



(51) International Patent Classification:

C07D 401/14 (2006.01) **A61K 31/4439** (2006.01)
C07D 413/14 (2006.01) **A61P 25/00** (2006.01)
C07D 405/14 (2006.01) **A61P 25/04** (2006.01)
A61K 31/444 (2006.01) **A61P 25/18** (2006.01)
A61K 31/4155 (2006.01) **A61P 25/20** (2006.01)
A61K 31/5377 (2006.01) **A61P 25/24** (2006.01)
A61K 31/506 (2006.01) **A61P 25/28** (2006.01)
A61K 31/351 (2006.01) **A61P 25/30** (2006.01)
A61K 31/4545 (2006.01) **A61P 25/36** (2006.01)

(21) International Application Number:

PCT/IB2021/000337

(22) International Filing Date:

20 May 2021 (20.05.2021)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

2020-090111 22 May 2020 (22.05.2020) JP

(71) Applicant: **TAKEDA PHARMACEUTICAL COMPANY LIMITED** [JP/JP]; 1-1, Doshomachi 4-chome, Chuoku, Osaka-shi, Osaka, 541-0045 (JP).

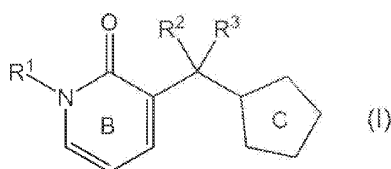
(72) Inventors: **HASUI, Tomoaki**; c/o Takeda Pharmaceutical Company Limited, 26-1, Muraoka-higashi 2-chome, Fujisawa-shi, Kanagawa, 251-0012 (JP). **MIKAMI, Satoshi**; c/o Takeda Pharmaceutical Company Limited, 26-1, Muraoka-higashi 2-chome, Fujisawa-shi, Kanagawa, 251-0012 (JP). **YAMASHITA, Toru**; c/o Takeda Pharmaceutical Company Limited, 26-1, Muraoka-higashi 2-chome, Fujisawa-shi, Kanagawa, 251-0012 (JP). **NAKAMURA, Shinji**; c/o Takeda Pharmaceutical Company Limited, 26-1, Muraoka-higashi 2-chome, Fujisawa-shi, Kanagawa, 251-0012 (JP). **MORIMOTO, Shinji**; c/o Takeda Pharmaceutical Company Limited, 26-1, Muraoka-higashi 2-chome, Fujisawa-shi, Kanagawa, 251-0012 (JP). **IMAE, DA, Toshihiro**; c/o Takeda Pharmaceutical Company Limited, 26-1, Muraoka-higashi 2-chome, Fujisawa-shi, Kanagawa, 251-0012 (JP).

gawa, 251-0012 (JP). **TAKAMI, Kazuaki**; c/o Takeda Pharmaceutical Company Limited, 26-1, Muraoka-higashi 2-chome, Fujisawa-shi, Kanagawa, 251-0012 (JP). **DAINI, Masaki**; c/o Takeda Pharmaceutical Company Limited, 26-1, Muraoka-higashi 2-chome, Fujisawa-shi, Kanagawa, 251-0012 (JP). **KAKEI, Hiroyuki**; c/o Takeda Pharmaceutical Company Limited, 26-1, Muraoka-higashi 2-chome, Fujisawa-shi, Kanagawa, 251-0012 (JP). **NAKAMURA, Minoru**; c/o Takeda Pharmaceutical Company Limited, 26-1, Muraoka-higashi 2-chome, Fujisawa-shi, Kanagawa, 251-0012 (JP). **YAMAGUCHI, Fumie**; c/o Takeda Pharmaceutical Company Limited, 26-1, Muraoka-higashi 2-chome, Fujisawa-shi, Kanagawa, 251-0012 (JP). **WANG, Chunxiang**; c/o Takeda Pharmaceutical Company Limited, 26-1, Muraoka-higashi 2-chome, Fujisawa-shi, Kanagawa, 251-0012 (JP). **TAKASHIMA, Sachie**; c/o Takeda Pharmaceutical Company Limited, 26-1, Muraoka-higashi 2-chome, Fujisawa-shi, Kanagawa, 251-0012 (JP). **KAMATA, Makoto**; c/o Takeda Pharmaceutical Company Limited, 26-1, Muraoka-higashi 2-chome, Fujisawa-shi, Kanagawa, 251-0012 (JP). **OGURO, Yuya**; c/o Takeda Pharmaceutical Company Limited, 26-1, Muraoka-higashi 2-chome, Fujisawa-shi, Kanagawa, 251-0012 (JP). **IKE-DA, Shuhei**; c/o Takeda Pharmaceutical Company Limited, 26-1, Muraoka-higashi 2-chome, Fujisawa-shi, Kanagawa, 251-0012 (JP).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH,

(54) Title: 3-((1H-PYRAZOL-4-YL)METHYL)-6'-(PHENYL)-2H-(1,2'-BIPYRIDIN)-2-ONE DERIVATIVES AND RELATED COMPOUNDS AS GPR139 ANTAGONISTS FOR USE IN A METHOD OF TREATMENT OF E.G. DEPRESSION



(57) Abstract: The present invention refers to compounds of formula (I). The present invention also relates to compounds of formula (I) for use as G Protein coupled Receptor 139 (GPR139) antagonists in methods of medical treatment of e.g. depression, Alzheimer's disease, schizophrenia, drug addiction, sleep disorders, pain, and attention deficit hyperactivity disorder. Exemplary compounds are e.g. 3-((1H-pyrazol-4-yl)methyl)-6'-(phenyl)-2H-(1,2'-bipyridin)-2-one derivatives and related compounds. The present description discloses the synthesis and characterisation of exemplary compounds, pharmacological data thereof, as well as exemplary tablet formulations comprising the compounds of the invention (e.g. page 83 to page 110; examples 1 to 33; reference example 1; test examples 1 and 2; tables 1 to 4).

[Continued on next page]

GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*