CLAIMS

[Claim 1] An organism or a cultured cell which undergoes a modification, wherein the modification comprises imparting or enhancing L-lactate utilization ability in the organism or the cultured cell, wherein the modification comprises (1) introduction of a gene that utilizes L-lactate, (2) introduction of a gene that imparts or enhances membrane permeability of L-lactate, and (3) attenuation or deletion of a gene that synthesizes L-lactate or D-lactate.

[Claim 2] The organism or the cultured cell according to claim 1, wherein the organism or the cultured cell comprises at least one selected from the group consisting of blue-green algae, microalgae, a yeast, E. coli, Bacillus subtilis, corynebacterium, actinomycetes, filamentous fungus, and Lactobacillus.

[Claim 3] The organism or the cultured cell according to claim 1, wherein the organism or the cultured cell comprises at least one selected from the group consisting of blue-green algae, E. coli, corynebacterium, filamentous fungus, and Lactobacillus.

[Claim 4] The organism or the cultured cell according to claim 1, wherein the organism or the cultured cell comprises blue-green algae.

[Claim 5] The organism or the cultured cell according to any one of claims 1 to 4, wherein the gene that utilizes L-lactate comprises a gene that encodes NAD-independent L-lactate dehydrogenase (EC 1.1.2.3).

[Claim 6] The organism or the cultured cell according to claim 5, wherein the gene that utilizes L-lactate comprises lldD gene derived from E. coli.

[Claim 7] The organism or the cultured cell according to any one of claims 1 to 6, wherein the gene that imparts or enhances membrane permeability of L-lactate comprises a gene that encodes lactate permease.

[Claim 8] The organism or the cultured cell according to claim 7, wherein the gene that imparts or enhances membrane permeability of L-lactate comprises lldP gene derived from E. coli.

[Claim 9] The organism or the cultured cell according to any one of claims 1 to 8, wherein the gene that synthesizes L-lactate or D-lactate comprises a gene that encodes D-lactate dehydrogenase.

[Claim 10] The organism or the cultured cell according to claim 9, wherein the gene that synthesizes L-lactate or D-lactate comprises ldhA gene.

[Claim 11] The organism or the cultured cell according to claim 1, wherein

the gene that utilizes L-lactate comprises a gene encoding NAD-independent L-lactate dehydrogenase (EC 1.1.2.3),

the gene that imparts or enhances membrane permeability of L-lactate comprises a gene encoding a lactate permease,

the gene that synthesizes L-lactate or D-lactate comprises a gene encoding D-lactate dehydrogenase, and

the organism or the cultured cell comprises blue-green algae.

[Claim 12] The organism or the cultured cell of according to claim 11, wherein

the gene that utilizes L-lactate comprises lldD gene derived from E. coli,

the gene that imparts or enhances membrane permeability of L-lactate comprises lldP gene derived from E. coli,

the gene that synthesizes L-lactate or D-lactate comprises ldhA gene, and

the organism or the cultured cell comprises blue-green algae.

[Claim 13] A method for culturing at least two types of cells including a cell X and a cell Y in a circulation manner, the method comprising:

a step (a) of providing a component excreted from the cell X to the cell Y;

a step (b) of providing a component derived from the cell Y to the cell X;

a step (c) of culturing the cell X and the cell Y; and

a step (d) of repeating the steps (a) to (c) as necessary, wherein

at least one of the components excreted from the cell X is L-lactate, and

at least one of the components derived from the cell Y is a nutritional component of the cell X, wherein the cell Y is the organism or the cultured cell according to any one of claims 1 to 12.

[Claim 14] The method according to claim 13, wherein the cells X and Y comprises animal cells and blue-green algae cells, respectively.

[Claim 15] The method according to any one of claim 13 or 14, wherein the component derived from the cell Y comprises glutamine or glutamate.

[Claim 16] The method according to any one of claims 13 to 15, wherein the culturing step comprises culturing the cell X and the cell Y in different places.

[Claim 17] A method for culturing animal cells by circulating component excreted from an animal cell culture by an organism, the method comprising:

a step (a) of consuming the excreted component, the organism or the cultured cell according to any one of claims 1 to 12;

a step (b) of harvesting a nutrient source of the animal cells from a culture solution of the organism or the cultured cell;

a step (c) of culturing the animal cells using the nutrient source; and

a step (d) of repeating the steps (a) to (c) as necessary, wherein

the excreted component comprises L-lactate, and

wherein the nutrient source comprises glucose, glutamic acid, glutamine, alanine, arginine, asparagine, aspartic acid, cysteine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, valine, pyruvic acid, vitamin B1, vitamin B2, vitamin B3, vitamin B5, vitamin B6, folate, choline, starch, glycogen, and cellulose.

[Claim 18] A method for producing cultured meat by circulating a component excreted from an animal cell culture by an organism to culture animal cells, the method comprising:

a step (a) of causing the organism or the cultured cell according to any one of claims 1 to 12, to consume a component to be excreted from an animal cell culture;

a step (b) of recovering a nutrient source of the animal cells from the organism or the cultured cell;

a step (c) of culturing the animal cells using the nutrient source;

a step (d) of repeating the steps (a) to (c) as necessary; and

a step (e) of subjecting the cultured animal cells to three-dimensional organization and molding the three-dimensionally organized animal cells into cultured meat, wherein

the excreted component comprises L-lactate, and

wherein the nutrient source comprises glucose, glutamic acid, glutamine, alanine, arginine, asparagine, aspartic acid, cysteine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, valine, pyruvic acid, vitamin B1, vitamin B2, vitamin B3, vitamin B5, vitamin B6,

folate, choline, starch, glycogen, and cellulose.

[Claim 19] A method for producing an amino acid and/or a desired product in an organism or a cultured cell using L-lactate excreted from an animal cell culture, the method comprising:

a step of providing the L-lactate to the organism or the cultured cell according to any one of claims 1 to 12;

a step of culturing the organism or the cultured cell under conditions in which L-lactate is utilized; and

a step of recovering the amino acid and/or the desired product as necessary.

[Claim 20] A method for maintaining the organism or the cultured cell according to any one of claims 1 to 12 using L-lactate excreted from an animal cell culture, the method comprising:

a step (a) of providing the L-lactate excreted from the animal cell to the organism or the cultured cell;

a step (b) of causing the organism or the cultured cell to consume the L-lactate;

a step (c) of recovering a nutrient source of the animal cells from the organism or the cultured cell as necessary; and

a step (d) of culturing the animal cells using the nutrient source as necessary,

wherein the nutrient source comprises glucose, glutamic acid, glutamine, alanine, arginine, asparagine, aspartic acid, cysteine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, valine, pyruvic acid, vitamin B1, vitamin B2, vitamin B3, vitamin B5, vitamin B6, folate, choline, starch, glycogen, and cellulose.