Plasmodium chabaudi chabaudi and *P. berghei* in CBA/Ca mice. II. The effectiveness and inter- or intra-species specificity of the passive transfer of immunity with serum. *Parasite Immunol.* **8,** 239-254.

Jepson, A., Sisay-Joof, F., Banya, W., Hassan-King, M., Frodsham, A., Bennett, S., Hill, A. S. V., Whittle, H. C. (1997a) Genetic linkage of mild malaria to the major histocompatibility complex in Gambian children: study of affected sibling pairs. *Brit. Med. J.* **315,** 96-97.

Jepson, A., Banya, W., Sisay-Joof, F., Hassan-King, M., Nunez, C., Bennett, S., Whittle, H. (1997b) Quantification of the relative contribution of major histocompatibility complex (MHC) and non-MHC genes to human immune responses to foreign antigens. *Infect. Immun.* **65,** 872-876.

Knight, J. C., Udalova, I., Hill, A. S. V., Greenwood, B. M., Peshu, N., Marsh, K., Kwiatkowski, D. (1999) A polymorphism that affects OCT-1 binding to the TNF promoter region is associated with severe malaria. *Nat. Genet.* **22,** 145-150.

Krishnan, L., Guilbert, L. J., Wegmann, T. G., Belosevic, M., Mossmann, T. R. (1996) T helper 1 response against *Leishmania major* in pregnant C57BL/6 mice increases implantation failure and fetal resorptions. Correlation with increased IFN-γ and TNF and reduced IL-10 production by placental cells. *J. Immunol.* **156,** 653-662.

Kumar, S., Good, M. F., Dontfraid, F., Vinetz, J. M., Miller, L. H. (1989) Interdepence of $CD4^+$ T cells and malarial spleen in immunity to *Plasmodium vinckei vinckei. J. Immunol.* **143,** 2017-2023.

Kumaratilake, L. M., Ferrante, A., Jaeger, T., Rzepczyk, C. (1996) GM-CSF-induced priming of human neutrophils for enhanced phagocytosis and killing of asexual blood stages of *Plasmodium falciparum*: synergistic effects of GM-CSF and TNF. *Parasite Immunol.* **18,** 115-123.

Kun, J. F., Mordmüller, B., Lell, B., Lehman, L. G., Luckner, D., Kremsner, P. G. (1998) Polymorphism in promoter region of inducible nitric oxide synthase gene and protection against malaria. *Lancet* **351,** 265-266.

Kwiatkowski, D., Hill, A. V. S., Sambou, I., Twumasi, P., Castracane, J., Manogue, K. R., Cerami, A., Brewster, D. R., Greenwood, B. M. (1990) TNF concentrations in fatal cerebral, non-fatal cerebral, and uncomplicated malaria. *Lancet* **336,** 1201-1204.

Kwiatkowski, D. (1992) Malaria: becoming more specific about non-specific immunity. *Curr. Opin. Immunol.* **4,** 425-431.

Kwiatkowski, D. (2000) Genetic susceptibility to malaria getting complex. *Curr. Opin. Genet. Dev.* **10,** 320-324.

Langhorne, J. (1989) The role of $CD4^+$ T cells in the immune response to *Plasmodium chabaudi. Parasitol. Today* **5,** 362-364.

Langhorne, J., Simon-Haarhaus, B., Meding, S. J. (1990) The role of CD4+ T cells in the protective immune response to *Plasmodium chabaudi in vivo. Immunol. Lett.* **25,** 101-107.

Langhorne, J., Pells, S., Eichmann, K. (1993) Phenotypic characterization of splenic T cells from mice infected with *Plasmodium chabaudi chabaudi. Scand. J. Immunol.* **38,** 521-528.

Levesque, M. C., Hobbs, M. R., Anstey, N. M., Vaugh, T. N., Chancellor, J. A., Pole, A., Perkins, D. J., Misukonis, M. A., Chanock, S. J., Granger, D. L., Weinberg, J. B. (1999) Nitric oxide synthase type 2 promoter polymorphisms, nitric oxide production, and disease severity in Tanzanian children with malaria. *J. Infect. Dis* **180,** 1994-2002.

Li, C., Corraliza, I., Langhorne, J. (1999) A defect in IL-10 leads to enhanced malarial disease in *Plasmodium chabaudi chabaudi* infection. *Infect. Immun.* **67,** 4435-4442.

