Trial Decision

Invalidation No. 2016-800012

France
Demandant ROQUETTE FRERES

Tokyo, Japan
Patent Attorney OFUCHI, Michie

Tokyo, Japan
Patent Attorney FUSE, Yukio

Tokyo, Japan
Patent Attorney MATSUMOTO, Mitsufumi

Tokyo, Japan
Attorney TAKAHASHI, Jun

USA
Demandee TERRAVIA HOLDINGS INC.

Osaka, Japan
Patent Attorney YAMAMOTO, Shusaku

Osaka, Japan
Attorney YAMAMOTO, Kensaku

Osaka, Japan
Patent Attorney HASEBE, Masahisa

Osaka, Japan
Patent Attorney ISHIKAWA, Daisuke

Osaka, Japan
Attorney NAMBA, Satoshi

Osaka, Japan
Attorney FUKUNAGA, Satoshi

An invalidation trial case of "Food Compositions of Micro Algal Biomass" of

Patent No. 5731982 between the parties has been decided as follows.

Conclusion

The appeal of the case was groundless.

The costs in connection with the trial shall be borne by the demandant.

Reason

1. History of the procedures

Patent No. 5731982 of the case was submitted on October 14, 2009 as an international filing date (claim of priorities under the Paris Convention was received by the foreign receiving office: October 14, 2008, US; March 3, 2009, US; April 27, 2009, US; September 25, 2009, US), on April 17, 2015.

The proceedings after appealing an invalidation trial of the case are as follows.

January 29, 2016	Appeal of invalidation trial
June 17, 2016	Submission of a Written Reply
November 7, 2016	Submission of Oral Proceedings Statement Brief (demandant)
November 29, 2016	Submission of Oral Proceedings Statement Brief (demandee)
December 13, 2016	Submission of Oral Proceedings Statement Brief (2) (demandant)
December 13, 2016	Oral proceeding
January 24, 2017	Submission of Written Statement (demandee)
February 7, 2017	Submission of Written Statement (demandant)

2. The patent invention

The inventions according to Claims 1 to 19 of Patent No. 5731982 of the case (hereinafter also referred to as "the patent invention 1" to "the patent invention 19") are as described in Claims 1 to 19 in view of the specification, the claims, and the drawings.

"[Claim 1]

A food composition comprising at least 0.1% w/w algal biomass and one or more other edible ingredients, wherein the algal biomass (i) comprises algal cells of *Chlorella protothecoides,* cultured under heterotrophic conditions, (ii) has a reduced green pigment deposit, and (iii) comprises less than 5% by weight or less than 1% by weight of docosahexanoic acid (DHA) (C22:6), or comprises substantially no docosahexanoic acid (DHA) (C22:6).

[Claim 2]

The food composition according to Claim 1, wherein the algal biomass further has one or more following characteristics:

a. the algal biomass comprises at least 10% algal oil by dry weight,

b. at least 50% by weight of the algal oil is monounsaturated oil,

c. the algal biomass comprises 0 to 115 mcg/g of total carotenoids,

d. the algal biomass comprises 20 to 40% carbohydrates by dry weight, and

e. the algal biomass comprises at least 0.5% w/w algal phospholipids.

[Claim 3]

The food composition according to Claim 1, wherein the algal biomass comprises predominantly intact cells.

[Claim 4]

The food composition according to Claim 1, wherein the algal biomass is predominantly lysed cells.

[Claim 5]

The food composition according to Claim 4, wherein the algal biomass is a homogenate.

[Claim 6]

The food composition according to Claim 4, wherein the algal biomass is a powder.

[Claim 7]

The food composition according to Claim 4, wherein the algal biomass is a powder, and comprises at least 40% algal oil by dry weight.

[Claim 8]

The food composition according to Claim 1, which is one of a salad dressing, egg product, baked good, bread, bar, snack chips, pasta, sauce, soup drink, beverage, frozen dessert, butter, and spread.

[Claim 9]

The food composition according to Claim 6, wherein the mean particle diameter of the powders is from 0.2×10^{-6} m to 10×10^{-6} m.

[Claim 10]

A method of producing the food composition according to any one of Claims 1 to 9, comprising:

combining algal biomass cultured under heterotrophic conditions, which has a reduced green pigment deposit, and comprises less than 5% by weight or less than 1% by weight of docosahexanoic acid (DHA) (C22:6), or comprises substantially no docosahexanoic acid (DHA) (C22:6), and at least one other edible ingredient.

[Claim 11]

The method according to Claim 10, comprising:

a. a step for determining an amount of non-algal oil, non-algal fat, or eggs in a conventional form of the food composition; and

b. a step for replacing a portion or all of the non-algal oil, non-algal fat, or eggs with the indicated amount of algal biomass, or compensating the non-algal oil, non-algal fat, or eggs for the indicated amount of algal biomass.

[Claim 12]

The method according to Claim 11, wherein none of non-algal oil, non-algal fat,

or eggs is added to the food composition.
[Claim 13]
The method according to Claim 11, wherein the amount of algal biomass is 0.25 to 4 times the mass or volume of non-algal oil, non-algal fat, or eggs in the conventional food product.
[Claim 14]
The method according to Claim 11, wherein the algal biomass is predominantly lysed, and in the form of powder or homogenate.
[Claim 15]
A food composition comprising at least 0.1% w/w algal biomass and one or more other edible ingredients, wherein the algal biomass is color mutants, and comprises less than 5% by weight or less than 1% by weight of docosahexanoic acid (DHA) (C22:6), or comprises substantially no docosahexanoic acid (DHA) (C22:6), wherein the color mutants are *Chlorella protothecoides*, strain 33-55 or *Chlorella protothecoides,* strain 25-32.
[Claim 16]
The food composition according to Claim 15, wherein the algal biomass is cultured under good manufacturing practice (GMP) conditions.
[Claim 17]
The method according to Claim 10, wherein the algal biomass is cultured under good manufacturing practice (GMP) conditions.
[Claim 18]
Algal biomass powders, (i) comprising algal cells of *Chlorella protothecoides* cultured under heterotrophic conditions, (ii) having a reduced green pigment deposit, and (iii) comprising less than 5% by weight or less than 1% by weight of docosahexanoic acid (DHA) (C22:6), or comprising substantially no docosahexanoic acid (DHA) (C22:6), wherein the algal biomass powders are pasteurized.
[Claim 19]
The algal biomass powders according to Claim 18, further comprising a preservative."

3. The demandant's allegation and Means of proof
The demandant requested the decision that "the patent for the inventions according to Claims 1 to 19 of Patent No. 5731982 shall be invalidated, and the costs in connection with the trial shall be borne by the demandee," and stated that the summary of the reasons for invalidation is as follows.

The respective inventions according to Claims 1 to 19 of the case could have been easily made by those skilled in the art based on Evidence A No. 1 to A No. 11, prior to the filing of the application, and therefore are unpatentable under Article 29, paragraph 2 of the Patent Law, and the patent corresponds to Article 123, paragraph 1,

item 2 of the Patent Law, and thus should be invalidated.

In addition, the Demandant has submitted, as Means of proof, the following Evidence A No. 1 to A No. 33.

