

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
1 July 2004 (01.07.2004)

PCT

(10) International Publication Number
WO 2004/055187 A1

- (51) International Patent Classification⁷: **C12N 15/30**, 15/861, A61K 39/015, C07K 14/445
- (21) International Application Number: PCT/EP2003/051019
- (22) International Filing Date: 16 December 2003 (16.12.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
02102781.8 17 December 2002 (17.12.2002) EP
PCT/EP03/50222 12 June 2003 (12.06.2003) EP
- (71) Applicant (*for all designated States except US*): **CRU-CELL HOLLAND B.V.** [NL/NL]; Archimedesweg 4, NL-2333 CN Leiden (NL).
- (72) Inventors; and
- (75) Inventors/Applicants (*for US only*): **PAU, Maria Grazia** [IT/NL]; Bargelaan 80, NL-2333 CW Leiden (NL). **HOLTERMAN, Lennart** [NL/NL]; Luxemburgstraat 16, NL-2552 RC Den Haag (NL). **KASPERS, Jorn** [NL/NL]; Haarlemmerstraat 186A, NL-2312 GH Leiden (NL). **STEGMANN, Antonius, Johannes, Hendrikus** [NL/NL]; Prins Frederikdreef 14, NL-2224 AA Katwijk (NL).
- (74) Agent: **KLEIN, Bart**; Crucell Holland B.V., Archimedesweg 4, P.O. Box 2048, NL-2301 CA Leiden (NL).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Declaration under Rule 4.17:**
— *of inventorship (Rule 4.17(iv)) for US only*
- Published:**
— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*
- 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: RECOMBINANT VIRAL-BASED MALARIA VACCINES

(57) **Abstract:** The present invention relates to novel vaccines against malaria infections, based on recombinant viral vectors, such as alphaviruses, adenoviruses or vaccinia viruses. The recombinant viral-based vaccines can be applied for immunization against different Plasmodium infections, such as infections by *P.falciparum* or *P.yoelii*. Novel codon-optimized circumsporozoite (CS) genes are disclosed. Preferably, replication-defective adenoviruses are used, derived of serotypes that encounter low titers of neutralizing antibodies. The invention therefore also relates to the use of different adenoviral serotypes that are administered to elicit a strong immune response, either in single vaccination setups, or in prime-boost set-ups in which compositions based on different serotypes can be applied.

WO 2004/055187 A1