HTS polypeptide and protein variants, wherein the variants have the single site mutations of Table 9 relative to the amino acid sequence of SEQ ID NO:3 and in addition wherein the methionine at position 1 in SEQ ID NO:3 is absent.

[0019] In another example of the invention, amino acid mutations of HTS polypeptide and protein variants are summarized in Table 10. The mutations of Table 10 are identified relative to the amino acid sequence of SEQ ID NO:3. Thus, a polypeptide having an amino acid sequence of a variant listed in Table 10 will have the amino acid sequence of SEQ ID NO:3, but with one or more site mutations identified in Table 10. Mutants of Table 10 also include those in which the methionine at position 1 of the protein is absent. In a related example, the invention provides HTS polypeptide and protein variants, wherein the variants have the single site mutations of Table 8 relative to the amino acid sequence of SEQ ID NO:3 and in addition wherein the methionine at position 1 in SEQ ID NO:3 is absent.

[0020] In another example of the invention, the HTS polypeptide and protein variants are those having the single-site mutations listed in Table 7, which are identified relative to the amino acid sequence of SEQ ID NO:3. In a related example of the invention, the HTS polypeptide and protein variants are those having the single-site mutations listed in Table 7 relative to the amino acid sequence of SEQ ID NO:3, and in addition wherein the methionine at position 1 in SEQ ID NO:3 is absent.

[0021] In another example of the invention, the HTS polypeptide and protein variants are other than those having the single-site mutations listed in Table 7 which are identified relative to the amino acid sequence of SEQ ID NO:3. In a related example, the present invention excludes polynucleotides encoding the HTS polypeptide and protein variants having the single-site mutations listed in Table 7. In a related example of the invention, the HTS polypeptide and protein variants are other than those having the single-site mutations listed in Table 7 and wherein the methionine at position 1 in SEQ ID NO:3 is absent. In a related example, the present invention excludes polynucleotides encoding the HTS polypeptide and protein variants having the single-site mutations listed in Table 7 and wherein the methionine of SEQ ID NO:3 is absent.

[0022] In another example of the invention, the HTS polypeptide or protein variants do not include a mutation of Table 7. In a related example, the present invention excludes HTS polypeptide or protein variants comprising a mutation listed in Table 7. In a related example, the present invention excludes polynucleotides encoding a HTS polypeptide or protein variant comprising a mutation listed in Table 7.

[0023] In another example of the invention, the HTS polypeptide or protein variants do not include a mutation of Table 3 or Table 6. In a related example, the present invention excludes HTS polypeptide or protein variants comprising a mutation listed in Table 3 or Table 6. In a related example, the present invention excludes polynucleotides encoding a HTS polypeptide or protein variant comprising a mutation listed in Table 3 or Table 6.

[0024] In yet another example of the invention, the HTS polypeptide or protein variant does not include a mutation of Table 8, Table 9 or Table 10, but does include 1 or more conservative mutations of the amino acid sequence of SEQ ID NO:3 or optionally of SEQ ID NO:141, wherein, in the variant, the methionine at position 1 is present or absent. In a related example, the present invention includes polynucleotides encoding a HTS polypeptide or protein variant that does not include a mutation of Table 8, Table 9 or Table 10, but does include 1 or more conservative mutations of the amino acid sequence of SEQ ID NO:3, wherein, in the variant, the methionine at position 1 is present or absent.

[0025] In other examples, the polynucleotide encoding the polypeptide having flavor-modulation or sweet-taste modulation activity is optionally operably linked to a heterologous regulatory element. Additionally or alternatively, the polynucleotide sequence further encodes a protein/peptide tag or

label. The protein/peptide tag is optionally an affinity tag. The protein tag is optionally a histidine tag (His tag). Optionally the protein tag is $(His)_6$. In an embodiment, the polynucleotide encoding the polypeptide having sweet-taste modulation activity is other than the nucleotide of SEQ ID NO:2 further encoding a protein/peptide tag or label.

