

CHAPTER 7

Bibliography

Bibliography

A G N (1931). The Late Baron Shibasaburo Kitasato. Canadian Medical Association Journal 25, 206.

Abbas, A., Lichtman, A., and Pillai, S. (2011). Cellular and molecular immunology (Elsevier Health Sciences).

Agnandji, S.T., Lell, B., Fernandes, J.F., Abossolo, B.P., Methogo, B.G.N.O., Kabwende, A.L., Adegnika, A.A., Mordmüller, B., Issifou, S., Kremsner, P.G., et al. (2012). A phase 3 trial of RTS,S/AS01 malaria vaccine in African infants. The New England Journal of Medicine 367, 2284–2295.

Agnandji, S.T., Lell, B., Soulanoudjingar, S.S., Fernandes, J.F., Abossolo, B.P., Conzelmann, C., Methogo, B.G.N.O., Doucka, Y., Flamen, A., Mordmüller, B., et al. (2011). First results of phase 3 trial of RTS,S/AS01 malaria vaccine in African children. The New England Journal of Medicine 365, 1863–1875.

Aikawa, M., Miller, L.H., Johnson, J., and Rabbege, J. (1978). Erythrocyte entry by malarial parasites. A moving junction between erythrocyte and parasite. The Journal of Cell Biology 77, 72–82.

Almagro, J.C., and Fransson, J. (2008). Humanization of antibodies. Frontiers in Bioscience : a Journal and Virtual Library 13, 1619–1633.

Andersson, K., Hämäläinen, M., and Malmqvist, M. (1999). Identification and optimization of regeneration conditions for affinity-based biosensor assays. A multivariate cocktail approach. Analytical Chemistry 71, 2475–2481.

Angrisano, F., Riglar, D.T., Sturm, A., Volz, J.C., Delves, M.J., Zuccala, E.S., Turnbull, L., Dekiwadia, C., Olshina, M. a, Marapana, D.S., et al. (2012). Spatial localisation of actin filaments across developmental stages of the malaria parasite. PloS One 7, e32188.

Antinori, S., Galimberti, L., Milazzo, L., and Corbellino, M. (2013). Plasmodium knowlesi: the emerging zoonotic malaria parasite. Acta Tropica 125, 191–201.

Armour, K.L., Clark, M.R., Hadley, A.G., and Williamson, L.M. (1999). Recombinant human IgG molecules lacking Fc γ receptor I binding and monocyte triggering activities. European Journal of Immunology 29, 2613–2624.

Armour, K.L., Parry-Jones, D.R., Beharry, N., Ballinger, J.R., Mushens, R., Williams, R.K., Beatty, C., Stanworth, S., Lloyd-Evans, P., Scott, M., et al. (2006). Intravascular survival of red cells coated with a mutated human anti-D antibody engineered to lack destructive activity. Blood 107, 2619–2626.

Armour, K.L., Van de Winkel, J.G.J., Williamson, L.M., and Clark, M.R. (2003). Differential binding to human Fc γ RIIa and Fc γ RIIb receptors by human IgG wildtype and mutant antibodies. Molecular Immunology 40, 585–593.

Baillie, J.K., and Digard, P. (2013). Influenza--time to target the host? *The New England Journal of Medicine* 369, 191–193.

Ballou, W.R., Arevalo-Herrera, M., Carucci, D., Richie, T.L., Corradin, G., Diggs, C., Druilhe, P., Giersing, B.K., Saul, A., Heppner, D.G., et al. (2004). Update on the clinical development of candidate malaria vaccines. *The American Journal of Tropical Medicine and Hygiene* 71, 239–247.

Bannister, L., and Mitchell, G. (2003). The ins, outs and roundabouts of malaria. *Trends in Parasitology* 19, 209–213.

Bannister, L.H., and Mitchell, G.H. (2009). The malaria merozoite, forty years on. *Parasitology* 136, 1435–1444.

Bannister, L.H., and Sherman, I.W. (2009). Plasmodium. *Encyclopedia of Life Sciences (ELS)*. John Wiley & Sons, Ltd: Chichester. 1–12.

Barbouche, R., Lortat-Jacob, H., Jones, I.M., and Fenouillet, E. (2005). Glycosaminoglycans and protein disulfide isomerase-mediated reduction of HIV Env. *Molecular Pharmacology* 67, 1111–1118.

Barbouche, R., Miquelis, R., Jones, I.M., and Fenouillet, E. (2003). Protein-disulfide isomerase-mediated reduction of two disulfide bonds of HIV envelope glycoprotein 120 occurs post-CXCR4 binding and is required for fusion. *The Journal of Biological Chemistry* 278, 3131–3136.

Bartholdson, S.J., Bustamante, L.Y., Crosnier, C., Johnson, S., Lea, S., Rayner, J.C., and Wright, G.J. (2012). Semaphorin-7A is an erythrocyte receptor for *P. falciparum* merozoite-specific TRAP homolog, MTRAP. *PLoS Pathogens* 8, e1003031.

Bartholdson, S.J., Crosnier, C., Bustamante, L.Y., Rayner, J.C., and Wright, G.J. (2013). Identifying novel *Plasmodium falciparum* erythrocyte invasion receptors using systematic extracellular protein interaction screens. *Cellular Microbiology* 15, 1304–1312.

Bartlett, J.G. (1996). A Guide to Primary Care of People with HIV/AIDS.

Baselga, J., Cortés, J., Kim, S.-B., Im, S.-A., Hegg, R., Im, Y., Roman, L., Pedrini, J.L., Pienkowski, T., Knott, A., et al. (2012). Pertuzumab plus trastuzumab plus docetaxel for metastatic breast cancer. *The New England Journal of Medicine* 366, 109–119.

Baum, J., Chen, L., Healer, J., Lopaticki, S., Boyle, M., Triglia, T., Ehlgren, F., Ralph, S. a, Beeson, J.G., and Cowman, A.F. (2009). Reticulocyte-binding protein homologue 5 - an essential adhesin involved in invasion of human erythrocytes by *Plasmodium falciparum*. *International Journal for Parasitology* 39, 371–380.

Baum, J., Maier, A.G., Good, R.T., Simpson, K.M., and Cowman, A.F. (2005). Invasion by *P. falciparum* merozoites suggests a hierarchy of molecular interactions. *PLoS Pathogens* 1, e37.

Baum, J., Richard, D., Healer, J., Rug, M., Krnajski, Z., Gilberger, T.-W., Green, J.L., Holder, A. a, and Cowman, A.F. (2006). A conserved molecular motor drives cell invasion and gliding motility across malaria life cycle stages and other apicomplexan parasites. *The Journal of Biological Chemistry* 281, 5197–5208.

Beck, A., Wurch, T., Bailly, C., and Corvaia, N. (2010). Strategies and challenges for the next generation of therapeutic antibodies. *Nature Reviews. Immunology* 10, 345–352.

Bei, A.K., and Duraisingh, M.T. (2012). Functional analysis of erythrocyte determinants of *Plasmodium* infection. *International Journal for Parasitology* 42, 575–582.

Belton, R.J., Chen, L., Mesquita, F.S., and Nowak, R. a (2008). Basigin-2 is a cell surface receptor for soluble basigin ligand. *The Journal of Biological Chemistry* 283, 17805–17814.

Besteiro, S., Dubremetz, J.-F., and Lebrun, M. (2011). The moving junction of apicomplexan parasites: a key structure for invasion. *Cellular Microbiology* 13, 797–805.

Birch, J.R., and Racher, A.J. (2006). Antibody production. *Advanced Drug Delivery Reviews* 58, 671–685.

Birkholtz, L.-M., Blatch, G., Coetzer, T.L., Hoppe, H.C., Human, E., Morris, E.J., Ngcete, Z., Oldfield, L., Roth, R., Shonhai, A., et al. (2008). Heterologous expression of plasmodial proteins for structural studies and functional annotation. *Malaria Journal* 7, 197.

Black, C.G., Wu, T., Wang, L., Hibbs, a R., and Coppel, R.L. (2001). Merozoite surface protein 8 of *Plasmodium falciparum* contains two epidermal growth factor-like domains. *Molecular and Biochemical Parasitology* 114, 217–226.

Blackman, M.J. (2008). Malarial proteases and host cell egress: an “emerging” cascade. *Cellular Microbiology* 10, 1925–1934.

Blackman, M.J., Scott-Finnigan, T.J., Shai, S., and Holder, A.A. (1994). Antibodies inhibit the protease-mediated processing of a malaria merozoite surface protein. *The Journal of Experimental Medicine* 180, 389–393.

Blomberg, K., Granberg, C., Hemmilä, I., and Lövgren, T. (1986). Europium-labelled target cells in an assay of natural killer cell activity. I. A novel non-radioactive method based on time-resolved fluorescence. *Journal of Immunological Methods* 86, 225–229.

Blumenthal, G.M., Scher, N.S., Cortazar, P., Chattopadhyay, S., Tang, S., Song, P., Liu, Q., Ringgold, K., Pilaro, A.M., Tilley, A., et al. (2013). First FDA approval of dual anti-HER2 regimen: pertuzumab in combination with trastuzumab and docetaxel for HER2-positive metastatic breast cancer. *Clinical Cancer Research: an Official Journal of the American Association for Cancer Research* *19*, 4911–4916.

Bole-Feysot, C., Goffin, V., Edery, M., Binart, N., and Kelly, P. a (1998). Prolactin (PRL) and its receptor: actions, signal transduction pathways and phenotypes observed in PRL receptor knockout mice. *Endocrine Reviews* *19*, 225–268.

Bora, H., Tyagi, R.K., and Sharma, Y.D. (2013). Defining the erythrocyte binding domains of Plasmodium vivax tryptophan rich antigen 33.5. *PLoS One* *8*, e62829.

Borre, M.B., Dziegiel, M., Høgh, B., Petersen, E., Rieneck, K., Riley, E., Meis, J.F., Aikawa, M., Nakamura, K., and Harada, M. (1991). Primary structure and localization of a conserved immunogenic Plasmodium falciparum glutamate rich protein (GLURP) expressed in both the preerythrocytic and erythrocytic stages of the vertebrate life cycle. *Molecular and Biochemical Parasitology* *49*, 119–131.

Boyle, M.J., Richards, J.S., Gilson, P.R., Chai, W., and Beeson, J.G. (2010). Interactions with heparin-like molecules during erythrocyte invasion by Plasmodium falciparum merozoites. *Blood* *115*, 4559–4568.

Bozdech, Z., Llinás, M., Pulliam, B.L., Wong, E.D., Zhu, J., and DeRisi, J.L. (2003). The transcriptome of the intraerythrocytic developmental cycle of Plasmodium falciparum. *PLoS Biology* *1*, E5.

Brown, M.H., and Barclay, a N. (1994). Expression of immunoglobulin and scavenger receptor superfamily domains as chimeric proteins with domains 3 and 4 of CD4 for ligand analysis. *Protein Engineering* *7*, 515–521.

Bruhns, P. (2012). Properties of mouse and human IgG receptors and their contribution to disease models. *Blood* *119*, 5640–5649.

Brunner, K.T., Mauel, J., Cerottini, J.C., and Chapuis, B. (1968). Quantitative assay of the lytic action of immune lymphoid cells on 51-Cr-labelled allogeneic target cells in vitro; inhibition by isoantibody and by drugs. *Immunology* *14*, 181–196.

Bruno, C.J., and Jacobson, J.M. (2010). Ibalizumab: an anti-CD4 monoclonal antibody for the treatment of HIV-1 infection. *The Journal of Antimicrobial Chemotherapy* *65*, 1839–1841.

Burgess, B.R., Schuck, P., and Garboczi, D.N. (2005). Dissection of merozoite surface protein 3, a representative of a family of Plasmodium falciparum surface proteins, reveals an oligomeric and highly elongated molecule. *The Journal of Biological Chemistry* *280*, 37236–37245.

Burns, J.M., Adeeku, E.K., Belk, C.C., and Dunn, P.D. (2000). An unusual tryptophan-rich domain characterizes two secreted antigens of Plasmodium yoelii-infected erythrocytes. *Molecular and Biochemical Parasitology* *110*, 11–21.

Burns, J.M., Adeeku, E.K., and Dunn, P.D. (1999). Protective immunization with a novel membrane protein of *Plasmodium yoelii*-infected erythrocytes. *Infection and Immunity* 67, 675–680.

