References

[Abbas *et al.* 2000]   A. K. Abbas, A. H. Lichtman, and J. S. Pober. *Cellular and Molecular Immunology*. W. B. Saunders Company, 2000.

[Abraham & Malaviya 1997]   S. Abraham and R. Malaviya. Mast cells in infection and immunity. *Infection and Immunity*, 65(9):3501–3508, 1997.

[Adams & Koziol 1995]   H. P. Adams and J. A. Koziol. Prediction of binding to MHC class I molecules. *J. Immunol. Methods*, 185:181–190, 1995.

[Adams *et al.* 1987]   T. E. Adams, S. Alpert, and D. Hanahan.   Non-tolerance and autoantibodies to a transgenic self antigen expressed in pancreatic β cells. *Nature*, 325:223–228, 1987.

[Adams *et al.* 1995]   L. B. Adams et al. Exacerbation of acute and chronic murine tuberculosis by administration of a tumor-necrosis-factor receptor-expressing adenovirus. *J. Infect. Dis.*, 171(2):400–405, 1995.

[Adorini *et al.* 1988]   L. Adorini, S. Muller, F. Cardinaux, P. V. Lehmann, F. Falcioni, and Z. A. Nagy. In vivo competition between self peptides and foreign antigens in T-cell activation. *Nature*, 344(6183):623–625, 1988.

[Agrawal & Linderman 1996]   N. G. Agrawal and J. J. Linderman. Mathematical modeling of helper T lymphocyte/antigen-presenting cell interactions: analysis of methods for modifying antigen processing and presentation. *J. Theor. Biol.*, 182(4):487–504, 1996.

[Aguilar *et al.* 2004]   A. Aguilar, G. Roemer, S. Debenham, M. Binns, D. Garcelon, and R. K. Wayne. High MHC diversity maintained by balancing selection in an otherwise genetically monomorphic mammal. *Proc. Natl. Acad. Sci. USA*, 101(10):3490–3494, 2004.

[Ahmed & Hashish 2003]   E. Ahmed and A. H. Hashish. On modelling of immune memory mechanisms. *Theory Biosci.*, 122:339–342, 2003.

[Aickelin *et al.* 2003]   U. Aickelin, P. Bentley, S. Cayzer, J. Kim, and J. McLeod. Danger theory: The link between AIS and IDS? In [Timmis *et al.* 2003], pages 147–155.

[Ainslie *et al.* 1992]   G. M. Ainslie, J. A. Solomon, and E. D. Bateman. Lymphocyte and lymphocyte subset numbers in blood and in bronchoalveolar lavage and pleural fluid in various forms of human pulmonary tuberculosis at presentation and during recovery. *Thorax*, 47(7):513–518, 1992.

400   References

[Altuvia & Margalit 2000]   Y. Altuvia and H. Margalit. Sequence signals for generation of antigenic peptides by the proteasome: implications for proteasomal cleavage mechanism. *J. Molec. Biol.*, 295:879–890, 2000.

[Alves *et al.* 2004]   R. T. Alves, M. R. Delgado, H. S. Lopes, and A. A. Freitas. An artificial immune system for fuzzy-rule induction in data mining. volume 3242, pages 1011–1020, 2004.

[Amaro *et al.* 1995]   J. D. Amaro, J. G. Houbiers, J. W. Drijfhout, R. M. Brandt, R. Schipper, J. N. Bavinck, C. J. Melief, and W. M. Kast. A computer program for predicting possible cytotoxic T lymphocyte epitopes based on HLA class I peptide-binding motifs. *Hum. Immunol.*, 43:13–18, 1995.

[Anderson & Matzinger 2000a]   C. C. Anderson and P. Matzinger. Anderson and Matzinger: Round 2. *Seminars in Immunology*, 12(3):277–292, 2000.

[Anderson & Matzinger 2000b]   C. C. Anderson and P. Matzinger. Danger: the view from the bottom of the cliff. *Seminars in Immunology*, 12(3):231–238, 2000.

[Anderson *et al.* 2002]   M. S. Anderson, E. Venanzi, L. Klein, Z. Chen, S. Berzins, S. Turley, H. von Boehmer, R. Bronson, A. Dierich, C. Benoist, and D. Mathis. Projection of an immunological self shadow within the thymus by the aire protein. *Science*, 298(5597):1395–1401, 2002.

[Andrews & Timmis 2005]   P. S. Andrews and J. Timmis. On diversity and artificial immune systems: Incorporating a diversity operator into aiNet. In *Proceedings of the International Conference on Natural and Artificial Immune Systems (NAIS05)*, volume 391 of *LNCS*, pages 293–306. Springer, 2005.

[Andrews & Timmis 2006]   P. S. Andrews and J. Timmis. A computational model of degeneracy in a lymph node. In *To appear in 5th International Conference on Artificial Immune Systems (ICARIS)*, 2006.

[Anfinsen 1973]   C. B. Anfinsen. Principles that govern the folding of protein chains. *Science*, 181:223–230, 1973.

[Antia *et al.* 1998]   R. Antia, S. S. Pilyugin, and R. Ahmed. Models of immune memory: On the role of cross-reactive stimulation, competition, and homeostasis in maintaining immune memory. *Proc. Natl. Acad. Sci. USA*, 95:14926–14931, 1998.

[Antia *et al.* 2005]   R. Antia, V. V. Ganusov, and R. Ahmed. The role of models in understanding CD8$^+$ T-cell memory. *Nature Review of Immunology*, 5:101–111, 2005.

[Aoki 1980]   K. Aoki. A criterion for the establishment of a stable polymorphism of higher order with an application to the evolution of polymorphism. *J. Math. Biol.*, 9:133–146, 1980.

[Apanius *et al.* 1997]   V. Apanius, D. Penn, P. R. Slev, L. R. Ruff, and W. K. Potts. The nature of selection on the major histocompatibility complex. *Crit. Rev. Immunol.*, 17:179–224, 1997.

[Apostolopoulos *et al.* 2001]   V. Apostolopoulos, I. F. McKenzie, and I. A. Wilson. Getting into the groove: unusual features of peptide binding to MHC class I molecules and implications in vaccine design. *Front. Biosci.*, 6(D):1311–1320, 2001.

[Armstrong & Hart 1971]   J. A. Armstrong and P. D. Hart. Response of cultured macrophages to mycobacterium tuberculosis, with observations on fusion of lysosomes and phagosomes. *J. Exp. Med.*, 134:713–740, 1971.

[Arnold *et al.* 2002]   P. Y. Arnold, N. L. La Gruta, T. Miller, K. M. Vignali, P. S. Adams, D. L. Woodland, and D. A. Vignali. The majority of immunogenic

epitopes generate CD4+ T cells that are dependent on MHC class II bound peptide-flanking residues. *J. Immunol.*, 169:739–749, 2002.

[Asachenkov 1994]   A. Asachenkov. *Disease Dynamics*. Birkhauser, 1994.

[Atlan & Cohen 1998]   H. Atlan and I. R. Cohen. Immune information, self-organization and meaning. *International Immunology*, 10(6):711–717, 1998.

[Avrameas 1991]   S. Avrameas. Natural autoantibodies: From 'horror autotoxicus' to 'gnothi seauton'. *Immunology Today*, 12:154–159, 1991.

[Ayara 2005]   M. Ayara. *An immune inspired solution for adaptable error detection in embedded systems*. PhD thesis, University of Kent, 2005.

[Baas & Gao 1999]   A. Baas and X. Gao. Peptide binding motifs and specificities for HLA-DQ molecules. *Immunogenetics*, 50(1-2):8–15, 1999.

[Bachmaier *et al.* 1999]   K. Bachmaier, N. Neu, L. M. De la Maza, S. Pal, A. Hessel, and J. M. Penninger. *Chlamydia* infections and heart disease linked through antigenic mimicry. *Science*, 283:1335–1339, 1999.

[Bader & Hogue 2000]   G. D. Bader and C. W. Hogue. BIND–a data specification for storing and describing biomolecular interactions, molecular complexes and pathways. *Bioinformatics*, 16:465–477, 2000.

[Baggiolini 1998]   M. Baggiolini. Chemokines and leukocyte traffic. *Nature*, 392(6676):565–568, 1998.

[Bak 1997]   P. Bak. *How Nature Works: the science of self-organized criticality*. Oxford University Press, 1997.

[Balasubramanian *et al.* 2005]   S. Balasubramanian, Y. Xia, E. Freinkman, and M. Gerstein. Sequence variation in G-protein-coupled receptors: analysis of single nucleotide polymorphisms. *Nucleic. Acids. Res.*, 33(5):1710–1721, 2005.

[Baldwin *et al.* 1999]   K. K. Baldwin, B. P. Trenchak, J. D. Altman, and M. M. Davis. Negative selection of T cells occurs throughout thymic development. *J. Immunol.*, 163:689–698, 1999.

[Balkwill 2000]   F. Balkwill, editor. *The Cytokine Network*. Oxford University Press, 2000.

[Bankovich *et al.* 2004]   A. J. Bankovich, A. T. Girvin, A. K. Moesta, and K. C. Garcia. Peptide register shifting within the MHC groove: theory becomes reality. *Mol Immunol*, 40:1033–1039, 2004.

[Banzhaf *et al.* 1998]   W. Banzhaf, P. Nordin, R. Keller, and F. Francome. *Genetic Programming: An Introduction*. Morgan Kauffman, 1998.

[Barouch *et al.* 1995]   D. Barouch, T. Friede, S. Stevanovic, L. Tussey, K. Smith, S. Rowland-Jones, V. Braud, A. McMichael, and H. G. Rammensee. HLA-A2 subtypes are functionally distinct in peptide binding and presentation. *J. Exp. Med.*, 182:1847–1856, 1995.

[Baum 1986]   E. B. Baum. Intractable computations without local minima. *Phys. Rev. Lett.*, 57:2764–2767, 1986.

[Bazzani *et al.* 2003]   A. Bazzani, D. Remondini, N. Intrator, and G.C. Castellani. The effect of noise on a class of energy-based learning rules. *Neural Computing*, 15:1621–1640, 2003.

[Bean *et al.* 1999]   A. G. D. Bean et al. Structural deficiencies in granuloma formation in TNF gene-targeted mice underlie the heightened susceptibility to aerosol mycobacterium tuberculosis infection, which is not compensated for by lymphotoxin. *J. Immunol.*, 162(6):3504–3511, 1999.

[Beck 1984]   K. Beck. Coevolution: mathematical analysis of host–parasite interactions. *J. Math. Biol.*, 19:63–77, 1984.

[Beer 1995]   R. D. Beer. A dynamical systems perspective on agent-environment interaction. *Artificial Intelligence*, 72:173–215, 1995.

[Beeson & McConnell 1995]   C. Beeson and H. M. McConnell. Reactions of peptides with class-II proteins of the major histocompatibility complex. *Journal of the American Chemical Society*, 117(42):10429–10433, 1995.

[Bellamy & Hill 1998]   R. Bellamy and A. Hill. Genetic susceptibility to mycobacteria and other infectious pathogens in humans. *Curr. Op. Immunol.*, 10:483–487, 1998.

[Bellamy *et al.* 1998]   R. Bellamy, C. Ruwende, T. Corrah, K. P. McAdam, H. C. Whittle, and A. V. Hill. Variations in the NRAMP1 gene and susceptibility to tuberculosis in West Africans. *N. Engl. J. Med.*, 338(10):640–4., 1998.

[Beltman *et al.* 2002]   J. B. Beltman, J. A. M. Borghans, and R. J. De Boer. Major Histocompatibility Complex: Polymorphism from coevolution. In U. Dieckmann, J. A. J. Metz, M. W. Sabelis, and K. Sigmund, editors, *Adaptive Dynamics of Infectious Diseases. In Pursuit of Virulence Management*, pages 210–221. Cambridge University Press, 2002.

[Benedict 1990]   P. Benedict.   Data   generation   program/2   v1.0. `http://ftp.ics.uci.edu/pub/machine-learning-databases/dgp-2/`, 1990. Inductive Learning Group, Beckman Institute for Advanced Technology and Sciences, University of Illinois at Urbana.

[Bentley & Timmis 2004]   P. J. Bentley and J. Timmis. A fractal immune network. In [Nicosia *et al.* 2004], pages 133–145.

[Bentley *et al.* 2005]   P. J. Bentley, J. Greensmith, and S. Ujjin. Two ways to grow tissue for Artificial Immune Systems. In [Jacob *et al.* 2005], pages 139–152.

[Bentley 2004]   P. J. Bentley. Fractal proteins. *Genetic Programming and Evolvable Machines*, 5(1):71–101, 2004.

