

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference 39227-80WO3	FOR FURTHER ACTION	See item 4 below
International application No. PCT/US2020/018460	International filing date (<i>day/month/year</i>) 15 February 2020 (15.02.2020)	Priority date (<i>day/month/year</i>) 15 February 2019 (15.02.2019)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant PURECIRCLE USA INC.		

1.	This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 <i>bis</i> . I(a).																								
2.	This REPORT consists of a total of 11 sheets, including this cover sheet. In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.																								
3.	This report contains indications relating to the following items: <table style="width: 100%; border: none;"> <tr> <td style="width: 10%; text-align: center;">☒</td> <td style="width: 30%;">Box No. I</td> <td style="width: 80%;">Basis of the report</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td style="text-align: center;">☒</td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td style="text-align: center;">☒</td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td style="text-align: center;">☒</td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table>	☒	Box No. I	Basis of the report	☐	Box No. II	Priority	☒	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	☒	Box No. IV	Lack of unity of invention	☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	☐	Box No. VI	Certain documents cited	☐	Box No. VII	Certain defects in the international application	☐	Box No. VIII	Certain observations on the international application
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4.	The International Bureau will communicate this report to designated Offices in accordance with Rules 44 <i>bis</i> .3(c) and 93 <i>bis</i> .1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44 <i>bis</i> .2).																								

	Date of issuance of this report 10 August 2021 (10.08.2021)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Miki Kobayashi e-mail pct.team8@wipo.int

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To: AUDREY J. BABCOCK TAFT STETTINIUS & HOLLISTER LLP 2200 IDS CENTER 80 SOUTH EIGHTH STREET MINNEAPOLIS, MN 55402
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Date of mailing
(day/month/year)

06 JUL 2020

Applicant's or agent's file reference 39227-80WO3		FOR FURTHER ACTION See paragraph 2 below
International application No. PCT/US2020/018460	International filing date (day/month/year) 15 February 2020	Priority date (day/month/year) 15 February 2019
International Patent Classification (IPC) or both national classification and IPC IPC(8) - C07H 1/00; C07H 15/256; C12P 19/56 (2020.01) CPC - A23L 27/36; C07H 1/00; C07H 15/256; C12P 19/56 (2020.05)		
Applicant PURECIRCLE USA INC.		

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, VA 22313-1450 Facsimile No. 571-273-8300	Date of completion of this opinion 03 June 2020	Authorized officer Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 Telephone No. 571-272-4300
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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

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Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - ☒ the international application in the language in which it was filed.
 - ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(b)).
3. ☒ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. ☒ forming part of the international application as filed:
 - ☒ in the form of an Annex C/ST.25 text file.
 - ☐ on paper or in the form of an image file.
 - b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
 - c. ☐ furnished subsequent to the international filing date for the purposes of international search only:
 - ☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).
 - ☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).
4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

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Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application.

☒ claims Nos. 4, 5, 7, 9

because:

☐ the said international application, or the said claims Nos. _____ relate to the following subject matter which does not require an international search (*specify*):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 4, 5, 7, 9 are so unclear that no meaningful opinion could be formed (*specify*):

Claims 4, 5, 7, and 9 are multiple dependent claims not drafted in accordance with the second and third sentences of Rule 6.4(a).

☐ the claims, or said claims Nos. _____ are so inadequately supported by the description that no meaningful opinion could be formed (*specify*):

☒ no international search report has been established for said claims Nos. 4, 5, 7, 9

☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

☐ furnish a sequence listing in the form of an Annex C/ST.25 text file, and such listing was not available to the International Searching Authority in the form and manner acceptable to it; or the sequence listing furnished did not comply with the standard provided for in Annex C of the Administrative Instructions.

☐ furnish a sequence listing on paper or in the form of an image file complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in the form and manner acceptable to it; or the sequence listing furnished did not comply with the standard provided for in Annex C of the Administrative Instructions.

☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rule 13ter.1(a) or (b).

☐ See Supplemental Box for further details.