Bushell, K.M., Söllner, C., Schuster-Boeckler, B., Bateman, A., and Wright, G.J. (2008). Large-scale screening for novel low-affinity extracellular protein interactions. *Genome Research* 18, 622–630.

Bustamante, L.Y., Bartholdson, S.J., Crosnier, C., Campos, M.G., Wanaguru, M., Nguon, C., Kwiatkowski, D.P., Wright, G.J., and Rayner, J.C. (2013). A full-length recombinant *Plasmodium falciparum* PfRH5 protein induces inhibitory antibodies that are effective across common PfRH5 genetic variants. *Vaccine* 31, 373–379.

Camus, D., and Hadley, T.J. (1985). A *Plasmodium falciparum* antigen that binds to host erythrocytes and merozoites. *Science (New York, N.Y.)* 230, 553–556.

Canfield, S.M., and Morrison, S.L. (1991). The binding affinity of human IgG for its high affinity Fc receptor is determined by multiple amino acids in the CH2 domain and is modulated by the hinge region. *The Journal of Experimental Medicine* 173, 1483–1491.

Carter, P.J. (2006). Potent antibody therapeutics by design. *Nature Reviews Immunology* 6, 343–357.

Carter, R., Mendis, K.N., Miller, L.H., Molineaux, L., and Saul, A. (2000). Malaria transmission-blocking vaccines--how can their development be supported? *Nature Medicine* 6, 241–244.

Casares, S., Brumeau, T.-D., and Richie, T.L. (2010). The RTS,S malaria vaccine. *Vaccine* 28, 4880–4894.

Chadd, H.E., and Chamow, S.M. (2001). Therapeutic antibody expression technology. *Current Opinion in Biotechnology* 12, 188–194.

Chames, P., and Baty, D. (2009). Bispecific antibodies for cancer therapy: the light at the end of the tunnel? *mAbs* 1, 539–547.

Chan, A.C., and Carter, P.J. (2010). Therapeutic antibodies for autoimmunity and inflammation. *Nature Reviews Immunology* 10, 301–316.

Chapman, K., Pullen, N., Graham, M., and Ragan, I. (2007). Preclinical safety testing of monoclonal antibodies: the significance of species relevance. *Nature Reviews Drug Discovery* 6, 120–126.

Chappel, M.S., Isenman, D.E., Everett, M., Xu, Y.Y., Dorrington, K.J., and Klein, M.H. (1991). Identification of the Fc gamma receptor class I binding site in human IgG through the use of recombinant IgG1/IgG2 hybrid and point-mutated antibodies. *Proceedings of the National Academy of Sciences of the United States of America* 88, 9036–9040.

Chen, L., Lopaticki, S., Riglar, D.T., Dekiwadia, C., Ubaldi, A.D., Tham, W.-H., O'Neill, M.T., Richard, D., Baum, J., Ralph, S. a., et al. (2011). An EGF-like Protein Forms a Complex with PfRh5 and Is Required for Invasion of Human Erythrocytes by Plasmodium falciparum. *PLoS Pathogens* 7, e1002199.

Chen, Q., Schlichtherle, M., and Wahlgren, M. (2000). Molecular Aspects of Severe Malaria. *Clinical Microbiology Reviews* 13, 439–450.

Chou, H.H., Takematsu, H., Diaz, S., Iber, J., Nickerson, E., Wright, K.L., Muchmore, E. a, Nelson, D.L., Warren, S.T., and Varki, a (1998). A mutation in human CMP-sialic acid hydroxylase occurred after the Homo-Pan divergence. *Proceedings of the National Academy of Sciences of the United States of America* 95, 11751–11756.

Chowdhury, P.S., and Pastan, I. (1999). Improving antibody affinity by mimicking somatic hypermutation in vitro. *Nature Biotechnology* 17, 568–572.

Clarke, A.W., Poulton, L., Wai, H.Y., Walker, S. a, Victor, S.D., Domagala, T., Mraovic, D., Butt, D., Shewmaker, N., Jennings, P., et al. (2010). A novel class of anti-IL-12p40 antibodies: potent neutralization via inhibition of IL-12-IL-12R β 2 and IL-23-IL-23R. *mAbs* 2, 539–549.

Clyde, D.F., Most, H., McCarthy, V.C., and Vanderberg, J.P. (1973). Immunization of man against sporozoite-induced falciparum malaria. *The American Journal of the Medical Sciences* 266, 169–177.

Cobleigh, M. a, Vogel, C.L., Tripathy, D., Robert, N.J., Scholl, S., Fehrenbacher, L., Wolter, J.M., Paton, V., Shak, S., Lieberman, G., et al. (1999). Multinational study of the efficacy and safety of humanized anti-HER2 monoclonal antibody in women who have HER2-overexpressing metastatic breast cancer that has progressed after chemotherapy for metastatic disease. *Journal of Clinical Oncology: Official Journal of the American Society of Clinical Oncology* 17, 2639–2648.

Coggeshall, L.T., and Kumm, H.W. (1937). DEMONSTRATION OF PASSIVE IMMUNITY IN EXPERIMENTAL MONKEY MALARIA. *The Journal of Experimental Medicine* 66, 177–190.

Cohen, S., Butcher, G.A., and Crandall, R.B. (1969). Action of malarial antibody in vitro. *Nature* 223, 368–371.

Cohen, S., McGregor, I.A., and Carrington, S. (1961). Gamma-globulin and acquired immunity to human malaria. *Nature* 192, 733–737.

Coles, A.J. (2013). Alemtuzumab therapy for multiple sclerosis. *Neurotherapeutics: the Journal of the American Society for Experimental NeuroTherapeutics* 10, 29–33.

Conway, D.J., Cavanagh, D.R., Tanabe, K., Roper, C., Mikes, Z.S., Sakihama, N., Bojang, K.A., Oduola, A.M., Kremsner, P.G., Arnot, D.E., et al. (2000). A principal target of human immunity to malaria identified by molecular population genetic and immunological analyses. *Nature Medicine* 6, 689–692.

Cooper, M. (2002). Optical biosensors in drug discovery. *Nature Reviews. Drug Discovery* 1, 515–528.

Coste, I. (2001). Unavailability of CD147 leads to selective erythrocyte trapping in the spleen. *Blood* 97, 3984–3988.

Cowman, A.F., Berry, D., and Baum, J. (2012). The cellular and molecular basis for malaria parasite invasion of the human red blood cell. *The Journal of Cell Biology* 198, 961–971.

Cowman, A.F., and Crabb, B.S. (2006). Invasion of red blood cells by malaria parasites. *Cell* 124, 755–766.

Crombet, T., Osorio, M., Cruz, T., Roca, C., Del Castillo, R., Mon, R., Iznaga-Escobar, N., Figueredo, R., Koropatnick, J., Renginfo, E., et al. (2004). Use of the humanized anti-epidermal growth factor receptor monoclonal antibody h-R3 in combination with radiotherapy in the treatment of locally advanced head and neck cancer patients. *Journal of Clinical Oncology: Official Journal of the American Society of Clinical Oncology* 22, 1646–1654.

Crompton, P.D., Pierce, S.K., and Miller, L.H. (2010). Advances and challenges in malaria vaccine development. *The Journal of Clinical Investigation* 120, 4168–4178.

Crosnier, C., Bustamante, L.Y., Bartholdson, S.J., Bei, A.K., Theron, M., Uchikawa, M., Mboup, S., Ndir, O., Kwiatkowski, D.P., Duraisingh, M.T., et al. (2011). Basigin is a receptor essential for erythrocyte invasion by *Plasmodium falciparum*. *Nature* 480, 534–537.

Crosnier, C., Staudt, N., and Wright, G.J. (2010). A rapid and scalable method for selecting recombinant mouse monoclonal antibodies. *BMC Biology* 8, 76.

Crosnier, C., Wanaguru, M., McDade, B., Osier, F.H., Marsh, K., Rayner, J.C., and Wright, G.J. (2013). A Library of Functional Recombinant Cell-surface and Secreted *P. falciparum* Merozoite Proteins. *Molecular & Cellular Proteomics : MCP* 12, 3976–3986.

Culleton, R., and Kaneko, O. (2010). Erythrocyte binding ligands in malaria parasites: intracellular trafficking and parasite virulence. *Acta Tropica* 114, 131–137.

Curtidor, H., Ocampo, M., Rodríguez, L.E., López, R., García, J.E., Valbuena, J., Vera, R., Puentes, A., Leiton, J., Cortes, L.J., et al. (2006). *Plasmodium falciparum* TryThrA antigen synthetic peptides block *in vitro* merozoite invasion to erythrocytes. *Biochemical and Biophysical Research Communications* 339, 888–896.

Davis, J.H., Aperlo, C., Li, Y., Kurosawa, E., Lan, Y., Lo, K.-M., and Huston, J.S. (2010). SEEDbodies: fusion proteins based on strand-exchange engineered domain (SEED) CH3 heterodimers in an Fc analogue platform for asymmetric binders or immunofusions and bispecific antibodies. *Protein Engineering, Design & Selection : PEDS* 23, 195–202.

Deeg, H.J., Blazar, B.R., Bolwell, B.J., Long, G.D., Schuening, F., Cunningham, J., Rifkin, R.M., Abhyankar, S., Briggs, A.D., Burt, R., et al. (2001). Treatment of steroid-refractory acute graft-versus-host disease with anti-CD147 monoclonal antibody ABX-CBL. *Blood* 98, 2052–2058.

Desjarlais, J.R., and Lazar, G. a (2011). Modulation of antibody effector function. *Experimental Cell Research* 317, 1278–1285.

Diacon, A.H., Dawson, R., Von Groote-Bidlingmaier, F., Symons, G., Venter, A., Donald, P.R., Van Niekerk, C., Everitt, D., Winter, H., Becker, P., et al. (2012). 14-day bactericidal activity of PA-824, bedaquiline, pyrazinamide, and moxifloxacin combinations: a randomised trial. *Lancet* 380, 986–993.

Dieckmann-Schuppert, a, Bender, S., Odenthal-Schnittler, M., Bause, E., and Schwarz, R.T. (1992). Apparent lack of N-glycosylation in the asexual intraerythrocytic stage of *Plasmodium falciparum*. *European Journal of Biochemistry / FEBS* 205, 815–825.

DiGiammarino, E., Ghayur, T., and Liu, J. (2012). Design and generation of DVD-IgTM molecules for dual-specific targeting. *Methods in Molecular Biology* (Clifton, N.J.) 899, 145–156.

Dodoo, D., Aikins, A., Kusi, K.A., Lamptey, H., Remarque, E., Milligan, P., Bosomprah, S., Chilengi, R., Osei, Y.D., Akanmori, B.D., et al. (2008). Cohort study of the association of antibody levels to AMA1, MSP119, MSP3 and GLURP with protection from clinical malaria in Ghanaian children. *Malaria Journal* 7, 142.

Dodoo, D., Theisen, M., Kurtzhals, J. a, Akanmori, B.D., Koram, K. a, Jepsen, S., Nkrumah, F.K., Theander, T.G., and Hviid, L. (2000). Naturally acquired antibodies to the glutamate-rich protein are associated with protection against *Plasmodium falciparum* malaria. *The Journal of Infectious Diseases* 181, 1202–1205.

Douglas, A.D., Williams, A.R., Illingworth, J.J., Kamuyu, G., Biswas, S., Goodman, A.L., Wyllie, D.H., Crosnier, C., Miura, K., Wright, G.J., et al. (2011). The blood-stage malaria antigen PfRH5 is susceptible to vaccine-inducible cross-strain neutralizing antibody. *Nature Communications* 2, 601.

Douglas, A.D., Williams, A.R., Knuepfer, E., Illingworth, J.J., Furze, J.M., Crosnier, C., Choudhary, P., Bustamante, L.Y., Zakutansky, S.E., Awuah, D.K., et al. (2013). Neutralization of *Plasmodium falciparum* Merozoites by Antibodies against PfRH5. *Journal of Immunology* (Baltimore, Md. : 1950).

Draper, S.J., and Heeney, J.L. (2010). Viruses as vaccine vectors for infectious diseases and cancer. *Nature Reviews Microbiology* 8, 62–73.