[Berek & Ziegner 1993]   C. Berek and M. Ziegner. The maturation of the immune response. *Immunology Today*, 14:200–402, 1993.

[Bernasconi *et al.* 2002]   N. L. Bernasconi, E. Traggiai, and A. Lanzavecchia. Maintenance of serological memory by polyclonal activation of human memory B-cells. *Science*, 298:2199–2202, 2002.

[Bersini & Varela 1994]   H. Bersini and F. Varela. *The Immune Learning Mechansims: Recruitment, Reinforcement and their Applications.* Chapman Hall, 1994.

[Bersini 1991]   H. Bersini. Immune network and adaptive control. In *Proceedings of the 1st European Conference on Artificial Life (ECAL)*, pages 217–226. MIT Press, 1991.

[Bersini 1992]   H. Bersini. Reinforcement and recruitment learning for adaptive process control. In *Proc. Int. Fuzzy Association Conference (IFAC/IFIP/IMACS) on Artificial Intelligence in Real Time Control*, pages 331–337, 1992.

[Bersini 2002]   H. Bersini. Self-assertion versus self-recognition. In [Timmis & Bentley 2002], pages 107–112.

[Bertoni & Sidney 1997]   R. Bertoni and J. Sidney. Human histocompatibility leukocyte antigen-binding supermotifs predict broadly cross-reactive cytotoxic T lymphocyte responses in patients with acute hepatitis. *J. Clin. Invest.*, 100(3):503–515, 1997.

[Bezerra *et al.* 2005]   G. Bezerra, T. Barra, L. N. de Castro, and F. Von Zuben. Adaptive Radius Immune Algorithm for Data Clustering. In [Jacob *et al.* 2005], pages 290–303.

[Bhasin & Singh 2003]   M. Bhasin and H. Singh. MHCBN: a comprehensive database of MHC binding and non-binding peptides. *Bioinformatics*, 19(5):665–666, 2003.

[Bienenstock *et al.* 1982]   E. L. Bienenstock, L. N. Cooper, and P. W. Munro. Theory for the development of neuron selectivity: Orientation specificity and binocular interaction in visual cortex. *J. Neurosci*, 2:32–48, 1982.

[Bindewald *et al.* 1998]   E. Bindewald, J. Hesser, and R. Männer. Implementing genetic algorithms with sterical constrains for protein structure prediction. In *Proc. International Conference on Parallel Problem Solving from Nature*, pages 959–967, Amsterdam, Netherland, 1998.

[Binley *et al.* 2004]   J. M. Binley et al. Comprehensive cross-clade neutralization analysis of a panel of anti-human immunodeficiency virus type 1 monoclonal antibodies. *J. Virol.*, 78:13232–13252, 2004.

[Bisset & Fierz 1993]   L. R. Bisset and W. Fierz. Using a neural network to identify potential HLA-DR1 binding sites within proteins. *J. Mol. Rec.*, 6:41–48, 1993.

[Bjorkman *et al.* 1987]   P. J. Bjorkman, M. A. Saper, B. Samraoui, W. S. Bennett, J. L. Strominger, and D. C. Wiley. Structure of the human class I histocompatibility antigen, HLA-A2. *Nature*, 329:506–512, 1987.

[Bleed *et al.* 2001]   D. Bleed et al. World health report 2001: Global tuberculosis control, 2001.

[Blythe & Flower 2005]   M. J. Blythe and D. R Flower. Benchmarking B cell epitope prediction: Underperformance of existing methods. *Protein Sci.*, 14:246–248, 2005.

[Blythe *et al.* 2002]   M. J. Blythe, I. A. Doytchinova, and D. R. Flower. Jenpep, a database of quantitative functional peptide data for immunology. *Bioinformatics*, 18:434–439, 2002.

[Bodmer 1972]   W. F. Bodmer. Evolutionary significance of the HL-A system. *Nature*, 237:139–145, 1972.

[Boehm *et al.* 1997]   U. Boehm, T. Klamp, M. Groot, and J. C. Howard. Cellular responses to interferon-gamma. *Ann. Rev. Immunol.*, 15:749–95, 1997.

[Bogarad & Deem 1999]   L. D. Bogarad and M. W. Deem. A hierarchical approach to protein molecular evolution. *Proc. Natl. Acad. Sci. USA*, 96:2591–2595, 1999.

[Bohm *et al.* 1999]   M. Bohm, J. Sturzebecher, and G. Klebe. Three-dimensional quantitative structure-activity relationship analyses using comparative molecular field analysis and comparative molecular similarity indices analysis to elucidate selectivity differences of inhibitors binding to trypsin, thrombin, and factor Xa. *J. Med. Chem.*, 42:458–477, 1999.

[Bonecini-Almeida 1998]   M. G. Bonecini-Almeida. Induction of in vitro human macrophage anti-mycobacterium tuberculosis activity: requirement for IFN-gamma and primed lymphocytes. *J. Immunol.*, 160(9):4490–9, 1998.

[Bonnett 2005]   C. Bonnett. The role of the recruited neutrophil in the innate response to aspergillus fumigatus. Master's thesis, Montana State University, USA, 2005.

[Borghans & De Boer 2001]   J. A. M. Borghans and R. J. De Boer. Diversity in the immune system. [Cohen & Segal 2001], pages 161–183.

[Borghans & De Boer 2002]   J. A. M. Borghans and R. J. De Boer. Memorizing innate instructions requires a sufficiently specific adaptive immune system. *Int. Immunol.*, 14:525–532, 2002.

[Borghans *et al.* 1999]   J. A. M. Borghans, A. J. Noest, and R. J. De Boer. How specific should immunological memory be? *J. Immunol.*, 163:569–575, 1999.

[Borghans *et al.* 2003]   J. A. M. Borghans, A. J. Noest, and R. J. De Boer. Thymic selection does not limit the individual MHC diversity. *Eur. J. Immunol.*, 33:3353–3358, 2003.

[Borghans *et al.* 2004]   J. A. M. Borghans, J. B. Beltman, and R. J. De Boer. MHC polymorphism under host-pathogen coevolution. *Immunogenetics.*, 55:732–739, 2004.

[Botha & Ryffel 2003]   T. Botha and B. Ryffel. Reactivation of latent tuberculosis infection in tnf-deficient mice. *J. Immunol.*, 171(6):3110–3118, 2003.

[Bothamley *et al.* 1989]   G. H. Bothamley et al. Association of tuberculosis and M. tuberculosis-specific antibody levels with HLA. *J. Infect. Dis.*, 159(3):549–555, 1989.

[Bothamley *et al.* 1993]   G. H. Bothamley et al. Association of antibody responses to the 19-kDa antigen of Mycobacterium tuberculosis and the HLA-DQ locus. *J. Infect. Dis.*, 167(4):992–993, 1993.

[Bowie *et al.* 1991]   J. U. Bowie, R. Luthy, and D. Eisenberg. A method to identify protein sequences that fold into a known three-dimensional structure. *Science*, 253:164–170, 1991.

[Brahmajothi 1991]   V. Brahmajothi. Association of pulmonary tuberculosis and HLA in south india. *Tubercle*, 72(2):123–32, 1991.

[Brazdil *et al.* 1991]   P. Brazdil, M. Gams, S. Sian, L. Torgo, and W. van de Velde. Learning in distributed systems and multi-agent environments. volume 482 of *LNAI*, pages 412–423. Springer, 1991.

[Bretscher & Cohn 1970]   P. Bretscher and M. Cohn. A theory of self-nonself discrimination. *Science*, 169:1042–1049, 1970.

[Bretscher 1972]   P. Bretscher. The control of humoral and associative antibody synthesis. *Transplant. Rev.*, 11:217–267, 1972.

[Bretscher 1999]   P. Bretscher. A two-step, two-signal model for the primary activation of precursor helper T cells. *Proc. Natl. Acad. Sci. USA*, 96:185–190, 1999.

[Bretscher 2000]   P. Bretscher. Contemporary models for peripheral tolerance and the classical 'historical postulate'. *Seminars in Immunology*, 12(3):221–229, 2000.

[Brookes 2003]   R. H. Brookes. CD8+ T cell-mediated suppression of intracellular Mycobacterium tuberculosis growth in activated human macrophages. *European J. Immunol.*, 33(12):3293–302, 2003.

[Brooks *et al.* 1983]   B. R. Brooks, R. E. Bruccoleri, B. D. Olafson, D. J. States, S. Swaminathan, and M. Karplus. CHARMM: A program for macromolecular energy, minimization, and dynamics calculations. *J. Comp. Chem.*, 4:187–217, 1983.

[Brooks 1991a]   R. A. Brooks. Intelligence without reason. In *Proc. 12th IJCAI, Sydney, Australia*, pages 569–595. Morgan Kaufmann, 1991.

[Brooks 1991b]   R. A. Brooks. Intelligence without representation. *Artificial Intelligence*, 47:139–159, 1991.

[Brown *et al.* 1996]   M. Brown, M. B. Rittenberg, C. Chen, and V. A. Roberts. Tolerance to single, but not multiple, amino acid replacements in antibody V-H CDR2: A means of minimizing B cell wastage from somatic hypermutation? *J. Immuonol.*, 156:3285–3291, 1996.

[Brusic & Flower 2004]   V. Brusic and D. R. Flower. Bioinformatics tools for identifying T-cell epitopes. *Drug Discovery Today: BioSilico*, 2(1):18–23, 2004.

[Brusic *et al.* 1998]   V. Brusic, G. Rudy, and L. C. Harrison. MHCPEP, a database of MHC-binding peptides: update 1997. *Nucleic Acids Res*, 26:368–371, 1998.

[Brusic *et al.* 2002]   V. Brusic, J. Zeleznikow, and N. Petrovsky. Molecular immunology databases and data repositories. *J. Immunol. Methods*, 238:17–28, 2002.

[Bryant & Ploegh 2004]   P. Bryant and H. Ploegh. class II MHC peptide loading by the professionals. *Curr. Op. Immunol.*, 16(1):96–102, 2004.

[Bryngelson & Wolynes 1987]   J. D. Bryngelson and P. G. Wolynes. Spin glasses and the statistical mechanics of protein folding. *Proc. Natl. Acad. Sci. USA*, 84:7524–7528, 1987.

[Bullock *et al.* 2003]   T. N. J. Bullock, D. W. Mullins, and V. H. Engelhard. Antigen density presented by dendritic cells in vivo differentially affects the number and avidity of primary, memory, and recall CD8(+) T cells. *J. Immunol.*, 170:1822–1829, 2003.

[Burden & Faires 2005]   R. L. Burden and J. D. Faires. *Numerical Analysis*. Thomson-Brooks/Cole Publishing, 2005.

[Burnet 1959]   F. M. Burnet. *The Clonal Selection Theory of Acquired Immunity*. Cambridge University Press, 1959.

[Burrows & Elkington 2003]   S. R. Burrows and R. A. Elkington. Promiscuous CTL recognition of viral epitopes on multiple human leukocyte antigens: biological validation of the proposed HLA A24 supertype. *J. Immunol.*, 171(3):1407–1412, 2003.

[Callard *et al.* 1999]   R. Callard, A. J. T. George, and J. Stark. Cytokines, chaos, and complexity. *Immunity*, 11:507–513, 1999.

[Canetti 1955]   G. Canetti. *The tubercle bacillus in the pulmonary lesion in man*. Springer, 1955.

[Canham & Tyrrell 2002]   R. O. Canham and A. M. Tyrrell. A multilayered immune system for hardware fault tolerance within an embryonic array. In [Timmis & Bentley 2002], pages 3–11.

[Cano & Fan 1998]   P. Cano and B. Fan. A geometric study of the amino acid sequence of class I HLA molecules. *Immunogenetics*, 45(1):15–26, 1998.

[Cantú-Paz *et al.* 2003]   E. Cantú-Paz et al., editors. volume 2724 of *LNCS*. Springer, 2003.

[Cantú-Paz 1998]   E. Cantú-Paz. A survey of parallel genetic algorithms. *Calculateurs Parallèles*, 10(2):141–171, 1998.

[Carlson & Doyle 2001]   J. Carlson and J. Doyle. Robustness and complexity. Technical Report RS-2001-017, SFI, 2001.

[Carrington & Martin 2006]   M. Carrington and M. P. Martin. The impact of variation at the KIR gene cluster on human disease. *Curr. Top. Microbiol. Immunol.*, 298:225–257, 2006.

