



(51) International Patent Classification:
A61K 39/00 (2006.01) *A61K 39/39* (2006.01)
A61K 39/08 (2006.01)

(21) International Application Number:
PCT/US2018/022597

(22) International Filing Date:
15 March 2018 (15.03.2018)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
62/471,636 15 March 2017 (15.03.2017) US
62/474,434 21 March 2017 (21.03.2017) US

(71) Applicant: **NOVAVAX, INC.** [US/US]; 20 Firstfield Road, Gaithersburg, Maryland 20878 (US).

(72) Inventors: **TIAN, Jing-Hui**; c/o Novavax, Inc., 20 Firstfield Road, Gaithersburg, Maryland 20878 (US). **LIU, Ye**; c/o Novavax, Inc., 20 Firstfield Road, Gaithersburg, Maryland 20878 (US). **SMITH, Gale**; c/o Novavax, Inc., 20 Firstfield Road, Gaithersburg, Maryland 20878 (US).

GLENN, Gregory; c/o Novavax, Inc., 20 Firstfield Road, Gaithersburg, Maryland 20878 (US). **FLYER, David**; c/o Novavax, Inc., 20 Firstfield Road, Gaithersburg, Maryland 20878 (US).

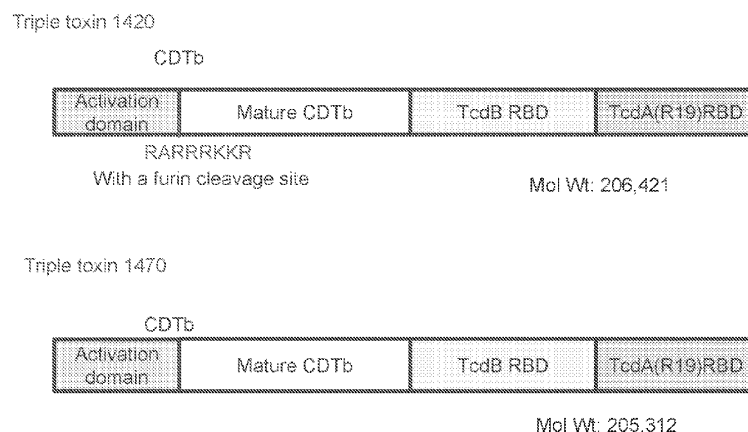
(74) Agent: **TUSCAN, Michael** et al.; Cooley LLP, 1299 Pennsylvania Avenue, N.W., Suite 700, Washington, District of Columbia 20004-2400 (US).

(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, 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, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ,

(54) Title: METHODS AND COMPOSITIONS FOR INDUCING IMMUNE RESPONSES AGAINST CLOSTRIDIUM DIFFICILE

Fig. 1: *C. difficile* triple toxin vaccine constructs



(57) Abstract: Disclosed herein are methods and compositions for treating or preventing bacterial infection. In particular, the methods and compositions are directed towards *C. difficile* infection. In particular aspects, the compositions are vaccines containing multimeric polypeptides containing portions of multiple toxins from bacteria. The polypeptides induce effective immune responses thus treating or preventing infection.

[Continued on next page]

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).

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

Published:

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*
- *with sequence listing part of description (Rule 5.2(a))*

(88) Date of publication of the international search report:

18 October 2018 (18.10.2018)