Drew, D.R., Sanders, P.R., and Crabb, B.S. (2005). *Plasmodium falciparum* merozoite surface protein 8 is a ring-stage membrane protein that localizes to the parasitophorous vacuole of infected erythrocytes. *Infection and Immunity* 73, 3912–3922.

Drew, M.E., Banerjee, R., Uffman, E.W., Gilbertson, S., Rosenthal, P.J., and Goldberg, D.E. (2008). Plasmodium food vacuole plasmepsins are activated by falcipains. *The Journal of Biological Chemistry* 283, 12870–12876.

Drummond, P.B., and Peterson, D.S. (2005). An analysis of genetic diversity within the ligand domains of the *Plasmodium falciparum* ebl-1 gene. *Molecular and Biochemical Parasitology* 140, 241–245.

Duffy, P.E., Sahu, T., Akue, A., Milman, N., and Anderson, C. (2012). Pre-erythrocytic malaria vaccines: identifying the targets. *Expert Review of Vaccines* 11, 1261–1280.

Duraisingh, M.T., Triglia, T., Ralph, S. a, Rayner, J.C., Barnwell, J.W., McFadden, G.I., and Cowman, A.F. (2003). Phenotypic variation of *Plasmodium falciparum* merozoite proteins directs receptor targeting for invasion of human erythrocytes. *The EMBO Journal* 22, 1047–1057.

Durocher, Y., Perret, S., and Kamen, A. (2002). High-level and high-throughput recombinant protein production by transient transfection of suspension-growing human 293-EBNA1 cells. *Nucleic Acids Research* 30, E9.

Dvorak, J.A., Miller, L.H., Whitehouse, W.C., and Shiroishi, T. (1975). Invasion of erythrocytes by malaria merozoites. *Science (New York, N.Y.)* 187, 748–750.

Dziegiel, M., Rowe, P., Bennett, S., Allen, S.J., Olerup, O., Gottschau, A., Borre, M., and Riley, E.M. (1993). Immunoglobulin M and G antibody responses to *Plasmodium falciparum* glutamate-rich protein: correlation with clinical immunity in Gambian children. *Infection and Immunity* 61, 103–108.

Edozien, J.C., Gilles, H.M., and Udeozo, I.O.K. (1962). ADULT AND CORD-BLOOD GAMMA-GLOBULIN AND IMMUNITY TO MALARIA IN NIGERIANS. *The Lancet* 280, 951–955.

Elliott, S.R., and Beeson, J.G. (2008). Estimating the burden of global mortality in children aged <5 years by pathogen-specific causes. *Clinical Infectious Diseases: an Official Publication of the Infectious Diseases Society of America* 46, 1794–1795.

Ellis, R.D., Sagara, I., Doumbo, O., and Wu, Y. (2010). Blood stage vaccines for *Plasmodium falciparum*: current status and the way forward. *Human Vaccines* 6, 627–634.

Ellis, R.D., Wu, Y., Martin, L.B., Shaffer, D., Miura, K., Aebig, J., Orcutt, A., Rausch, K., Zhu, D., Mogensen, A., et al. (2012). Phase 1 study in malaria naïve adults of BSAM2/Alhydrogel®+CPG 7909, a blood stage vaccine against *P. falciparum* malaria. *PloS One* 7, e46094.

Enea, V., Ellis, J., Zavala, F., Arnot, D.E., Asavanich, A., Masuda, A., Quakyi, I., and Nussenzweig, R.S. (1984). DNA cloning of *Plasmodium falciparum* circumsporozoite gene: amino acid sequence of repetitive epitope. *Science (New York, N.Y.)* 225, 628–630.

Van Epps, H.L. (2006). Michael Heidelberger and the demystification of antibodies. *Journal of Experimental Medicine* 203, 5–5.

Epstein, J.E., Tewari, K., Lyke, K.E., Sim, B.K.L., Billingsley, P.F., Laurens, M.B., Gunasekera, A., Chakravarty, S., James, E.R., Sedegah, M., et al. (2011). Live attenuated malaria vaccine designed to protect through hepatic CD8⁺ T cell immunity. *Science* (New York, N.Y.) 334, 475–480.

Escalante, a a, Freeland, D.E., Collins, W.E., and Lal, a a (1998). The evolution of primate malaria parasites based on the gene encoding cytochrome b from the linear mitochondrial genome. *Proceedings of the National Academy of Sciences of the United States of America* 95, 8124–8129.

Fadool, J.M., and Linser, P.J. (1993). Differential glycosylation of the 5A11/HT7 antigen by neural retina and epithelial tissues in the chicken. *Journal of Neurochemistry* 60, 1354–1364.

Farrow, R.E., Green, J., Holder, A. a, and Molloy, J.E. (2011). The mechanism of erythrocyte invasion by the malarial parasite, *Plasmodium falciparum*. *Seminars in Cell & Developmental Biology* 22, 953–960.

Fenouillet, E., Barbouche, R., Courageot, J., and Miquelis, R. (2001). The catalytic activity of protein disulfide isomerase is involved in human immunodeficiency virus envelope-mediated membrane fusion after CD4 cell binding. *The Journal of Infectious Diseases* 183, 744–752.

Fernández-Robledo, J. a, and Vasta, G.R. (2010). Production of recombinant proteins from protozoan parasites. *Trends in Parasitology* 26, 244–254.

Fessel, W.J., Anderson, B., Follansbee, S.E., Winters, M. a, Lewis, S.T., Weinheimer, S.P., Petropoulos, C.J., and Shafer, R.W. (2011). The efficacy of an anti-CD4 monoclonal antibody for HIV-1 treatment. *Antiviral Research* 92, 484–487.

Flicek, P., Amode, M.R., Barrell, D., Beal, K., Brent, S., Chen, Y., Clapham, P., Coates, G., Fairley, S., Fitzgerald, S., et al. (2011). Ensembl 2011. *Nucleic Acids Research* 39, D800–6.

Foote, J., and Winter, G. (1992). Antibody framework residues affecting the conformation of the hypervariable loops. *Journal of Molecular Biology* 224, 487–499.

Fowkes, F.J.I., Richards, J.S., Simpson, J. a, and Beeson, J.G. (2010). The relationship between anti-merozoite antibodies and incidence of *Plasmodium falciparum* malaria: A systematic review and meta-analysis. *PLoS Medicine* 7, e1000218.

Gabison, E.E., Hoang-Xuan, T., Mauviel, A., and Menashi, S. (2005). EMMPRIN/CD147, an MMP modulator in cancer, development and tissue repair. *Biochimie* 87, 361–368.

Gallina, A., Hanley, T.M., Mandel, R., Trahey, M., Broder, C.C., Viglianti, G. a, and Ryser, H.J.-P. (2002). Inhibitors of protein-disulfide isomerase prevent cleavage of disulfide bonds in receptor-bound glycoprotein 120 and prevent HIV-1 entry. *The Journal of Biological Chemistry* 277, 50579–50588.

Garcia, C.R.S., De Azevedo, M.F., Wunderlich, G., Budu, A., Young, J. a, and Bannister, L. (2008). Plasmodium in the postgenomic era: new insights into the molecular cell biology of malaria parasites. *International Review of Cell and Molecular Biology* 266, 85–156.

Gardner, M.J., Hall, N., Fung, E., White, O., Berriman, M., Hyman, R.W., Carlton, J.M., Pain, A., Nelson, K.E., Bowman, S., et al. (2002). Genome sequence of the human malaria parasite Plasmodium falciparum. *Nature* 419, 498–511.

Geels, M.J., Imoukhuede, E.B., Imbault, N., Van Schooten, H., McWade, T., Troye-Blomberg, M., Dobbelaer, R., Craig, A.G., and Leroy, O. (2011). European Vaccine Initiative: lessons from developing malaria vaccines. *Expert Review of Vaccines* 10, 1697–1708.

Gerloff, D.L., Creasey, A., Maslau, S., and Carter, R. (2005). Structural models for the protein family characterized by gamete surface protein Pfs230 of Plasmodium falciparum. *Proceedings of the National Academy of Sciences of the United States of America* 102, 13598–13603.

Geyer, C.R., McCafferty, J., Dübel, S., Bradbury, A.R.M., and Sidhu, S.S. (2012). Recombinant antibodies and in vitro selection technologies. *Methods in Molecular Biology* (Clifton, N.J.) 901, 11–32.

Ghevaert, C., Herbert, N., Hawkins, L., Grehan, N., Cookson, P., Garner, S.F., Crisp-Hihn, A., Lloyd-Evans, P., Evans, A., Balan, K., et al. (2013). Recombinant HPA-1a antibody therapy for treatment of fetomaternal alloimmune thrombocytopenia: proof of principle in human volunteers. *Blood* 122, 313–320.

Ghevaert, C., Wilcox, D.A., Fang, J., Armour, K.L., Clark, M.R., Ouwehand, W.H., and Williamson, L.M. (2008). Developing recombinant HPA-1a-specific antibodies with abrogated Fc γ receptor binding for the treatment of fetomaternal alloimmune thrombocytopenia. *The Journal of Clinical Investigation* 118, 2929–2938.

Gilberger, T.-W., Thompson, J.K., Triglia, T., Good, R.T., Duraisingh, M.T., and Cowman, A.F. (2003). A novel erythrocyte binding antigen-175 parologue from Plasmodium falciparum defines a new trypsin-resistant receptor on human erythrocytes. *The Journal of Biological Chemistry* 278, 14480–14486.

Gilson, P.R., and Crabb, B.S. (2009). Morphology and kinetics of the three distinct phases of red blood cell invasion by Plasmodium falciparum merozoites. *International Journal for Parasitology* 39, 91–96.

Githui, E.K., Peterson, D.S., Aman, R. a, and Abdi, A.I. (2010). Prevalence of 5' insertion mutants and analysis of single nucleotide polymorphism in the erythrocyte binding-like 1 (eb1-1) gene in Kenyan Plasmodium falciparum field isolates. *Infection,*

Genetics and Evolution: Journal of Molecular Epidemiology and Evolutionary Genetics in Infectious Diseases 10, 834–839.

Goel, V.K., Li, X., Chen, H., Liu, S., Chishti, A.H., and Oh, S.S. (2003). Band 3 is a host receptor binding merozoite surface protein 1 during the Plasmodium falciparum invasion of erythrocytes. Proceedings of the National Academy of Sciences of the United States of America 100, 5164–5169.

Gonzales, N.R., De Pascalis, R., Schlom, J., and Kashmiri, S.V.S. (2005). Minimizing the immunogenicity of antibodies for clinical application. Tumour Biology : the Journal of the International Society for Oncodevelopmental Biology and Medicine 26, 31–43.

Gordon, D.M., McGovern, T.W., Krzych, U., Cohen, J.C., Schneider, I., LaChance, R., Heppner, D.G., Yuan, G., Hollingdale, M., and Slaoui, M. (1995). Safety, immunogenicity, and efficacy of a recombinantly produced Plasmodium falciparum circumsporozoite protein-hepatitis B surface antigen subunit vaccine. The Journal of Infectious Diseases 171, 1576–1585.

Gorman, S.D., and Clark, M.R. (1990). Humanisation of monoclonal antibodies for therapy. Seminars in Immunology 2, 457–466.

Gowda, D.C., and Davidson, E. (2000). Reply. Parasitology Today 16, 39–40.

Gowda, D.C., and Davidson, E. a (1999). Protein glycosylation in the malaria parasite. Parasitology Today (Personal Ed.) 15, 147–152.

Graham, F.L., Smiley, J., Russell, W.C., and Nairn, R. (1977). Characteristics of a human cell line transformed by DNA from human adenovirus type 5. The Journal of General Virology 36, 59–74.

Graves, P., and Gelband, H. (2006). Vaccines for preventing malaria (pre-erythrocytic). The Cochrane Database of Systematic Reviews CD006198.

Greenwood, B.M., and Targett, G. a T. (2011). Malaria vaccines and the new malaria agenda. Clinical Microbiology and Infection : the Official Publication of the European Society of Clinical Microbiology and Infectious Diseases 17, 1600–1607.

Greenwood, J., and Clark, M. (1993). Effector functions of matched sets of recombinant human IgG subclass antibodies. In Protein Engineering of Antibody Molecules for Prophylactic and Therapeutic Applications in Man, pp. 85–100.