[Carrington *et al.* 1999]   M. Carrington, G. W. Nelson, M. P. Martin, T. Kissner, D. Vlahov, J. J. Goedert, R. Kaslow, S. Buchbinder, K. Hoots, and S. J. O'Brien. HLA and HIV-1: Heterozygote advantage and B*35-Cw*04 disadvantage. *Science*, 283:1748–1752, 1999.

[Caruso *et al.* 1999]   A. M. Caruso et al. Mice deficient in CD4 T cells have only transiently diminished levels of IFN-gamma, yet succumb to tuberculosis. *J. Immunol.*, 162(9):5407–5416, 1999.

[Casson & Manser 1995]   L. P. Casson and T. Manser. Random mutagenesis of 2 complementarity-determining region amino-acids yields an unexpectedly high-

frequency of antibodies with increased affinity for both cognate antigen and autoantigen. *J. Exp. Med.*, 182:743–750, 1995.

[Castellani *et al.* 1998]   G. C. Castellani, C. Giberti, C. Franceschi, and F. Bersani. Stable state analysis of an immune network model. *Int. J. Bifurcation and Chaos*, 8:1285–1301, 1998.

[Castellani *et al.* 1999]   G. C. Castellani, N. Intrator, H. Shouval, and L. N. Cooper. Solutions of the BCM learning rule in a network of lateral interacting non-linear neurons networks. *Comput. Neur. Syst*, 10:111–121, 1999.

[Castellani *et al.* 2001]   G. C. Castellani, E. M. Quinlan, L. N. Cooper, and H. Z. Shouval. A biophysical model of bidirectional synaptic plasticity: dependence on AMPA and NMDA receptors. *Proc. Natl. Acad. Sci. USA*, 98:12772–12777, 2001.

[Castellani *et al.* 2005]   G. C. Castellani, E. M. Quinlan, F. Bersani, L. N. Cooper, and H. Z. Shouval. A model of bidirectional synaptic plasticity: from signaling network to channel conductance. *Learn. Mem.*, 12:423–432, 2005.

[Castelli & Buhot 202]   F. A. Castelli and C. Buhot. HLA-DP4, the most frequent HLA II molecule, defines a new supertype of peptide-binding specificity. *J. Immunol.*, 169(12):6928–6934, 202.

[Castiglione *et al.* 2003]   F. Castiglione, V. Selitser, and Z. Agur. The effect of drug schedule on hypersensitive reactions: a study with a cellular automata model of the immune system. In Luigi Preziosi, editor, *Cancer Modelling and Simulation*, chapter 12. CRC Press, 2003.

[Castro & Timmis 2002]   L. N. de Castro and J. Timmis. An Artificial Immune Network for Multi Modal Optimisation. In *Proceedings of the World Congress on Computational Intelligence WCCI*, pages 699–704, Honolulu, HI., 2002.

[Celada & Schreiber 1997]   A. Celada and R. D. Schreiber. Internalization and degradation of receptor-bound interferon-gamma by murine macrophages. demonstration of receptor recycling. *J. Immunol.*, 139(1):147–53, 1997.

[Celada & Seiden 1992]   F. Celada and P. E. Seiden. A computer model of cellular interactions in the immune system. *Immunology Today*, 13:56–62, 1992.

[Cerottini & Luescher 1991]   J. C. Cerottini and I. F. Luescher. Direct analysis of peptide binding to cell-associated MHC class I molecules. *Immunol. Lett.*, 30(2):171–5, 1991.

[Chakraborty 1993]   A. Chakraborty. Tuberculosis situation in India: Measuring it through time. *Indian Journal of Tuberculosis*, 40:215–225, 1993.

[Chan & Kaufmann 1995]   J. Chan and H. Kaufmann. Immune mechanisms of protection. *Tuberculosis. Pathogenesis, Protection and Control*, pages 389–415, 1995.

[Chan & Stolfo 1993]   P. K. Chan and S. J. Stolfo. Toward parallel and distributed learning by meta-learning. In *Working Notes AAAI Work. Knowledge Discovery in Databases*, pages 227–240, 1993.

[Chan 1993]   V. Chan. Secondary lymphoid-tissue chemokine (SLC) is chemotactic for mature dendritic cells. *Blood*, 93:3610–3616, 1993.

[Chang *et al.* 2005]   S. T. Chang, J. J. Linderman, and D. E. Kirschner. Multiple mechanisms allow mycobacterium tuberculosis to continuously inhibit MHC class II -mediated antigen presentation by macrophages. *Proc. Natl. Acad. Sci. USA*, 102(12):4530–4535, 2005.

[Chao *et al.* 2004]   D. L. Chao, M. P. Davenport, S. Forrest, and A. S. Perelson. A stochastic model of cytotoxic T cell responses. *J. Theor. Biol.*, 228:227–240, 2004.

[Chao *et al.* 2005]   D. L. Chao, M. P. Davenport, S. Forrest, and A. S. Perelson. The effects of thymic selection on the range of T cell cross-reactivity. *Eur. J. Immunol.*, 35:3452–3459, 2005.

[Chapman 1998]   H. A. Chapman. Endosomal proteolysis and MHC class II function. *Curr. Op. Immunol.*, 10:93–102, 1998.

[Chattratichat *et al.* 1997]   J. Chattratichat, J. Darlington, M. Ghanem, Y. Guo, H. Hunning, M. Kohler, J. Sutiwaraphun, H. Wing To, and D. Yang. Large scale data mining: Challenges and responses. In *KDD-97*, pages 143–146, 1997.

[Chelvanayagam 1997]   G. Chelvanayagam. A roadmap for HLA-DR peptide binding specificities. *Hum. Immunol.*, 58(2):61–69, 1997.

[Chen & Parham 1989]   B. P. Chen and P. Parham. Direct binding of influenza peptides to class I HLA molecules. *Nature*, 337(6209):743–745, 1989.

[Chen *et al.* 1992]   C. Chen, V. A. Roberts, and M. B. Rittenberg. Generation and analysis of random point mutations in an antibody CDR2 sequencemany mutated antibodies lose their ability to bind antigen. *J. Exp. Med.*, 176:855–866, 1992.

[Chen *et al.* 1994]   Y. Chen, J. Sidney, S. Southwood, A. L. Cox, K. Sakaguchi, R. A. Henderson, E. Appella, D. F. Hunt, A. Sette, and V. H. Engelhard. Naturally processed peptides longer than nine amino acid residues bind to the class I MHC molecule HLA-A2.1 with high affinity and in different conformations. *J. Immunol.*, 152:2874–2881, 1994.

[Chen *et al.* 2002]   X. Chen, Y. Lin, M. Liu, and M. K. Gilson. The binding database: data management and interface design. *Bioinformatics*, 18:130–139, 2002.

[Chicz *et al.* 1992]   R. M. Chicz, R. G. Urban, W. S. Lane, J. C. Gorga, L. J. Stern, D. A. A. Vignali, and J. L. Strominger. Predominant naturally processed peptides bound to HLA-DR1 are derived from MHC-related molecules and are heterogeneous in size. *Nature*, 358:764–768, 1992.

[Chicz *et al.* 1993]   R. M. Chicz et al. Specificity and promiscuity among naturally processed peptides bound to HLA-DR alleles. *J. Exp. Med.*, 178(1):27–47, 1993.

[Chiel & Beer 1997]   H. J. Chiel and R. D. Beer. The brain has a body: adaptive behavior emerges from interactions of nervous system, body and environment. *Trends in Neurosciences*, 20(12):553–557, 1997.

[Christinck & Luscher 1991]   E. R. Christinck and M. A. Luscher. Peptide binding to class I MHC on living cells and quantitation of complexes required for CTL lysis. *Nature*, 352(6330):67–70, 1991.

[Churchill *et al.* 2000]   H. R. O. Churchill, P. S. Anderson, E. A. Parke, R. A. Mariuzza, and D. M. Kranz. Mapping the energy of superantigen staphylococcus enterotoxin C3 recognition of an alpha/beta T cell receptor using alanine scanning mutagenesis. *J. Exp. Med.*, 191:835–846, 2000.

[Clancey 1997]   W. Clancey. *Situated Cognition: On Human Knowledge and Computer Representations*. Cambridge University Press, 1997.

[Clark & Forman 1984]   S. S. Clark and J. Forman. Functional aspects of class I MHC molecule domains. *Surv. Immunol. Res.*, 3((2-3)):179–83, 1984.

[Clark *et al.* 2005a]   E. Clark, A. Hone, and J. Timmis. A Markov Chain Model of the B-cell Algorithm. In [Jacob *et al.* 2005], pages 318–330.

[Clark *et al.* 2005b]   J. A. Clark, S. Stepney, and H. Chivers. Breaking the model: finalisation and a taxonomy of security attacks. In *REFINE 2005*, volume 137 of *ENTCS*, pages 225–242, 2005.

[Clark 1997]   A. Clark. *Being There : putting brain, body and world together again.* Oxford University Press, 1997.

[Cohen & Segal 2001]   I. R. Cohen and L. A. Segal. *Design Principles for the Immune System and Other Distributed Autonomous Systems.* SFI, 2001.

[Cohen *et al.* 2004]   I. R. Cohen, Uri Hershberg, and Sorin Solomon. Antigen-receptor degeneracy and immunological paradigms. *Molecular Immunology*, 40:993–996, 2004.

[Cohen 2000a]   I. R. Cohen. Discrimination and dialogue in the immune system. *Seminars in Immunology*, 12(3):215–219, 2000.

[Cohen 2000b]   I. R. Cohen. *Tending Adam's Garden: Evolving the Cognitive Immune Self.* Elsevier Academic Press, 2000.

[Cohen 2001]   I. R. Cohen. The creation of immune specificity. [Cohen & Segal 2001], pages 151–159.

[Cohn & Langman 1990]   M. Cohn and R. E. Langman. The protecton: the evolutionarily selected unit of humoral immunity. *Immunol. Reviews*, 15:1–131, 1990.

[Cohn & Mata 2006]   M. Cohn and J. Mata. The tritope model for restrictive recognition of antigen by T-cells: II. implications for ontogeny, evolution and physiology. *Molecular Immunology*, in press, 2006.

[Cohn *et al.* 2002]   M. Cohn, R. E. Langman, and J. J. Mata. A computerized model for the self-nonself discrimination at the level of the T-helper (Th-genesis). I. the origin of 'primer' effector T-helpers. *Int. Immunol.*, 14:1105–1112, 2002.

[Cohn 1969]   M. Cohn. Immunological tolerance. pages 281–338. Academic Press, 1969.

[Cohn 1983]   M. Cohn. Progress in immunology. pages 839–851. Academic Press, 1983.

[Cohn 1985]   M. Cohn. Diversity in the immune system: "Preconceived ideas" or ideas preconceived? *Biochimie*, 67:9–27, 1985.

[Cohn 1986]   M. Cohn. In P. Matzinger et al., editors, *Proceedings of the EMBO Workshop on Tolerance*, pages 3–35, Basle, 1986. Editiones (Roche).

[Cohn 1992]   M. Cohn. The self-nonself discrimination: Reconstructing a cabbage from sauerkraut. *Res. Immunol.*, 143:323–334, 1992.

[Cohn 1994]   P. M. Cohn. *Elements of Linear Algebra.* Chapman and Hall, 1994.

[Cohn 1997]   M. Cohn. A new concept of immune specificity emerges from a consideration of the self-nonself discrimination. *Cell. Immunol.*, 181:103–108, 1997.

[Cohn 1998]   M. Cohn. At the feet of the master: The search for universalities. Divining the evolutionary selection pressures that resulted in an immune system. *Cytogenet. Cell Genet.*, 80:54–60, 1998.

[Cohn 2001]   M. Cohn. *Historical Issues and Contemporary Debates in Immunology*, chapter Dialogues with Selves, pages 53–85. Elsevier, 2001.

[Cohn 2002]   M. Cohn. The immune system: a weapon of mass destruction invented by evolution to even the odds during the war of the DNAs. *Immunol. Rev.*, 185:24–38, 2002.

[Cohn 2003]   M. Cohn. Does complexity belie a simple decision—on the Efroni and Cohen critique of the minimal model for a self–nonself discrimination. *Cellular Immunology*, 221:138–142, 2003.

[Cohn 2004]   M. Cohn. Whither T-suppressors: If they didn't exist would we have to invent them? *Cell. Immunol.*, 27:81–92, 2004.

[Cohn 2005a]   M. Cohn. A biological context for the self-nonself discrimination and the regulation of effector class by the immune system. *Immunologic Research*, 31:133–150, 2005.