Marquet, S., Abel, L., Hillaire, D., Dessein, H., Kalil, J., Feingold, J., Weissenbach, J., Dessein, A, J. (1996) Genetic localization of a locus controlling the intensity of infection by *S. mansoni* on chromosome 5q31-q33. *Nat. Genet.* **14,** 181-184.

Marsh, D., Neely, J. D., Breazeale, D. R., Ghosh, B., Freidhoff, L. R., Ehrlich-Kautzky, E., Schou, K., Krishnaswamy, G., Beaty, T. H. (1994) Linkage analysis of IL-4 and other chromosome 5q31.1 markers and total serum immunoglobulin concentrations. *Science* **264,** 1152-1156.

Marsh, K. (1992) Malaria a neglected disease? *Parasitol.* **104,** S53-S69.

Marsh, K. (1999) Clinical features of malaria. In: *Malaria: Molecular and Clinical Aspects,* eds. Wahlgren, M., Perlmann, P., pp. 87-117, Harwood Academic Publ.

McGregor, I. A., Carrington, S., Cohen, S. (1963) Treatment of East African *P. falciparum* malaria with West African human γ-globulin. *Trans. R. Soc. Trop. Med. Hyg.* **57,** 170-175.

McGregor, I. A. (1984) Epidemiology, malaria and pregnancy. *Am. J. Trop. Med. Hyg.* **33,** 517-525.

McGuire, W., Hill, A. V. S., Allsopp, C. E. M., Greenwood, B. M., Kwiatkowski, D. (1994) Variation in the TNF-α promoter region associated with susceptibility to cerebral malaria. *Nature* **371,** 508-511.

Meding, S. J., Cheng, S. C., Simon-Haarhaus, B., Langhorne, J. (1990) Role of gamma interferon during infection with *Plasmodium chabaudi chabaudi. Infect. Immun.* **58,** 3671-3678.

Meding, S. J., Langhorne, J. (1991) $CD4^+$ T cells and B cells are necessary for the transfer of protective immunity to *Plasmodium chabaudi chabaudi. Eur. J. Immunol.* **21,** 1433-1438.

Menedex, C. (1995) Malaria during pregnancy: a priority area of malaria research and control. *Parasitol. Today* **11,** 178-183.

Meyers, D. A., Postma, D. S., Panhuysen, C. I., Xu, J., Amelung, P. J., Levitt, R. C., Bleeker, E. R. (1994) Evidence for a locus regulating total serum IgE levels mapping to chromosome 5. *Genomics* **23,** 464-470.

Miller, L. H., Good, M. F., Milon, G. (1994) Malaria pathogenesis. *Science* **264,** 1878-1883.

Mordmüller, B. G., Metzger, W. G., Juillard, P., Brinkman, B. M. N., Verweiji, C. L., Grau, G. E., Kremsner, P. G. (1997) Tumor necrosis factor in *Plasmodium falciparum* malaria: high plasma level is associated with fever but high production capacity is associated with rapid fever clearance. *Eur. Cytokine Netw.* **8,** 29-35.

Morges, W., Weidanz, W. P. (1980) *Plasmodium yoelii*: the thymus-dependent lymphocyte in mice immunodepressed by malaria. *Exp. Parasitol.* **50,** 188-194.

Müller-Myhsok, B., Stelma, F. F., Guissé-Sow, F., Muntau, B., Thorsten, T., Burchard, G. D., Gryseels, B., Horstmann, R. D., (1997) Further evidence suggesting the presence of a locus, on human chromosome 5q31-q33, influencing the intensity of infection with *Schistosoma mansoni. Am. J. Hum. Genet.* **61,** 4522-545.

Newbold, C., Warn, P., Black, G., Berendt, A., Craig, A., Snow, R., Msobo, M., Peshu, N. Marsh, K. (1997) Receptor-specific adhesion and clinical disease in *Plasmodium falciparum. Am. J. Trop. Med. Hyg.* **57,** 389-398.

Newbold, C. I. (1999) Antigenic variation in *Plasmodium falciparum*: mechanisms and consequences. *Curr. Opin. Microbiol.* **2,** 420-425.

Orago, A. S., Facer, C. A. (1991) Cytotoxicity of human natural killer (NK) cell subsets for Plasmodium falciparum erythrocytic schizonts: stimulation by cytokines and inhibition by neomycin. *Clin. Exp. Immunol.* **86,** 22-29.