Haase, S., Cabrera, A., Langer, C., Treeck, M., Struck, N., Herrmann, S., Jansen, P.W., Bruchhaus, I., Bachmann, A., Dias, S., et al. (2008). Characterization of a conserved rhoptry-associated leucine zipper-like protein in the malaria parasite Plasmodium falciparum. Infection and Immunity 76, 879–887.

Harris, P.K., Yeoh, S., Dluzewski, A.R., O'Donnell, R. a, Withers-Martinez, C., Hackett, F., Bannister, L.H., Mitchell, G.H., and Blackman, M.J. (2005). Molecular identification of a malaria merozoite surface sheddase. PLoS Pathogens 1, 241–251.

Harvey, K.L., Gilson, P.R., and Crabb, B.S. (2012). A model for the progression of receptor-ligand interactions during erythrocyte invasion by *Plasmodium falciparum*. *International Journal for Parasitology* 42, 567–573.

Hayakawa, T., Aki, I., Varki, A., Satta, Y., and Takahata, N. (2006). Fixation of the human-specific CMP-N-acetylneurameric acid hydroxylase pseudogene and implications of haplotype diversity for human evolution. *Genetics* 172, 1139–1146.

Hayton, K., Gaur, D., Liu, A., Takahashi, J., Henschen, B., Singh, S., Lambert, L., Furuya, T., Bouttenot, R., Doll, M., et al. (2008). Erythrocyte binding protein PfRH5 polymorphisms determine species-specific pathways of *Plasmodium falciparum* invasion. *Cell Host & Microbe* 4, 40–51.

He, B., Mao, C., Ru, B., Han, H., Zhou, P., and Huang, J. (2013). Epitope mapping of metuximab on CD147 using phage display and molecular docking. *Computational and Mathematical Methods in Medicine* 2013, 983829.

Helguera, G., Rodríguez, J.A., Luria-Pérez, R., Henery, S., Catterton, P., Bregni, C., George, T.C., Martínez-Maza, O., and Penichet, M.L. (2011). Visualization and quantification of cytotoxicity mediated by antibodies using imaging flow cytometry. *Journal of Immunological Methods* 368, 54–63.

Hernandez, A., Parmentier, J., Wang, Y., Cheng, J., and Bornstein, G.G. (2012). *Antibody Engineering* (Totowa, NJ: Humana Press).

Herold, K.C., Gitelman, S.E., Masharani, U., Hagopian, W., Bisikirska, B., Donaldson, D., Rother, K., Diamond, B., Harlan, D.M., and Bluestone, J.A. (2005). A single course of anti-CD3 monoclonal antibody hOKT3gamma1(Ala-Ala) results in improvement in C-peptide responses and clinical parameters for at least 2 years after onset of type 1 diabetes. *Diabetes* 54, 1763–1769.

Heslop, H.E., Benaim, E., Brenner, M.K., Krance, R. a, Stricklin, L.M., Rochester, R.J., and Billing, R. (1995). Response of steroid-resistant graft-versus-host disease to lymphoblast antibody CBL1. *Lancet* 346, 805–806.

Hezareh, M., Hessell, A.N.N.J., Jensen, R.C., and J, J.A.N.G. (2001). Effector Function Activities of a Panel of Mutants of a Broadly Neutralizing Antibody against Human Immunodeficiency Virus Type 1. *Society* 75, 12161–12168.

Hill, A.V.S. (2011). Vaccines against malaria. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences* 366, 2806–2814.

Hirsch, A.J., Medigeshi, G.R., Meyers, H.L., DeFilippis, V., Früh, K., Briese, T., Lipkin, W.I., and Nelson, J.A. (2005). The Src family kinase c-Yes is required for maturation of West Nile virus particles. *Journal of Virology* 79, 11943–11951.

Hirsch, M.S., Brun-Vézinet, F., Clotet, B., Conway, B., Kuritzkes, D.R., D'Aquila, R.T., Demeter, L.M., Hammer, S.M., Johnson, V.A., Loveday, C., et al. (2003). Antiretroviral drug resistance testing in adults infected with human immunodeficiency virus type 1: 2003 recommendations of an International AIDS Society-USA Panel.

Clinical Infectious Diseases: an Official Publication of the Infectious Diseases Society of America 37, 113–128.

Ho, M., and Pastan, I. (2009). In vitro antibody affinity maturation targeting germline hotspots. *Methods in Molecular Biology* (Clifton, N.J.) 525, 293–308, xiv.

Hodder, A.N., Czabotar, P.E., Ubaldi, A.D., Clarke, O.B., Lin, C.S., Healer, J., Smith, B.J., and Cowman, A.F. (2012). Insights into Duffy binding-like domains through the crystal structure and function of the merozoite surface protein MSPDBL2 from *Plasmodium falciparum*. *The Journal of Biological Chemistry* 287, 32922–32939.

Hoffman, S.L., Goh, L.M.L., Luke, T.C., Schneider, I., Le, T.P., Doolan, D.L., Sacci, J., De la Vega, P., Dowler, M., Paul, C., et al. (2002). Protection of humans against malaria by immunization with radiation-attenuated *Plasmodium falciparum* sporozoites. *The Journal of Infectious Diseases* 185, 1155–1164.

Hoffman, T.L., Canziani, G., Jia, L., Rucker, J., and Doms, R.W. (2000). A biosensor assay for studying ligand-membrane receptor interactions: binding of antibodies and HIV-1 Env to chemokine receptors. *Proceedings of the National Academy of Sciences of the United States of America* 97, 11215–11220.

Hogarth, P.M., and Pietersz, G. a (2012). Fc receptor-targeted therapies for the treatment of inflammation, cancer and beyond. *Nature Reviews. Drug Discovery* 11, 311–331.

Holliger, P., and Hudson, P. (2005). Engineered antibody fragments and the rise of single domains. *Nature Biotechnology* 23, 1126–1136.

Hoogenboom, H.R. (2005). Selecting and screening recombinant antibody libraries. *Nature Biotechnology* 23, 1105–1116.

Howell, S. a, Withers-Martinez, C., Kocken, C.H., Thomas, a W., and Blackman, M.J. (2001). Proteolytic processing and primary structure of *Plasmodium falciparum* apical membrane antigen-1. *The Journal of Biological Chemistry* 276, 31311–31320.

Hu, G., Cabrera, A., Kono, M., Mok, S., Chaal, B.K., Haase, S., Engelberg, K., Cheemadan, S., Spielmann, T., Preiser, P.R., et al. (2010). Transcriptional profiling of growth perturbations of the human malaria parasite *Plasmodium falciparum*. *Nature Biotechnology* 28, 91–98.

Hwang, W.Y.K., and Foote, J. (2005). Immunogenicity of engineered antibodies. *Methods* (San Diego, Calif.) 36, 3–10.

Iacono, K.T., Brown, A.L., Greene, M.I., and Saouaf, S.J. (2007). CD147 immunoglobulin superfamily receptor function and role in pathology. *Experimental and Molecular Pathology* 83, 283–295.

Idusogie, E.E., Presta, L.G., Gazzano-Santoro, H., Totpal, K., Wong, P.Y., Ultsch, M., Meng, Y.G., and Mulkerrin, M.G. (2000). Mapping of the C1q binding site on

rituxan, a chimeric antibody with a human IgG1 Fc. *Journal of Immunology* (Baltimore, Md.: 1950) **164**, 4178–4184.

Igakura, T., Kadomatsu, K., Kaname, T., Muramatsu, H., Fan, Q.W., Miyauchi, T., Toyama, Y., Kuno, N., Yuasa, S., Takahashi, M., et al. (1998). A null mutation in basigin, an immunoglobulin superfamily member, indicates its important roles in peri-implantation development and spermatogenesis. *Developmental Biology* **194**, 152–165.

Iyer, J., Grüner, A.C., Rénia, L., Snounou, G., and Preiser, P.R. (2007). Invasion of host cells by malaria parasites: a tale of two protein families. *Molecular Microbiology* **65**, 231–249.

Jacobson, J.M., Lalezari, J.P., Thompson, M. a, Fichtenbaum, C.J., Saag, M.S., Zingman, B.S., D'Ambrosio, P., Stambler, N., Rotshteyn, Y., Marozsan, A.J., et al. (2010). Phase 2a study of the CCR5 monoclonal antibody PRO 140 administered intravenously to HIV-infected adults. *Antimicrobial Agents and Chemotherapy* **54**, 4137–4142.

Jakobovits, A., Amado, R.G., Yang, X., Roskos, L., and Schwab, G. (2007). From XenoMouse technology to panitumumab, the first fully human antibody product from transgenic mice. *Nature Biotechnology* **25**, 1134–1143.

Jalah, R., Sarin, R., Sud, N., Alam, M.T., Parikh, N., Das, T.K., and Sharma, Y.D. (2005). Identification, expression, localization and serological characterization of a tryptophan-rich antigen from the human malaria parasite *Plasmodium vivax*. *Molecular and Biochemical Parasitology* **142**, 158–169.

Jefferis, R. (2009). Glycosylation as a strategy to improve antibody-based therapeutics. *Nature Reviews. Drug Discovery* **8**, 226–234.

Jiménez-Díaz, M.B., Mulet, T., Viera, S., Gómez, V., Garuti, H., Ibáñez, J., Alvarez-Doval, A., Shultz, L.D., Martínez, A., Gargallo-Viola, D., et al. (2009). Improved murine model of malaria using *Plasmodium falciparum* competent strains and non-myelodepleted NOD-scid IL2Rgamma^{-/-} mice engrafted with human erythrocytes. *Antimicrobial Agents and Chemotherapy* **53**, 4533–4536.

Jones, P.T., Dear, P.H., Foote, J., Neuberger, M.S., and Winter, G. (1986). Replacing the complementarity-determining regions in a human antibody with those from a mouse. *Nature* **321**, 522–525.

Kabat, E.A., Wu, T.T., Perry, H.M., Gottesman, K.S., and Foeller, C. (1991). Sequences of Proteins of Immunological Interest (United States Public Health Service, National Institutes of Health, Bethesda).

Kadekoppala, M., and Holder, A. a (2010). Merozoite surface proteins of the malaria parasite: the MSP1 complex and the MSP7 family. *International Journal for Parasitology* **40**, 1155–1161.

Kadekoppala, M., O'Donnell, R. a, Grainger, M., Crabb, B.S., and Holder, A. a (2008). Deletion of the *Plasmodium falciparum* merozoite surface protein 7 gene impairs parasite invasion of erythrocytes. *Eukaryotic Cell* 7, 2123–2132.

Kadekoppala, M., Ogun, S. a, Howell, S., Gunaratne, R.S., and Holder, A. a (2010). Systematic genetic analysis of the *Plasmodium falciparum* MSP7-like family reveals differences in protein expression, location, and importance in asexual growth of the blood-stage parasite. *Eukaryotic Cell* 9, 1064–1074.

Kalunian, K.C., Davis, J.C., Merrill, J.T., Totoritis, M.C., and Wofsy, D. (2002). Treatment of systemic lupus erythematosus by inhibition of T cell costimulation with anti-CD154: a randomized, double-blind, placebo-controlled trial. *Arthritis and Rheumatism* 46, 3251–3258.

Kanekura, T., Miyauchi, T., Tashiro, M., and Muramatsu, T. (1991). Basigin, a new member of the immunoglobulin superfamily: genes in different mammalian species, glycosylation changes in the molecule from adult organs and possible variation in the N-terminal sequences. *Cell Structure and Function* 16, 23–30.

Karu, A.E., Bell, C.W., and Chin, T.E. (1995). Recombinant Antibody Technology. *ILAR Journal* 37, 132–141.

Kashmiri, S.V.S., De Pascalis, R., Gonzales, N.R., and Schlom, J. (2005). SDR grafting--a new approach to antibody humanization. *Methods (San Diego, Calif.)* 36, 25–34.

Kats, L.M., Black, C.G., Proellocks, N.I., and Coppel, R.L. (2006). *Plasmodium* rhoptries: how things went pear-shaped. *Trends in Parasitology* 22, 269–276.

Kim, G.G., Donnenberg, V.S., Donnenberg, A.D., Gooding, W., and Whiteside, T.L. (2007). A novel multiparametric flow cytometry-based cytotoxicity assay simultaneously immunophenotypes effector cells: comparisons to a 4 h ^{51}Cr -release assay. *Journal of Immunological Methods* 325, 51–66.