[Means of proof]
Evidence A No. 1: JP 2003-23966 A
Evidence A No. 2: WU Qing-Yu et al, "New Discoveries in Study on Hydrocarbons from Thermal Degradation of Heterotrophically Yellowing Algae", SCIENCE IN CHINA (Series B), March 1994, Vol. 37, No. 3, pp. 326-335
Evidence A No. 3: G.M.CLORE et al, "A COMPUTER ANALYSIS OF CYANIDE STIMULATED OXYGEN UPTAKE IN *CHLORELLA PROTOTHECOIDES*", FEBSLETTERS, July 1977, Volume 79, Number 2, pp. 353-356
Evidence A No. 4: Iwao Tasaki et. al., "Honyukoyagi-ni-yoru-ohsyokukurorera- no-syoukaritsu," Animal Science Journal/Japanese Society of Animal Science ed., Vol. 48, No. 11, pp. 661-663
Evidence A No. 5: David Biello, "Biofuel of the Future: Oil from Algae", SCIENTIFIC AMERICAN, Sep 1, 2008
Evidence A No. 6: JP 9-252707 A
Evidence A No. 7: "Full Report (All Nutrients) 01001, Butter, salted", USDA National Nutrient Database for Standard Reference Release 28<URL:http://ndb.nal.usda.gov/>
Evidence A No. 8: Xiaoling Miao et al, "Biodiesel production from heterotrophic microalgal oil", Bioresource Technology 97, (2006) 841-846
Evidence A No. 9: JP 2006-14700 A
Evidence A No. 10: Environmental Stresses in Nonmammalian Organisms, p. 29
Evidence A No. 11: Han Xu et al, "High quality biodiesel production from a microalga *Chlorella protothecoides* by heterotrophic growth in fermenters," Journal of Biotechnology 126(2006) pp. 499-507
Evidence A No. 12: GRAS Notice (GRN) No. 469<URL:http://www.fda.gov /downloads/Food/IngredientsPackagingLabeling/GRAS/NoticeInventory/ucm359718.pdf>
Evidence A No. 13: "ALGOMED HOME PAGE"<URL:http://www.algomed.de /?op=presse&id=13,URL:http://www.algomed.de/index.php?lang=eng & op=produkte>
Evidence A No. 14: "solazyme Market and Products"<URL:http://www.solazyme.com/market-and-products.shtml>
Evidence A No. 15: Japanese Examined Patent Application No. 45-17146
Evidence A No. 16: CN Patent Publication No. 1837352
Evidence A No. 17: Ichiro Imai, et. al., "Kaidokukenkyu-no-saisentan: genjyo-to-tenbo,"Japanese Soc. of Scientific Fisheries, supervision, Fisheries Science Series 153, Kouseisha Kouseikaku Co., Ltd., March 20, 2007, pp. 9-18, 43-48, 65
Evidence A No. 18: "Aoko-no-dokuso," the Aichi Institute of Public

Health<URL:http:/www.pref.aichi.jp/eiseiken/5f/bloom_t.html>
Evidence A No. 19: Yuan-Kun Lee, "Commercial production of microalgae in the Asia-Pacific rim", Journal of Applied Phycology, 9: pp. 403-411, 1997
Evidence A No. 20: Robert A. kay, "Microalgae as Food and Supplement", Critical Reviews in Food Science and Nutrition, 30(6): pp. 555-573 (1991)
Evidence A No. 21: RFI's *Chlorella vulgaris* GRAS Self affirmation, June, 2011, pp. 1-42
Evidence A No. 22: "Kenkoushokuhin"-no-anzensei/yuukouseijyouhou, National Institute of Health and Nutrition<URL:http://hfnet.nih.go.jp/contents/detail105.html>
Evidence A No. 23: PRESS RELEASE, ROQUETTE<URL:http://www.roquettefood.com/media/deliacms/media/80/8061-2cc5c6.pdf>
Evidence A No. 24: "Yusirui-no-sibousanseibunhyou" <URL:http://www.geocities.jp/jr2bvb/syokuhin/sibousan/oil_s.htm>
Evidence A No. 24-1: Standard tables of food composition in Japan, 2015 (Seventh Revised Edition): Report of the Subdivision on Resources, the Council for Science and Technology, Ministry of Education, Culture, Sports, Science and Technology, Japan Table of fatty acids compisition<URL:http://www.mext.go.jp/a_menu/syokuhinseibun/1365295.htm>
Evidence A No. 25: "'Taste' of fat?," Hyakkaen <URL:https://sites,google.com/site/coffeetambe/coffeescience/physiology/taste/fat>
Evidence A No. 26: Riichiro, Usugi, et al., "Shishitsu ha-syokuhin-no-oishisa-ya-koku-ni-eikyousuruka?-sono jissyouteki kokoromi-." Research reports of Shokei Gakuin College, Vol. 53, 2006-05, pp. 85-90
Evidence A No. 27: JP 2000-175680 A
Evidence A No. 28: JP 2002-223787 A
Evidence A No. 29: JP 2016-198117 A
Evidence A No. 30: "*Chlorella*," Plant Cell and Molecular Biology <URL:http://photosyn.jp/pwiki/index.php?%E3%82%AF%E3%83%AD%E3%83%AC%E3%83%A9>
Evidence A No. 31: "Stock culture information NIES-2163," the Microbial Culture Collection at the National Institute for Environmental Studies <URL:http://mcc.nies.go.jp/strainList.do?strainId=2555&condition=Auxenochlorella+protothecoides>
Evidence A No. 32: "Stock culture information NIES-2176," the Microbial Culture Collection at the National Institute for Environmental Studies <URL:http://mcc.nies.go.jp/strainList.do?strainId=2568&condition=Auxenochlorella+protothecoides>
Evidence A No. 33: Ryuta Hirajima, "Sinposeiyouken-hyouka-no-framework-to-"gijyutsutekikadai"-no-igi,"Patent 2010, Vol. 63, No. 5 (separate volume No. 3), pp. 34-49

Incidentally, there is no dispute regarding the validity of Evidence A No. 1 to A No. 33 between the parties.

4. Summary of the demandee's allegation

On the other hand, the demandee requested the decision that "The appeal of the case was groundless, and the costs in connection with the trial shall be borne by the demandant," and states that the above demandant's arguments are improper, and therefore there are no grounds for invalidating the patented inventions of the case.

In addition, the demandee has submitted, as Means of proof, the following Evidence B No. 1 to B No. 19.

[Means of proof]
Evidence B No. 1: Hiroshi Takeda, "Chemical Composition of Cell Walls as a Taxonomical Marker", J. Plant Res., 106: pp. 195-200, 1993
Evidence B No. 2: Hiroshi Takeda, "SUGAR COMPOSITION OF THE CELL WALL AND THE TAXONOMY OF *CHLORELLA* (*CHLOROPHYCEAE*)", J. Phycol., 27, pp. 224-232 (1991)
Evidence B No. 3: HIROSHI TAKEDA, "TAXONOMICAL ASSIGNMENT OF CHLOROCOCAL ALGAE FROM THEIR CELL WALL COMPOSITION", Phytochemistry, Vol. 34, No. 4, pp. 1053-1055, 1993
Evidence B No. 4: FR 2924126 A
Evidence B No. 5: US 2007/0099280 A
Evidence B No. 6: Day et al.," Safety evaluation of a high-lipid algal biomass from *Chlorella protothecoides*", Regulatory Toxicology and Pharmacology 55 (2009) pp. 166-180
Evidence B No. 7: Jeffrey A. Running et al., "Heterotrophic production of ascorbic acid by microalgae", Journal of Applied Phycology 6: pp. 99-104, 1994
Evidence B No. 8: Michael A. Borowitzka, "Microalgae as sources of pharmaceuticals and other biologically active compounds", Journal of Applied Phycology 7: pp. 3-15, 1995
Evidence B No. 9: David Kyle," PRODUCTION AND USE OF LIPIDS FROM MICROALGAE," Lipid Technology, May-June 1992, pp. 59-64
Evidence B No. 10: Feng Chen," High cell density culture of microalgae in heterotrophic growth," TIBTECH NOVEMBER 1996 (VOL. 14), pp. 421-426
Evidence B No. 11: "The Great Algae Robbery", BiofuelsDigest<URL:http://www.biofuelsdigest.com/bdigest/2015/02/27/the-great-algae-robbery/>
Evidence B No. 12: "SOLAZYME, INC.'S ANSWER TO PLAINTIFF ROQUETTE FRERES, S.A.'S COMPLAINT, PETITION TO CONFIRM ARBITRATION AWARD,