[0026] An example of the invention provides a polynucleotide (e.g., isolated polynucleotide) encoding a polypeptide, where the encoded polypeptide is selected from the group consisting of: (a) a polypeptide sequence selected from the group consisting of the amino acid sequences of a variant listed in Table 8, Table 9 or Table 10, where the polypeptide further consists of a protein/peptide tag, optionally an affinity tag, or optionally a histidine tag; (b) a polypeptide having at least 80% sequence identity to a polypeptide sequence selected from the group consisting of the amino acid sequences of a variant listed in Table 8, Table 9 or Table 10, where the polypeptide further consists of a protein/peptide tag, optionally an affinity tag, or optionally a histidine tag; and (c) a polypeptide sequence modified from the polypeptide sequence selected from the group consisting of the amino acid sequences of a variant listed in Table 8, Table 9 or Table 10 by deletion, insertion, substitution, or addition of no more than 24 amino acids and wherein the polypeptide further consists of a protein/peptide tag, optionally an affinity tag or optionally a histidine tag and where the polypeptide sequence is different from that of SEQ ID NO:3 containing the histidine tag. In a related embodiment, the encoded polypeptide is different from that of SEQ ID NO:142 containing a histidine tag.

[0027] In specific examples, the polynucleotide encoding the polypeptide having sweet-taste modulation activity is other than SEQ ID NO:76, SEQ ID NO:77, SEQ ID NO:79, SEQ ID NO:80, SEQ ID NO:82, SEQ ID NO:83, SEQ ID NO:85, SEQ ID NO:86, SEQ ID NO:88, SEQ ID NO:89, SEQ ID NO:90, SEQ ID NO:91, SEQ ID NO:93, SEQ ID NO:94, SEQ ID NO:96, SEQ ID NO:97, SEQ ID NO:99, SEQ ID NO:100, SEQ ID NO:102, SEQ ID NO:103, SEQ ID NO:104, SEQ ID NO:105, SEQ ID NO:107, SEQ ID NO:108, SEQ ID NO:110, SEQ ID NO:111, SEQ ID NO:112, SEQ ID NO:113, SEQ ID NO:115, SEQ ID NO:116, SEQ ID NO:117, SEQ ID NO:118, SEQ ID NO:120, SEQ ID NO:121, SEQ ID NO:122, SEQ ID NO:123, SEQ ID NO:125, SEQ ID NO:126, SEQ ID NO:128, SEQ ID NO:129, SEQ ID NO:130, SEQ ID NO:131, SEQ ID NO:133, SEQ ID NO:134, SEQ ID NO:135, SEQ ID NO:136, SEQ ID NO:138, SEQ ID NO:139 or SEQ ID NO:140 as identified in international patent application PCT/US2022/82443 and U.S. patent application 18/146,958.

[0028] Another example of the invention provides a polynucleotide other than the polynucleotide of SEQ ID NO:4, which corresponds to the coding sequence optimized for His tagged HTS in *E. coli* (wherein residues 364-381 correspond to an optional His tag sequence). Another example of the invention provides a polynucleotide other than the polynucleotide of SEQ ID NO:6, which corresponds to the

coding sequence of HTS optimized for expression in *S. cerevisiae* (to which a coding sequence for a His-tag, e.g., $(His)_6$ is added).

[0029] In a specific embodiment, the invention provides Myd variants which exhibit enhanced thermostabilty with respect to native isofomrs of Myd proteins (HTS-1 and HTS-2). In specific embodiment, the invention provides a

[0030] In additional examples, the invention provides an expression cassette comprising a polynucleotide herein and a vector comprising the polynucleotide, as well as a host cell transformed with the vector. Additionally, a method of producing a protein having sweet-taste modulation activity, comprising culturing the transformed host cell in a medium under conditions that result in producing the protein having sweet-taste modulation activity also is provided.

[0031] In additional examples, the invention provides a host cell which expresses a polypeptide as described herein. In embodiments, the host cell *is E. coli*. In embodiments, the host cell is a plant cell.