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Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has, within the applicable time limit:
- ☐ paid additional fees.
 - ☐ paid additional fees under protest and, where applicable, the protest fee.
 - ☐ paid additional fees under protest but the applicable protest fee was not paid.
 - ☒ not paid additional fees.
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with.
 - ☒ not complied with for the following reasons:

<See Supplemental Box>

4. Consequently, this opinion has been established in respect of the following parts of the international application:
- ☐ all parts.
 - ☒ the parts relating to claims Nos. 1-3, 6, 8, 10-17

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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	8, 10-17	YES
	Claims	1-3, 6	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-3, 6, 8, 10-17	NO
Industrial applicability (IA)	Claims	1-3, 6, 8, 10-17	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1-3, 6, 8, and 10-17 have been analyzed subject to the restriction that the claims read on steviol glycoside I with the following formula, wherein R1 and R2 sugar chains are defined as the first entry in the table of claim 1.

Claims 1-3 and 6 lack novelty under PCT Article 33(2) as being anticipated by Nanjing Nuoyun Biological Technology Co., Ltd. (hereinafter Nanjing Nuoyun).

Regarding Claim 1, Nanjing Nuoyun discloses steviol glycoside I (See Translation, Abstract) with the following formula, wherein R1 and R2 sugar chains are defined as the first entry in the table of claim 1 (See Original Document, Pg. 2, see compound (IV)).

Regarding Claim 2, Nanjing Nuoyun discloses the steviol glycoside of claim 1, and further discloses a method for producing at least one steviol glycoside (See Translation, Abstract and Claim 1), comprising the steps of: a. providing a starting composition comprising an organic compound with at least one carbon atom (See Translation, Claim 1); b. providing an enzyme preparation or microorganism containing at least one enzyme selected from steviol biosynthesis enzymes, UDP-glucosyltransferases (See Translation, Claim 1, UDPG based transferase) and optionally UDP-glucose recycling enzymes; c. contacting the enzyme preparation or microorganism with a medium containing the starting composition to produce a medium (See Translation, Claim 1, generating compound (IV)) comprising at least one steviol glycoside (See Translation, Claim 1, generating compound (IV)).

Regarding Claim 3, Nanjing Nuoyun discloses the steviol glycoside of claim 1, and further discloses a method for producing at least one steviol glycoside (See Translation, Abstract and Claim 1), comprising the steps of: a. providing a starting composition comprising an organic compound with at least one carbon atom (See Translation, Claim 1); b. providing a biocatalyst comprising at least one enzyme selected from steviol biosynthesis enzymes, UDP-glucosyltransferases (See Translation, Claim 1, UDPG based transferase) and optionally UDP-glucose recycling enzymes; c. contacting the biocatalyst with a medium containing the starting composition to produce a medium comprising at least one steviol glycoside (See Translation, Claim 1, generating compound (IV)).

Regarding Claim 6, Nanjing Nuoyun discloses the method of claim 2, wherein the microorganism is E.coli (See Translation, Pg. 4, Embodiment 1, Utilize molecular biology and technique for gene engineering etc. to obtain the expression of recombinant e. coli bacterial strain containing genes of interest).

Claims 8 and 10-16 lack an inventive step under PCT Article 33(3) as being obvious over Nanjing Nuoyun Biological Technology Co., Ltd. (hereinafter Nanjing Nuoyun) in view of WO 2018/213290 A1 to Purecircle Usa Inc. (hereinafter Purecircle '290).