AND COUNTERCLAIMS", IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE<URL:http://www.ascension-publishing.com/Solazyme- Roquette-022615-2.pdf>
Evidence B No. 13: "Roquette's Microalgae High Lipid Algal Flour Wins Most Innovative Food Ingredient at the 2013 Fi Europe Excellence Awards," PR Newswire Association LLC, Nov 25, 2013<URL:http://www.prnewswire.com/news-releases/roquettes- microalgae-high-lipid-algal-flour-wins-most-innovative-food-ingredient-at-the-2013-fi-europe-excellence-awards-233286631.html>
Evidence B No. 14: Jorg Ullmann, "The difference between *chlorella vulgaris* and *chlorella pyrenoidosa*," ALGOMED Publications (Diplom-Biologe); 2006
Evidence B No. 15: "History," Roquette Klotze GmbH & Co.KG<URL:http://www.algomed.de/index.php?op=algenfarm_geschichte>
Evidence B No. 16: Volker A. R. Huss et al., "BIOCHEMICAL TAXONOMY AND MOLECULAR PHYLOGENY OF THE GENUS *CHLORELLA* SENSU LATO (CHLOROPHYTA)," J. Phycol, 35, pp. 587-598 (1999)
Evidence B No. 17: John Kirk et al., "Mastitis Control Program for *Prototheca Mastitis* in Dairy Cows"<URL:http://milkquality.wisc.edu/wp-content/uploads/2011/09/mastitis-control-program_prototheca- mastitis.pdf>
Evidence B No. 18: "JOINT VENTURE AND OPERATING AGREEMENT OF SOLAZYME ROQUETTE NUTRITIONALS, LLC," November 3, 2010
Evidence B No. 19: "SOLAZYME, INC., Claimant/Respondent, vs. ROQUETTEFRERES, S. A., Claimant/Respondent" ARBITRATION AWARD, February 19, 2015

5. Matters described in Evidence B

Evidence B Nos. 1, 2, 11, 15, 16, and 24-1 to 26 describe the following matters.

[Evidence A No. 1]
[Evidence A No. 1a]
"[Claim 1] A green tea composition comprising an alga with green tea, wherein the algae belongs to *Chlorella* sp.; has a cell wall which includes little α-cellulose and is easily dissolved with alkali, and is very easy to destroy mechanically; and, under dark culture, produces CGF in cells, having almost the same quality and quantity as CGF in cells produced by autotrophic *Chlorella* sp., under light culture.
[Claim 2] The green tea composition according to claim 1, wherein the alga is *Chlorella vulgaris* E-25.
[Claim 3] The green tea composition according to claim 1 or 2, wherein the composition is obtained in the form of tea leaves, an aqueous liquid, or powders.
[Claim 4] A process for producing a green tea composition comprising an alga with green tea, wherein the alga belongs to *Chlorella* sp.; has a cell wall which includes little α-cellulose and is easily dissolved with alkali, and is very easy to destroy mechanically;

and, under dark culture, produces CGF in cells, having almost the same quality and quantity as CGF in cells produced by autotrophic *Chlorella* sp. under light culture, characterized in that the process comprises:

providing the heat-treated alga in the form of powder or an aqueous liquid,

providing green tea in the form of tea leaves, powder, extraction extract, or aqueous liquid of the same, and

mixing the alga and the green tea."

[Evidence A No. 1b] "[0001]
[Field of the Invention] The present invention relates to a green tea composition which is mild and can provide a leaching solution suitable as a beverage, and to a process for producing the same."

[Evidence A No. 1c] "[0002]
[Description of the Prior Art] The leaching solution of tea leaves has obtained higher evaluation as a fancy drink and as a health drink since ancient times, since a large number of excellent functional components such as catechin, caffeine, a vitamin, and theanine are included therein. Incidentally, green tea is roughly classified into tea made from steaming, such as highest-quality green tea, sweet tea (powdered green tea), green tea, coarse tea, roasted tea, tea with whole rice, and tea prepared by a roast and roll method. Expensive highest-quality green tea or higher-grade green tea has a mild taste, while inexpensive, lower-grade green tea (for example, third or fourth picked tea leaves) or coarse tea has a bitter taste and astringency. Therefore, although many purchasers like highest-quality green tea or higher-grade green tea in view of flavor, under the circumstances, they purchase lower-grade green tea or coarse tea in view of a price.
[0003]
[Problem to be solved by the invention] Therefore, the object of the present invention is to provide a mild and tasty inexpensive green tea composition as with highest-quality green tea or higher-grade green tea, which has little bitter taste and astringency, in spite of using inexpensive lower-grade green tea, etc., as tea material."

[Evidence A No. 1d] "[0009]
[Mode for carrying out the invention] Below, an embodiment of the invention is described. First, it describes about the green tea and alga which are tea materials of a green tea composition. ‘Green tea’ means what was made to stop the activity of an enzyme (i.e., without fermenting) by steaming with steam or heating with fire, a tea bud, etc., at the first stage of manufacture. Therefore, it includes the tea made from steaming, such as highest-quality green tea, sweet tea (powdered green tea), green tea, coarse tea, roasted tea, and tea with whole rice, and tea prepared by a roast and roll method. Incidentally, since roasted tea, tea with whole rice, etc., are made by further roasting or heating with strong fire green tea, etc.; although they become light brown eventually,

these are also contained in green tea by the present invention.
[0010] Since the improvement effect of flavor is remarkable and inexpensive when the lower-grade tea of green tea, coarse tea, roasted tea, etc., are used as tea material, their use is recommended. Since the alga used by the present invention presents bright green, as described below, if teas having a green appearance, for example, green tea, and coarse tea, is used as tea material, they can use the green coloring effect of the alga."

[Evidence A No. 1e] "[0011] The alga belonging to *Chlorella* sp. used by the present invention is a mutant, which has a cell wall which includes little α-cellulose and is easily dissolved with alkali, and is very easy to destroy mechanically; and which under dark culture, produces CGF in cells, having almost the same quality and quantity as CGF in cells produced by autotrophic *Chlorella* sp. under light culture.
[0012] The alga belonging to above-mentioned *Chlorella* sp. is obtained by separating specific mutants using unicellular separation, and has the following various characteristics.
(1) It is a stock of the pure line strain obtained by repeating unicellular separation many times, and unlike the *Chlorella* cultivated in an open field pond, the property of lineages is stable, and the reproducibility of experimental results is very high.
(2) The α-cellulose of the cell wall was missing, crushing was very easy physically, the digestibility was also higher than that of the conventional autotrophic nutrition *Chlorella*, and when actually subjected to an experiment, the true digestibility by the direct method of a rat was 81.6% to 59.7% that of autotrophic nutrition *Chlorella*.
(3) The present *Chlorella* strain has a high amount of CGF, although an amount of CGF of the *Chlorella* of dark culture is usually low. It is heterotrophism *Chlorella*, and is suitable for the tank culture under dark, and has a high growth rate (culture time: 41 to 72 hours at 30°C), with the phycobiont showing a bright green.
(4) A flavor is significantly close to that of a highest-quality green tea or higher-grade green tea."

[Evidence A No. 1f] "[0013] A typical example of the above-mentioned alga is ‘E-25 strain of *Chlorella vulgaris*.’ E-25 strain of *Chlorella vulgaris* is disclosed in JP58-29074B. Irrespective of light-and-darkness culture, the size of a cell is 2.8 to 3.9 x 3.2 to 4.2 μm, and an average ratio in every direction is a globular form of 1.00 to 1.08, and a cell wall is smooth. It lives on a single cell, and has a cup-type chloroplast and a pyrenoid in cells. Two pieces, four pieces, or six daughter cells (usually four pieces) (autospore) are formed, and it breeds asexually. As a physiological property, it does not have hydrogenase, but in the state of nitrogen starvation it fades in order not to generate chlorophyll and carotenoid. It will be dyed red if it dyes by ruthenium red. Temperature is 25 to 40°C, and pH of a condition for growth is 5 to 9. Ethyl alcohol is not used, although acetic acid and D-glucose are used as a carbon source in the dark culture (organic culture) using acetic acid or glucose. As a nitrogen source, there can be used

sources of inorganic nitrogen, such as potassium nitrate, ammonium sulfate, etc., along with an organic nitrogen source, such as urea and ammonium acetate.
[0014] *Chlorella vulgaris* E-25 has the following components.
[Table 1]

水分（常圧乾燥法）	2．3～ 4．3%
タンパク質（係数6．25）	25．0～45．3%
脂質（酸分解法）	13．5～21．0%
繊維	0．5～ 4．5%
灰分	4．1～ 7．4%
糖質	29．5～45．0%

水分（常圧乾燥法）　Moisture (atmospheric heating drying method)
タンパク質（係数６．２５）　Protein (coefficient 6.25)
脂質（酸分解法）　Lipid (acid hydrolysis method)
繊維　Fiber
灰分　Ash
糖質　Sugar

Therefore, *Chlorella vulgaris* E-25 is preferable also based on a nutritional standpoint."