[Cohn 2005b]   M. Cohn. The common sense of the self-nonself discrimination. *Springer Seminars in Immunopathology*, 27:3–17, 2005.

[Comstock 1982]   G. Comstock. Epidemiology of tuberculosis. *American Review of Respiratory Disease*, 125:8–16, 1982.

[Cooke & Hunt 1995]   D. Cooke and J. Hunt. Recognising promoter sequences using an Artificial Immune System. In *Proceedings of Intelligent Systems in Molecular Biology*, pages 89–97. AAAI Press, 1995.

[Cooper *et al.* 1993]   A. M. Cooper, D. K. Dalton, T. A. Stewart, J. P. Griffin, D. G. Russell, and I. M. Orme. Disseminated tuberculosis in interferon gamma gene-disrupted mice. *J. Exp. Med.*, 178(6):2243–2247, 1993.

[Cooper *et al.* 1997a]   A. M. Cooper, J. E. Callahan, M. Keen, J. T. Belisle, and I. M. Orme. Expression of memory immunity in the lung following re-exposure to mycobacterium tuberculosis. *Tuber. Lung Dis.*, 78(1):67–73, 1997.

[Cooper *et al.* 1997b]   A. M. Cooper, J. Magram, J. Ferrante, and I. M. Orme. Interleukin 12 (il-12) is crucial to the development of protective immunity in mice intravenously infected with mycobacterium tuberculosis. *J. Exp. Med.*, 186(1):39–45, 1997.

[Cooper *et al.* 2003]   L. R. Cooper, D. W. Corne, and M. J. Crabbe. Use of a novel hill-climbing genetic algorithm in protein folding simulations. *Comp. Bio. Chem.*, 27:575–580, 2003.

[Copeland 2002]   B. J. Copeland. The Church-Turing Thesis. In E. N. Zalta, editor, *The Stanford Encyclopedia of Philosophy* (Fall 2002 edition), 2002. http://plato.stanford.edu/archives/fall2002/entries/church-turing/.

[Corper *et al.* 2000]   A. L. Corper, T. Stratmann, V. Apostolopoulos, C. A. Scott, K. C. Garcia, A. S. Kang, I. A. Wilson, and L. Teyton. A structural framework for deciphering the link between I-Ag7 and autoimmune diabetes. *Science*, 288:505–511, 2000.

[Coutinho *et al.* 1993]   A. Coutinho, J. Salaun, C. Corbel, A. Bandeira, and N. Le Douarin. The role of thymic epithelium in the establishment of transplantation tolerance. *Immunol. Rev.*, 133:225–240, 1993.

[Crippen *et al.* 1998]   T. L. Crippen, D. W. H. Riches, and D. M. Hyde. Differential regulation of the expression of cytokine-induced neutrophil chemoattractant by mouse macrophages. *Pathobiology*, 66(1):24–32, 1998.

[Crotty *et al.* 2003]   S. Crotty, P. Felgner, H. Davies, J. Glidewell, L. Villarreal, and R. Ahmed. SAP is required for generating long-term humoral immunity. *Nature*, 421:282–287, 2003.

[Cruciani & Watson 1994]   G. Cruciani and K. A. Watson. Comparative molecular field analysis using GRID force-field and GOLPE variable selection methods in a study of inhibitors of glycogen phosphorylase b. *J. Med. Chem.*, 37(16):2589–2601, 1994.

[Crutchfield 1994]   J. P. Crutchfield. The calculi of emergence: computation, dynamics, and induction. *Physica D*, 75:11–54, 1994.

[Cui *et al.* 1998]   Y. Cui, R. S. Chen, and W. H. Wong. Protein folding simulation using genetic algorithm and supersecondary structure constraints. *Proteins: Structure, Function and Genetics*, 31(3):247–257, 1998.

[Cullell-Young *et al.* 2001]   M. Cullell-Young et al. From transcription to cell surface expression, the induction of MHC class II I-A alpha by interferon-gamma in macrophages is regulated at different levels. *Immunogenetics*, 53(2):136–44, 2001.

[Cunliffe 1997]   J. Cunliffe. Morphostasis: an evolving perspective. *Medical Hypotheses*, 49:449–459, 1997.

[Cutello & Nicosia 2004]   V. Cutello and G. Nicosia. The clonal selection principle for in silico and in vitro computing. In L. N. de Castro and F. J. von Zuben, editors, *Recent Developments in Biologically Inspired Computing*. Idea Group Publishing, Hershey, PA, 2004.

[Cutello *et al.* 2004]   V. Cutello, G. Nicosia, and M. Parvone. Exploring the capability of immune algorithms: A characterisation of hypermutation operators. In [Nicosia *et al.* 2004], pages 263–276.

[Cutello *et al.* 2006]   V. Cutello, G. Narzisi, and G. Nicosia. A multi-objective evolutionary approach to the protein structure prediction problem. *J. Royal Soc. Inter.*, 3:139–151, 2006.

[Czermak *et al.* 1999]   B. J. Czermak et al. In vitro and in vivo dependency of chemokine generation on C5a and TNF-alpha. *J. Immunol.*, 162(4):2321–2325, 1999.

[Daida & Hilss 2003]   J. M. Daida and A. M. Hilss. Identifying structural mechanisms in standard genetic programming. In [Cantú-Paz *et al.* 2003], pages 1639–1651.

[Daida *et al.* 2003a]   J. M. Daida, A. M. Hilss, D. J. Ward, and S. L. Long. Visualizing tree structures in genetic programming. In [Cantú-Paz *et al.* 2003], pages 1652–1664.

[Daida *et al.* 2003b]   J. M. Daida, H. Li, R. Tang, and A. M. Hilss. What makes a problem GP-hard? Validating a hypothesis of structural causes. In [Cantú-Paz *et al.* 2003], pages 1665–1677.

[Dalton *et al.* 1993]   D. Dalton et al. Multiple defects of immune cell function in mice with disrupted inteferon gamma genes. *Science*, 259:1739–1742, 1993.

[Dandekar & Argos 1996]   T. Dandekar and P. Argos. Identifying the tertiary fold of small proteins with different topologies from sequence and secondary structure using the genetic algorithm and extended criteria specific for strand regions. *J. Molec. Biol.*, 256:645–660, 1996.

[Dasgupta 1999]   D. Dasgupta. *Artificial Immune Systems and their Applications*. Springer, 1999.

[Davenport *et al.* 1995]   M. P. Davenport, C. L. Quinn, R. M. Chicz, B. N. Green, A. C. Willis, W. S. Lane, J. I. Bell, and A. V. Hill. Naturally processed peptides from two disease-resistance-associated HLA-DR13 alleles show related sequence motifs and the effects of the dimorphism at position 86 of the HLA-DR β chain. *Proc. Natl. Acad. Sci. USA*, 92:6567–6571, 1995.

[Day *et al.* 2001]   R. O. Day, J. B. Zydallis, and G. B. Lamont. Solving the protein structure prediction problem through a multiobjective genetic algorithm. *ICNN*, 2:31–35, 2001.

[De Boer & Noest 1998]   R. J. De Boer and A. J. Noest. T cell renewal rates, telomerase, and telomere length shortening. *J. Immunol.*, 22:5832–5837, 1998.

[De Boer *et al.* 1992]   R. J. De Boer, L. A. Segal, and A. S. Perelson. Pattern formulation in one-and two-dimensional shape-space models of the immune system. *J. Theor. Biol.*, 155(3):295–333, 1992.

[De Boer *et al.* 2004]   R. J. De Boer, J. A. Borghans, M. van Boven, C. Kesmir, and F. J. Weissing. Heterozygote advantage fails to explain the high degree of polymorphism of the MHC. *Immunogenetics.*, 55:725–731, 2004.

[de Castro & Timmis 2002a]   L. N. de Castro and J. Timmis. *Artificial Immune Systems: A New Computational Intelligence Approach.* Springer, 2002.

[de Castro & Timmis 2002b]   L. N. de Castro and J. Timmis. Hierarchy and convergence of immune networks: Basic ideas and preliminary results. In [Timmis & Bentley 2002], pages 231–240.

[de Castro & Timmis 2003]   L. N. de Castro and J. Timmis. Artificial immune systems as a novel soft computing paradigm. *Soft Computing*, 7:526–544, 2003.

[de Castro & Von Zuben 2000]   L. N. de Castro and F. J. Von Zuben. The clonal selection algorithm with engineering applications. In *GECCO Workshop on Artificial Immune Systems and Their Applications*, pages 36–37, 2000.

[de Castro & Von Zuben 2001]   L. N. de Castro and F. J. Von Zuben. *aiNet: An Artificial Immune Network for Data Analysis*, pages 231–259. Idea Group Publishing, USA, 2001.

[de Castro & Von Zuben 2002]   L. N. de Castro and F. J. Von Zuben. Learning and optimization using the clonal selection principle. *IEEE Transactions on Evol. Comp.*, 6(3):239–251, 2002.

[de Groot *et al.* 2001]   A. S. de Groot, A. Bosma, N. Chinai, J. Frost, B. M. Jesdale, M. A. Gonzalez, W. Martin, and C. Saint-Aubin. From genome to vaccine: in silico predictions, ex vivo verification. *Vaccine*, 19:4385–4395, 2001.

[de Groot *et al.* 2002]   N. G. de Groot, N. Otting, G. G. Doxiadis, S. S. Balla-Jhagjhoorsingh, J. L. Heeney, J. J. van Rood, P. Gagneux, and R. E. Bontrop. Evidence for an ancient selective sweep in the MHC class I gene repertoire of chimpanzees. *Proc. Natl. Acad. Sci. USA*, 99:11748–11753, 2002.

[Deavin *et al.* 1996]   A. J. Deavin, T. R. Auton, and P. J. Greaney. Statistical comparison of established T-cell epitope predictors against a large database of human and murine antigens. *Mol. Immunol.*, 33(145-155), 1996.

[Deb *et al.* 2002]   K. Deb, A. Pratap, S. Agarwal, and T. Meyarivan. A fast and elitist multiobjective genetic algorithm: Nsga-2. *IEEE Trans. Evol. Comp.*, 6:182–197, 2002.

[De Boer & Perelson 1993]   R. J. De Boer and A. S. Perelson. How diverse should the immune system be? *Proc. R. Soc. Lond. B Biol. Sci.*, 252:171–175, 1993.

[Deem & Lee 2003]   M.W. Deem and H.Y. Lee. Sequence space localization in the immune system response to vaccination and disease. *Phys. Rev. Lett.*, 91:068101:1–4, 2003.

[Degli-Eposti & Smyth 2005]   M. A. Degli-Eposti and M. J. Smyth. Close encounters of a different kind: dendritic cells and NK cells take centre stage. *Nat. Rev. Imm.*, 5(2):112–124, 2005.

[del Guercio & Sidney 1995]   M. F. del Guercio and J. Sidney. Binding of a peptide antigen to multiple HLA alleles allows definition of an a2-like supertype. *J. Immunol.*, 154(2):685–693, 1995.

[Delvig *et al.* 2002]   A. A. Delvig et al. TGF-beta1 and IFN-gamma cross-regulate antigen presentation to CD4 T cells by macrophages. *J. Leukoc. Biol.*, 72(1):163–166, 2002.

[Dembic 2000]   Z. Dembic. Immune system protects integrity of tissues. *Molec. Immunol.*, 37:563–569, 2000.

[Dempsey *et al.* 1996]   P. W. Dempsey, M. E. D. Allison, S. Akkaraju, C. C. Good-
now, and D. T. Fearon. C3D of complement as a molecular adjuvant: Bridging
innate and acquired immunity. *Science*, 271(5247):348–350, 1996.

[Denzin & Cresswell 195]   L. K. Denzin and P. Cresswell. HLA-DM induces CLIP
dissociation from MHC class II alpha beta dimers and facilitates peptide loading.
Cell, 82(1):155–65, 195.

[Derrida 1980]   B. Derrida. Random-energy model: limit of a family of disordered
models. *Phys. Rev. Lett.*, 45:79–82, 1980.

[Dessen *et al.* 1997]   A. Dessen, C. M. Lawrence, S. Cupo, D. M. Zaller, and D. C.
Wiley. X-ray crystal structure of HLA-DR4 (DRA*0101, DRB*0401) complexed
with a peptide from human collagen II. *Immunity*, 7:473–481, 1997.

[Detours & Perelson 1999]   V. Detours and A. S. Perelson. Explaining high allore-
activity as a quantitative consequence of affinity-driven thymocyte selection.
Proc. Natl. Acad. Sci. USA, 96:5153–5158, 1999.