Regarding Claim 8, Nanjing Nuoyun discloses the method of claim 2. Nanjing Nuoyun fails to explicitly disclose wherein the enzyme is selected from the group consisting of a mevalonate (MVA) pathway enzyme, a 2-C-methyl-D-erythritol-4-phosphate pathway (MEP/DOXP) enzyme, geranylgeranyl diphosphate synthase, copalyl diphosphate synthase, kaurene synthase, kaurene oxidase, kaurenoic acid 13-hydroxylase (KAH), steviol synthetase, deoxyxylulose 5-phosphate synthase (DXS), D-1-deoxyxylulose 5-phosphate reductoisomerase (DXR), 4-diphosphocytidyl-2-C-methyl-D-erythritol synthase (CMS), 4-diphosphocytidyl-2-C-methyl-D-erythritol kinase (CMK), 4-diphosphocytidyl-2-C-methyl-D-erythritol 2,4-cyclodiphosphate synthase (MCS), 1-hydroxy-2-methyl-2(E)-butenyl 4-diphosphate synthase (HDS), 1-hydroxy-2-methyl-2(E)-butenyl 4-diphosphate reductase (HDR), acetoacetyl-CoA thiolase, truncated HMG-CoA reductase, mevalonate kinase, phosphomevalonate kinase, mevalonate pyrophosphate decarboxylase, cytochrome P450 reductase, UGT7411, UGT85C2, UGT91D2, EUGT11, UGTS12, UGT76G1, UGlyT91C1 or mutant variant thereof having >85% amino-acid sequence identity, >86% amino-acid sequence identity, >87% amino-acid sequence identity, >88% amino-acid sequence identity, >89% amino-acid sequence identity, >90% amino-acid sequence identity, >91% amino-acid sequence identity, >92% amino-acid sequence identity, >93% amino-acid sequence identity, >94% amino-acid sequence identity, >95% amino-acid sequence identity, >96% amino-acid sequence identity, >97% amino-acid sequence identity, >98% amino-acid sequence identity, >99% amino-acid sequence identity. Purecircle '290, in the field of steviol glycoside synthesis (Purecircle '290, Abstract), teaches wherein the enzyme is a mevalonate (MVA) pathway enzyme (Purecircle '290, Claims 1 and 8). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Nanjing Nuoyun with the teaching of Purecircle '290 for the purpose of providing a synthetic route that is simple, efficient, and economical in the preparation of high purity steviol glycosides (Purecircle '290, Pg. 1, last two Paras.) thereby preparing steviol glycosides using a process which is suitable for use commercially.

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

<Box No. IV Lack of unity of invention>

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees need to be paid.

Group I+: claims 1-3, 6, 8, and 10-17 are drawn to steviol glycosides I-XLI, methods for producing at least one steviol glycoside thereof, consumable products thereof, methods for enhancing the sweetness of a beverage or food product thereof, methods for modifying the flavor of a beverage or food product thereof, and methods for suppressing foaming of a beverage or food product thereof.

The first invention of Group I+ is restricted to steviol glycoside I with the following formula, wherein R1 and R2 sugar chains are defined as the first entry in the table of claim 1; methods for producing at least one steviol glycoside thereof; consumable products thereof; methods for enhancing the sweetness of a beverage or food product thereof; methods for modifying the flavor of a beverage or food product thereof; and methods for suppressing foaming of a beverage or food product thereof. It is believed that claims 1-3, 6, 8, and 10-17 read on this first named invention and thus these claims will be searched without fee to the extent that they read on the above embodiment.

Applicant is invited to elect additional formula(e) for each additional compound to be searched in a specific combination by paying an additional fee for each set of election. Each additional elected formula(e) requires the selection of a single definition for each compound variable. An exemplary election would be steviol glycoside II with the following formula, wherein R1 and R2 sugar chains are defined as the second entry in the table of claim 1; methods for producing at least one steviol glycoside thereof; consumable products thereof; methods for enhancing the sweetness of a beverage or food product thereof; methods for modifying the flavor of a beverage or food product thereof; and methods for suppressing foaming of a beverage or food product thereof. Additional formula(e) will be searched upon the payment of additional fees. Applicants must specify the claims that read on any additional elected inventions. Applicants must further indicate, if applicable, the claims which read on the first named invention if different than what was indicated above for this group. Failure to clearly identify how any paid additional invention fees are to be applied to the "+" group(s) will result in only the first claimed invention to be searched/examined.

The inventions listed in Groups I+ do not relate to a single general inventive concept under PCT Rule 13.1, because under PCT Rule 13.2 they lack the same or corresponding special technical features for the following reasons:

The Groups I+ formulae do not share a significant structural element requiring the selection of alternatives for the compound variables R1 and R2 and accordingly these groups lack unity a priori.