Kim, S.J., and Hong, H.J. (2012). Humanization by guided selections. *Methods in Molecular Biology (Clifton, N.J.)* 907, 237–257.

Kimura, E.A., Katzin, A.M., and Couto, A.S. (2000). More on protein glycosylation in the malaria parasite. *Parasitology Today* 16, 38–40.

Koch, C., Staffler, G., Huttinger, R., Hilgert, I., Prager, E., Cerny, J., Steinlein, P., Majdic, O., Horejsi, V., and Stockinger, H. (1999). T cell activation-associated epitopes of CD147 in regulation of the T cell response, and their definition by antibody affinity and antigen density. *International Immunology* 11, 777.

Köhler, G., and Milstein, C. (1975). Continuous cultures of fused cells secreting antibody of predefined specificity. *Nature* 256, 495–497.

Korzeniewski, C., and Callewaert, D.M. (1983). An enzyme-release assay for natural cytotoxicity. *Journal of Immunological Methods* 64, 313–320.

Koussis, K., Withers-Martinez, C., Yeoh, S., Child, M., Hackett, F., Knuepfer, E., Juliano, L., Woehlbier, U., Bujard, H., and Blackman, M.J. (2009). A multifunctional serine protease primes the malaria parasite for red blood cell invasion. *The EMBO Journal* 28, 725–735.

Kromenaker, S.J., and Srienc, F. (1994). Stability of producer hybridoma cell lines after cell sorting: a case study. *Biotechnology Progress* 10, 299–307.

Labrijn, A.F., Meesters, J.I., De Goeij, B.E.C.G., Van den Bremer, E.T.J., Neijssen, J., Van Kampen, M.D., Strumane, K., Verploegen, S., Kundu, A., Gramer, M.J., et al. (2013). Efficient generation of stable bispecific IgG1 by controlled Fab-arm exchange. *Proceedings of the National Academy of Sciences of the United States of America* 110, 5145–5150.

Larkin, M.A., Blackshields, G., Brown, N.P., Chenna, R., McGettigan, P.A., McWilliam, H., Valentin, F., Wallace, I.M., Wilm, A., Lopez, R., et al. (2007). Clustal W and Clustal X version 2.0. *Bioinformatics* (Oxford, England) 23, 2947–2948.

Lee-MacAry, A.E., Ross, E.L., Davies, D., Taylor, R., Honeychurch, J., Glennie, M.J., Snary, D., and Wilkinson, R.W. (2001). Development of a novel flow cytometric cell-mediated cytotoxicity assay using the fluorophores PKH-26 and TO-PRO-3 iodide. *Journal of Immunological Methods* 252, 83–92.

Leykauf, K., Treeck, M., Gilson, P.R., Nebl, T., Braulke, T., Cowman, A.F., Gilberger, T.W., and Crabb, B.S. (2010). Protein kinase a dependent phosphorylation of apical membrane antigen 1 plays an important role in erythrocyte invasion by the malaria parasite. *PLoS Pathogens* 6, e1000941.

Li, J., Matsuoka, H., Mitamura, T., and Horii, T. (2002). Characterization of proteases involved in the processing of Plasmodium falciparum serine repeat antigen (SERA). *Molecular and Biochemical Parasitology* 120, 177–186.

Liao, C.-G., Kong, L.-M., Song, F., Xing, J.-L., Wang, L.-X., Sun, Z.-J., Tang, H., Yao, H., Zhang, Y., Wang, L., et al. (2011a). Characterization of basigin isoforms and the inhibitory function of basigin-3 in human hepatocellular carcinoma proliferation and invasion. *Molecular and Cellular Biology* 31, 2591–2604.

Liao, H.-X., Chen, X., Munshaw, S., Zhang, R., Marshall, D.J., Vandergrift, N., Whitesides, J.F., Lu, X., Yu, J.-S., Hwang, K.-K., et al. (2011b). Initial antibodies binding to HIV-1 gp41 in acutely infected subjects are polyreactive and highly mutated. *The Journal of Experimental Medicine* 208, 2237–2249.

Liao, H.-X., Lynch, R., Zhou, T., Gao, F., Alam, S.M., Boyd, S.D., Fire, A.Z., Roskin, K.M., Schramm, C. a., Zhang, Z., et al. (2013). Co-evolution of a broadly neutralizing HIV-1 antibody and founder virus. *Nature* 496, 469–476.

Lieberman-Blum, S.S., Fung, H.B., and Bandres, J.C. (2008). Maraviroc: a CCR5-receptor antagonist for the treatment of HIV-1 infection. *Clinical Therapeutics* 30, 1228–1250.

- Lindenmann, J. (1984). Origin of the terms “antibody” and “antigen”. Scandinavian Journal of Immunology 19, 281–285.
- Lo, B.K.C. (2004). Antibody humanization by CDR grafting. Methods in Molecular Biology (Clifton, N.J.) 248, 135–159.
- Lobo, C.-A., Rodriguez, M., Reid, M., and Lustigman, S. (2003). Glycophorin C is the receptor for the Plasmodium falciparum erythrocyte binding ligand PfEBP-2 (baebl). Blood 101, 4628–4631.
- Lonberg, N. (2005). Human antibodies from transgenic animals. Nature Biotechnology 23, 1117–1125.
- Lopaticki, S., Maier, A.G., Thompson, J., Wilson, D.W., Tham, W.-H., Triglia, T., Gout, A., Speed, T.P., Beeson, J.G., Healer, J., et al. (2011). Reticulocyte and erythrocyte binding-like proteins function cooperatively in invasion of human erythrocytes by malaria parasites. Infection and Immunity 79, 1107–1117.
- Lux, A., and Nimmerjahn, F. (2013). Of mice and men: the need for humanized mouse models to study human IgG activity in vivo. Journal of Clinical Immunology 33 Suppl 1, S4–8.
- Macmillan, M.L., Couriel, D., Weisdorf, D.J., Schwab, G., Havrilla, N., Fleming, T.R., Huang, S., Roskos, L., Slavin, S., Shadduck, R.K., et al. (2007). A phase 2/3 multicenter randomized clinical trial of ABX-CBL versus ATG as secondary therapy for steroid-resistant acute graft-versus-host disease. Blood 109, 2657–2662.
- Magliocca, J.F., and Knechtle, S.J. (2006). The evolving role of alemtuzumab (Campath-1H) for immunosuppressive therapy in organ transplantation. Transplant International : Official Journal of the European Society for Organ Transplantation 19, 705–714.
- Maier, A.G., Baum, J., Smith, B., Conway, D.J., and Cowman, A.F. (2009). Polymorphisms in erythrocyte binding antigens 140 and 181 affect function and binding but not receptor specificity in Plasmodium falciparum. Infection and Immunity 77, 1689–1699.
- Maier, A.G., Duraisingh, M.T., Reeder, J.C., Patel, S.S., Kazura, J.W., Zimmerman, P. a, and Cowman, A.F. (2003). Plasmodium falciparum erythrocyte invasion through glycophorin C and selection for Gerbich negativity in human populations. Nature Medicine 9, 87–92.
- Male, D., Brostoff, J., Roth, D., and Roitt, I. (2006). Essential immunology.
- Manske, M., Miotto, O., Campino, S., Auburn, S., Almagro-Garcia, J., Maslen, G., O'Brien, J., Djimde, A., Doumbo, O., Zongo, I., et al. (2012). Analysis of Plasmodium falciparum diversity in natural infections by deep sequencing. Nature 487, 375–379.
- De Marco, A. (2009). Strategies for successful recombinant expression of disulfide bond-dependent proteins in Escherichia coli. Microbial Cell Factories 8, 26.

Markovic, I., Stantchev, T.S., Fields, K.H., Tiffany, L.J., Tomić, M., Weiss, C.D., Broder, C.C., Strelbel, K., and Clouse, K. a (2004). Thiol/disulfide exchange is a prerequisite for CXCR4-tropic HIV-1 envelope-mediated T-cell fusion during viral entry. *Blood* *103*, 1586–1594.

Marsh, K., and Kinyanjui, S. (2006). Immune effector mechanisms in malaria. *Parasite Immunology* *28*, 51–60.

Martin, M.J., Rayner, J.C., Gagneux, P., Barnwell, J.W., and Varki, A. (2005). Evolution of human-chimpanzee differences in malaria susceptibility: relationship to human genetic loss of N-glycolylneuraminic acid. *Proceedings of the National Academy of Sciences of the United States of America* *102*, 12819–12824.

Marvin, J.S., and Zhu, Z. (2005). Recombinant approaches to IgG-like bispecific antibodies. *26*, 649–658.

Mason, D.W., and Williams, a F. (1980). The kinetics of antibody binding to membrane antigens in solution and at the cell surface. *The Biochemical Journal* *187*, 1–20.

Massie, B., Couture, F., Lamoureux, L., Mosser, D.D., Guilbault, C., Jolicoeur, P., Bélanger, F., and Langelier, Y. (1998). Inducible overexpression of a toxic protein by an adenovirus vector with a tetracycline-regulatable expression cassette. *Journal of Virology* *72*, 2289–2296.

Mayer, D.C.G., Cofie, J., Jiang, L., Hartl, D.L., Tracy, E., Kabat, J., Mendoza, L.H., and Miller, L.H. (2009). Glycophorin B is the erythrocyte receptor of Plasmodium falciparum erythrocyte-binding ligand, EBL-1. *Proceedings of the National Academy of Sciences of the United States of America* *106*, 5348–5352.

Mayer, D.C.G., Mu, J.-B., Feng, X., Su, X. -z., and Miller, L.H. (2002). Polymorphism in a Plasmodium falciparum Erythrocyte-binding Ligand Changes Its Receptor Specificity. *Journal of Experimental Medicine* *196*, 1523–1528.

Mayer, D.C.G., Mu, J.-B., Kaneko, O., Duan, J., Su, X., and Miller, L.H. (2004). Polymorphism in the Plasmodium falciparum erythrocyte-binding ligand JESEBL/EBA-181 alters its receptor specificity. *Proceedings of the National Academy of Sciences of the United States of America* *101*, 2518–2523.

McConkey, S.J., Reece, W.H.H., Moorthy, V.S., Webster, D., Dunachie, S., Butcher, G., Vuola, J.M., Blanchard, T.J., Gothard, P., Watkins, K., et al. (2003). Enhanced T-cell immunogenicity of plasmid DNA vaccines boosted by recombinant modified vaccinia virus Ankara in humans. *Nature Medicine* *9*, 729–735.

McCoubrie, J.E., Miller, S.K., Sargeant, T., Good, R.T., Hodder, A.N., Speed, T.P., De Koning-Ward, T.F., and Crabb, B.S. (2007). Evidence for a common role for the serine-type Plasmodium falciparum serine repeat antigen proteases: implications for vaccine and drug design. *Infection and Immunity* *75*, 5565–5574.

McGregor, I., Carrington, S., and Cohen, S. (1963). Treatment of east african *P. falciparum* malaria with west african human γ -globulin. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 57, 170–175.

Mehlin, C., Boni, E., Buckner, F.S., Engel, L., Feist, T., Gelb, M.H., Haji, L., Kim, D., Liu, C., Mueller, N., et al. (2006). Heterologous expression of proteins from *Plasmodium falciparum*: results from 1000 genes. *Molecular and Biochemical Parasitology* 148, 144–160.

Meissner, P., Pick, H., Kulangara, a, Chatellard, P., Friedrich, K., and Wurm, F.M. (2001). Transient gene expression: recombinant protein production with suspension-adapted HEK293-EBNA cells. *Biotechnology and Bioengineering* 75, 197–203.

Mezghrani, A., Courageot, J., Mani, J.C., Pugniere, M., Bastiani, P., and Miquelis, R. (2000). Protein-disulfide isomerase (PDI) in FRTL5 cells. pH-dependent thyroglobulin/PDI interactions determine a novel PDI function in the post-endoplasmic reticulum of thyrocytes. *The Journal of Biological Chemistry* 275, 1920–1929.

Miller, L.H., Ackerman, H.C., Su, X.-Z., and Wellem, T.E. (2013). Malaria biology and disease pathogenesis: insights for new treatments. *Nature Medicine* 19, 156–167.

Miller, L.H., Baruch, D.I., Marsh, K., and Doumbo, O.K. (2002a). The pathogenic basis of malaria. *Nature* 415, 673–679.