Othoro, C., Lal, A. A., Nahlen, B., Koech, D., Orago, A. S. S., Udhayakumar, V. (1999) A low interleukin-10 tumor necrosis factor α is associated with malaria anemia in children residing in a holoendemic malaria region in West Kenya. *J. Infect. Dis.* **179,** 279-282.

Perlmann, H., Helmby, H., Hagstedt, M., Carlson, J., Larsson, P. H., Troye-Blomberg, M., Perlmann, P. (1994) IgE elevation and IgE anti-malarial antibodies in *Plasmodium falciparum* malaria: association of high IgE levels with cerebral malaria. *Clin. Exp. Immunol.* **97,** 284-292.

Perlmann, H., Kumar, S., Vinetz, J. M., Kullberg, M., Miller, L. H., Perlmann, P. (1995) Cellular mechanisms in the immune response to malaria in *Plasmodium vinckei* infected mice. *Infect. Immun.* **63,** 3987-3993.

Perlmann, P., Perlmann, H., Flyg Wåhlin, B., Hagstedt, M., ElGhazali, G., Worku, S., Fernandez, V., Rutta, A. S. M., Troye-Blomberg, M. (1997) Immunoglobulin E, a pathogenic factor in *Plasmodium falciparum* malaria. *Infect. Immun.* **65,** 116-121.

Perlmann, P., Perlmann, H., ElGhazali, G., Troye-Blomberg, M. (1999) IgE and tumor necrosis factor in malaria infection. *Immunol. Lett.* **65,** 29-33.

Podoba, J. E., Stevenson, M. M. (1991) $CD4^+$ and $CD8^+$ T lymphocytes both contribute to acquired immunity to blood-stage *Plasmodium chabaudi AS. Infect. Immun.* **59,** 51-58.

Postma, D. S., Bleeker, E. R., Amelung, P. J., Holroyd, K. J., Xu, J., Panhuysen, C. I. M., Jianfeng,X., Carolien, I.M., Panhuysen, D.A., Myers, D. A., Levitt, R.C. (1995) Genetic susceptibility to asthma-bronchial hyperresponsiveness coinherited with a major gene for atopy. *New Engl. J. Med.* **333,** 894-900.

Raghapathy, R. (1997) Th1-type immunity is incompatible with successful pregnancy. *Immunol. Today* **18,** 478-482.

Rihet, P., Traoré, Y., Abel, L., Aucan, C., Traoré-Leroux, T., Fumoux, F. (1998) Malaria in humans: *Plasmodium falciparum* blood infection levels are linked to chromosome 5q31-q33. *Am. J. Hum. Genet.* **63,** 498-505.

Romero, P. (1992) Malaria vaccines. *Curr. Opin. Immunol.* **4,** 432-441.

Rosenberg, Y. J. (1978) Autoimmune and polyclonal B cell responses during murine malaria. *Nature* **274,** 170-172.

Roussilhon, C., Agrapart, M., Ballett, J. J., Bensussan, A. (1990) T lymphocytes bearing the γδ T cell receptor in patients with acute *Plasmodium falciparum* malaria. *J. Infect. Dis.* **162,** 283-285.

Roussilhon, C., Agrapart, M., Guglielmi, P., Bensussan, A., Brasseur, P., Ballet, J. J. (1994) Human TCR γδ lymphocyte response on primary exposure to *Plasmodium falciparum. Clin. Exp. Immunol.* **95,** 91-97.

Rzepczyk, C. M., Stamatiou, S., Anderson, K., Stowers, A., Cheng, Q., Saul, A., Allworth, A., McCormack, J., Whitby, M., Olive, C., Lawrence, G. (1996) Experimental human *Plasmodium falciparum* infections: longitudinal analysis of lymphocyte responses with particular reference to γδ T cells. *Scand. J. Immunol.* **43,** 219-277.

Rzepczyk, C. M., Hale, K., Woodroffe, N., Bobogare, A., Csurhes, P., Ishii, A., Ferrante, A. (1997) Humoral immune responses of Solomon Islanders to the merozoite surface antigen 2 of *Plasmodium falciparum* show pronounced skewing towards antibodies of the immunoglobulin G3 subclass. *Infect. Immun.* **65,** 1098-1100.

Sam, H., Stevenson, M. M. (1999) In vivo IL-12 production and IL-12 receptors ß1 and ß2 mRNA expression in the spleen are differentially up-regulated in resistant B6 and susceptible A/J mice during early blood-stage *Plasmodium chabaudi (AS)* malaria. *J. Immunol.* **162,** 1582-1589.