[0032] Another example of the invention provides a polypeptide (e.g., isolated polypeptide) having sweet-taste modulation activity and comprising (i) a polypeptide sequence selected from those amino acid sequences of a variant listed in Table 8, Table 9 or Table 10; wherein the polypeptide sequence is different from SEQ ID NO:3 and optionally different from SEQ ID NO:141 or (ii) a polypeptide having at least 80% sequence identity to a polypeptide sequence selected from the group consisting of those amino acid sequences of a variant listed in Table 8, Table 9 or Table 10, wherein the polypeptide sequence is different from SEQ ID NO:3 and optionally different from SEQ ID NO:141. In additional examples, the polypeptide (a) contains at least one modification relative to a polypeptide sequence selected from the group consisting of an amino acid sequence of a variant listed in Table 8, Table 9 or Table 10 by deletion, insertion, substitution, or addition of no more than 24 amino acids, wherein the polypeptide is different from polypeptide SEQ ID NO:3 and optionally different from SEQ ID NO:141, and/or (b) further comprises a protein/peptide tag, optionally an affinity tag, and particularly a histidine tag, and wherein the polypeptide has sweet-taste modulation activity.

[0033] In another example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by at least one mutation selected from those listed in Table 8, Table 9 or Table 10. In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by two mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by three mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In a related example, the invention provides a

polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by four mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by five mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by six mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In further embodiments of the preceding embodiments, the 1-6 modifications are other than removal of the methionine at position 1. In embodiments, in the polypeptides having 1-6 amino acid modifications, the methionine at position 1 is present or absent. The invention also provides polynucleotides encoding the foregoing mutant (variant) polypeptides of SEQ ID NO:3. The invention further provides the foregoing mutant polypeptides which further comprise a protein/peptide tag, optionally an affinity tagand more specifically a histidine tag. The invention also provides polynucleotides encoding the foregoing mutant polypeptides of SEQ ID NO:3 which mutants further comprise a protein/peptide tag, optionally an affinity tag and more specifically a histidine tag. In an embodiment, the polypeptide excludes polypeptides comprising a mutation listed in Table 7.

[0034] In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by seven mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by eight mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by nine mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by ten mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by eleven mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by twelve mutations at

different positions selected from those listed in Table 8, Table 9 or Table 10. In further embodiments of the preceding embodiments, the 1-12 modifications are other than removal of the methionine at position 1. In embodiments, in the polypeptides having 1-12 amino acid modification, the methionine at position 1 is present or absent. The invention also provides polynucleotides encoding the foregoing mutant polypeptides of SEQ ID NO:3. The invention further provides the foregoing mutant polypeptides which further comprise a protein/peptide tag, optionally an affinity tag and more specifically a histidine tag. The invention also provides polynucleotides encoding the foregoing mutant polypeptides of SEQ ID NO:3 which further comprise a protein/peptide tag, optionally an affinity tag and more specifically a histidine tag. In an example, the polypeptide excludes polypeptides comprising a mutation listed in Table 7.

[0035] In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by thirteen mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by fourteen mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by fifteen mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by sixteen mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by seventeen mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by eighteen mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In further embodiments of the preceding embodiments, the 1-18 modifications are other than removal of the methionine at position 1. In embodiments, in the polypeptides having 1-18 amino acid modification, the methionine at position 1 is present or absent. The invention also provides polynucleotides encoding the foregoing mutant polypeptides of SEQ ID NO:3. The invention further provides the foregoing mutant polypeptides which further comprise a protein/peptide tag, optionally an affinity tag and more specifically a histidine tag. The invention also provides polynucleotides encoding the foregoing mutant polypeptides of SEQ ID NO:3 which further comprise a protein/peptide

tag, optionally an affinity tag and more specifically a histidine tag. In an example, the polypeptide excludes polypeptides comprising a mutation listed in Table 7.

[0036] In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by nineteen mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by twenty mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by twenty-one mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by twenty-two mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by twenty-three mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In a related example, the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by twenty-four mutations at different positions selected from those listed in Table 8, Table 9 or Table 10. In further embodiments of the preceding embodiments, the 1-24 modifications are other than removal of the methionine at position 1. In embodiments, in the polypeptides having 1-24 amino acid modification, the methionine at position 1 is present or absent. The invention also provides polynucleotides encoding the foregoing mutant polypeptides of SEQ ID NO:3. The invention further provides the foregoing mutant polypeptides which further comprise a protein/peptide tag, optionally an affinity tag, and more specifically a histidine tag. The invention also provides polynucleotides encoding the foregoing mutant polypeptides of SEQ ID NO:3 which further comprise a protein/peptide tag, optionally an affinity tag and more specifically a histidine tag. In an example, the polypeptide excludes polypeptides comprising a mutation listed in Table 7.