[Detours & Perelson 2000]   V. Detours and A. S. Perelson. The paradox of allore-
activity and self MHC restriction: Quantitative analysis and statistics. *Proc.
Natl. Acad. Sci. USA*, 97:8479–8483, 2000.

[Detours *et al.* 1999]   V. Detours, R. Mehr, and A. S. Perelson. A quantitative
theory of affinity-driven T cell repertoire selection. *J. Theor. Biol.*, 200:389–
403, 1999.

[Dewar *et al.* 1985]   M. J. S. Dewar, E. G. Zoebisch, E. F. Healy, and J. J. P.
Stewart. A new general purpose quantum mechanical molecular model. *J. Am.
Chem. Soc*, 107:3902–3909, 1985.

[Dines & Powell 1997]   K. Dines and H. Powell. Mast cell interactions with the ner-
vous system: relationship to mechanisms of disease. *Journal of neuropathology
and experimental neurology*, 56(6):627–640, 1997.

[Doherty & Zinkernagel 1975]   P. C. Doherty and R. M. Zinkernagel. Enhanced im-
munological surveillance in mice heterozygous at the H-2 gene complex. *Nature*,
256:50–52, 1975.

[Doherty *et al.* 2000]   P. C. Doherty, J. M. Riberdy, and G. T Belz. *Philos. Trans.
R. Soc. Lond. B. Biol. Sc.*, 355:1093, 2000.

[Dolin *et al.* 1994]   P. J. Dolin, M. C. Raviglione, and A. Kochi. Global tubercu-
losis incidence and mortality during 1990-2000. *Bulletin of the World Health
Organization*, 72(2):213–220, 1994.

[Doolan & Hoffman 1997]   D. L. Doolan and S. L. Hoffman. Degenerate cytotoxic
T cell epitopes from P. falciparum restricted by multiple HLA-A and HLA-B
supertype alleles. *Immunity*, 7(1):97–112, 1997.

[Doytchinova & Flower 2002a]   I. A. Doytchinova and D. R. Flower. A compara-
tive molecular similarity index analysis (CoMSIA) study identifies an HLA-A2
binding supermotif. *J. Comput.-Aid. Molec. Des.*, 16:535–544, 2002.

[Doytchinova & Flower 2002b]   I. A. Doytchinova and D. R. Flower. Physicochem-
ical explanation of peptide binding to HLA-A*0201 major histocompatibility
complex: a three-dimensional quantitative structure-activity relationship study.
Proteins, 48:505–518, 2002.

[Doytchinova & Flower 2002c]   I. A. Doytchinova and D. R. Flower. Quantitative
approaches to computational vaccinology. *Immunol Cell Biol*, 80:270–279, 2002.

[Doytchinova & Flower 2003]   I. A. Doytchinova and D. R. Flower. Towards the in
silico identification of class II restricted T-cell epitopes: a partial least squares it-
erative self-consistent algorithm for affinity prediction. *Bioinformatics*, 19:2263–
2270, 2003.

[Doytchinova *et al.* 2002]   I. A. Doytchinova, M. J. Blythe, and D. R. Flower. Additive method for the prediction of protein-peptide binding affinity. application to the MHC class I molecule HLA-A*0201. *J. Proteome Res*, 1:263–272, 2002.

[Doytchinova *et al.* 2004a]   I. Doytchinova, S. Hemsley, and D. R. Flower. Transporter associated with antigen processing preselection of peptides binding to the MHC: A bioinformatic evaluation. *J. Immunol.*, 173:6813–6819, 2004.

[Doytchinova *et al.* 2004b]   I. A. Doytchinova, P. Guan, and D. R Flower. Identifying human MHC supertypes using bioinformatic methods. *J. Immunol.*, 172(7):4314–4123, 2004.

[Doytchinova *et al.* 2004c]   I. A. Doytchinova, V. A. Walshe, N. A. Jones, S. E. Gloster, P. Borrow, and D. R. Flower. Coupling in silico and in vitro analysis of peptide-MHC binding: A bioinformatic approach enabling prediction of superbinding peptides and anchorless epitopes. *J. Immunol.*, 172:7495–7502, 2004.

[Dunbrack & Cohen. 1997]   R. L. Dunbrack and F. E. Cohen. Bayesian statistical analysis of protein sidechain rotamer preferences. *Protein Science*, 6:1661–1681, 1997.

[Dutton *et al.* 1998]   R. W. Dutton, L. M. Bradley, and S. L. Swain. T cell memory. *Ann. Rev. Immunol.*, 16:201–223, 1998.

[Dybdahl & Lively 1998]   M. F. Dybdahl and C. M. Lively. Host-parasite co-evolution: evidence for rare advantage and time-lagged selection in a natural population. *Evolution*, 52:1057–1066, 1998.

[Ebnet *et al.* 1996]   K. Ebnet, E. P. Kaldjian, A. O. Anderson, and S. Shaw. Orchestrated information transfer underlying leukocyte endothelial interactions. *Ann. Rev. Immunol.*, 14:155–177, 1996.

[Edelman & Gally 2001]   G. M. Edelman and J. A. Gally. Degeneracy and complexity in biological systems. *Proc. Natl. Acad. Sci. USA*, 98(24):13763–13768, 2001.

[Efroni & Cohen 2002]   S. Efroni and I. R. Cohen. Simplicity belies a complex system: a response to the minimal model of immunity of Langman and Cohn. *Cellular Immunology*, 216:23–30, 2002.

[Efroni & Cohen 2003]   S. Efroni and I. R. Cohen. The heuristics of biologic theory: the case of self–nonself discrimination. *Cellular Immunology*, 223:87–89, 2003.

[Efroni *et al.* 2003]   S. Efroni, D. Harel, and I. R. Cohen. Towards rigorous comprehension of biological complexity: Modeling, execution, and visualization of thymic T-cell maturation. *Genome Research*, 13:2485–2497, 2003.

[Egerton *et al.* 1990]   M. Egerton, R. Scollay, and K. Shortman. Kinetics of mature T-cell development in the thymus. *Proc. Natl. Acad. Sci. USA*, 87:2579–2582, 1990.

[Ehlers 2003]   S. Ehlers. Role of tumour necrosis factor (TNF) in host defence against tuberculosis: implications for immunotherapies targeting TNF. *Annals of the Rheumatic Diseases*, 62:37–42, 2003.

[Ellegren *et al.* 1993]   H. Ellegren, G. Hartman, M. Johansson, and L. Andersson. Major histocompatibility complex monomorphism and low levels of DNA fingerprinting variability in a reintroduced and rapidly expanding population of beavers. *Proc. Natl. Acad. Sci. USA*, 90(17):8150–8153, 1993.

[Emile *et al.* 1997]   J. F. Emile et al. Correlation of granuloma structure with clinical outcome defines two types of idiopathic disseminated BCG infection. *Journal of Pathology*, 181:25–30, 1997.

[Falcone *et al.* 2000]   F. Falcone, H. Haas, and B. Gibbs. The human basophil: a new appreciation of its role in immune responses. *Blood*, 96(13):4028–4038, 2000.

[Fan & Long 2001]   Q. R. Fan and E. O. Long. Crystal structure of the human natural killer cell inhibitory receptor KIR2DL1-HLA-CW4 complex. *Nat. Immunol.*, 2(5):452–460, 2001.

[Farmer *et al.* 1986]   J. D. Farmer, N. H. Packard, and A. S. Perelson. The immune system, adaptation, and machine learning. *Physica D*, 22:187–204, 1986.

[Farmer *et al.* 1987]   J. D. Farmer, S. A. Kauffmann, N. H. Packard, and A. S. Perelson. Adaptive dynamic networks as models for the immune-system and autocatalytic sets. *Ann. New York Acad. Sci.*, 504:118–131, 1987.

[Fauchere & Pliska 1983]   J. Fauchere and V. Pliska. Hydrophobic parameters π of amino acid side chain from the partitioning of n-acetyl-amino-acid amides,. *Eur. J. Med. Chem.*, 18:369–375, 1983.

[Fell 2005]   D. A. Fell. Enzymes, metabolites and fluxes. *J. Exp. Bot.*, 56:267–272, 2005.

[Fenton 1998]   M. J. Fenton. Macrophages and tuberculosis. *Curr. Op. Immunol.*, 5(1):72–78, 1998.

[Fink & Bevan 1995]   P. J. Fink and M. J. Bevan. Positive selection of thymocytes. *Adv. Immunol.*, 59:99–133, 1995.

[Flesch & Kaufmann 1990]   I. Flesch and S. Kaufmann. Activation of tuberculostatic macrophage functions by gamma interferon, interleukin-4, and tumor necrosis factor. *Infect. Immun.*, 58:2675–2677, 1990.

[Flood-Page *et al.* 2003]   P. Flood-Page, A. Menzies-Gow, A. B. Kay, and D. Robinson. Eosinophilas role remains uncertain as anti–interleukin-5 only partially depletes numbers in asthmatic airway. *American Journal of Respiratory Critical Care Medicine*, 167:199–204, 2003.

[Flower *et al.* 2002]   D. R. Flower, I. A. Doytchinova, K. Paine, P. Taylor, M. J. Blythe, D. Lamponi, C. Zygouri, P. Guan, H. McSparron, and H. Kirkbride. Computational vaccine design. In *Drug Design: Cutting Edge Approaches*. RSC, 2002.

[Flower 2003]   D. R. Flower. Towards in silico prediction of immunogenic epitopes. *Trends Immunology*, 24:667–674, 2003.

[Flynn & Chan 2001a]   J. Flynn and J. Chan. Immunology of tuberculosis. *Annual Reviews in Immunology*, 19:93–129, 2001.

[Flynn & Chan 2001b]   J. L. Flynn and J. Chan. Tuberculosis: latency and reactivation. *Infect Immun*, 69(7):4195–201., 2001.

[Flynn & Ernst 2000]   J. L. Flynn and J. D. Ernst. Immune responses in tuberculosis. *Curr. Op. Immunol.*, 12(4):432–6., 2000.

[Flynn *et al.* 1992]   J. L. Flynn et al. Major histocompatibility complex class-I-restricted T-cells are required for resistance to Mycobacterium-tuberculosis infection. *Proc. Natl. Acad. Sci. USA*, 82(24):12013–12017, 1992.

[Flynn *et al.* 1993]   J. L. Flynn, J. Chan, K. J. Triebold, D. K. Dalton, T. A. Stewart, and B. R. Bloom. An essential role for interferon gamma in resistance to mycobacterium tuberculosis infection. *J. Exp. Med.*, 178(6):2249–2254, 1993.

[Flynn 1995]   J. L. Flynn. IL-12 increases resistance of BALB/c mice to Mycobacterium tuberculosis infection. *J. Immunol.*, 155:2515, 1995.

[Fogel 2000]   D. B. Fogel. *Evolutionary Computation: Toward a New Philosophy of Machine Intelligence*. IEEE Press, 2000.

[Fontenot & Rudensky 2005]   J. D. Fontenot and A. Y. Rudensky. A well adapted regulatory contrivance: regulatory T cell development and the forkhead family transcription factor Foxp3. *Nat. Immunol.*, 6(4):331–337, 2005.

[Forrest *et al.* 1994]   S. Forrest, A. S. Perelson, L. Allen, and R. Cherukuri. Self–nonself discrimination in a computer. In *Proc. IEEE Symposium on Research Security and Privacy*, pages 202–212, 1994.

[Forrest *et al.* 1997]   S. Forrest, S. Hofmeyr, and A. Somayaji. Computer Immunology. *Comm. ACM*, 40(10):88–96, 1997.

[Foxman *et al.* 1997]   E. Foxman, J. Campbell, and E. Butcher. Multistep navigation and the combinatorial control of leukocyte chemotaxis. *J. Cell Biol.*, 139:1349–1360, 1997.

[Freitas & Timmis 2003]   A. Freitas and J. Timmis. Revisiting the foundations of artificial immune systems: A problem oriented perspective. In [Timmis *et al.* 2003], pages 229–241.

[Fremont *et al.* 1998]   D. H. Fremont, D. Monnaie, C. A. Nelson, W. A. Hendrickson, and E. R. Unanue. Crystal structure of I-Ak in complex with a dominant epitope of lysozyme. *Immunity*, 8:305–317, 1998.

[Freter *et al.* 1983]   R. Freter, R. R. Freter, and H. Brickner. Experimental and mathematical-models of escherichia-coli plasmid transfer in-vitro and in-vivo. *Infection and Immunity*, 39(1):60–84, 1983.

[Gallucci *et al.* 1999]   S. Gallucci, M. Lolkema, and P. Matzinger. Natural adjuvants: endogenous activators of dendritic cells. *Nature Medicine*, 5:1249–1255, 1999.