[Evidence A No. 1g] "[0015] Tank culture (dark culture) of algae is carried out, and after centrifugation and harvesting of the fungus body, the harvested fungus body is rinsed 2 to 3 times, and then subjected to repeating centrifugation. Then, in order to address a photoallergy, heating pretreatment is performed at about 110°C for about 3 to 10 minutes, before freeze-drying or spray drying, to thereby provide algae. The extract of *Chlorella* can be produced by, for example, suspending dry algae in water, boiling at 100°C for about 1 hour, then carrying out centrifugation, and diluting a supernatant fluid 10 to 20 times with water. *Chlorella vulgaris* E-25 is available from the applicant."

[Evidence A No. 1h] "[0020]
[Examples] *Chlorella vulgaris* E-25 to be used in the following Examples was produced by being subjected to tank culture (dark culture); after centrifugation and harvesting of the fungus body, the harvested fungus body was rinsed 2 to 3 times, and then subjected to repeating centrifugation; and in order to address a photoallergy, heating pretreatment was performed at about 110°C for about 3 minutes before spray drying. All green tea, such as green tea, is a commercial product.
[0021] Example 1
Fourth picked green tea (tea leaves) 100 g
Chlorella vulgaris E-25 2 g
Water 10 g

These were mixed and the mixture was agitated for 1 minute with a food processor, followed by drying for 50 minutes with a 60°C forced-air drier. When the liquid beverage (green tea composition) produced by leaching out 2 g of the resulting mixture with 150 g of boiling water (70°C) was sampled, there were little bitter taste and astringency, and it had mellow flavor similar to that of highest-quality green tea or higher-grade green tea.

[0022] Example 2

Powdered-green-tea (powder)	92 g
Chlorella vulgaris E-25	8 g

These were mixed and the mixture was agitated for 1 minute with a food processor. A small amount of boiling water (60°C) was added, and the obtained mixture 1 g was agitated with a bamboo whisk. When the obtained liquid beverage (green tea composition) was sampled, there were little bitter taste and astringency, and it had mellow flavor similar to that of highest-quality green tea or higher-grade green tea.

[0023] Example 3

Fourth picked green tea (tea leaves)	50 g
Chlorella vulgaris E-25	1 g
Boiling water (70°C)	3500 g

These were mixed and the mixture was filtrated, and the obtained liquid beverage (green tea composition) was heat-sterilized (100°C), and a PET bottle was filled up after cooling to room temperature. When the liquid beverage (green tea composition) was sampled immediately after, there were little bitter taste and astringency and it had mellow flavor similar to that of highest-quality green tea or higher-grade green tea. In addition, the appearance was bright green.

[0024] Example 4

Other tea leaves were used instead of green tea, and the liquid beverage (green tea composition) was produced in the same way as in Example 3. Then, having investigated in the same way, there were little bitter taste and astringency.

[0025] Example 5

Instead of the tea leaves of Examples 3 and 4, the powders obtained by carrying out spray drying of the leaching solution of each tea leaves, were used, and *Chlorella vulgaris* E-25 (1 g) and boiling water (60°C) were added thereto, and the mixture was mixed sufficiently. When the obtained liquid beverage (green tea composition) was sampled immediately after, there were little bitter taste and astringency, and it had mellow flavor similar to that of highest-quality green tea or higher-grade green tea. The appearance was bright green."

[Evidence A No. 1i] "[0026] Comparative example 1

In order to compare with the liquid beverage (green tea composition) of Examples 1 to 5, a green tea beverage consisting of only a green tea component, without *Chlorella vulgaris* E-25, was produced in the same way as in Examples 1 to 5, and flavor, a color,

and stability with time were investigated. All results were inferior compared with the liquid beverage (green tea composition) of Examples 1 to 6.
[0027] Comparative example 2
In order to compare with the liquid beverage (green tea composition) of Examples 1 to 5, a green tea beverage which comprises the *chlorella* cultivated under the conventional sunlight instead of *Chlorella vulgari*s E-25 was produced in the same way as in Examples 1 to 5, and flavor was investigated. It was strongly bluish and it turned out that the beverage is not suitable for beverage at all.
[0028] Comparative example 3
In order to compare with the liquid beverage (green tea composition) of Examples 1 to 5, a green tea beverage which comprises Spirulina of algae instead of *Chlorella vulgaris* E-25 was produced in the same way as Examples 1 to 5, and flavor was investigated. It was strongly bluish and it turned out that the beverage is not suitable for beverage at all."

[Evidence A No. 1j] "[0029]
[Effect of the Invention] Even if inexpensive green tea, such as lower-grade green tea, is used for the green tea composition of the present invention as tea material, the liquid beverage obtained as a result has a mild flavor with little bitter taste and astringency, similar to that of highest-quality green tea or higher-grade green tea."

Considering the above descriptions, Evidence A No. 1 describes the following inventions (hereinafter also referred to as "Demandant's Invention 1-1," and "Demandant's Invention 1-2").

<Demandant's Invention 1-1>
"A green tea composition comprising an alga belonging to *Chlorella* sp. with green tea, wherein the composition comprises at most about 10% relative to the total amount of the green tea and the alga, and wherein the alga has a cell wall which includes little α-cellulose and is easily dissolved with alkali, and is very easy to destroy mechanically; wherein the alga is *Chlorella vulgaris* E-25 cultured under dark culture, and shows bright green."

<Demandant's Invention 1-2>
"A powder of an alga belonging to *Chlorella* sp., wherein the alga has a cell wall which includes little α-cellulose and is easily dissolved with alkali, and is very easy to destroy mechanically, wherein the alga is *Chlorella vulgaris* E-25 cultured under dark culture, shows bright green, and has been treated by heating."

[Evidence A No. 2]
(Evidence A No. 2a) "New Discoveries in Study on Hydrocarbons from Thermal Degradation of Heterotrophically Yellowing Algae" (page 326, Title)

(Evidence A No. 2b) "

Abstract Green autotrophic alga *Chlorella protothecoides* contains a very small quantity of hydrocarbons. Heterotrophic culture of this alga results in the cells yellowing, chlorophyll disappearing, protein deceasing, and lipid increasing remarkably. The quantities of hydrocarbons obtained from them directly and from the thermal degradation of the cells at or below 200°C are very low. These hydrocarbons are characterized by predominance of high molecular weight normal alkanes with maximum at C23-C25. When these heterotrophically yellowing cells are thermally degraded at 300°C, the aliphatic hydrocarbons increase greatly, to 32 times that of the green autotrophic ones at the same temperature. Meanwhile, the low molecular weight normal alkanes with C17 as the peak become predominant instead of the original ones of high molecular weight. The actual potential of microplanktonic algae in producing hydrocarbons should be much greater than what people have recognized before.
" (page 326, "Abstract")

(Evidence A No. 2c) "

1 Introduction

Most studies on characteristics of algae-generated hydrocarbons focus on the samples of crude oils, source rocks, and some micro-algal fossils[1,2]. Thermal simulant experiments of algae often use green autotrophic cells directly as materials[3-9]. It has been found that some species of micro-algae can transition from autotrophic growth to heterotrophic growth in the environment rich in organic carbon nutrition, which results in algae yellowing and disappearance of chlorophyll[7-9]. The gradual change of cells from green to yellow and degeneration or disappearance of chlorophyll are also the characteristics of algal cells in process of the deposition and burial before being subjected to thermal degradation in nature. Higher gas generation rate has been reported from thermal degradation of these heterotrophical yellowing cells[10], but the influences of heterotrophic yellowing and its biochemical changes in cells on liquid hydrocarbons from thermal degradation are unclear. The purpose of this study is to simulate the process of heterotrophically yellowing algal cells subject to thermal degradation and to investigate the influence of biochemical changes in cells on the potentials and patterns of algae-generated hydrocarbons.
" (pages 326 to 327, "1 Introduction")

(Evidence A No. 2d) "

3 Results

3.1 *Fatty Acids and Amino Acids in Two Kinds of Cells*

The determinations of crude lipids and fatty acids in heterotrophic yellowing alga and green autotrophic alga showed that the content of crude lipid in the former was

much higher than that in the latter (Table 1). Their compositions and relative contents of fatty acids were also remarkably different. Especially, heterotrophically yellowing cells contained a large amount of oleic acid, accounting for 69.36% of the total fatty acids.