Miller, L.H., Hudson, D., Rener, J., Taylor, D., Hadley, T.J., and Zilberstein, D. (1983). A monoclonal antibody to rhesus erythrocyte band 3 inhibits invasion by malaria (*Plasmodium knowlesi*) merozoites. *The Journal of Clinical Investigation* 72, 1357–1364.

Miller, S.K., Good, R.T., Drew, D.R., Delorenzi, M., Sanders, P.R., Hodder, A.N., Speed, T.P., Cowman, A.F., De Koning-Ward, T.F., and Crabb, B.S. (2002b). A subset of *Plasmodium falciparum* SERA genes are expressed and appear to play an important role in the erythrocytic cycle. *The Journal of Biological Chemistry* 277, 47524–47532.

Milstein, C., and Cuello, A.C. (1983). Hybrid hybridomas and their use in immunohistochemistry. *Nature* 305, 537–540.

Moorthy, V.S., Hutubessy, R., Newman, R.D., and Hombach, J. (2012). Decision-making on malaria vaccine introduction: the role of cost-effectiveness analyses. *Bulletin of the World Health Organization* 90, 864–866.

Morahan, B.J., Wang, L., and Coppel, R.L. (2008). No TRAP , no invasion. *Trends in Parasitology* 77–84.

Moran, N. (2013). Mouse platforms jostle for slice of humanized antibody market. *Nature Biotechnology* 31, 267–268.

Morgan, A., Jones, N., Nesbitt, A., and Chaplin, L. (1995). The N-terminal end of the CH2 domain of chimeric human IgG1 anti-HLA-DR is necessary for Clq, Fc_YRI and Fc_YRIII binding. *Immunology* 86, 319–324.

Morita, M., Kuba, K., Ichikawa, A., Nakayama, M., Katahira, J., Iwamoto, R., Watanebe, T., Sakabe, S., Daidoji, T., Nakamura, S., et al. (2013). The lipid mediator protectin D1 inhibits influenza virus replication and improves severe influenza. *Cell* 153, 112–125.

Morrison, S.L. (2007). Two heads are better than one. *Nature Biotechnology* 25, 1233–1234.

Morrison, S.L., Johnson, M.J., Herzenberg, L.A., and Oi, V.T. (1984). Chimeric human antibody molecules: mouse antigen-binding domains with human constant region domains. *Proceedings of the National Academy of Sciences of the United States of America* 81, 6851–6855.

Muchmore, E.A., Diaz, S., and Varki, A. (1998). A structural difference between the cell surfaces of humans and the great apes. *American Journal of Physical Anthropology* 107, 187–198.

Muralidharan, V., Oksman, A., Pal, P., Lindquist, S., and Goldberg, D.E. (2012). Plasmodium falciparum heat shock protein 110 stabilizes the asparagine repeat-rich parasite proteome during malarial fevers. *Nature Communications* 3, 1310.

Muramatsu, T., and Miyauchi, T. (2003). Basigin (CD147): a multifunctional transmembrane protein involved in reproduction, neural function, inflammation and tumor invasion. *Histology and Histopathology* 18, 981–987.

Murray, C.J.L., Rosenfeld, L.C., Lim, S.S., Andrews, K.G., Foreman, K.J., Haring, D., Fullman, N., Naghavi, M., Lozano, R., and Lopez, A.D. (2012). Global malaria mortality between 1980 and 2010: a systematic analysis. *Lancet* 379, 413–431.

Naglich, J.G., Metherall, J.E., Russell, D.W., and Eidels, L. (1992). Expression cloning of a diphtheria toxin receptor: identity with a heparin-binding EGF-like growth factor precursor. *Cell* 69, 1051–1061.

Nelson, A.L., Dhimolea, E., and Reichert, J.M. (2010). Development trends for human monoclonal antibody therapeutics. *Nature Reviews. Drug Discovery* 9, 767–774.

Nikodem, D., and Davidson, E. (2000). Identification of a novel antigenic domain of Plasmodium falciparum merozoite surface protein-1 that specifically binds to human erythrocytes and inhibits parasite invasion, *in vitro*. *Molecular and Biochemical Parasitology* 108, 79–91.

Nimmerjahn, F., and Ravetch, J.V. (2006). Fc_γ receptors: old friends and new family members. *Immunity* 24, 19–28.

Nimmerjahn, F., and Ravetch, J. V (2008). Fcgamma receptors as regulators of immune responses. *Nature Reviews Immunology* 8, 34–47.

Ntumngia, F.B., Bahamontes-Rosa, N., and Kun, J.F.J. (2005). Genes coding for tryptophan-rich proteins are transcribed throughout the asexual cycle of *Plasmodium falciparum*. *Parasitology Research* 96, 347–353.

Ntumngia, F.B., Bouyou-Akotet, M.K., Uhlemann, A.-C., Mordmüller, B., Kremsner, P.G., and Kun, J.F.J. (2004). Characterisation of a tryptophan-rich *Plasmodium falciparum* antigen associated with merozoites. *Molecular and Biochemical Parasitology* 137, 349–353.

Nussenzweig, R.S., Vanderberg, J., Most, H., and Orton, C. (1967). Protective immunity produced by the injection of x-irradiated sporozoites of plasmodium berghei. *Nature* 216, 160–162.

Ogutu, B.R., Apollo, O.J., McKinney, D., Okoth, W., Siangla, J., Dubovsky, F., Tucker, K., Waitumbi, J.N., Diggs, C., Wittes, J., et al. (2009). Blood stage malaria vaccine eliciting high antigen-specific antibody concentrations confers no protection to young children in Western Kenya. *PloS One* 4, e4708.

Ogwang, C., Afolabi, M., Kimani, D., Jagne, Y.J., Sheehy, S.H., Bliss, C.M., Duncan, C.J.A., Collins, K.A., Garcia Knight, M.A., Kimani, E., et al. (2013). Safety and immunogenicity of heterologous prime-boost immunisation with *Plasmodium falciparum* malaria candidate vaccines, ChAd63 ME-TRAP and MVA ME-TRAP, in healthy Gambian and Kenyan adults. *PloS One* 8, e57726.

Okech, B., Mujuzi, G., Ogwal, A., Shirai, H., Horii, T., and Egwang, T.G. (2006). High titers of IgG antibodies against *Plasmodium falciparum* serine repeat antigen 5 (SERA5) are associated with protection against severe malaria in Ugandan children. *The American Journal of Tropical Medicine and Hygiene* 74, 191–197.

Olson, M. V, and Varki, A. (2003). Sequencing the chimpanzee genome: insights into human evolution and disease. *Nature Reviews Genetics* 4, 20–28.

Otz, T. (2010). *Antibody Engineering* (Berlin, Heidelberg: Springer Berlin Heidelberg).

Outchkourov, N.S., Roeffen, W., Kaan, A., Jansen, J., Luty, A., Schuiffel, D., Van Gemert, G.J., Van de Vegte-Bolmer, M., Sauerwein, R.W., and Stunnenberg, H.G. (2008). Correctly folded Pfs48/45 protein of *Plasmodium falciparum* elicits malaria transmission-blocking immunity in mice. *Proceedings of the National Academy of Sciences of the United States of America* 105, 4301–4305.

Padlan, E.A. (1994). Anatomy of the antibody molecule. *Molecular Immunology* 31, 169–217.

Padlan, E.A., Abergel, C., and Tipper, J.P. (1995). Identification of specificity-determining residues in antibodies. *FASEB Journal: Official Publication of the Federation of American Societies for Experimental Biology* 9, 133–139.

- Pasini, E.M., Kirkegaard, M., Mortensen, P., Lutz, H.U., Thomas, A.W., and Mann, M. (2006). In-depth analysis of the membrane and cytosolic proteome of red blood cells. *Blood* 108, 791–801.
- Perkins, M.E., and Rocco, L.J. (1988). Sialic acid-dependent binding of Plasmodium falciparum merozoite surface antigen, Pf200, to human erythrocytes. *Journal of Immunology* (Baltimore, Md. : 1950) 141, 3190–3196.
- Peterson, N.C. (2005). Advances in monoclonal antibody technology: genetic engineering of mice, cells, and immunoglobulins. *ILAR Journal / National Research Council, Institute of Laboratory Animal Resources* 46, 314–319.
- Phyo, A.P., Nkhoma, S., Stepniewska, K., Ashley, E. a, Nair, S., McGready, R., Ier Moo, C., Al-Saai, S., Dondorp, A.M., Lwin, K.M., et al. (2012). Emergence of artemisinin-resistant malaria on the western border of Thailand: a longitudinal study. *Lancet* 379, 1960–1966.
- Pinder, J., Fowler, R., Bannister, L., Dluzewski, A., and Mitchell, G.H. (2000). Motile systems in malaria merozoites: how is the red blood cell invaded? *Parasitology Today* 16, 240–245.
- Plassmeyer, M.L., Reiter, K., Shimp, R.L., Kotova, S., Smith, P.D., Hurt, D.E., House, B., Zou, X., Zhang, Y., Hickman, M., et al. (2009). Structure of the Plasmodium falciparum circumsporozoite protein, a leading malaria vaccine candidate. *The Journal of Biological Chemistry* 284, 26951–26963.
- Pleschka, S., Wolff, T., Ehrhardt, C., Hobom, G., Planz, O., Rapp, U.R., and Ludwig, S. (2001). Influenza virus propagation is impaired by inhibition of the Raf/MEK/ERK signalling cascade. *Nature Cell Biology* 3, 301–305.
- Prudêncio, M., Rodriguez, A., and Mota, M.M. (2006). The silent path to thousands of merozoites: the Plasmodium liver stage. *Nature Reviews. Microbiology* 4, 849–856.
- Prussia, A., Thepchatri, P., Snyder, J.P., and Plemper, R.K. (2011). Systematic Approaches towards the Development of Host-Directed Antiviral Therapeutics. *International Journal of Molecular Sciences* 12, 4027–4052.
- Puig, O., Caspary, F., Rigaut, G., Rutz, B., Bouveret, E., Bragado-Nilsson, E., Wilm, M., and Séraphin, B. (2001). The tandem affinity purification (TAP) method: a general procedure of protein complex purification. *Methods (San Diego, Calif.)* 24, 218–229.
- Qu, Z., Griffiths, G.L., Wegener, W.A., Chang, C.-H., Govindan, S. V, Horak, I.D., Hansen, H.J., and Goldenberg, D.M. (2005). Development of humanized antibodies as cancer therapeutics. *Methods (San Diego, Calif.)* 36, 84–95.
- Rasmussen, S.K., Næsted, H., Müller, C., Tolstrup, A.B., and Frandsen, T.P. (2012). Recombinant antibody mixtures: production strategies and cost considerations. *Archives of Biochemistry and Biophysics* 526, 139–145.

Rayner, J.C., Huber, C.S., and Barnwell, J.W. (2004). Conservation and divergence in erythrocyte invasion ligands: *Plasmodium reichenowi* EBL genes. *Molecular and Biochemical Parasitology* 138, 243–247.

Rayner, J.C., Liu, W., Peeters, M., Sharp, P.M., and Hahn, B.H. (2011). A plethora of *Plasmodium* species in wild apes: a source of human infection? *Trends in Parasitology* 27, 222–229.

Rayner, J.C., Vargas-Serrato, E., Huber, C.S., Galinski, M.R., and Barnwell, J.W. (2001). A *Plasmodium falciparum* homologue of *Plasmodium vivax* reticulocyte binding protein (PvRBP1) defines a trypsin-resistant erythrocyte invasion pathway. *The Journal of Experimental Medicine* 194, 1571–1581.

Reddy, K.S., Pandey, A.K., Singh, H., Sahar, T., Emmanuel, A., Chitnis, C.E., Chauhan, V.S., and Gaur, D. (2013). A bacterially expressed full-length recombinant *Plasmodium falciparum* RH5 protein binds erythrocytes and elicits potent strain-transcending parasite neutralizing antibodies. *Infection and Immunity*.

Reeves, P.M., Bommarius, B., Lebeis, S., McNulty, S., Christensen, J., Swimm, A., Chahroudi, A., Chavan, R., Feinberg, M.B., Veach, D., et al. (2005). Disabling poxvirus pathogenesis by inhibition of Abl-family tyrosine kinases. *Nature Medicine* 11, 731–739.