[Gammack *et al.* 2005]   D. Gammack et al. Understanding granuloma formation using different mathematical and biological scales. *SIAM Journal of Multiscale Modeling and Simulation*, 3:312–345, 2005.

[Gao *et al.* 2001]   X. Gao, G. W. Nelson, P. Karacki, M. P. Martin, J. Phair, R. Kaslow, J. J. Goedert, S. Buchbinder, K. Hoots, D. Vlahov, S. J. O'Brien, and M. Carrington. Effect of a single amino acid change in MHC class I molecules on the rate of progression to AIDS. *N. Engl. J. Med.*, 344(22):1668–1675, May 2001.

[Gardner 1970]   M. Gardner. Mathematical games: the fantastic combinations of John Conway's new solitaire game "life". *Scientific American*, 223:120–123, 1970.

[Garrett 2003]   S. M. Garrett. A paratope is not a epitope: implications for immune network models and clonal selection. In [Timmis *et al.* 2003], pages 217–228.

[Garrett 2005]   S. M. Garrett. How do we evaluate artificial immune systems? *Evolutionary Computation*, 13(2):145–177, 2005.

[Gaspar & Hirsbrunner 2002]   A. Gaspar and B. Hirsbrunner. From optimization to learning in learning in changing environments: The pittsburgh immune classifier system. In [Timmis & Bentley 2002], pages 190–199.

[George *et al.* 2005]   A. J. T. George, J. Stark, and C. Chan. Understanding specificity and sensitivity of T cell recognition. *Trends in Immunology*, 26(12):653–659, 2005.

[Germain & Hendrix 1991]   R. N. Germain and L. R. Hendrix. MHC class II structure, occupancy and surface expression determined by post-endoplasmic reticulum antigen binding. *Nature*, 353(6340):134–139, 1991.

[Germain 2004]   R. N. Germain. An innately interesting decade of research in immunology. *Nature Medicine*, 10:1307–1320, 2004.

[Gillanders *et al.* 1997]   W. E. Gillanders, H. L. Hanson, R. J. Rubocki, T. H. Hansen, and J. M. Connolly. Class I-restricted cytotoxic T cell recognition of split peptide ligands. *Int. Immunol.*, 9:81–89, 1997.

[Gillard & Farr 2005]   G. O. Gillard and A. G. Farr. Contrasting models of promiscuous gene expression by thymic epithelium. *J. Exp. Med.*, 202:15–19, 2005.

[Gillespie 1977]   G. T. Gillespie. Exact stochastic simulation of coupled chemical reactions. *J. Phys. Chem.*, 81:2340 – 2361, 1977.

[Godkin *et al.* 2001]   A. J. Godkin, K. J. Smith, A. Willis, M. V. Tejada-Simon, J. Zhang, T. Elliott, and A. V. Hill. Naturally processed HLA class II peptides reveal highly conserved immunogenic flanking region sequence preferences that reflect antigen processing rather than peptide-MHC interactions. *J. Immunol.*, 166:6720–6727, 2001.

[Golbraikh & Tropsha 2002]   A. Golbraikh and A. Tropsha. Beware of q2! *J. Molec. Graph Model*, 20:269–76, 2002.

[Goldfeld *et al.* 1998]   A. E. Goldfeld et al. Association of an HLA-DQ allele with clinical tuberculosis. *J. Am. Med. Assoc.*, 279(3):226–228, 1998.

[Goldstein *et al.* 2004]   B. Goldstein, J. R. Faeder, and W. Hlavacek. Mathematical models of immune receptor signalling. *Nat. Rev. Imm.*, 4:445–456, 2004.

[Gomez *et al.* 2003]   J. Gomez, F. Gonzalez, and D. Dasgupta. An immuno-fuzzy approach to anomaly detection. In *Proceedings of the 12th IEEE International Conference on Fuzzy Systems*, pages 137–142. IEEE Press, 2003.

[Goodman *et al.* 2002]   D. Goodman, L. Boggess, and A. Watkins. Artificial immune system classification of multiple-class problems. In *Proc. of Intelligent Engineering Systems*, pages 179–184. ASME, 2002.

[Goodman *et al.* 2003]   D. Goodman, L. Boggess, and A. Watkins. An investigation into the source of power for AIRS, an artificial immune classification system. In *Proc. Int. Joint Conf. Neural Networks*, pages 1678–1683. IEEE, 2003.

[Goodwin 1994]   B. C. Goodwin. *How the Leopard Changed Its Spots: the evolution of complexity.* Phoenix, 1994.

[Gopalakrishnan & Roques 1992]   B. Gopalakrishnan and B. P. Roques. Do antigenic peptides have a unique sense of direction inside the MHC binding groove? a molecular modelling study. *FEBS Lett*, 303((2-3)):224–228, 1992.

[Gordon & Riley 1992]   D. M. Gordon and M. A. Riley. A theoretical and experimental-analysis of bacterial-growth in the bladder. *Molecular Microbiology*, 6(4):555–562, 1992.

[Gotter & Kyewski 1994]   J. Gotter and B. Kyewski. Regulating self-tolerance by deregulating gene expression. *Curr. Op. Immunol.*, 16:741–745, 1994.

[Goust 1993]   J. M. Goust. Major histocompatibility complex. *Immunol. Ser.*, 58:29–48, 1993.

[Govindarajan *et al.* 2003]   K. R. Govindarajan, P. Kangueane, T. W. Tan, and S. Ranganathan. MPID: MHC-peptide interaction database for sequence-structure-function information on peptides binding to MHC molecules. *Bioinformatics*, 19:309–310, 2003.

[Grayson *et al.* 2002]   J. Grayson, L. E. Harrington, J. G. Lanier, E. J. Wherry, and R. Ahmed. Differential sensitivity to naïve and memory CD8+ T cells to apoptosis in vivo. *J. Immunol.*, 169:3760–3770, 2002.

[Greensmith *et al.* 2005]   J. Greensmith, U. Aickelin, and S. Cayzer. Introducing dendritic cells as a novel immune-inspired algorithm for anomaly detection. In [Jacob *et al.* 2005], pages 153–167.

[Gropp *et al.* 1999]   W. Gropp, E. Lusk, and A. Skjellum. *Using MPI: Portable Parallel Programming with the Message Passing Interface.* MIT Press, 2nd edition, 1999.

[Grossman & Paul 2000]   Z. Grossman and W. E. Paul. Self-tolerance: context dependent tuning of T cell antigen recognition. *Seminars in Immunology*, 12(3):197–203, 2000.

[Grossman & Paul 2001]   Z. Grossman and W. E. Paul. Autoreactivity, dynamic tuning and selectivity. *Curr. Op. Immunol.*, 13(687-698), 2001.

[Grotzke & Lewinsohn 2005]   J. E. Grotzke and D. M. Lewinsohn. Role of CD8+ T lymphocytes in control of Mycobacterium tuberculosis infection. *Microbes Infect*, 7(4):776–788, 2005.

[Guan *et al.* 2003a]   P. Guan, I. A. Doytchinova, and D. R. Flower. A comparative molecular similarity indices (CoMSIA) study of peptide binding to the HLA-A3 superfamily. *Bioorg. Med. Chem.*, 11:2307–2311, 2003.

[Guan *et al.* 2003b]   P. Guan, I. A. Doytchinova, and D. R. Flower. HLA-A3 super-motif defined by quantitative structure-activity relationship analysis. *Protein Eng.*, 16:11–18, 2003.

[Gulukota & DeLisi 2001]   K. Gulukota and C. DeLisi. Neural network method for predicting peptides that bind major histocompatibility complex molecules. *Methods Mol. Biol.*, 156:201–209, 2001.

[Gulukota *et al.* 1997]   K. Gulukota, J. Sidney, A. Sette, and C. DeLisi. Two complementary methods for predicting peptides binding major histocompatibility complex molecules. *J. Molec. Biol.*, 267:1258–1267, 1997.

[Haken & Mikhailov 1993]   H. Haken and A. Mikhailov, editors. *Interdisciplinary Approaches to Nonlinear Complex Systems*, volume 62 of *Synergetics*. Springer, 1993.

[Hamilton *et al.* 1990]   W. D. Hamilton, R. Axelrod, and R. Tanese. Sexual reproduction as an adaptation to resist parasites (a review). *Proc. Natl. Acad. Sci. USA*, 87:3566–3573, 1990.

[Harding *et al.* 2003]   C. V. Harding, L. Ramachandra, and M. J. Wick. Interaction of bacteria with antigen presenting cells: influences on antigen presentation and antibacterial immunity. *Curr. Op. Immunol.*, 15(1):112–9, 2003.

[Hart & Ross 2002]   E. Hart and P. Ross. Exploiting the analogy between immunology and sparse distributed memories: A system for clustering non-stationary data. In [Timmis & Bentley 2002], pages 49–58.

[Hart & Ross 2004]   E. Hart and P. Ross. Studies on the implications of shape-space models for idiotypic networks. In [Nicosia *et al.* 2004], pages 413–426.

[Hart & Ross 2005]   E. Hart and P. Ross. The impact of the shape of antibody recognition regions on the emergence of idiotypic networks. *Intl. J. Unconventional Computing*, 1(3):281–314, 2005.

[Hart & Timmis 2005]   E. Hart and J. Timmis. Application areas of AIS: The past, the present and the future. In [Jacob *et al.* 2005], pages 483–497.

[Hart 2005]   E. Hart. Not all balls are round: An investigation of alternative recognition-region shapes. In [Jacob *et al.* 2005], pages 29–42.

[Hattotuwagama *et al.* 2004]   C. K. Hattotuwagama, P. Guan, I. A. Doytchinova, C. Zygouri, and D. R. Flower. Quantitative online prediction of peptide binding to the major histocompatibility complex. *J. Molec. Graph. Model.*, 22:195–207, 2004.

[Haykin 1999]   S. Haykin. *Neural Networks-A Comprehensive Foundation.* Prentice-Hall, 1999.

[Hennecke & Wiley 2002]   J. Hennecke and D. C. Wiley. Structure of a complex of the human T-cell receptor (TCR) HA1.7, influenza hemaglutinin peptide, and major histocompatibility complex class II molecule, HLA-DR4 (DRA*0101 and DRB1*0401): insight into TCR cross-restriction and alloreactivity. *J. Exp. Med*, 195:571–581, 2002.

[Hiemstra *et al.* 2000]   H. S. Hiemstra, J. W. Drijfhout, and B. O. Roep. Antigen arrays in T cell immunology. *Curr. Op. Immunol.*, 12:80–84, 2000.

[Hightower *et al.* 1995]   R. R. Hightower, S. A. Forrest, and A. S. Perelson. The evolution of emergent organization in immune system gene libraries. In *Proceedings of the 6th International Conference on Genetic Algorithms*, pages 344–350. Morgan Kaufmann, 1995.

[Hill 1998]   A. Hill. The immunogenetics of human infectious diseases. *Ann. Rev. Immunol.*, 16:593–617, 1998.

[Hmama *et al.* 1998]   Z. Hmama et al. Attenuation of HLA-DR expression by mononuclear phagocytes infected with mycobacterium tuberculosis is related to intracellular sequestration of immature class II heterodimers. *J. Immunol.*, 161(9):4882–93, 1998.

[Hoebe *et al.* 2004]   K. Hoebe, E. Janssen, and B. Beutler. The interface between innate and adaptive immunity. *Nat. Immunol.*, 5(10):971–974, 2004.

[Hofmeyr & Forrest 2000]   S. Hofmeyr and S. Forrest. Architecture for an artificial immune system. *Evolutionary Computation*, 7(1):1289–1296, 2000.

[Holland 1975]   J. H. Holland. Genetic algorithms and classifer systems: Foundations and future directions. In *Proc. of International Conference on Genetic Algorithms*, pages 82–89, 1975.

[Hone 2005]   A. Hone. Ordinary differential equations. In *Encyclopedia of Nonlinear Science*. Routledge, 2005.

[Honey & Rudensky 2003]   K. Honey and A. Y. Rudensky. Lysosomal cysteine proteases regulate antigen presentation. *Nat. Rev. Imm.*, 3(6):472–82, 2003.

[Horig *et al.* 1999]   H. Horig, A. C. Young, N. J. Papadopoulos, T. P. DiLorenzo, and S. G. Nathenson. Binding of longer peptides to the H-2Kb heterodimer is restricted to peptides extended at their C terminus: refinement of the inherent MHC class I peptide binding criteria. *J. Immunol*, 163:4434–4441, 1999.