Additionally, even if Groups I+ were considered to share the technical features of steviol glycosides I-XLI with the following core structure; a method for producing at least one steviol glycoside, comprising the steps of: a. providing a starting composition comprising an organic compound with at least one carbon atom; b. providing an enzyme preparation or microorganism containing at least one enzyme selected from steviol biosynthesis enzymes, NDP-glucosyltransferases and optionally NDP-glucose recycling enzymes; c. contacting the enzyme preparation or microorganism with a medium containing the starting composition to produce a medium comprising at least one steviol glycoside; a method for producing at least one steviol glycoside, comprising the steps of: a. providing a starting composition comprising an organic compound with at least one carbon atom; b. providing a biocatalyst comprising at least one enzyme selected from steviol biosynthesis enzymes, NDP-glucosyltransferases and optionally NDP-glucose recycling enzymes; c. contacting the biocatalyst with a medium containing the starting composition to produce a medium comprising at least one steviol glycoside; a consumable product comprising at least one steviol glycoside, wherein the product is selected from the group consisting of a food, a beverage, a pharmaceutical composition, a tobacco product, a nutraceutical composition, an oral hygiene composition, and a cosmetic composition; a method for enhancing the sweetness of a beverage or food product, comprising a sweetener comprising: a. providing a beverage or food product comprising a sweetener; and b. adding a sweetness enhancer comprising at least one steviol glycoside wherein at least one steviol glycoside is present in a concentration at or below the sweetness recognition threshold; a method for modifying the flavor of a beverage or food product, comprising a. providing a beverage or food product, and b. adding a composition comprising at least one steviol glycoside; and a method for suppressing foaming of a beverage or food product, comprising a. providing a beverage or a food product, and b. adding a foam suppressor comprising at least one steviol glycoside, these shared technical features do not represent a contribution over the prior art as disclosed by WO 2018/213290 A1 to Purecircle USA Inc. and US 2017/0303566 A1 to Suntory Beverage & Food Limited.

WO 2018/213290 A1 to Purecircle USA Inc. teaches steviol glycosides I-XLI with the following core structure (Abstract, rebaudiosides M); a method for producing at least one steviol glycoside (Claim 1), comprising the steps of: a. providing a starting composition comprising an organic compound with at least one carbon atom (Claim 1); b. providing an enzyme preparation or microorganism containing at least one enzyme selected from steviol biosynthesis enzymes, NDP-glucosyltransferases and optionally NDP-glucose recycling enzymes (Claim 1); c. contacting the enzyme preparation or microorganism with a medium containing the starting composition to produce a medium comprising at least one steviol glycoside (Claim 1); a consumable product (Claim 10) comprising at least one steviol glycoside, wherein the product is selected from the group consisting of a food, a beverage, a pharmaceutical composition, a tobacco product, a nutraceutical composition, an oral hygiene composition, and a cosmetic composition (Claim 10); a method for enhancing the sweetness of a beverage or food product (Claim 19), comprising a sweetener comprising: a. providing a beverage or food product comprising a sweetener (Claim 19); and b. adding a sweetness enhancer comprising at least one steviol glycoside wherein at least one steviol glycoside is present in a concentration at or below the sweetness recognition threshold (Claim 19); and a method for modifying the flavor of a beverage or food product (Claim 19), comprising a. providing a beverage or food product, and b. adding a composition comprising at least one steviol glycoside (Claim 19).

US 2017/0303566 A1 to Suntory Beverage & Food Limited teaches a method for suppressing foaming of a beverage or food product (Claim 8), comprising a. providing a beverage or a food product (Claim 8), and b. adding a foam suppressor comprising at least one steviol glycoside (Claim 8).

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

The inventions listed in Groups I+ therefore lack unity under Rule 13 because they do not share a same or corresponding special technical feature.

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Regarding Claim 10, Nanjing Nuoyun discloses the steviol glycoside of claim 1. Nanjing Nuoyun fails to explicitly disclose a consumable product comprising at least one steviol glycoside, wherein the product is selected from the group consisting of a food, a beverage, a pharmaceutical composition, a tobacco product, a nutraceutical composition, an oral hygiene composition, and a cosmetic composition. Purecircle '290 teaches a consumable product (Purecircle '290, Claim 10) comprising at least one steviol glycoside, wherein the product is selected from the group consisting of a food, a beverage, a pharmaceutical composition, a tobacco product, a nutraceutical composition, an oral hygiene composition (Purecircle '290, Claim 10). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Nanjing Nuoyun with the teaching of Purecircle '290 for the purpose of providing an essentially non-caloric sweetener which does not elicit a glycemic response (Purecircle '290, Pg. 1, Para. 3) thereby providing a sweetener for use in products targeted to diabetics and others interested in controlling for their intake of carbohydrates.