[0037] Another example of the invention provides a polypeptide having sweet-taste modulation activity (e.g., isolated polypeptide) comprising the amino acid sequence of SEQ ID NO:3 which is modified by at least one mutation, where the at least one mutation is selected from the mutations listed in Table 8, Table 9 or Table 10 and is not a mutation listed in Table 7, and where the polypeptide is also modified by one or more additional mutations, where the one or more additional mutations are selected from the

mutations listed in Table 7. In a further example, the polypeptide is modified by two or more mutations selected from the mutations listed in Table 8, Table 9 or Table 10. In an example, the polypeptide is also modified by two or more additional mutations, where the two or more additional mutations are selected from the mutations listed in Table 7. In an example, the polypeptide has at least 80% sequence identity to a polypeptide sequence selected from the group consisting of those amino acid sequences of variants listed in Table 8, Table 9 or Table 10. The forgoing polypeptides optionally further comprise a protein/peptide tag, optionally an affinity tag or optionally a histidine tag.

[0038] In another example, the polypeptides of the invention are optionally isolated and/or optionally purified. In another example, the polynucleotides of the invention are optionally isolated and/or purified. In another example, the polypeptides of the invention optionally comprise a protein/peptide tag, optionally an affinity tag or optionally a histidine tag. In another example, the polypeptides of the invention optionally comprise an affinity tag. In another example, the polypeptides of the invention optionally comprise a histidine tag. In another example, the polypeptides of the invention optionally have a methionine at position 1. In another example, the polypeptides of the invention are optionally derivatized as described herein. In another example, the polypeptides of the invention are acylated, and optionally acetylated, at the N-terminus. In another example, the polypeptides of the invention are acylated at the N-terminus. In another example, the polypeptides of the invention have a methionine at position 1 and the methionine is derivatized and optionally the S of the methionine is oxidized. In another example, the polypeptides of the invention have a methionine at position 1 and the methionine is derivatized wherein the S of the methionine is oxidized. In another example, the polypeptides of the invention are pegylated at the N-terminus. In another example, the polypeptides of the invention are derivatized at the C-terminus as described herein. In another example, the polypeptides of the invention are esterified at the C-terminus.

[0039] In other examples, certain polypeptides of the invention exhibit sweet-taste modulation activity that is enhanced compared to the polypeptide of SEQ ID NO:3. In other examples certain polypeptides of the invention exhibit thermal stability that is enhanced compared to the polypeptide of SEQ ID NO:3.

[0040] Another example of the invention provides a composition which comprises one or more polypeptides of this invention which exhibit flavor modulation and/or sweet taste modulation activity and/or exhibit sweet taste. The composition includes a combination of (a) a product for oral administration other than *Mattirolomyces terfezioides* truffle, and (b) a sweetening composition comprising the polypeptide, wherein the combination has enhanced sweet taste and/or change or enhancement in flavor compared to the product for oral administration. The polypeptide includes one or more polypeptide sequences, either individually or in a combination of two or more thereof having

flavor modulation and/or sweet-taste modulation activity and comprising (i) a polypeptide sequence selected from an amino acid sequence of a variant of Table 8, Table 9 or Table 10 , wherein the polypeptide sequence is different from SEQ ID NO:3 and optionally different from SEQ ID NO:141; or (ii) a polypeptide having at least 80% sequence identity to a polypeptide sequence selected from the group consisting of an amino acid sequence of a variant of Table 8, Table 9 or Table 10, wherein the polypeptide sequence is different from SEQ ID NO:3 and optionally different from SEQ ID NO:141; or (iii) wherein the polypeptide of a variant of Table 8, Table 9 or Table 10 further comprises a protein/peptide tag, or affinity tag, wherein the protein/peptide tag is optionally a histidine tag.

[0041] Another example of the invention is a sweetening composition which comprises one or more polypeptides of the invention (e.g., HTS variants) exhibiting sweet taste. A related example of the invention is a flavor modulation composition which comprises one or more polypeptides of the invention (e.g., HTS variants) exhibiting flavor modulation activity. In embodiments, sweetening compositions contain 30 ppm or more of total HTS variant polypeptide. In embodiments, flavor modulation compositions contain 30 ppm or less of total HTS variant polypeptide.