[Hsieh *et al.* 2004]   C. S. Hsieh, Y. Linng, J. Tyznik, S. G. Self, D. Liggit, and A. Y. Rudensky. Recognition of the peripheral self by naturally arising CD4+ CD25+ T cell receptors. *Immunity*, 21(2):267–277, 2004.

[Huang *et al.* 1996]   C. C. Huang, G. S. Couch, E. F. Pettersen, and T. E. Ferrin. Chimera: An extensible molecular modeling application constructed using standard components. *Pacific Symposium on Biocomputing*, 1:724, 1996.

[Huang *et al.* 1999]   S. E. Huang, R. Samudrala, and J. W. Ponder. Ab initio folding prediction of small helical proteins using distance geometry and knowledge-based scoring functions. *J. Molec. Biol.*, 290:267–281, 1999.

[Hughes & Nei 1988]   A. L. Hughes and M. Nei. Pattern of nucleotide substitution at major histocompatibility complex class I loci reveals overdominant selection. *Nature*, 335:167–170, 1988.

[Hughes & Nei 1989]   A. L. Hughes and M. Nei. Nucleotide substitution at major histocompatibility complex class II loci: Evidence for overdominant selection. *Proc. Natl. Acad. Sci. USA*, 86:958–962, 1989.

[Hughes & Nei 1992]   A. L. Hughes and M. Nei. Models of host–parasite interaction and MHC polymorphism. *Genetics*, 132:863–864, 1992.

[Hughes & Yeager 1998]   A. L. Hughes and M. Yeager. Natural selection at major histocompatibility complex loci of vertebrates. *Annu. Rev. Genet.*, 32:415–435, 1998.

[Huhn *et al.* 1996]   R. D. Huhn, E. Radwanski, S. M. O'Connell, M. G. Sturgill, L. Clarke, R. P. Cody, M. B. Affrime, and D. L. Cutler. Pharmacokinetics and immunomodulatory properties of intravenously administered recombinant human interleukin-10 in healthy volunteers. *Blood*, 87(2):699–705., 1996.

[Huhn *et al.* 1997]   R. D. Huhn et al. Pharmacodynamics of subcutaneous recombinant human IL-10 in healthy volunteers. *Clinical Pharmacology and Therapeutics*, 62:171–180, 1997.

[Hull *et al.* 2001]   D. L. Hull, R. E. Langman, and S. S. Glenn. A general account of selection: Biology, immunology and behavior. *Behavioral and Brain Sciences*, 245:11–28, 2001.

[Hunt & Cooke 1996]   J. Hunt and D. Cooke. Learning using an artificial immune system. *Journal of Network and Computer Applications*, 19:189–212, 1996.

[Hunt *et al.* 1992]   D. F. Hunt, H. Michel, T. A. Dickinson, J. Shabanowitz, A. L. Cox, K. Sakaguchi, and E. Appella. Peptides presented to the immune system by the murine class II major histocompatibility complex molecule I-Ad. *Science*, 256:1817–1820, 1992.

[Hunt *et al.* 1998]   J. Hunt, J. Timmis, D. Cooke, M. Neal, and C. King. JISYS: Development of an artificial immune system for real-world applications. In D. Dasgupta, editor, *Artificial Immune Systems and their Applications*, pages 157–186. Springer, 1998.

[Huseby *et al.* 2005]   E. S. Huseby, J. White, F. Crawford, T. Vass, D. Becker, C. Pinilla, P. Marrack, and J. W. Kappler. How the T cell repertoire becomes peptide and MHC specific. *Cell*, 122(2):247–260, July 2005.

[Jacob *et al.* 2004]   C. Jacob, J. Litorco, and L. Lee. Immunity through swarms: Agent-based simulations of the human immune system. In [Nicosia *et al.* 2004], pages 477–489.

[Jacob *et al.* 2005]   C. Jacob, M. Pilat, P. Bentley, and J. Timmis, editors. *Proc. of the 4th International Conference on Artificial Immune Systems(ICARIS)*, volume 3627 of *LNCS*. Springer, 2005.

[Jacobs 1996]   O. L. R Jacobs. *Introduction to Control Theory*. Oxford University Press, corrected 2nd edition, 1996.

[Jakobsen & Gao 1998]   I. B. Jakobsen and X. Gao. Correlating sequence variation with HLA-A allelic families: implications for T cell receptor binding specificities. *Immunol. Cell Biol.*, 76(2):135–142, 1998.

[James & Tawfik 2003]   L. C. James and D. S. Tawfik. The specificity of cross-reactivity: promiscuous antibody binding involves specific hydrogen bonds rather than nonspecific hydrophobic stickiness. *Protein Sci.*, 12:2183–2193, 2003.

[Janeway & Katz 1984]   C. A. Janeway and M. E. Katz. Self Ia-recognizing T cells undergo an ordered series of interactions with Ia-bearing substrate cells of defined function during their development: a model. *Surv. Immunol. Res.*, 3:45–54, 1984.

[Janeway & Travers 1997]   C. A. Janeway and P. Travers. *Immunobiology: The Immune System in Health and Disease.* Garland Publications, 1997.

[Janeway 1992]   C. A. Janeway. The immune system evolved to discriminate infectious nonself from noninfectious self. *Immunology Today*, 13:11–16, 1992.

[Janeway 2001]   C. A. Janeway. Inaugural article: How the immune system works to protect the host from infection: A personal view. *Proc. Natl. Acad. Sci. USA*, 98(13):7461–7468, 2001.

[Jardetzky *et al.* 1991]   T. S. Jardetzky, W. S. Lane, R. A. Robinson, D. R. Madden, and D. C. Wiley. Identification of self peptides bound to purified HLA-B27. *Nature*, 353:326–329, 1991.

[Jeffery & Bangham 2000]   K. J. Jeffery and C. R. Bangham. Do infectious diseases drive MHC diversity? *Microbes. Infect.*, 2:1335–1341, 2000.

[Jeffery *et al.* 2000]   K. J. Jeffery, A. A. Siddiqui, M. Bunce, A. L. Lloyd, A. M. Vine, A. D. Witkover, S. Izumo, K. Usuku, K. I. Welsh, M. Osame, and C. R. Bangham. The influence of HLA class I alleles and heterozygosity on the outcome of human T cell lymphotropic virus type I infection. *J. Immunol.*, 165:7278–7284, 2000.

[Jen 2001]   E. Jen. Stable or robust? What's the difference? *Robustness in Natural, Engineering and Social Systems*, (RS-2001-024), 2001.

[Jerne 1974]   N. K. Jerne. Towards a network theory of the immune system. *Ann. Immunol. (Inst. Pasteur)*, 125C:373–389, 1974.

[Jiang & Chess 2006]   H. Jiang and L. Chess. Mechanisms of disease - regulation of immune responses by T cell. *New England Journal Of Medicine*, 354(11):1166–1176, 2006.

[Jiang *et al.* 2002]   S. Jiang, N. J. Borthwick, P. Morrison, G. F. Gao, and M. W. Steward. Virus-specific CTL responses induced by an H-2K(d)-restricted, motif-negative 15-mer peptide from the fusion protein of respiratory syncytial virus. *J. Gen. Virol.*, 83:429–438, 2002.

[Johnson *et al.* 2004]   C. G. Johnson, J. P. Goldman, and W. J. Gullick. Simulating complex intracellular processes using object-oriented computational modelling. *Progress in Biophysics and Molecular Biology*, 86(3):379–406, 2004.

[Jones *et al.* 1993]   D. R. Jones, C. D. Perttunen, and B. E. Stuckman. Lipschitzian optimization without the Lipschitz constant. *J. Optimization Theory and Application*, 79:157–181, 1993.

[Jones 2005]   S. A. Jones. Directing transition from innate to acquired immunity: Defining a role for IL-6. *J. Immunol.*, 175(6):3463–3468, 2005.

[Jordan & Smith 1999]   D. W. Jordan and P. Smith. *Nonlinear Ordinary Differential Equations.* Oxford University Press, 3rd edition, 1999.

[Kaiser *et al.* 1997]   C. E. Kaiser, G. B. Lamont, L. D. Merkle, G. H. Gates Jr., and R. Patcher. Polypeptide structure prediction: Real-valued versus binary hybrid genetic algorithms. In *Proc. ACM Symp. on Applied Computing (SAC)*, pages 279–286, San Jose, CA, 1997.

[Kaleab *et al.* 1990]   B. Kaleab et al. Mycobacterial-induced cytotoxic T cells as well as nonspecific killer cells derived from healthy individuals and leprosy patients. *European J. Immunol.*, 20:2651–2659, 1990.

[Kamradt & Volkmer-Engert 2004]   T. Kamradt and R. Volkmer-Engert. Cross-reactivity of T lymphocytes in infection and autoimmunity. *Mol. Divers.*, 8:271–280, 2004.

[Kapsenberg 2003]   M. L. Kapsenberg. Dendritic cell control of pathogen driven T cell polarization. *Nat. Rev. Imm.*, 3(12):984–993, 2003.

[Karlin & Mrazek 2000]   S. Karlin and J. Mrazek. Predicted highly expressed genes of diverse prokaryotic genomes. *J. Bacteriol.*, 182:5238–5250, 2000.

[Karre *et al.* 1986]   K. Karre, H. G. Ljunggren, G. Piontek, and R. Kiessling. Selective rejection of H-2-deficient lymphoma variants suggests alternative immune defense strategy. *Nature*, 319(6055):675–678, 1986.

[Karre 1995]   K. Karre. Express yourself or die: peptides, MHC molecules, and NK cells. *Science*, 267:978–979, 1995.

[Kast & Melief 1991]   W. M. Kast and C. J. Melief. Fine peptide specificity of cytotoxic T lymphocytes directed against adenovirus-induced tumours and peptide-MHC binding. *Int. J. Cancer Suppl.*, 6:90–94, 1991.

[Kast *et al.* 1994]   W. M. Kast, R. M. Brandt, J. Sidney, J. W. Drijfhout, R. T. Kubo, H. M. Grey, C. J. Melief, and A. Sette. Role of HLA-A motifs in identification of potential CTL epitopes in human papillomavirus type 16 E6 and E7 proteins. *J. Immunol.*, 152:3904–3912, 1994.

[Kastrup *et al.* 2000]   I. B. Kastrup, S. Stevanovic, G. Arsequell, G. Valencia, J. Zeuthen, H. G. Rammensee, T. Elliott, and J. S. Haurum. Lectin purified human class I MHC-derived peptides: evidence for presentation of glycopeptides in vivo. *Tissue Antigens*, 56:129–135, 2000.

[Kauffman & Weinberger 1989]   S. A. Kauffman and E. D. Weinberger. The NK model of rugged fitness landscapes and its application to maturation of the immune response. *J. Theor. Biol.*, 141:211–246, 1989.

[Kauffman *et al.* 1988]   S. A. Kauffman, E. D. Weinberger, and A. S. Perelson. Theoretical Immunology, Part one. In *Maturation of the immune response via adaptive walks on affinity landscapes*. 1988.

[Kauffman 1995]   S. A. Kauffman. *At Home in the Universe: the search for laws of complexity*. Viking, 1995.

[Kauffman 2000]   S. A. Kauffman. *Investigations*. Oxford University Press, 2000.

[Kaufmann 1988]   S. Kaufmann. CD8 + T-lymphocytes in intracellular microbial infections. *Immunol. Today*, 9:168–174, 1988.

[Kaufmann 1993]   S. Kaufmann. Immunity to intracellular bacteria. *Annu. Rev. Immunol.*, 11:129–163, 1993.

[Kelsey & Timmis 2003]   J. Kelsey and J. Timmis. Immune inspired somatic contiguous hypermutation for function optimisation. In *Proc. of Genetic and Evolutionary Computation Conference (GECCO)*, volume 2723 of *LNCS*, pages 207–218. Springer, 2003.

[Kelsey *et al.* 2003]   J. Kelsey, J. Timmis, and A. Hone. Chasing chaos. In *Proc. of Congress on Evolutionary Computation (CEC)*, pages 89–98, Canberra, Australia., 2003. IEEE.

[Kelso 1995]   J. A. S. Kelso. *Dynamic Patterns: the self-organization of brain and behavior*. MIT Press, 1995.

[Kennedy & Eberhart 2001]   J. Kennedy and R. Eberhart. *Swarm Intelligence*. Morgan Kaufmann, 2001.

[Kepler & Perelson 1993]   T. B. Kepler and A. S. Perelson. Somatic hypermutation in B cells: an optimal control treatment. *J. Theor. Biol.*, 164:37 – 64, 1993.