Regarding Claim 11, modified Nanjing Nuoyun discloses the consumable product of claim 10. Nanjing Nuoyun fails to explicitly disclose wherein the product is selected from the group consisting of beverages; natural juices; refreshing drinks; carbonated soft drinks; diet drinks; zero calorie drinks; reduced calorie drinks and foods; yogurt drinks; instant juices; instant coffee; powdered types of instant beverages; canned products; syrups; fermented soybean paste; soy sauce; vinegar; dressings; mayonnaise; ketchups; curry; soup; instant bouillon; powdered soy sauce; powdered vinegar; types of biscuits; rice biscuit; crackers; bread; chocolates; caramel; candy; chewing gum; jelly; pudding; preserved fruits and vegetables; fresh cream; jam; marmalade; flower paste; powdered milk; ice cream; sorbet; vegetables and fruits packed in bottles; canned and boiled beans; meat and foods boiled in sweetened sauce; agricultural vegetable food products; seafood; ham; sausage; fish ham; fish sausage; fish paste; deep fried fish products; dried seafood products; frozen food products; preserved seaweed; preserved meat; tobacco and medicinal products. Purecircle '290 teaches wherein the product is beverages (Purecircle '290, Claims 10 and 15). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Nanjing Nuoyun with the teaching of Purecircle '290 for the purpose of providing an essentially non-caloric sweetener which does not elicit a glycemic response (Purecircle '290, Pg. 1, Para. 3) thereby providing a sweetener for use in products targeted to diabetics and others interested in controlling for their intake of carbohydrates.

Regarding Claim 12, modified Nanjing Nuoyun discloses the consumable product of claim 10. Nanjing Nuoyun fails to explicitly disclose further comprising at least one additive selected from the group consisting of carbohydrates, polyols, amino acids and their corresponding salts, poly-amino acids and their corresponding salts, sugar acids and their corresponding salts, nucleotides, organic acids, inorganic acids, organic salts including organic acid salts and organic base salts, inorganic salts, bitter compounds, caffeine, flavorants and flavoring ingredients, astringent compounds, proteins or protein hydrolysates, surfactants, emulsifiers, flavonoids, alcohols, polymers and combinations thereof. Purecircle '290 teaches the consumable product further comprising polyols (Purecircle '290, Claims 10, 15, and 16). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Nanjing Nuoyun with the teaching of Purecircle '290 for the purpose of providing an essentially non-caloric sweetener which does not elicit a glycemic response (Purecircle '290, Pg. 1, Para. 3) thereby providing a sweetener for use in products targeted to diabetics and others interested in controlling for their intake of carbohydrates.

Regarding Claim 13, modified Nanjing Nuoyun discloses the consumable product of claim 10. Nanjing Nuoyun fails to explicitly disclose further comprising at least one functional ingredient selected from the group consisting of saponins, antioxidants, dietary fiber sources, fatty acids, vitamins, glucosamine, minerals, preservatives, hydration agents, probiotics, prebiotics, weight management agents, osteoporosis management agents, phytoestrogens, long chain primary aliphatic saturated alcohols, phytosterols and combinations thereof. Purecircle '290 teaches the consumable product further comprising saponins (Purecircle '290, Claims 10, 15, and 17). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Nanjing Nuoyun with the teaching of Purecircle '290 for the purpose of providing an essentially non-caloric sweetener which does not elicit a glycemic response (Purecircle '290, Pg. 1, Para. 3) thereby providing a sweetener for use in products targeted to diabetics and others interested in controlling for their intake of carbohydrates.

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In case the space in any of the preceding boxes is not sufficient.
Continuation of:

Regarding Claim 14, modified Nanjing Nuoyun discloses the consumable product of claim 10. Nanjing Nuoyun fails to explicitly disclose further comprising a compound selected from the group consisting of steviolmonoside, steviolmonoside A, steviolbioside, steviolbioside A, steviolbioside B, steviolbioside C, steviolbioside D, steviolbioside E, rubusoside, dulcoside A, dulcoside B, dulcoside C, dulcoside D, stevioside, stevioside A, stevioside B, stevioside C, stevioside D, stevioside E, stevioside E2, stevioside F, stevioside G, stevioside H, rebaudioside A, rebaudioside A2, rebaudioside A3, rebaudioside A4, rebaudioside B, rebaudioside B2, rebaudioside C, rebaudioside C2, rebaudioside C3, rebaudioside C4, rebaudioside C5, rebaudioside C6, rebaudioside D, rebaudioside D2, rebaudioside D3, rebaudioside D4, rebaudioside D5, rebaudioside D6, rebaudioside D7, rebaudioside D8, rebaudioside E, rebaudioside E2, rebaudioside E3, rebaudioside E4, rebaudioside E5, rebaudioside E6, rebaudioside E7, rebaudioside F, rebaudioside F2, rebaudioside F3, rebaudioside G, rebaudioside H, rebaudioside H2, rebaudioside H3, rebaudioside H4, rebaudioside H5, rebaudioside H6, rebaudioside I, rebaudioside I2, rebaudioside I3, rebaudioside J, rebaudioside K, rebaudioside K2, rebaudioside KA, rebaudioside L, rebaudioside M, rebaudioside M2, rebaudioside M3, rebaudioside N, rebaudioside N2, rebaudioside N3, rebaudioside N4, rebaudioside N5, rebaudioside O, rebaudioside O2, rebaudioside O3, rebaudioside O4, rebaudioside Q, rebaudioside Q2, rebaudioside Q3, rebaudioside R, rebaudioside S, rebaudioside T, rebaudioside T1, rebaudioside U, rebaudioside U2, rebaudioside V, rebaudioside V2, rebaudioside V3, rebaudioside W, rebaudioside W2, rebaudioside W3, rebaudioside Y, rebaudioside Z1, rebaudioside Z2, rebaudioside AM, SvG7, NSF-02, Mogroside V, siratose, Luo Han Guo, allulose, D-allose, D-tagatose, erythritol, brazzein, neohesperidin dihydrochalcone, glycyrrhizic acid and its salts, thaumatin, perillartine, pernanthidin, mukuroziosides, baiyunoside, phlomisoides-I, dimethyl-hexahydrofluorene-dicarboxylic acid, aubrietin, perianthrin, carnosin flosides, cyclocarioside, pterocariosides, polypodoside A, brazilin, hernandulcin, phillodulcin, glycyphyllin, phlorizin, trilobatin, dihydroflavonol, dihydroquercetin-3-acetate, neostilbin, trans-cinnamaldehyde, monatin and its salts, seliguanin A, hematoxylin, monellin, osladin, pterocarioside A, pterocarioside B, mabinlin, pentadin, miraculin, curculin, neoculin, chlorogenic acid, cynarin, siamenoside, sucralose, potassium acesulfame, aspartame, alitame, saccharin, cyclamate, neotame, dulcin, suosan advantame, gymnemic acid, holidulin, ziziphin, lactisole, glutamate, aspartic acid, glycine, alanine, threonine, proline, lysine, tryptophan, maltitol, mannitol, sorbitol, lactitol, inositol, isomalt, propylene glycol, glycerol, threitol, galactitol, hydrogenated isomaltulose, reduced isomaltooligosaccharides, reduced xylo-oligosaccharides, reduced gentio-oligosaccharides, reduced maltose syrup, reduced glucose syrup, hydrogenated starch hydrolyzates, polyglycitol, sugar alcohols, L-sugars, L-sorbose, L-arabinose, trehalose, galactose, rhamnose, various cyclodextrins, cyclic oligosaccharides, various types of maltodextrins, dextran, sucrose, glucose, ribulose, fructose, threose, xylose, lyxose, altrose, mannose, idose, lactose, maltose, invert sugar, isotrehalose, neotrehalose, isomaltulose, erythrose, deoxyribose, gulose, talose, erythrose, xylulose, cellobiose, amylopectin, glucosamine, mannosamine, glucuronic acid, gluconic acid, glucono-lactone, abequose, galactosamine, beet oligosaccharides, isomalto-oligosaccharides (isomaltose, isomaltotriose, panose and the like), xylo-oligosaccharides (xylotriose, xylobiose and the like), xylo-terminated oligosaccharides, gentio-oligosaccharides (gentiobiose, gentiotriose, gentiotetraose and the 102 like), nigero-oligosaccharides, palatinose oligosaccharides, fructooligosaccharides (kestose, nystose and the like), maltotetraol, maltotriol, malto-oligosaccharides (maltotriose, maltotetraose, maltopentaose, maltohexaose, maltoheptaose and the like), starch, inulin, inulo-oligosaccharides, lactulose, melibiose, raffinose, isomerized liquid 5 sugars such as high fructose corn syrups, coupling sugars, soybean oligosaccharides, Dpsicose, D-ribose, L-glucose, L-fucose, D-turanose, D-leucrose. Purecircle '290 teaches the consumable product further comprising rebaudioside A (Purecircle '290, Claims 10, 15, and 18). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Nanjing Nuoyun with the teaching of Purecircle '290 for the purpose of providing an essentially non-caloric sweetener which does not elicit a glycemic response (Purecircle '290, Pg. 1, Para. 3) thereby providing a sweetener for use in products targeted to diabetics and others interested in controlling for their intake of carbohydrates.