...

Table 1 Contents of Crude Lipid and Fatty Acids

Samples	Lipid/algae (%)	Relative contents of fatty acids					
		oleic acid (18 : 1)	linoleic acid (18 : 2)	palmitic acid (16 : 0)	linolentic acid (18 : 3)	lauric acid (12 : 0)	arachidic acid (20 : 0)
Yellowing cells	72.91	69.36	15.28	11.12	3.38	0.78	0.01
Green cells	16.55	11.99	56.00	16.14	11.06	4.79	-

" (pages 328 to 329, "3.1 Fatty Acids and Amino Acids in Two Kinds of Cells")

[Evidence A No. 11]
(Evidence A No. 11a)
Abstract

The aim of the study was to obtain high quality biodiesel production from a microalga *Chlorella protothecoids* through the technology of transesterification. The technique of metabolic control through heterotrophic growth of *C. protothecoides* was applied, and the heterotrophic *C. protothecoides* contained the crude lipid content of 55.2%. To increase the biomass and reduce the cost of alga, corn powder hydrolysate instead of glucose was used as an organic carbon source in heterotrophic culture medium in fermenters. The result showed that cell density significantly increased under the heterotrophic condition, and the highest cell concentration reached 15.5gL-1. A large amount of microalgal oil was efficiently extracted from the heterotrophic cells by using n-hexane, and then transmuted into biodiesel by acidic transesterification. The biodiesel was characterized by a high heating value of 41 MJkg-1, a density of 0.864kgL-1, and a viscosity of 5.2×10-4 Pa s (at 40°C). The method has great potential in the industrial production of liquid fuel from microalga.
" (page 499, "Abstract")

(Evidence A No. 11b) "
1. Introduction

As a biodegradable, renewable, and non-toxic fuel, biodiesel fuel has received considerable attention in recent years. It also contributes no net carbon dioxide or sulfur to the atmosphere and emits less gaseous pollutants than conventional diesel fuel (Lang et al., 2001; Antolin et al., 2002; Vicente et al., 2004). Biodiesel fuel, which consists of the simple alkyl esters of fatty acids, is presently making the transition from a research topic and demonstration fuel to a marketed commodity. Annual US production in 2001 has been estimated at 57-76 million liters, with European production more than 10 times

that amount (Jhon Van Gerpen, 2005). However, the economic aspect of biodiesel production limits its development and large-scale use. Biodiesel usually costs over US$0.5L-1, compared to US$0.35L-1 for conventional diesel fuel (Zhang et al., 2003).

Chlorella protothecoides is a microalga that can grow photoautotrophically or heterotrophically under different culture conditions. Heterotrophic growth of *C. protothecoides* supplied with acetate, glucose, or other organic compounds as a carbon source results in high biomass and high content of lipid in cells (Endo et al., 1977; Wu at el., 1994). With the addition of the organic carbon source (glucose) to the medium and the decrease of the inorganic nitrogen source in the medium, the heterotrophic *C. protothecoides* was cultivated with the crude lipid content up to 55.2%, which was about four times that in photoautotrophic *C. protothecoides* (Miao and Wu, 2004a). Therefore, *C. protothecoides* has not only become an important source of many products, such as aquaculture feeds, human food supplements, and pharmaceuticals (Kyle,1992; Running et al., 1994; Borowitzka, 1995; Chen, 1996), but has also been suggested as a very good candidate for fuel production (Wu at al., 1992; Wen at al., 2002; Miao and Wu, 2004a).

To increase the biomass and reduce the cost of alga, corn powder hydrolysate (CPH) as a substrate in heterotophic growth of *C. photothecoides* was used. *Chlorella protothecoides* was heterotrophically cultured in a 5L stirred tank fermenter with CPH feeding, which gave significant improvement in cell density (15.5gL-1) and productivity. High quality biodiesel was obtained from heterotrophic microalgal oil by acidic transesterification. It was characterized by a high heating value of 41MJ kg-1, a density of 0.864kg L-1, and a viscosity of 5.2×10-4 Pa s (at 40°C).
" (pages 499 to 500, "Introduction")

[Evidence A No. 15]
(Evidence A No. 15a) "The present invention relates to a heterotrophic nutrition culture of a unicellular green alga such as *Chlorella, Scenedesmus* (hereinafter referred to as "*Chlorella*, etc."), which has been considered important, as sources such as food, feed, drug, chlorophyll, a lactic acid bacteria-growth-promoting factor, and a bioactive factor, and is a consistent process of selection of strains and separation of the same, as well as industrial mass culture based on the selection and separation" (page 1, left column, lines 18 to 24).

(Evidence A No. 15b) "The inventors of the present application have investigated a process of a heterotrophic nutrition culture of *Chlorella*, etc., for many years, and as a result, they have found that if the selection conditions of *Chlorella*, etc., strains, which grow well with not depending on light in the culture of *Chlorella*, etc., and the culture conditions thereof may be found, *Chlorella*, etc., may be mass-produced by means of industrial tank culture. Therefore, carbohydrates such as sugars which are extremely abundant as resources are used as energy resources, and proteins, vitamins, etc., which

have a high nutritional value and are poor in resources, may be extremely effectively and inexpensively produced" (page 1, left column, line 37 to right column line 8).

[Evidence A No. 16]
(Evidence A No. 16a)
(the specification, page 1, lines 7 to 9) “(*Chlorella* contains an abundant protein, polysaccharides, lipids, chlorophyll, vitamins, trace elements, some biologically active metabolites, and is extensively used as supplements, feed, food additives, fine chemicals, and materials for pharmaceutical formulation.)”

(Evidence A No. 16b)
(the Specification, page 1, lines 15 to 21) “(although almost all of mass cultures of a heterotrophic nutrition type-*Chlorella*, which has been reported, use glucose as carbon sources, the utilization rate of glucose is low in every case, and an amount of remaining sugars at the late stage of culture is large, and therefore the remaining sugars should be collected for use or are consumed. Depending on the type of a heterotrophic nutrition type-*Chlorella*, the highest glucose concentration at which it may be resistant is not necessarily the same. Regarding *Chlorella protothecoides*, the study by Shi, et al. (1999) indicates that the glucose concentration which is most suitable for producing lutein is 40 g/l; Ryo Seimei et al. (2000) concludes that the glucose concentration which is most advantageous in growing *Chlorella* is 10 g/l; and ? Kai, et al. (2005) concludes that that a glucose concentration of greater than 13.8 g/l has an adverse effect on the growth of *Chlorella*.)

[Evidence A No. 24-1] (related positions only)
(Evidence A No. 24-1a) "

日本食品標準成分表2015年版（七訂） 脂肪酸成分表 編　　更新日：2016年2月5日

第2表 脂肪酸 100 g 当たりの脂肪酸成分表(脂肪酸組成表)(本表)

14 油脂類

食品群	食品番号	索引番号	食品名	脂肪酸総量	飽和脂肪酸	一価不飽和脂肪酸	多価不飽和脂肪酸	n-3系多価不飽和脂肪酸	n-6系多価不飽和脂肪酸	12:0 ラウリン酸	16:0 パルミチン酸	18:1 計	18:2 n-6 リノール酸	18:3 n-3 α-リノレン酸	備考
			Tagname	FACID	FASAT	FAMS	FAPU	FAPUN3	FAPUN6	F12D0	F16D0	F18D1	F18D2N6	F18D3N3	
			単位	g/100 g 脂肪酸総量	g/100 g 脂肪酸総量	g/100 g 脂肪酸総量	g/100 g 脂肪酸総量	g/100 g 脂肪酸総量	g/100 g 脂肪酸総量	g/100 g 脂肪酸総量	g/100 g 脂肪酸総量	g/100 g 脂肪酸総量	g/100 g 脂肪酸総量	g/100 g 脂肪酸総量	
14	14015	1838	(動物脂類) 牛脂	100.0	45.3	50.2	4.0	0.2	3.8	0.1	26.1	45.5	3.7	0.2	飼料：いも取りしたもの 別名：ヘット
14	14016	1839	(動物脂類) ラード	100.0	42.4	47.0	10.6	0.5	10.1	0.2	25.1	43.2	9.6	0.5	別名：豚脂 飼料：精製品