[0042] Another more specific example of the invention provides a composition including a combination of (a) a product for oral administration other than *Mattirolomyces terfezioides* truffle, and (b) a sweetening composition comprising the polypeptide, wherein the combination has enhanced sweet taste compared to the product for oral administration. In embodiments, the polypeptide includes (a) one or more amino acid sequences selected from the group consisting of the amino acid sequences of a variant of Table 8, Table 9 or Table 10. In embodiments, the polypeptide is not a variant listed in Table 7, Table 3 or Table 6.

[0043] Another example of the invention provides a method for modulating the taste of a product for oral administration. The method comprises combining the product for oral administration with an effective amount of a flavor modulation composition or a sweetening composition comprising the polypeptide (e.g., a HTS variant), wherein the product for oral administration differs from *Mattirolomyces terfezioides* truffle, and wherein the combination has enhanced flavor or sweet taste, respectively, compared to the product for oral administration. In embodiments, the polypeptide includes one or more sequences as listed herein, particularly those having one or more mutations of Table 8, Table 9 or Table 10, either individually or in a combination of two or more thereof. In embodiments, the polypeptide is not a variant listed in Table 7, Table 3 or Table 6.

[0044] Another example of the invention provides a method of purifying a polypeptide having flavor modulation activity or sweet-taste modulation activity. The method includes: (a) conducting hydrophobic interaction chromatography (HIC) on a composition comprising a polypeptide, and/or (b) conducting size exclusion chromatography (SEC) on the composition comprising the polypeptide. In

embodiments, the method includes (a) conducting hydrophobic interaction chromatography (HIC) on a composition comprising a polypeptide, or (b) conducting size exclusion chromatography (SEC) on the composition comprising the polypeptide. In embodiments, the method includes (a) conducting hydrophobic interaction chromatography (HIC) on a composition comprising a polypeptide to generate a purified composition, and thereafter (b) conducting size exclusion chromatography (SEC) on the purified composition comprising the polypeptide. In embodiments, the polypeptide includes one or more sequences, either individually or in a combination of two or more thereof having sweet-taste modulation activity and comprising (i) a polypeptide sequence selected from that of a variant of Table 8, Table 9 or Table 10, wherein the polypeptide sequence is different from SEQ ID NO:3 and optionally different from SEQ ID NO:141; or (ii) a polypeptide having at least 80% sequence identity to a polypeptide sequence selected from the group consisting of that of a variant of Table 8, Table 9 or Table 10, wherein the polypeptide sequence is different from SEQ ID NO:3 and optionally different from SEQ ID NO:141; (iii) wherein the polypeptide sequence of the variants of Table 8, Table 9 or Table 10 further comprises a protein/peptide tag, wherein the protein tag is optionally an affinity tag or more specifically a histidine tag; (iv) wherein the polypeptide contains 1-24 mutations selected from those listed in Table 8, Table 9 or Table 10 and optionally further comprises a protein/peptide tag, wherein the protein tag is optionally an affinity tag and more specifically a histidine tag. In a related example, the invention provided polypeptides that are purified by the method described herein.

[0045] Another example of the invention provides sweetener compositions. In some embodiments, the sweetener compositions include: (a) one or more polypeptide, wherein the one or more polypeptide comprises: (i) a polypeptide sequence selected from amino acid sequences of any variant listed in Table 8, Table 9 or Table 10; (ii) a polypeptide sequence having at least 80% sequence identity to a polypeptide sequence selected from the group consisting of amino acid sequences of any variant listed in Table 8; Table 9 or Table 10; (iii) a polypeptide sequence containing at least one modification by deletion, insertion, substitution, or addition of no more than 24 amino acids, relative to a polypeptide sequence selected from the group consisting of an amino acid sequence of a variant listed in Table 8, Table 9 or Table 10; or (iv) a polypeptide of any of (i)-(iii), wherein the methionine at position 1 is absent; and/or the polypeptide further comprises a protein/peptide tag, optionally an affinity tag or optionally a histidine tag or optionally a $(His)_6$ tag; and (b) at least one additional sweetener other than a Myd sweet protein.