Regarding Claim 15, Nanjing Nuoyun discloses the steviol glycoside of claim 1. Nanjing Nuoyun fails to explicitly disclose a method for enhancing the sweetness of a beverage or food product, comprising a sweetener comprising: a. providing a beverage or food product comprising a sweetener; and b. adding a sweetness enhancer comprising at least one steviol glycoside, wherein at least one steviol glycoside is present in a concentration at or below the sweetness recognition threshold. Purecircle '290 teaches a method for enhancing the sweetness of a beverage or food product (Purecircle '290, Claims 3 and 19), comprising a sweetener (Purecircle '290, Claims 3 and 19) comprising: a. providing a beverage or food product comprising a sweetener (Purecircle '290, Claims 3 and 19); and b. adding a sweetness enhancer comprising at least one steviol glycoside (Purecircle '290, Claims 3 and 19), wherein at least one steviol glycoside is present in a concentration at or below the sweetness recognition threshold (Purecircle '290, Claims 3 and 19). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Nanjing Nuoyun with the teaching of Purecircle '290 for the purpose of providing an essentially non-caloric sweetener which does not elicit a glycemic response (Purecircle '290, Pg. 1, Para. 3) thereby providing a sweetener for use in products targeted to diabetics and others interested in controlling for their intake of carbohydrates.

Regarding Claim 16, Nanjing Nuoyun discloses the steviol glycoside of claim 1. Nanjing Nuoyun fails to explicitly disclose a method for modifying the flavor of a beverage or food product, comprising a. providing a beverage or food product, and b. adding a composition comprising at least one steviol glycoside. Purecircle '290 teaches a method for modifying the flavor of a beverage or food product (Purecircle '290, Claim 19), comprising a. providing a beverage or food product (Purecircle '290, Claim 19), and b. adding a composition comprising at least one steviol glycoside (Purecircle '290, Claim 19). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Nanjing Nuoyun with the teaching of Purecircle '290 for the purpose of providing an essentially non-caloric sweetener which does not elicit a glycemic response (Purecircle '290, Pg. 1, Para. 3) thereby providing a sweetener for use in products targeted to diabetics and others interested in controlling for their intake of carbohydrates.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US2020/018460

Supplemental Box

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Claim 17 lacks an inventive step under PCT Article 33(3) as being obvious over Nanjing Nuoyun Biological Technology Co., Ltd. (hereinafter Nanjing Nuoyun) in view of Suntory Beverage & Food Limited.

Regarding Claim 17, Nanjing Nuoyun discloses the steviol glycoside of claim 1. Nanjing Nuoyun fails to explicitly disclose a method for suppressing foaming of a beverage or food product, comprising a. providing a beverage or a food product, and b. adding a foam suppressor comprising at least one steviol glycoside. Suntory Beverage & Food Limited teaches a method for suppressing foaming of a beverage or food product (Suntory Beverage & Food Limited, [Claim 8]), comprising a. providing a beverage or a food product (Suntory Beverage & Food Limited, [Claim 8]), and b. adding a foam suppressor comprising at least one steviol glycoside (Suntory Beverage & Food Limited, [Claim 8]). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Nanjing Nuoyun with the teaching of Suntory Beverage & Food Limited for the purpose of reducing the likelihood of the beverage from foaming over the container and causing unwanted spillage (Suntory Beverage & Food Limited, [Para. [0009]]) thereby allowing a more controllable transfer of the beverage from the container to the vessel used to consume.

Claims 1-3, 6, 8, and 10-17 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.