日本食品標準成分表２０１５年版（七訂）　脂肪酸成分表　編　　The Japanese Standard Tables of Food Composition, 2015 (Seventh Revised Edition), Fatty acid composition table
第２表　脂肪酸１００ｇ当たりの脂肪酸成分表（脂肪酸組成表）（本表）
Table 2 Fatty acid component table (Fatty acid composition table) per 100 g of

fatty acid (Present table)
１４油脂類　14 Oils and Fats
更新日：２０１６年２月５日　　Date of updating: February 5, 2016
食品群　　Food group
食品番号　　Food number
索引番号　　Search number
食品名　　Food name
脂肪酸総量　Total amount of fatty acid
飽和脂肪酸　Saturated fatty acid
一価不飽和脂肪酸　Monounsaturated fatty acid
多価不飽和脂肪酸　Polyunsaturated fatty acid
ｎ－３系多価不飽和脂肪酸　　(n-3) Polyunsaturated fatty acid
ｎ－６系多価不飽和脂肪酸　　(n-6) Polyunsaturated fatty acid
１２：０　ラウリン酸　　12:0 lauric acid
１６：０　パルミチン酸　16:0 palmitic acid
１８：１　計　　18:1 total
１８：２　ｎ－６　リノール酸　18:2 (n-6) linoleic acid
１８：３　ｎ－３　αリノレン酸 18:3 (n-3) α-linolenic acid
備考　Note
単位　Unit
（動物脂類）牛脂　(Animal fat) beef tallow
（動物脂類）ラード　　(Animal fat) lard
試料：いり取りしたもの　Sample: made by roasting
別名：ヘット　　Byname: fat
別名：豚脂　Byname: lard
試料：精製品　　Sample: Purified product

[Evidence A No. 25]
(Evidence A No. 25a) "A 'taste' of fat?

In general, fats or fats-and-oils have not been recognized as providing a specific ‘taste,’ however, in Chinese cuisine, etc., oils may be used as ‘providing the cuisines with "a well-seasoned taste,"’ and milk fat such as fresh cream or butter may provide a well-seasoned taste. Also, in coffees, fats-and-oils provide sources of a well-seasoned taste, and serve to completely dissolve flavor components to the coffees, thereby maintaining the flavor in the mouth, and therefore they are considered to have an effect on the whole flavor."

[Evidence A No. 26]

(Evidence A No. 26a) "Introduction

It is empirically known that fat is significantly involved in the taste of food, but how fat in food has an effect on tasty remains still unknown.

The reason why a fatty tuna or a marbled beef is tasty, and what substances are involved in the taste, have not been clarified.

Although well-purified edible fats and oils are tasteless and odorless, if they are oxidized, the taste thereof changes with putting out oxidized order. One of the authors has approached this matter for a long time, and examined as to how fats (oils) are involved in taste or well-seasoned taste of food from two viewpoints at this time. Specifically, one is how taste or well-seasoned taste changes if fat is added to or removed from commercial available soups, and whether or not the above effect varies depending on the type of fat to be added. The other viewpoint is directed to a flavor component from marbled beef.

In recent years, although low-fat food has been widely used in view of reducing calories, it is known that if an amount of fat is decreased, taste or well-seasoned taste is also reduced, and therefore this study is of great significance."

(Evidence A No. 26b) "3. Changes in a sensory evaluation when degreasing soups
How a sensory evaluation changes when soups are degreased has been tested. When non-degreased soups were prepared as prescribed, they had a strong taste. Therefore, a soup prepared by the normal prescription was diluted 1.4-fold, as control relative to degreased soups, in the sensory evaluation. The results are shown in Table-5 and Table-6. For Soups C and D, a high degree of reduction in taste and well-seasoned taste was observed by degreasing, with reduction in mildness, favorability, and taste. These results indicate that fat in the soups is involved in taste and the strength of a well-seasoned taste (sense of taste), although the soups include loss of about 10% due to degreasing."

6. Matters described in the respective Evidences B

Evidence B Nos. 1 to 3 describe the following matters.

[Evidence B No. 1]
(Evidence B No. 1a) "

Cell wall-lytic activity also has species-specificity. Araki and Takeda (1992) showed that there are two types of lytic enzyme in *Chlorella*. The enzyme of the first group has optimal pH at alkaline, and that of the second group has acidic optimal pH. The enzymes of both groups differ also in their localization. The lytic enzyme of alkaline optimal pH was found in both cytosol and cell wall, and the enzyme of acidic optimal pH was not found in cytosol, but in the culture medium in addition to the localization on the cell wall. *Chlorella* with lytic enzyme of alkaline optimal pH has the rigid wall of glucosamine, and that with the enzyme of acidic optimal pH has the rigid

wall of glucose and mannose. Cell wall lytic enzyme is extracted from a *Chlorella*. A lytic enzyme degrades the own cell wall, as a matter of course. The enzyme also degraded the cell wall of some other strains, but the effect was restricted only to closely related strains (Araki and Takeda 1992). The cell wall lytic enzyme was shown to have species-specificity.
" (page 198, left column, line 26 to right column, line 11)

[Evidence B No. 2]
(Evidence B No. 2a) "

Abstract

Cell walls of forty *Chlorella* strains covering all species of the Algal Collection of Göttingen (*C. fusca* var. vacuolata, *C. kessleri*, *C. luteoviridis*, *C. minutissima*, *C. protothecoides*, *C. saccharophila*, *C. sorokiniana*, *C. vulgaris*, and *C. zofingiensis*) were compared. The nine species were divided into two groups according to the major sugar in the rigid wall. The first group had a glucose-mannose-rigid wall and included *C. fusca* var. vacuolata, *C. luteoviridis*, *C. minutissima*, *C. protothecoides*, *C. saccharophila*, and *C. zofingiensis*. The second group, with a glucosamine-rigid wall, included *C. kessleri*, *C. sorokiniana*, and *C. vulgaris*. *Chlorella* strains of the nine species were further classified by constituent sugars, ruthenium red stainability, and anisotropy of the cell walls.
" (page 224, left column, "Abstract")

[Evidence B No. 3]
(Evidence B No. 3a) "

Introduction

The cell wall of *Chlorella* species is specifically diverse [1-3]. After comparing cell wall compositions, Takeda [4] presented a classification of *Chlorella*. This genus can be divided into two big groups by the sugar constituent of the rigid wall, a glucose-mannose-type and a glucosamine-type. The former includes *C. fusca* var. vacuolata, *C. luteoviridis*, *C. minutissima*, *C. protothecoides*, *C. saccharophila* and *C. zofingiensis*, the latter *C. kessleri*, *C. sorokiniana,* and *C. vulgaris* [4]. All species differed in their Ruthenium Red stainability, anisotropy, and sugar composition of matrix polysaccharides.

In this study, cell walls of eight *Chlorella* strains and one strain each of *Scenedesmus* and *Viridiella* were assigned to species.
" (page 1053, left column "Introduction")

7. Judgment by the body
[7-1. The patent invention 1]
Comparing the patent invention 1 with Demandant Invention 1-1,
"a green tea composition" in Demandant Invention 1-1 corresponds to "a food

composition" in the patent invention 1;

"dark culture" in Demandant Invention 1-1 corresponds to "culture under a heterotrophic nutrition condition" in the patent invention 1;

"about 10%" of the maximal ratio of algae relative to the total amount of green tea and algae, in Demandant Invention 1-1, is within the scope of "at least 0.1% w/w" algal biomass in the patent invention 1; and

"*Chlorella vulgaris* E-25" in Demandant Invention 1-1 is identical to "*Chlorella protothecoides*" according to the patent invention 1 in "*Chlorella*" sp.

Therefore, the former is identical to the latter in terms of "a food composition comprising at least 0.1% w/w algal biomass and one or more other edible ingredients, wherein the algal biomass comprises algal cells of *Chlorella,* cultured under heterotrophic conditions," while the former is different from the latter in the respective following matters.

Difference 1-1: In the patent invention 1, the *Chlorella* is *Chlorella protothecoides*, while in Demandant's Invention 1-1, the *Chlorella* is *Chlorella vulgaris* E-25 which has a cell wall which includes little α-cellulose and is easily dissolved with alkali, and is very easy to destroy mechanically.