[0046] The additional sweetener is optionally selected from a steviol glycoside sweetener, a mogroside sweetener, sucrose, allulose, sucralose, a polyol, and high fructose corn syrup (HFCS). In other embodiments, the sweetener compositions include: (a) one or more polypeptide, wherein the one or more polypeptide comprises: (i) a polypeptide sequence selected from amino acid sequences of any

variant listed in Table 8, Table 9 or Table 10; (ii) a polypeptide sequence having at least 80% sequence identity to a polypeptide sequence selected from the group consisting of amino acid sequences of any variant listed in Table 8; Table 9 or Table 10; (iii) a polypeptide sequence containing at least one modification by deletion, insertion, substitution, or addition of no more than 24 amino acids, relative to a polypeptide sequence selected from the group consisting of an amino acid sequence of a variant listed in Table 8, Table 9 or Table 10; or (iv) a polypeptide of any of (i)- (iii), wherein the methionine at position 1 is absent; and/or the polypeptide further comprises a protein/peptide tag, optionally an affinity tag or optionally a histidine tag or optionally a $(His)_6$ tag; and (b) at least one additional component selected from monosaccharides, disaccharides (e.g., sucrose), sugar alcohols (e.g., mannitol), amino acids (e.g., leucine), organic acids (e.g., citric acid), hypoxanthine, theophylline, vitamins and combinations thereof.

[0047] In embodiments, sweetener composition herein comprise at least one additional component selected from sucrose, mannitol, citric acid, hypoxanthine, theophylline, leucine, and combinations thereof.

[0048] In specific embodiments, the polypeptide of the sweetener compositions has the amino acid sequence of SEQ ID NO:3. In specific embodiments, the polypeptide of the sweetener composition has the amino acid sequence of SEQ ID NO:3 where the methionine at position 1 is missing. In embodiments, the polypeptide of the sweetener is a mixture of a polypeptide having amino acid sequence of SEQ ID NO:3 and a polypeptide having amino acid sequence o SEQ ID NO:3 where the methionine at position 1 is missing.

[0049] In embodiments, the polypeptide of the sweetener compositions is present in an amount between about 1 ppm and about 50 ppm. In some embodiments, the polypeptide is present in an amount between about 1 ppm and about 40 ppm. In further embodiments, the polypeptide is present in an amount selected from an amount between about 1 ppm and about 30 ppm, about 1 ppm and about 25 ppm, about 1 ppm and about 20 ppm or about 1 ppm and about 15 ppm. In some embodiments, the polypeptide is present in an amount between about 5 ppm and about 50 ppm. In some embodiments, the polypeptide is present in an amount between about 10 ppm and about 50 ppm. In some embodiments, the polypeptide is present in an amount between about 15 ppm and about 50 ppm. In some embodiments, the polypeptide is present in an amount between about 20 ppm and about 50 ppm. In some embodiments, the polypeptide is present in an amount between about 25 ppm and about 50 ppm. In some embodiments, the polypeptide is present in an amount between about 30 ppm and about 50 ppm. In some embodiments, the polypeptide is present in an amount between about 35 ppm and about 50 ppm. In some embodiments, the polypeptide is present in an amount between about 40 ppm and about 50 ppm. In some embodiments, the polypeptide is present in an amount between about 45 ppm and about 50 ppm. In some embodiments, the polypeptide is present in an amount between about

10 ppm and about 40 ppm. In some embodiments, the polypeptide is present in an amount between about 20 ppm and about 30 ppm. In some embodiments, the steviol glycoside sweetener is selected from rebaudioside M ("Reb M"), RebM80, rebaudioside D ("Reb D"), Reb A95 and rebaudioside A ("Reb A"). In embodiments, the mogroside sweetener is selected from siamenoside I and mogroside V.

[0050] In another example, the invention provides a combination of a product for oral administration, wherein the product is not *Mattirolomyces terfezioides* truffle, and a sweetening composition described herein. In some embodiments, the product for oral administration has at least one improved organoleptic property compared to a product for oral administration that does not contain the sweetener composition, wherein the organoleptic property is selected from the group consisting of aroma, flavor, basic taste (sweetness, sour, saltiness, bitterness or umami), aftertaste or linger, temporal profile, mouthfeel or a combination thereof. In embodiments, the product for oral administration is a solid food product or a beverage product. In embodiments, the product for oral administration is a yogurt product. In embodiments, the product for oral administration is a chewing gum product.