Regules, J.A., Cummings, J.F., and Ockenhouse, C.F. (2011). The RTS,S vaccine candidate for malaria. *Expert Review of Vaccines* 10, 589–599.

Reichert, J.M. (2010). Metrics for antibody therapeutics development. *mAbs* 2, 695–700.

Reichert, J.M., Rosensweig, C.J., Faden, L.B., and Dewitz, M.C. (2005). Monoclonal antibody successes in the clinic. *Nature Biotechnology* 23, 1073–1078.

Richard, D., MacRaild, C.A., Riglar, D.T., Chan, J.-A., Foley, M., Baum, J., Ralph, S. a, Norton, R.S., and Cowman, A.F. (2010). Interaction between *Plasmodium falciparum* apical membrane antigen 1 and the rhoptry neck protein complex defines a key step in the erythrocyte invasion process of malaria parasites. *The Journal of Biological Chemistry* 285, 14815–14822.

Richards, J.S., and Beeson, J.G. (2009). The future for blood-stage vaccines against malaria. *Immunology and Cell Biology* 87, 377–390.

Riechmann, L., Clark, M., Waldmann, H., and Winter, G. (1988). Reshaping human antibodies for therapy. *Nature* 332, 323–327.

Rigaut, G., Shevchenko, A., Rutz, B., Wilm, M., Mann, M., and Séraphin, B. (1999). A generic protein purification method for protein complex characterization and proteome exploration. *Nature Biotechnology* 17, 1030–1032.

Riglar, D.T., Richard, D., Wilson, D.W., Boyle, M.J., Dekiwadia, C., Turnbull, L., Angrisano, F., Marapana, D.S., Rogers, K.L., Whitchurch, C.B., et al. (2011). Super-

resolution dissection of coordinated events during malaria parasite invasion of the human erythrocyte. *Cell Host & Microbe* 9, 9–20.

Riley, E.M., and Stewart, V.A. (2013). Immune mechanisms in malaria: new insights in vaccine development. *Nature Medicine* 19, 168–178.

Rodriguez, M., Lustigman, S., Montero, E., Oksov, Y., and Lobo, C.A. (2008). PfRH5: a novel reticulocyte-binding family homolog of plasmodium falciparum that binds to the erythrocyte, and an investigation of its receptor. *PloS One* 3, e3300.

Roestenberg, M., McCall, M., Hopman, J., Wiersma, J., Luty, A.J.F., Van Gemert, G.J., Van de Vegte-Bolmer, M., Van Schaijk, B., Teelen, K., Arens, T., et al. (2009). Protection against a malaria challenge by sporozoite inoculation. *The New England Journal of Medicine* 361, 468–477.

Ruecker, A., Shea, M., Hackett, F., Suarez, C., Hirst, E.M. a, Milutinovic, K., Withers-Martinez, C., and Blackman, M.J. (2012). Proteolytic Activation of the Essential Parasitophorous Vacuole Cysteine Protease SERA6 Accompanies Malaria Parasite Egress from Its Host Erythrocyte. *The Journal of Biological Chemistry* 287, 37949–37963.

Ryczyn, M.A., Reilly, S.C., O'Malley, K., and Clevenger, C. V (2000). Role of cyclophilin B in prolactin signal transduction and nuclear retrotranslocation. *Molecular Endocrinology (Baltimore, Md.)* 14, 1175–1186.

Sabchareon, a, Burnouf, T., Ouattara, D., Attanath, P., Bouharoun-Tayoun, H., Chantavanich, P., Foucault, C., Chongsuphajaisiddhi, T., and Druilhe, P. (1991). Parasitologic and clinical human response to immunoglobulin administration in falciparum malaria. *The American Journal of Tropical Medicine and Hygiene* 45, 297–308.

Sakamoto, H., Takeo, S., Maier, A.G., Sattabongkot, J., Cowman, A.F., and Tsuboi, T. (2012). Antibodies against a Plasmodium falciparum antigen PfMSPDBL1 inhibit merozoite invasion into human erythrocytes. *Vaccine* 30, 1972–1980.

Sanders, P.R., Gilson, P.R., Cantin, G.T., Greenbaum, D.C., Nebl, T., Carucci, D.J., McConville, M.J., Schofield, L., Hodder, A.N., Yates, J.R., et al. (2005). Distinct protein classes including novel merozoite surface antigens in Raft-like membranes of Plasmodium falciparum. *The Journal of Biological Chemistry* 280, 40169–40176.

Saul, A. (1987). Kinetic constraints on the development of a malaria vaccine. *Parasite Immunology* 9, 1–9.

Schaefer, W., Regula, J.T., Bähner, M., Schanzer, J., Croasdale, R., Dürr, H., Gassner, C., Georges, G., Kettenberger, H., Imhof-Jung, S., et al. (2011). Immunoglobulin domain crossover as a generic approach for the production of bispecific IgG antibodies. *Proceedings of the National Academy of Sciences of the United States of America* 108, 11187–11192.

Schasfoort, R.B.M., and Tudos, A.J. (2008). Handbook of Surface Plasmon Resonance (Cambridge: Royal Society of Chemistry).

Schlegel, J., Redzic, J.S., Porter, C.C., Yurchenko, V., Bukrinsky, M., Labeikovsky, W., Armstrong, G.S., Zhang, F., Isern, N.G., DeGregori, J., et al. (2009). Solution characterization of the extracellular region of CD147 and its interaction with its enzyme ligand cyclophilin A. *Journal of Molecular Biology* 391, 518–535.

Schwartz, L., Brown, G. V, Genton, B., and Moorthy, V.S. (2012). A review of malaria vaccine clinical projects based on the WHO rainbow table. *Malaria Journal* 11, 11.

Seder, R. a, Chang, L.-J., Enama, M.E., Zephir, K.L., Sarwar, U.N., Gordon, I.J., Holman, L. a, James, E.R., Billingsley, P.F., Gunasekera, A., et al. (2013). Protection Against Malaria by Intravenous Immunization with a Nonreplicating Sporozoite Vaccine. *Science* (New York, N.Y.) 1–12.

Sergeeva, A., Kolonin, M.G., Molldrem, J.J., Pasqualini, R., and Arap, W. (2006). Display technologies: application for the discovery of drug and gene delivery agents. *Advanced Drug Delivery Reviews* 58, 1622–1654.

Sharkey, R.M., Juweid, M., Shevitz, J., Behr, T., Dunn, R., Swayne, L.C., Wong, G.Y., Blumenthal, R.D., Griffiths, G.L., and Siegel, J. a (1995). Evaluation of a complementarity-determining region-grafted (humanized) anti-carcinoembryonic antigen monoclonal antibody in preclinical and clinical studies. *Cancer Research* 55, 5935s–5945s.

Shields, R.L., Namenuk, a K., Hong, K., Meng, Y.G., Rae, J., Briggs, J., Xie, D., Lai, J., Stadlen, a, Li, B., et al. (2001). High resolution mapping of the binding site on human IgG1 for Fc gamma RI, Fc gamma RII, Fc gamma RIII, and FcRn and design of IgG1 variants with improved binding to the Fc gamma R. *The Journal of Biological Chemistry* 276, 6591–6604.

Shimomura, T., Ochiai, M., Kondo, J., and Morimoto, Y. (1992). A novel protease obtained from FBS-containing culture supernatant, that processes single chain form hepatocyte growth factor to two chain form in serum-free culture. *Cytotechnology* 8, 219–229.

Sim, B.K., Chitnis, C.E., Wasniowska, K., Hadley, T.J., and Miller, L.H. (1994). Receptor and ligand domains for invasion of erythrocytes by *Plasmodium falciparum*. *Science* (New York, N.Y.) 264, 1941–1944.

Sinden, R.E. (2010). A biologist's perspective on malaria vaccine development. *Human Vaccines* 6, 3–11.

Singh, B., Kim Sung, L., Matusop, A., Radhakrishnan, A., Shamsul, S.S.G., Cox-Singh, J., Thomas, A., and Conway, D.J. (2004). A large focus of naturally acquired *Plasmodium knowlesi* infections in human beings. *Lancet* 363, 1017–1024.

Singh, S., Alam, M.M., Pal-Bhowmick, I., Brzostowski, J. a, and Chitnis, C.E. (2010). Distinct external signals trigger sequential release of apical organelles during erythrocyte invasion by malaria parasites. *PLoS Pathogens* 6, e1000746.

Singh, S., Plassmeyer, M., Gaur, D., and Miller, L.H. (2007). Mononeme: a new secretory organelle in *Plasmodium falciparum* merozoites identified by localization of rhomboid-1 protease. *Proceedings of the National Academy of Sciences of the United States of America* 104, 20043–20048.

Singh, S., Soe, S., Weisman, S., Barnwell, J.W., Pérignon, J.L., and Druilhe, P. (2009). A conserved multi-gene family induces cross-reactive antibodies effective in defense against *Plasmodium falciparum*. *PloS One* 4, e5410.

Smith, S.L. (1996). Ten years of Orthoclone OKT3 (muromonab-CD3): a review. *Journal of Transplant Coordination : Official Publication of the North American Transplant Coordinators Organization (NATCO)* 6, 109–19; quiz 120–1.

Sparrow, R.L., Healey, G., Patton, K. a, and Veale, M.F. (2006). Red blood cell age determines the impact of storage and leukocyte burden on cell adhesion molecules, glycophorin A and the release of annexin V. *Transfusion and Apheresis Science : Official Journal of the World Apheresis Association : Official Journal of the European Society for Haemapheresis* 34, 15–23.

Srinivasan, P., Beatty, W.L., Diouf, a., Herrera, R., Ambroggio, X., Moch, J.K., Tyler, J.S., Narum, D.L., Pierce, S.K., Boothroyd, J.C., et al. (2011). Binding of *Plasmodium* merozoite proteins RON2 and AMA1 triggers commitment to invasion. *Proceedings of the National Academy of Sciences* 108, 13275–13280.

Strohal, R., Kroemer, G., Wick, G., and Kofler, R. (1987). Complete variable region sequence of a nonfunctionally rearranged kappa light chain transcribed in the nonsecretor P3-X63-Ag8.653 myeloma cell line. *Nucleic Acids Research* 15, 2771.

Stubbs, J., Simpson, K.M., Triglia, T., Plouffe, D., Tonkin, C.J., Duraisingh, M.T., Maier, A.G., Winzeler, E. a, and Cowman, A.F. (2005). Molecular mechanism for switching of *P. falciparum* invasion pathways into human erythrocytes. *Science (New York, N.Y.)* 309, 1384–1387.

Su, X., Hayton, K., and Wellems, T.E. (2007). Genetic linkage and association analyses for trait mapping in *Plasmodium falciparum*. *Nature Reviews. Genetics* 8, 497–506.

Sutherland, C.J., Tanomsing, N., Nolder, D., Oguike, M., Jennison, C., Pukrittayakamee, S., Dolecek, C., Hien, T.T., Do Rosário, V.E., Arez, A.P., et al. (2010). Two nonrecombining sympatric forms of the human malaria parasite *Plasmodium ovale* occur globally. *The Journal of Infectious Diseases* 201, 1544–1550.

Taechalertpaisarn, T., Crosnier, C., Bartholdson, S.J., Hodder, A.N., Thompson, J., Bustamante, L.Y., Wilson, D.W., Sanders, P.R., Wright, G.J., Rayner, J.C., et al.

(2012). Biochemical and functional analysis of two *Plasmodium falciparum* blood-stage 6-cys proteins: P12 and P41. *PLoS One* 7, e41937.

Tamura, M., Milenic, D.E., Iwahashi, M., Padlan, E., Schlom, J., and Kashmiri, S. V (2000). Structural correlates of an anticarcinoma antibody: identification of specificity-determining residues (SDRs) and development of a minimally immunogenic antibody variant by retention of SDRs only. *Journal of Immunology* (Baltimore, Md. : 1950) 164, 1432–1441.

Tan, S.-L., Ganji, G., Paeper, B., Proll, S., and Katze, M.G. (2007). Systems biology and the host response to viral infection. *Nature Biotechnology* 25, 1383–1389.

Taylor, H.M., Triglia, T., Thompson, J., Sajid, M., Fowler, R., Wickham, M.E., Cowman, A.F., and Holder, A.A. (2001). Plasmodium falciparum homologue of the genes for *Plasmodium vivax* and *Plasmodium yoelii* adhesive proteins, which is transcribed but not translated. *Infection and Immunity* 69, 3635–3645.

