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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: OLEOSIN GENES AND PROMOTERS FROM COFFEE

(57) Abstract: Oleosin- and steroleosin-encoding polynucleotides from coffee plants are disclosed. Also disclosed are promoter sequences from coffee oleosin genes, and methods for using these polynucleotides and promoters for gene regulation and manipulation of flavor, aroma and other features of coffee beans.



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# INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2006/026121

A. CLASSIFICATION OF SUBJECT MATTER  
INV. C12N15/29 C12N15/82 A01H5/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
C12N A01H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, BIOSIS, Sequence Search, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                                            | Relevant to claim No. |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| X         | WO 2004/113520 A2 (NESTEC SA [CH]; CORNELL RES FOUNDATION INC [US] NESTEC SA [CH]; CORNELL) 29 December 2004 (2004-12-29) page 21, line 26 - page 22, line 8                                                                                                  | 1,2,6, 8-13,21, 22,24 |
| X         | CHEN JEFF C F ET AL: "Cloning, expression and isoform classification of a minor oleosin in sesame oil bodies" JOURNAL OF BIOCHEMISTRY (TOKYO), vol. 122, no. 4, October 1997 (1997-10), pages 819-824, XP002416737 ISSN: 0021-924X page 821 - page 822<br>-/- | 1-6, 8-14,21, 22,24   |

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

### \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

16 May 2007

Date of mailing of the international search report

12/06/2007

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International application No  
PCT/US2006/026121

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                                                                                                                           | Relevant to claim No.     |
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| X         | -& DATABASE EMBL [Online]<br>2 June 1997 (1997-06-02), "Sesamum indicum<br>15.5 kDa oleosin mRNA, complete cds."<br>XP002416744<br>retrieved from EBI accession no.<br>EM_PRO:U97700<br>Database accession no. U97700<br>the whole document                                                                                                  | 1-6,<br>8-14,21,<br>22,24 |
| X         | LEPRINCE O ET AL: "OLEOSINS PREVENT<br>OIL-BODY COALESCENCE DURING SEED<br>IMBIBITION AS SUGGESTED BY A<br>LOW-TEMPERATURE SCANNING ELECTRON<br>MICROSCOPE STUDY OF DESICCATION-TOLERANT<br>AND -SENSITIVE OILSEEDS"<br>PLANTA, SPRINGER VERLAG, DE,<br>vol. 204, 1998, pages 109-119, XP000885490<br>ISSN: 0032-0935<br>abstract<br>table 2 | 1-24                      |
| P,X       | SIMKIN ANDREW J ET AL: "Oleosin gene<br>family of Coffea canephora: Quantitative<br>expression analysis of five oleosin genes<br>in developing and germinating coffee<br>grain"<br>JOURNAL OF PLANT PHYSIOLOGY,<br>vol. 163, no. 7, May 2006 (2006-05), pages<br>691-708, XP002416738<br>ISSN: 0176-1617<br>the whole document               | 1-24,<br>46-68            |
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## INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                                                       | Relevant to claim No. |
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| A         | KIM HYUN UK ET AL: "A novel group of<br>oleosins is present inside the pollen of<br>Arabidopsis"<br>JOURNAL OF BIOLOGICAL CHEMISTRY,<br>vol. 277, no. 25,<br>21 June 2002 (2002-06-21), pages<br>22677-22684, XP002416739<br>ISSN: 0021-9258<br>the whole document       | 1-24                  |
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|           | -----<br>-/--                                                                                                                                                                                                                                                            |                       |

# INTERNATIONAL SEARCH REPORT

International application No

PCT/US2006/026121

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                     | Relevant to claim No. |
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| A         | <p>LIN LI-JEN ET AL: "Steroleosin, a sterol-binding dehydrogenase in seed oil bodies"</p> <p>PLANT PHYSIOLOGY (ROCKVILLE), vol. 128, no. 4, April 2002 (2002-04), pages 1200-1211, XP002416741</p> <p>ISSN: 0032-0889</p> <p>-----</p> |                       |

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

The two claims 24 have been renumbered 24(a) and 24(b) consecutively

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2006/026121

## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:  
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☒ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:  
Alleged Invention 1: claims 1-24(a) partially; Alleged Invention 9: claims 4-68 completely
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

Invention (alleged) 1: Claims 1-24(a) all partially

A nucleic acid molecule encoding an oleosin characterised by reference to SEQ ID NOS:1 and 8; vector, oligonucleotide, host and plant relating to said nucleic acid molecule.

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Inventions (alleged) 2 - 6: Claims 1-24(a) all partially

A nucleic acid molecule encoding an oleosin characterised by reference to SEQ ID NOS:2 through to 6 and 9 through to 13, where 2 and 3, 4 and 5 etc are each an individual alleged invention; vector, oligonucleotide, host and plant relating to said nucleic acid molecule.

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Invention 7 (alleged): Claims 24(b)- 29 completely

A method to modulate flavour or aroma in coffee beans comprising modulating production of oleosins.

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Invention 8 (alleged): Claims 30-45 all completely

A promoter isolated from a coffee plant gene encoding oleosin characterised by reference to SEQ ID NO:15

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Invention 9 (alleged): Claims 46-68 all completely

A nucleic acid molecule encoding an steroleosin characterised by reference to SEQ ID NOS:7 and 14; vector, oligonucleotide, host and plant relating to said nucleic acid molecule.

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Invention 10 (alleged): Claims 69-74 all completely

A method to modulate flavour or aroma in coffee beans comprising modulating production of steroleosins.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2006/026121

| Patent document<br>cited in search report |    | Publication<br>date | Patent family<br>member(s) |               | Publication<br>date |
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