[0051] In another example, the invention provides a beverage or beverage product comprising the sweetener composition described herein. In some embodiments, the beverage or beverage product has at least one improved organoleptic property compared to a beverage or beverage product that does not contain the sweetener composition, wherein the organoleptic property is selected from the group consisting of aroma, flavor, basic taste (sweetness, sour, saltiness, bitterness or umami), aftertaste or linger, temporal profile, mouthfeel or a combination thereof. In some embodiments, the beverage or beverage product is selected from a low-calorie or no-calorie beverage or beverage product. In embodiments, the beverage is selected from cola, ginger-ale, soft drinks, root beer, fruit juice, fruit-flavored juice, vegetable juice, vegetable-flavored juice, sports drinks, energy drinks, plant protein beverage, near water drinks (e.g., water with natural or synthetic flavorants), tea type (e.g. black tea, green tea, red tea, oolong tea), coffee, cocoa drink, beverage containing milk components (e.g. milk beverages, coffee containing milk components, café au lait, milk tea, fruit milk beverages). In embodiments, the beverage or beverage product includes at least one organic acid additive salt that is a sodium, calcium, potassium, or magnesium salt of an organic acid. In embodiments, the organic acid is selected from citric acid, malic acid, tartaric acid, fumaric acid, lactic acid, alginic acid, ascorbic acid, benzoic acid and adipic acid.

[0052] In another example, the invention provides methods of improving at least one organoleptic property of the product for oral administration described herein. In embodiments the product for oral administration is a solid food product or a liquid beverage product. In an embodiment, the invention

provides methods of improving at least one organoleptic property of the product for oral administration described herein. The methods include adding a sweetener composition as described herein to a solid or liquid matrix, thereby providing the product having at least one improved organoleptic property. In embodiments, the improved organoleptic property is selected from the group consisting of aroma, flavor, basic taste (sweetness, sour, saltiness, bitterness or umami), aftertaste or linger, temporal profile, mouthfeel or a combination thereof. In embodiments, the amount of polypeptide present in the product improved by the methods is an amount between about 1 ppm and about 50 ppm, about 1 ppm and about 40 ppm, about 1 ppm and about 30 ppm, about 1 ppm and about 25 ppm, about 1 ppm and about 20 ppm or about 1 ppm and about 15 ppm. In embodiments, the product is a solid food product and the sweetener composition is added to, combined with or mixed into the solid food product.

[0053] In embodiments, the invention provides methods of improving at least one organoleptic property of the beverage or beverage product described herein. The methods include adding a sweetener composition as described herein to a liquid matrix, thereby providing a beverage or beverage product having at least one improved organoleptic property. In embodiments, the improved organoleptic property is selected from the group consisting of aroma, flavor, basic taste (sweetness, sour, saltiness, bitterness or umami), aftertaste or linger, temporal profile, mouthfeel or a combination thereof. In embodiments, the amount of polypeptide present in the beverage or beverage product improved by the methods is an amount between about 1 ppm and about 50 ppm, about 1 ppm and about 40 ppm, about 1 ppm and about 30 ppm, about 1 ppm and about 25 ppm, about 1 ppm and about 20 ppm or about 1 ppm and about 15 ppm.

[0054] In another example, the invention provides methods of changing/modifying at least one organoleptic property of a product for oral administration as described herein. The methods include adding a sweetener composition as described herein to the product, thereby providing a product having at least one changed/modified organoleptic property. In embodiments, the changed/modified organoleptic property is selected from the group consisting of aroma, flavor, basic taste (sweetness, sour, saltiness, bitterness or umami), aftertaste or linger, temporal profile, mouthfeel or a combination thereof. In embodiments, the amount of polypeptide present in the product changed/modified by the methods is an amount between about 1 ppm and about 50 ppm, about 1 ppm and about 40 ppm, about 1 ppm and about 30 ppm, about 1 ppm and about 25 ppm, about 1 ppm and about 20 ppm or about 1 ppm and about 15 ppm. In embodiments, the product for oral administration is a food product or a beverage product. In embodiments, the product is a solid food product and the sweetener composition is added to, combined with or mixed into the solid food product.

[0055] In another example, the invention provides methods of changing/modifying at least one organoleptic property of the beverage or beverage product described herein. The methods include