Taylor, T.E., Molyneux, M.E., Wirima, J.J., Borgstein, a, Goldring, J.D., and Hommel, M. (1992). Intravenous immunoglobulin in the treatment of paediatric cerebral malaria. *Clinical and Experimental Immunology* 90, 357–362.

Teilum, K., Hoch, J.C., Goffin, V., Kinet, S., Martial, J.A., and Kraglund, B.B. (2005). Solution structure of human prolactin. *Journal of Molecular Biology* 351, 810–823.

Tham, W.-H., Healer, J., and Cowman, A.F. (2012). Erythrocyte and reticulocyte binding-like proteins of *Plasmodium falciparum*. *Trends in Parasitology* 28, 23–30.

Tham, W.-H., Wilson, D.W., Lopaticki, S., Schmidt, C.Q., Tetteh-Quarcoo, P.B., Barlow, P.N., Richard, D., Corbin, J.E., Beeson, J.G., and Cowman, A.F. (2010). Complement receptor 1 is the host erythrocyte receptor for *Plasmodium falciparum* PfRh4 invasion ligand. *Proceedings of the National Academy of Sciences of the United States of America* 107, 17327–17332.

Theisen, M., Vuust, J., Gottschau, a, Jepsen, S., and Høgh, B. (1995). Antigenicity and immunogenicity of recombinant glutamate-rich protein of *Plasmodium falciparum* expressed in *Escherichia coli*. *Clinical and Diagnostic Laboratory Immunology* 2, 30–34.

Thera, M. a, Doumbo, O.K., Coulibaly, D., Laurens, M.B., Ouattara, A., Kone, A.K., Guindo, A.B., Traore, K., Traore, I., Kouriba, B., et al. (2011). A field trial to assess a blood-stage malaria vaccine. *The New England Journal of Medicine* 365, 1004–1013.

Thera, M.A., Doumbo, O.K., Coulibaly, D., Laurens, M.B., Kone, A.K., Guindo, A.B., Traore, K., Sissoko, M., Diallo, D.A., Diarra, I., et al. (2010). Safety and immunogenicity of an AMA1 malaria vaccine in Malian children: results of a phase 1 randomized controlled trial. *PLoS One* 5, e9041.

Theron, M., Hesketh, R.L., Subramanian, S., and Rayner, J.C. (2010). An adaptable two-color flow cytometric assay to quantitate the invasion of erythrocytes by

Plasmodium falciparum parasites. Cytometry. Part A : the Journal of the International Society for Analytical Cytology 77, 1067–1074.

Thomas, P., and Smart, T.G. (2005). HEK293 cell line: a vehicle for the expression of recombinant proteins. Journal of Pharmacological and Toxicological Methods 51, 187–200.

Tom, R., Bisson, L., and Durocher, Y. (2008). Transfection of HEK293-EBNA1 Cells in Suspension with Linear PEI for Production of Recombinant Proteins. CSH Protocols 2008, pdb.prot4977.

Tomschy, a, Fauser, C., Landwehr, R., and Engel, J. (1996). Homophilic adhesion of E-cadherin occurs by a co-operative two-step interaction of N-terminal domains. The EMBO Journal 15, 3507–3514.

Topolska, A.E., Lidgett, A., Truman, D., Fujioka, H., and Coppel, R.L. (2004). Characterization of a membrane-associated rhoptry protein of Plasmodium falciparum. The Journal of Biological Chemistry 279, 4648–4656.

Tramontano, A., Chothia, C., and Lesk, A.M. (1990). Framework residue 71 is a major determinant of the position and conformation of the second hypervariable region in the VH domains of immunoglobulins. Journal of Molecular Biology 215, 175–182.

Tran, T.M., Ongoiba, A., Coursen, J., Crosnier, C., Diouf, A., Huang, C.-Y., Li, S., Doumbo, S., Doumtabe, D., Kone, Y., et al. (2013). Naturally Acquired Antibodies Specific for Plasmodium falciparum Reticulocyte-Binding Protein Homologue 5 Inhibit Parasite Growth and Predict Protection From Malaria. The Journal of Infectious Diseases 1–10.

Treeck, M., Zacherl, S., Herrmann, S., Cabrera, A., Kono, M., Struck, N.S., Engelberg, K., Haase, S., Frischknecht, F., Miura, K., et al. (2009). Functional analysis of the leading malaria vaccine candidate AMA-1 reveals an essential role for the cytoplasmic domain in the invasion process. PLoS Pathogens 5, e1000322.

Triglia, T., Chen, L., Lopaticki, S., Dekiwadia, C., Riglar, D.T., Hodder, A.N., Ralph, S. a, Baum, J., and Cowman, A.F. (2011). Plasmodium falciparum Merozoite Invasion Is Inhibited by Antibodies that Target the PfRh2a and b Binding Domains. PLoS Pathogens 7, e1002075.

Triglia, T., Duraisingh, M.T., Good, R.T., and Cowman, A.F. (2005). Reticulocyte-binding protein homologue 1 is required for sialic acid-dependent invasion into human erythrocytes by Plasmodium falciparum. Molecular Microbiology 55, 162–174.

Triglia, T., Thompson, J.K., and Cowman, A.F. (2001). An EBA175 homologue which is transcribed but not translated in erythrocytic stages of Plasmodium falciparum. Molecular and Biochemical Parasitology 116, 55–63.

Tsuboi, T., Takeo, S., Iriko, H., Jin, L., Tsuchimochi, M., Matsuda, S., Han, E.-T., Otsuki, H., Kaneko, O., Sattabongkot, J., et al. (2008). Wheat germ cell-free system-based production of malaria proteins for discovery of novel vaccine candidates. *Infection and Immunity* 76, 1702–1708.

Tsurushita, N., Hinton, P.R., and Kumar, S. (2005). Design of humanized antibodies: from anti-Tac to Zenapax. *Methods (San Diego, Calif.)* 36, 69–83.

Uhlemann, a C., Oguariri, R.M., McColl, D.J., Coppel, R.L., Kremsner, P.G., Anders, R.F., and Kun, J.F. (2001). Properties of the Plasmodium falciparum homologue of a protective vaccine candidate of Plasmodium yoelii. *Molecular and Biochemical Parasitology* 118, 41–48.

Vaccaro, C., Zhou, J., Ober, R.J., and Ward, E.S. (2005). Engineering the Fc region of immunoglobulin G to modulate in vivo antibody levels. *Nature Biotechnology* 23, 1283–1288.

Varki, A. (2001). Loss of N-glycolylneuraminic acid in humans: Mechanisms, consequences, and implications for hominid evolution. *American Journal of Physical Anthropology* 69, 54–69.

Vaughan, A.M., and Kappe, S.H.I. (2012). Malaria vaccine development: persistent challenges. *Current Opinion in Immunology* 24, 324–331.

Verdrager, J. (1986). Epidemiology of the emergence and spread of drug-resistant falciparum malaria in South-East Asia and Australasia. *The Journal of Tropical Medicine and Hygiene* 89, 277–289.

Wanaguru, M., Crosnier, C., Johnson, S., Rayner, J.C., and Wright, G.J. (2013). Biochemical Analysis of the Plasmodium falciparum Erythrocyte-binding Antigen-175 (EBA175)-Glycophorin-A Interaction: IMPLICATIONS FOR VACCINE DESIGN. *The Journal of Biological Chemistry* 288, 32106–32117.

Weidle, U.H., Scheuer, W., Eggle, D., Klostermann, S., and Stockinger, H. (2010). Cancer-related issues of CD147. *Cancer Genomics & Proteomics* 7, 157–169.

Wickramarachchi, T., Cabrera, A.L., Sinha, D., Dhawan, S., Chandran, T., Devi, Y.S., Kono, M., Spielmann, T., Gilberger, T.W., Chauhan, V.S., et al. (2009). A novel Plasmodium falciparum erythrocyte binding protein associated with the merozoite surface, PfDBLMSP. *International Journal for Parasitology* 39, 763–773.

Wilkinson, B., and Gilbert, H.F. (2004). Protein disulfide isomerase. *Biochimica Et Biophysica Acta* 1699, 35–44.

Williams, A.R., Douglas, A.D., Miura, K., Illingworth, J.J., Choudhary, P., Murungi, L.M., Furze, J.M., Diouf, A., Miotto, O., Crosnier, C., et al. (2012). Enhancing Blockade of Plasmodium falciparum Erythrocyte Invasion: Assessing Combinations of Antibodies against PfRH5 and Other Merozoite Antigens. *PLoS Pathogens* 8, e1002991.

Woof, J.M., and Burton, D.R. (2004). Human antibody-Fc receptor interactions illuminated by crystal structures. *Nature Reviews Immunology* 4, 89–99.

World Health Organization (2008). THE GLOBAL MALARIA MALARIA ACTION PLAN.

World Health Organization (2012). World Malaria Report 2012 (Geneva, Switzerland).

Wranik, B.J., Christensen, E.L., Schaefer, G., Jackman, J.K., Vendel, A.C., and Eaton, D. (2012). LUZ-Y, a novel platform for the mammalian cell production of full-length IgG-bispecific antibodies. *The Journal of Biological Chemistry* 287, 43331–43339.

Wright, G.J. (2009). Signal initiation in biological systems: the properties and detection of transient extracellular protein interactions. *Molecular bioSystems* 5, 1405–1412.

Wu, C., Ying, H., Grinnell, C., Bryant, S., Miller, R., Clabbers, A., Bose, S., McCarthy, D., Zhu, R.-R., Santora, L., et al. (2007). Simultaneous targeting of multiple disease mediators by a dual-variable-domain immunoglobulin. *Nature Biotechnology* 25, 1290–1297.

Wu, Y., Ellis, R.D., Shaffer, D., Fontes, E., Malkin, E.M., Mahanty, S., Fay, M.P., Narum, D., Rausch, K., Miles, A.P., et al. (2008). Phase 1 trial of malaria transmission blocking vaccine candidates Pfs25 and Pvs25 formulated with montanide ISA 51. *PloS One* 3, e2636.

Yan, B., Boyd, D., Kaschak, T., Tsukuda, J., Shen, A., Lin, Y., Chung, S., Gupta, P., Kamath, A., Wong, A., et al. (2011). Engineering upper hinge improves stability and effector function of a human IgG1. *The Journal of Biological Chemistry* 1–14.

Yeoh, S., O'Donnell, R. a, Koussis, K., Dluzewski, A.R., Ansell, K.H., Osborne, S. a, Hackett, F., Withers-Martinez, C., Mitchell, G.H., Bannister, L.H., et al. (2007). Subcellular discharge of a serine protease mediates release of invasive malaria parasites from host erythrocytes. *Cell* 131, 1072–1083.

Young, K.H. (1998). Yeast two-hybrid: so many interactions, (in) so little time... *Biology of Reproduction* 58, 302–311.

Yu, X.-L., Hu, T., Du, J.-M., Ding, J.-P., Yang, X.-M., Zhang, J., Yang, B., Shen, X., Zhang, Z., Zhong, W.-D., et al. (2008). Crystal structure of HAb18G/CD147: implications for immunoglobulin superfamily homophilic adhesion. *The Journal of Biological Chemistry* 283, 18056–18065.

Yu, Y., Lee, P., Ke, Y., Zhang, Y., Yu, Q., Lee, J., Li, M., Song, J., Chen, J., Dai, J., et al. (2010). A humanized anti-VEGF rabbit monoclonal antibody inhibits angiogenesis and blocks tumor growth in xenograft models. *PloS One* 5, e9072.

Von Zons, P., Crowley-Nowick, P., Friberg, D., Bell, M., Koldovsky, U., and Whiteside, T.L. (1997). Comparison of europium and chromium release assays: cytotoxicity in healthy individuals and patients with cervical carcinoma. *Clinical and Diagnostic Laboratory Immunology* 4, 202–207.

Zuccala, E.S., Gout, A.M., Dekiwadia, C., Marapana, D.S., Angrisano, F., Turnbull, L., Riglar, D.T., Rogers, K.L., Whitchurch, C.B., Ralph, S.A., et al. (2012). Subcompartmentalisation of proteins in the rhoptries correlates with ordered events of erythrocyte invasion by the blood stage malaria parasite. *PLoS One* 7, e46160.