Difference 1-2: In the patent invention 1, the algal biomass has a reduced green pigment deposit, while in Demandant's Invention 1-1, the alga shows a bright green.

Difference 1-3: In the patent invention 1, an algal biomass comprises less than 5% by weight or less than 1% by weight of docosahexanoic acid (DHA) (C22:6), or comprises substantially no docosahexanoic acid (DHA) (C22:6), while Demandant's Invention 1-1 does not specify such a matter.

Therefore, the above differences will now be discussed below.

First, considering Differences 1-2 and 1-3, regarding a reduced pigment deposit according to Difference 1-2, as (i) paragraph [0005] of the specification of the present application describes that "algal powders produced using algae grown by photosynthesis in a pond and a photobioreactor, are commercial available, but they have a deep green color (due to chlorophyll), and an intense and unpleasant taste"; and (ii) paragraph [0087] describes that "it is possible that algae such as *Chlorella* grow either by photosynthesis or under a heterotrophic nutrition. Algae, which are generally green, if grown in the presence of immobilized carbon sources as carbon sources, and in the absence of light; i.e., under a heterotrophic nutrition, show yellow without green pigment deposit, or with a significantly reduced green pigment deposit. Algae having a reduced green pigment deposit (or no green pigment deposit) may be advantageous as food components. One of advantages of algae having a reduced green pigment deposit (or no green pigment deposit) is that the algae have a reduced chlorophyll flavor," algae such as *Chlorella*, if they grow in the absence of light; i.e., under a heterotrophic nutrition, lack a green pigment deposit or have a significantly reduced pigment deposit, and an unpleasant taste due to chlorophyll is also reduced.

Therefore, although "*Chlorella vulgaris* E-25" cultured under dark" according to Demandant's Invention 1-1 is regarded as showing a bright green, it is deemed to be

highly probable that the "*Chlorella vulgaris* E-25" has at least a reduced green pigment deposit compared to *Chlorella vulgaris* E-25" cultured under light.

In addition, regarding Difference 1-3, Evidence A No. 1 does not directly describe an amount of docosahexanoic acid (DHA) regarding "*Chlorella vulgaris* E-25" "cultured under dark" according to Demandant's Invention 1-1.

However, DHA is a fatty acid contained in blueback in a relatively large amount, and is not much contained in other food.

In addition, considering that the different type of *Chlorella* sp., i.e., *Chlorella protothecoides* cultured under a heterotrophic nutrition culture (dark culture), does not contain DHA (Evidence A No. 2d), and that Evidence A No. 1 describes that components of "*Chlorella vulgaris* E-25" cultured under dark" range about 13.5 to 21.0 % (Evidence A No. 1f) on the basis of the entire fat, it is not deemed that "*Chlorella vulgaris* E-25" "cultured under dark" contains 5% or more of DHA.

Therefore, it is not deemed that the above differences 1-2 and 1-3 are respectively substantial differences.

However, considering Difference 1-1, although Demandant's Invention 1-1 is made from inexpensive lower-grade *Sencha* (green tea) as tea material, the object thereof is to provide a mild and tasty green tea composition, such as *Gyokuro* (highest-quality green tea) or higher-grade *Sencha* (green tea), which has little bitter taste and astringency, in spite of using inexpensive lower-class *Sencha* (green tea), etc., as tea material, and the object is solved by mixing "*Chlorella vulgaris* E-25" "cultured under dark" with the tea composition.

In addition, by mixing "*Chlorella vulgaris* E-25" "cultured under dark" with the tea composition according to Demandant's Invention 1-1,

(a) the algae provide a cell wall, which includes little α-cellulose and is easily dissolved with alkali, and is very easy to destroy mechanically, whereby the digestibility is higher than that of the conventional autotrophic nutrition *Chlorella* (Evidence A Nos. 1a and 1e),

(b) since the algae produce under dark culture in cells CGF with almost the same quality and quantity as CGF (Chlorella growth factor; a biologically active substance contained in *Chlorella*) in cells produced by autotrophic *Chlorella* sp. under light culture, the algae are preferable in nutritional view (Evidence A Nos. 1a, 1e, and 1f),

(c) since the algae show a bright green, if *Sencha* (green tea) or *Bancha* (coarse tea) is used as tea material, they can use the green coloring effect of algae (Evidence A Nos. 1e and 1d).

On the contrary, Evidence A No. 2 describes "heterotrophically yellowing algae, *Chlorella protothecoides*," however, it relates to "new discoveries in study on hydrocarbons from thermal degradation of heterotrophically yellowing algae, *Chlorella protothecoides*," and does not describe or suggest that the above "heterotrophically yellowing algae, *Chlorella protothecoides*" is used in a tea composition, or even more is used in a food composition.

In addition, regarding the above "heterotrophically yellowing algae, *Chlorella protothecoides*," although Evidence A No. 2 describes that the algae result in the cells yellowing, chlorophyll disappearing, protein deceasing, and lipid increasing remarkably

(Evidence A Nos. 2a and 2b), none of the evidences submitted by the Demandant describes or suggests that if the algae are contained in tea composition, the above object is solved; i.e., the tea composition provides a mild and tasty green tea composition, like *Gyokuro* (highest-quality green tea) or higher-grade *Sencha* (green tea), which has little bitter taste and astringency, in spite of using inexpensive lower-grade *Sencha* (green tea), etc., as tea material, as with "*Chlorella vulgaris* E-25" “cultured under dark" according to Demandant's Invention 1-1, and there are no such technical common knowledge.

Further, "*Chlorella protothecoides*," is known as having a rigid cell wall (Evidence B No. 1a, Evidence B No. 2a, and Evidence B No. 3a), and it is not clear whether or not autotrophic nutrition *Chlorella* cultures produce under dark culture in cells CGF with the almost same quality and quantity as CGF in cells produced by autotrophic *Chlorella* sp. under light culture, and does not show a bright green. Therefore, it cannot be expected that the above advantageous effects (a) to (c) of Demandant's Invention 1-1 are exhibited.

Therefore, there is no motivation in Demandant's Invention 1-1 that would make those skilled in the art use *Chlorella protothecoides* instead of *Chlorella vulgaris* E-25, and thus it is not deemed that those skilled in the art could have easily conceived of making the patent invention 1 mentioned in the above Difference 1-1.

Thus, it is not also deemed that the patent invention 1 could have been easily conceived of by those skilled in the art based on the invention described in Evidence A No. 1 and the inventions described in Evidence A No. 2 to A No. 11.

7-2. The patent inventions 2 to 9

Comparing the patent inventions 2 to 9 with Demandant's Invention 1-1, the former is different from the latter in at least Difference 1-1 as mentioned in the above "[7-1. The patent invention 1]," and it is not deemed that the difference could have been easily made by those skilled in the art, and therefore it is not deemed that the patent inventions 2 to 9 could have been easily conceived of by those skilled in the art based on the invention described in Evidence A No. 1 and the inventions or well-known techniques described in the Evidence A No. 2 to A No. 11.

7-3. The patent inventions 10 to 14, 17

The patent inventions 10 to 14 and 17 are a process of production, which directly or indirectly refers to the patent invention 1 relating to "a food composition." Comparing the patent invention 1 with Demandant's Invention 1-1, the former is different from the latter in Difference 1-1, for the same reasons as mentioned in the above "[7-1. The patent invention 1]," and it is not deemed that the difference could have been easily made by those skilled in the art, and therefore it is also not deemed that the patent inventions 10 to 14 and 17 could have been easily conceived of by those skilled in the art based on the invention described in Evidence A No. 1 and the inventions described in Evidence A No. 2 to A No. 11.

7-4. The patent invention 15

Comparing the patent invention 15 with Demandant's Invention 1-1, the former

is identical to the latter, in being “a food composition comprising at least 0.1% w/w algal biomass and one or more other edible ingredients, wherein the algal biomass is *Chlorella*," while the former is different from the latter in the respective following matters.

Difference 15-1: In the patent invention 15, the *Chlorella* is a color mutant, *Chlorella protothecoides*, strain 33-55 or *Chlorella protothecoides*, strain 25-32, while in Demandant's Invention 1-1, the *Chlorella* is *Chlorella vulgaris* E-25 which has a cell wall which includes little α-cellulose and is easily dissolved with alkali, and is very easy to destroy mechanically.