Sedegah, M., Finkelman, F., Hoffman, S. L. (1994) Interleukin 12 induction of interferon gamma-dependent protection against malaria. *Proc. Natl. Acad. Sci. USA* **91,** 10700-10702.

Seder, R. B., Paul, W. E., Dvorak, A. M., Sharkis, A., Kagey-Sobotka, A., Niv, Y., Finkelman, F.D., Barbieri, S.A., Galli, S. J., Plaut, M. (1991) Mouse splenic and bone marrow cell populations that express high affinity Fce receptors and produce interleukin 4 are highly enriched basophils. *Proc. Natl. Acad. Sci. USA* **88,** 2835-2839.

Shaffer, N., Grau, G. E., Hedberg, K., Davchi, F., Lyamba, B., Hightower, A. W., Breman, J. G., Nguyen-Dinh, P. (1991) Tumor necrosis factor and severe malaria. *J. Infect. Dis.* **163,** 96-101.

Shi, Y. P. B. L., Udhayakumar, V., Oloo, A. J., Nahlen, B., Lal, A. A. (1999) Differential effect and interaction of monocytes, hyperimmune sera, and immunoglobulin G on the growth of asexual stage *Plasmodium falciparum* parasites. *Am. J. Trop. Med. Hyg.* **60,** 135-141.

Sjöberg, K., Lepers, J. P., Rahalimalala, L., Larsson, Å., Olerup, O., Marbiah, N. T., Troye-Blomberg, M., Perlmann, P. (1992) Genetic regulation of human anti-malarial antibodies in twins. *Proc. Natl. Acad. Sci. USA* **89,** 2101-2104.

Steketee, R. W., Wirima, J. J., Slutsker, L., Heymann, D. L., Breman, J. G. (1996) The problem of malaria and malaria control in pregnancy in sub-Saharan Africa. *Am. J. Trop. Med. Hyg.* **55,** 2-7.

Stevenson, M. M., Lyanga, J. J., Skamene, E. (1982) Murine malaria: genetic control of resistance to *Plasmodium chabaudi. Infect. Immun.* **38,** 80-88.

Stevenson, M. M., Tam, M., Nowartski, M. (1990) Role of interferon-γ and tumour necrosis factor in host resistance to *Plasmodium chabaudi (AS). Immunol. Lett.* **25,** 115-121.

Stevenson, M. M., Tam, M. F. (1993) Differential induction of helper T cell subsets during blood stage *Plasmodium chabaudi AS* infection in resistant and susceptible mice. *Clin. Exp. Immunol.* **92,** 77-83.

Stevenson, M. M., Tam, M., Wolf, S., Sher, A. (1995) IL-12 induced protection against blood-stage *Plasmodium chabaudi (AS)* requires IFN-γ and TNF and occurs via nitric oxide dependent mechanisms. *J. Immunol.* **155,** 2545-2556.

Süss, G., Eichmann, K., Kury, E., Linke, A. Langhorne, J. (1988) Roles of CD4- and CD8-bearing T lymphocytes in the immune response to the erythrocytic stages of *Plasmodium chabaudi. Infect. Immun.* **56,** 3081-3088.

Taylor-Robinson, A. W., Phillips, R. S. (1993) Protective $CD4^+$ T-cell lines raised against *Plasmodium chabaudi* show characteristics of either Th1 or Th2 cells. *Parasite Immunol.* **15,** 301-310.

Taylor-Robinson, A. W., Phillips, R. S., Severn , A., Moncada, S., Liew, F. Y. (1993) The role of Th1 and Th2 cells in a rodent malaria infection. *Science* **260,** 1931-1934.

Trape, J. F., Rogier, C., Konate, L., Diagne, N., Bouganali, H., Canque, B., Legros, F., Badji, A., Ndiaye, P., Brahimi, K., Faye, O., Druilhe, P., da Silva, L. P. (1994) The Dielmo

project: a longitudinal study of natural malaria infection and the mechanisms of protective immunity in a community living in a holoendemic area in Senegal. *Am. J. Trop. Med. Hyg.* **51,** 123-137.