Difference 15-3: In the patent invention 15, an algal biomass comprises less than 5% by weight or less than 1% by weight of docosahexanoic acid (DHA) (C22:6), or comprises substantially no docosahexanoic acid (DHA) (C22:6), while Demandant's Invention 1-1 does not specify such a matter.

Therefore, the above differences will now be discussed below.

First, Difference 15-3 is not a substantial difference, for the same reasons as mentioned regarding Difference 1-3 in "[7-1. The patent invention 1]."

However, regarding Difference 15-1, for the same reasons as mentioned regarding Difference 1-1 in "[7-1. The patent invention 1]," it is not deemed that those skilled in the art could have easily conceived of using *Chlorella protothecoides* instead of *Chlorella vulgaris* E-25, none of the exhibits submitted by the Demandant describes or suggests that a color mutant, *Chlorella protothecoides*, strain 33-55 or *Chlorella protothecoides*, strain 25-32, is applied to a food composition.

Therefore, it is not deemed that those skilled in the art could have easily conceived of making the patent invention 15 mentioned in the above Difference 15-1, in Demandant's Invention 1-1.

Thus, it is also not deemed that the patent invention 15 could have been easily conceived of by those skilled in the art based on the invention described in Evidence A No. 1 and the inventions described in Evidence A No. 2 to A No. 11.

7-5. The patent invention 16

Comparing the patent invention 16 with Demandant's Invention 1-1, the former is different from the latter in Difference 15-1, for the same reasons as mentioned in the above "[7-4. The patent invention 15]," and it is not deemed that the difference could have been easily made by those skilled in the art, and therefore it is also not deemed that the patent invention 16 could have been easily conceived of by those skilled in the art based on the invention described in Evidence A No. 1 and the inventions described in Evidence A No. 2 to A No. 11.

7-6. The patent invention 18

Comparing the patent invention 18 with Demandant's Invention 1-2, the former is identical to the latter in that "algal biomass powders comprise algal cells of *Chlorella protothecoides* cultured under heterotrophic conditions," while the former is different

from the latter in the respective following matters.

Difference 18-1: in the patent invention 18, the *Chlorella* is *Chlorella protothecoides*, while in Demandant's Invention 1-2, the *Chlorella* is *Chlorella vulgaris* E-25 which has a cell wall which includes little α-cellulose and is easily dissolved with alkali, and is very easy to destroy mechanically.

Difference 18-2: in the patent invention 18, algal biomass powders have a reduced green pigment deposit, while in Demandant's Invention 1-2, the algae show a bright green.

Difference 18-3: in the patent invention 18, algal biomass powders comprise less than 5% by weight or less than 1% by weight of docosahexanoic acid (DHA) (C22:6), or comprise substantially no docosahexanoic acid (DHA) (C22:6), while Demandant's Invention 1-2 does not specify such a matter.

Difference 18-4: in the patent invention 18, algal biomass powders are pasteurized at low temperature, while in Demandant's Invention 1-2, algae have been treated by heating.

Therefore, the respective differences will now be discussed below.

First, regarding Difference 18-4, sterilization by heating is usually carried out in the food field, and it is well known technique that the heating is carried out at low temperature (less than 100°C) so that the food flavor, etc., is not impaired, and therefore it is deemed that those skilled in the art could have easily conceived of pasteurizing algae at low temperature in Demandant's Invention 1-2.

In addition, regarding Differences 18-2 and 18-3, it is not deemed that they are, respectively, substantial differences, for the same reasons as mentioned regarding Differences 1-2 and 1-3 in "[7-1. The patent invention 1]."

However, regarding Difference 18-1, it is not deemed that the difference could have been easily conceived of by those skilled in the art, for the same reasons as mentioned regarding Difference 1-1 in "[7-1. The patent invention 1]."

Thus, it is not deemed that the patent invention 18 could have been easily conceived of by those skilled in the art based on the invention described in the Evidence A No. 1 and the inventions described in Evidence A No. 2 to A No. 11.

7-7. The patent invention 19

Comparing the patent invention 19 with the Demandant's Invention 1-2, the former is different from the latter in at least Difference 18-1, for the same reasons as mentioned in the above "[7-6. The patent invention 18]," and it is not deemed that the difference could have been easily made by those skilled in the art, and therefore it is also not deemed that the patent invention 19 could have been easily conceived of by those skilled in the art based on the invention described in Evidence A No. 1 and the inventions described in Evidence A No. 2 to A No. 11.

7-8. Demandant's allegation

The Demandant asserted that (i) it is technical common knowledge that lipids of *Chlorella protothecoides* cultured under a heterotrophic nutrition condition of Evidence A No. 2 are representative ones which constitute lard or tallow (Evidence A No. 24-1), provide food with a well-seasoned taste and a mild flavor (Evidence A No. 25), and are involved in the strength of taste and a well-seasoned taste (the degree of feeling) (Evidence A No. 26), and (ii) the lipids of *Chlorella protothecoides* and the tea composition according to in Evidence A No. 1 are also common in light of a mild taste and an effect of *Gyokuro* (highest-quality green tea) described in Evidence A No. 1, and therefore there is motivation which would make those skilled in the art replace "*Chlorella vulgaris* E-25" according to Demandant Invention 1-1 with "*Chlorella protothecoides*" with higher lipid content according to Evidence A No. 2 (Oral Proceedings Statement Brief, page, 4; Oral Proceedings Statement Brief (2), pages 5 to 7; and Written Statement, page 5).

However, even if the lipids of *Chlorella protothecoides* are representative ones which constitute lard or tallow, food exemplified in Evidence A No. 25 is "Chinese dishes", "fresh cream", " butter", and "coffee", and food exemplified in Evidence A No. 26 is "fatty tuna," "marbled beef," and "a commercial available soup," and these exemplified foods are significantly different from the green tea composition described in Evidence A No. 1 in flavor; and therefore even if Evidence A Nos. 25 and 26 indicate that lipids provide these exemplified foods with taste, a well-seasoned taste, etc., they do not indicate that the green tea composition provides a mild and tasty inexpensive green tea composition as with *Gyokuro* (highest-quality green tea) or higher-grade *Sencha* (green tea), and there is no such technical common knowledge.

In addition, since the Demandant believes that two main applications of algae of *Chlorella* sp. cultured under a heterotrophic nutrition condition in the field are food or fuel (Evidence A No. 11, etc.), the Demandant asserted that those skilled in the art in the food application are the same as those skilled in the art in the fuel application; therefore, it is technical common knowledge that algae for food is transferred to that for fuel and vice versa, and algae of *Chlorella* sp. cultured under a heterotrophic nutrition condition are applied to food (Evidence A Nos. 15 and 16), and applying "*Chlorella protothecoides*" described in Evidence A No. 2 to Demandant's Invention 1-1 is merely a selection of an optimized material and a modification of design matter (Oral Proceedings Statement Brief, pages 6 to 9; Oral Proceedings Statement Brief (2), pages 16 to 18).

However, even if those skilled in the art could have easily conceived of applying lipids contained in algae of *Chlorella* sp. cultured under a heterotrophic nutrition condition, to food, there is no motivation that make those skilled in the art use "*Chlorella protothecoides*" described in Evidence A No. 2, instead of "*Chlorella vulgaris* E-25" according to Demandant's Invention 1-1, and it is not deemed that those skilled in the art could have easily conceived of using "*Chlorella protothecoides.*"

Accordingly, all of the Demandant's arguments cannot be accepted.

8. Closing

Accordingly, the patent for the inventions according to Claims 1 to 19 of the case cannot be invalidated by the reasons and means of proof that the Demandant asserted, and the costs in connection with the trial shall be borne by the Demandant as requested under the requirements prescribed in Article 61 of the Civil Proceedings Act, which is applied mutatis mutandis pursuant to Article 169, paragraph 2 of the Patent Law.

Therefore, the trial decision shall be made as described in the conclusion.

March 14, 2017

Chief administrative judge: KIMOTO, Takashi

Administrative judge: TORII, Minoru

Administrative judge: KUBOTA, Haruhiko