Treutiger, C. J., Hedlund, I., Helmby, H., Carlson, J., Jepson, A., Twumasi, P., Kwiatkowski, D., Greenwood, B. M., Wahlgren, M. (1992) Rosette formation in *Plasmodium falciparum* isolates and anti-rosette activity of sera from Gambians with cerebral or uncomplicated malaria. *Am. J. Trop. Med. Hyg.* **46,** 503-510.

Trinchieri, G. (1993) Interleukin 12 and its role in the generation of Th2 cells. *Immunol. Today* **14,** 335-338.

Troye-Blomberg, M., Olerup, O., Larsson, ., Sjöberg, K., Perlmann, H., Riley, E., Lepers, J.-P., Perlmann, P. (1991) Failure to detect MHC class II association of the human immune responses induced by repeated malaria infections to *Plasmodium falciparum* antigen Pf155/RESA. *Int. Immunol.* **3,** 1043-1051.

Troye-Blomberg, M., Weidanz, W. P., van der Heyde, H. (1999a) The role of T cells in immunity to malaria and the pathogenesis of disease. In: *Malaria: Molecular and Clinical Aspects,* eds. Wahlgren, M., Perlmann, P., pp. 403-438. Harwood Academic Publ.

Troye-Blomberg, M., Worku, S., Tangteerawatana, P., Jamshaid, R., Söderström, K., Elghazali, G., Moretta, L., Hammarström, M.-L., Mincheva-Nilsson, L. (1999b) Human γδT cells that inhibit the *in vitro* growth of the asexual blood stages of the *Plasmodium falciparum* parasite express cytolytic and proinflammatory cytokines. *Scand. J. Immunol.* **50,** 642-650.

Udeinya, I. J., Miller, L. H., McGregor, I. A., Jensen, J. B. (1983) *P. falciparum* strain-specific antibody blocks binding of infected erythrocytes to amelanotic cells. *Nature* **303,** 429-431.

Waller, D., Krishna, S., Crawley, J., Miller, K., Nosten, F., Chapman, D., Kuile, F. O., Craddock, C., Berry, C., Holloway, P. A. H., Brewster, D., Greenwood, B. M., White, N. J. (1995) Clinical features and outcome of severe malaria in Gambian children. *Clin. Infect. Dis.* **21,** 577-587.

Warsame, M., Wernsdorfer, W. H., Perlmann, H., Lebbad, M., Ericsson, Ö., Matola, Y. G., Troye-Blomberg, M., Perlmann, P., Berzins, K. (1997) A malariometric survey in a rural community in the Muheza district, Tanzania: age profiles in the development of humoral immune responses. *Acta Tropica* **68,** 239-253.

Wattavidanage, J., Carter, R., Perera, R. L., Munasingha, A., Bandara, S., McGuiness, D., Wickramasinghe, A. R., Alles, H. K., Mendis, K. N., Premawansa, S. (1999) TNFα*2 marks high risk of severe disease during *Plasmodium falciparum* malaria and other infections in Sri Lankans. *Clin. Exp. Immunol.* **115,** 350-355.

Wåhlin Flyg, B., Perlmann, H., Perlmann, P., Esposito, F., Berzins, K. (1997) Wild isolates of *Plasmodium falciparum* malaria show decreased sensitivity to *in vitro* inhibition of parasite growth mediated by autologous host antibodies. *Clin. Exp. Immunol.* **107,** 321-327.

Wegman, T. G., Lin, H., Guilbert, L., Mossman, T. R. (1993) Bidirectional cytokine interactions in maternal-foetal relationship: is successful pregnancy a Th2 phenomenon? *Immunol. Today* **14,** 353-356.

Weidanz, W. P., Long, C. A. (1988) The role of T cells in immunity to malaria. *Progr. Allergy* **41,** 215-252.

WHO (1998) Fact sheet no 94. World Health Organization, Geneva.

Winkler, S., Willheim, M., Baier, K., Schmid, D., Aichelburg, A., Graninger, W., Kremsner, P. G. (1998) Reciprocal regulation of Th1- and Th2 cytokine-producing cells during clearance of parasitemia in *Plasmodium falciparum* malaria. *Infect. Immun.* **66,** 6040-6044.

Worku, S., Björkman, A., Troye-Blomberg, M., Jemaneh, L., Färnert, A., Christensson, B. (1997) Lymphocyte activation and subset redistribution in the peripheral blood in acute malaria illness: distinct $\gamma\delta^+$ T cell patterns in *Plasmodium falciparum* and *P. vivax* infections. *Clin. Exp. Immunol.* **108,** 43-41.