[Kesmir *et al.* 2002]   C. Kesmir, A. K. Nussbaum, H. Schild, V. Detours, and S. Brunak. Prediction of proteasome cleavage motifs by neural networks. *Protein Eng.*, 15:287–296, 2002.

[Khanna & Burrows 1997]   R. Khanna and S. R. Burrows. Hierarchy of epstein-barr virus-specific cytotoxic T-cell responses in individuals carrying different subtypes of an HLA allele: implications for epitope-based antiviral vaccines. *J Virol*, 71(10):7429–7439, 1997.

[Kim & Bentley 2002a]   J. Kim and P. J. Bentley. Immune memory in the dynamic clonal selection algorithm. In [Timmis & Bentley 2002], pages 59–67.

[Kim & Bentley 2002b]   J. Kim and P. J. Bentley. A model of gene library evolution in the dynamic clonal selection algorithm. In [Timmis & Bentley 2002], pages 182–189.

[Kim *et al.* 2005]   S. Kim et al. Licencing of natural killer cells by host major histocompatibility complex class I molecules. *Nature*, 436:709–713, 2005.

[Kim 2002]   J. Kim. *Integrating Artificial Immune Algorithms for Intrusion Detection.* PhD thesis, UCL, 2002.

[Kimachi *et al.* 1997]   K. Kimachi, M. Croft, and H. M. Grey. The minimal number of antigen-major histocompatibility complex class II complexes required for activation of naive and primed T cells. *European J. Immunol.*, 27(12):3310–7, 1997.

[Kincaid & Cheney 2002]   D. Kincaid and W. Cheney. *Numerical Analysis: Mathematics of Scientific Computing.* Brooks/Cole, 3rd edition, 2002.

[Kindler 1989]   V. Kindler. The inducing role of tumor necrosis factor in the development of bactericidal granulomas during BCG development. *Cell*, 56:731–740, 1989.

[King *et al.* 2005]   R. D. King, S. M. Garrett, and G. M. Coghill. On the use of qualitative reasoning to simulate and identify metabolic pathways. *Bioinformatics*, 21:2017–2026, 2005.

[Kirk 1997]   D. E. Kirk. *Optimal Control Theory-An Introduction.* Prentice Hall Inc., 1997.

[Kirschner & Blaser 1995]   D. Kirschner and M. Blaser. The dynamics of H. pylori infection of the human stomach. *J. Theor. Biol.*, 176:281–290, 1995.

[Kisielow *et al.* 1988]   P. Kisielow, H. Bluthmann, U. D. Staerz, M. Steinmetz, and H. Von Boehmer. Tolerance in T-cell-receptor transgenic mice involves deletion of nonmature $CD4^+8^+$ thymocytes. *Nature*, 333:742–746, 1988.

[Klebe & Abraham 1999]   G. Klebe and U. Abraham. Comparative molecular similarity index analysis (comsia) to study hydrogen-bonding properties and to score combinatorial libraries. *J. Comput. Aid. Molec. Des.*, 13:1–10, 1999.

[Klebe *et al.* 1994]   G. Klebe, U. Abraham, and T. Mietzner. Molecular similarity indices in a comparative analysis (comsia) of drug molecules to correlate and predict their biological activity. *J. Med. Chem.*, 37:4130–4146, 1994.

[Kleinstein & Seiden 2000]   S. H. Kleinstein and Philip E. Seiden. Simulating the immune system. *Computing in Science and Engineering*, 2(4):69–77, 2000.

[Kleinstein *et al.* 2003]   S. H. Kleinstein, Y. Louzoun, and M. J. Shlomchik. Estimating hypermutation rates from clonal tree data. *J. Immunol.*, 171(9):4639–4649, 2003.

[Klyubin *et al.* 2005]   A. S. Klyubin, D. Polani, and C. L. Nehaniv. All else being equal be empowered. In *ECAL 2005*, volume 3630 of *LNAI*, pages 744–753. Springer, 2005.

[Knight & Timmis 2001]   T. Knight and J. Timmis. AINE: An immunological approach to data mining. In *Proc. IEEE Int. Conf. Data Mining*, pages 297–304. IEEE Press, 2001.

[Knight & Timmis 2003]   T. Knight and J. Timmis. A multi-layered immune inspired machine learning algorithm. In A. Lotfi and M. Garibaldi, editors, *Applications and Science in Soft Computing*, pages 195–202. Springer, 2003.

[Knowles & Corne 1999]   J. D. Knowles and D. W. Corne. The Pareto archived evolution strategy : A new baseline algorithm for Pareto multiobjective optimisation. *Proc. of Congress on Evolutionary Computation (CEC)*, 10:98–105, 1999.

[Knowles & Corne 2000]   J. D. Knowles and D. W. Corne. Approximating the nondominated front using the pareto archived evolution strategy. *Evol. Comp.*, 8(2):149–172, 2000.

[Koch & Platt 2003]   C. A. Koch and J. L. Platt. Natural mechanisms for evading graft rejection: the fetus as an allograft. *Springer Seminars Immunopathology*, 25:95–117, 2003.

[Kocher *et al.* 1999]   A. Kocher, J. Jaffe, and B. Jun. Differential power analysis. In *Crypto '99*, volume 1666 of *LNCS*, pages 388–397. Springer, 1999.

[Kocher 1996]   A. Kocher. Timing attacks on implementations of Diffie-Hellman, RSA, DSS, and other systems. In *Crypto '96*, volume 1109 of *LNCS*, pages 104–113. Springer, 1996.

[Korber *et al.* 2001a]   B. Korber, B. Gaschen, K. Yusim, R. Thakallapally, C. Kesmir, and V. Detours. Evolutionary and immunological implications of contemporary HIV-1 variation. *Br. Med. Bull.*, 58:19–42, 2001.

[Korber *et al.* 2001b]   B. T. M. Korber, C. Brander, B. F. Haynes, R. Koup, C. Kuiken, J. P. Moore, B. D. Walker, and D. Watkins. HIV molecular immunology. Technical report, Los Alamos National Laboratory, 2001.

[Koyama *et al.* 1999]   S. Koyama et al. Monocyte chemotactic factors released from type II pneumocyte-like cells in response to TNF-alpha and IL-1 alpha. *European Respiratory Journal*, 13(4):820–828, 1999.

[Krakauer 2001]   D. Krakauer. Robustness and overdesign. Technical Report RS-2001-050, SFI, 2001.

[Kramnik *et al.* 2000]   I. Kramnik et al. Genetic control of resistance to experimental infection with virulent mycobacterium tuberculosis. *Proc. Natl. Acad. Sci. USA*, 97(15):8560–8565, 2000.

[Krohling *et al.* 2002]   R. Krohling, Y. Zhou, and A. Tyrrell. Evolving FPGA-based robot controllers using an evolutionary algorithm. In [Timmis & Bentley 2002], pages 41–46.

[Kubinyi & Kehrhahn 1976]   H. Kubinyi and O. H. Kehrhahn. Quantitative structure-activity relationships. 3.1 a comparison of different Free-Wilson models. *J. Med. Chem.*, 19:1040–1049, 1976.

[Kumar & Bentley 2003]   S. Kumar and P. J. Bentley, editors. *On Growth, Form and Computers*. Elsevier, 2003.

[Kundu & Faulkes 2004]   S. Kundu and C. G. Faulkes. Patterns of MHC selection in African mole-rats, family Bathyergidae: the effects of sociality and habitat. *Proc. Biol. Sci.*, 271(1536):273–278, 2004.

[Kurata & Berzofsky 1990]   A. Kurata and J. A. Berzofsky. Analysis of peptide residues interacting with MHC molecule or T cell receptor. Can a peptide bind in more than one way to the same MHC molecule? *J. Immunol.*, 144(12):4526–4535, 1990.

[Kurt-Jones *et al.* 2002]   E. Kurt-Jones, L. Mandell, C. Whitney, A. Padgett, K. Gosselin, P. Newburger, and R. Finberg. Role of toll-like receptor 2 (TLR2) in neutrophil activation: GM-CSF enhances TLR2 expression and TLR2-mediated interleukin 8 responses in neutrophils. *Blood*, 100(5):1860–1868, 9 2002.

[Kushmerick 1997]   N. Kushmerick. Software agents and their bodies. *Minds and Machines*, 7(2):227–247, 1997.

[Kyewski & Derbinski 2004]   B. Kyewski and J. Derbinski. Self-representation in the thymus: An extended view. *Nat. Rev. Imm.*, 4(9):688–698, 2004.

[Lafaille *et al.* 1994]   J. J. Lafaille, K. Nagashima, M. Katsuki, and S. Tonegawa. High incidence of spontaneous autoimmune encephalomyelitis in immunodeficient anti-myelin basic protein T cell receptor transgenic mice. *Cell*, 78:399–408, 1994.

[Lafaille *et al.* 1997]   J. J. Lafaille, E. van de Keere, A. Hsu, J. Baron, W. Haas, C. Raine, and S. Tonegawa. Myelin basic protein-specific T helper 2 (Th2) cells cause experimental autoimmune encephalomyelitis in immunodeficient hosts rather than protect them from the disease. *J. Exp. Med.*, 186(2):307–312, 1997.

[Lakoff & Johnson 1980]   G. Lakoff and M. Johnson. *Metaphors We Live By*. University of Chicago Press, 1980.

[Lakoff & Núñez 2000]   G. Lakoff and R. E. Núñez. *Where Mathematics Comes From*. Basic Books, 2000.

[Lakoff 1987]   G. Lakoff. *Women, Fire, and Dangerous Things: what categories reveal about the mind*. University of Chicago Press, 1987.

[Lamas *et al.* 1998]   J. R. Lamas, J. M. Brooks, B. Galocha, A. B. Rickinson, and J. A. Lopez de Castro. Relationship between peptide binding and T cell epitope selection: a study with subtypes of HLA-B27. *Int. Immunol.*, 10(3):259–266, 1998.

[Lane *et al.* 1999]   B. R. Lane et al. TNF-alpha inhibits HIV-1 replication in peripheral blood monocytes and alveolar macrophages by inducing the production of RANTES and decreasing C-C chemokine receptor 5 (CCR5) expression. *J. Immunol.*, 63(7):3653–3661, 1999.

[Langman & Cohn 1986]   R. E. Langman and M. Cohn. The 'complete' idiotype network is an absurd immune system. *Immunology Today*, 7(4):100 – 101, 1986.

[Langman & Cohn 1993a]   R. E. Langman and M. Cohn. The challenges of chickens and rabbits to immunology. In *52nd Forum in Immunology*, volume 144, pages 421–495, 1993.

[Langman & Cohn 1993b]   R. E. Langman and M. Cohn. A theory of the ontogeny of the chicken humoral immune system: The consequences of diversification by gene hyperconversion and its extension to rabbit. *Res. Immunol*, 144:421–446, 1993.

[Langman & Cohn 2000a]   R. E. Langman and M. Cohn. Editorial introduction. *Seminars in Immunology*, 12(3):159–162, 2000.

[Langman & Cohn 2000b]   R. E. Langman and M. Cohn. Editorial summary. *Seminars in Immunology*, 12(3):343–344, 2000.

[Langman & Cohn 2000c]   R. E. Langman and M. Cohn. A minimal model for the self–nonself discrimination: a return to basics. *Seminars in Immunology*, 12(3):189–195, 2000.

[Langman & Cohn 2002a]   R. E. Langman and M Cohn. Haplotype exclusion: the solution to a problem in natural selection. *Seminars in Immunology*, 14:153–162, 2002.

[Langman & Cohn 2002b]   R. E. Langman and M. Cohn. If the immune repertoire evolved to be large, random, and somatically generated, then... *Cellular Immunology*, 216:15–22, 2002.

[Langman *et al.* 2003]   R. E. Langman, J. J. Mata, and M. Cohn. A computerized model for the self-nonself discrimination at the level of the T-helper (Th genesis) II. The behavior of the system upon encounter with nonself antigens. *Int. Immunol.*, 15:593–609, 2003.

[Langman 2000]   R. E. Langman. The specificity of immunological reactions. *Molecular Immunology*, 37:555–561, 2000.

[Langton 1991]   C. G. Langton. *Computation at the Edge of Chaos: phase-transitions and emergent computation*. PhD thesis, University of Michigan, USA, 1991.

[Lanzavecchia 1996]   A. Lanzavecchia. Mechanisms of antigen uptake for presentation. *Curr. Op. Immunol.*, 8(3):348–54, 1996.

[Lapedes & Farber 2001]   A. Lapedes and R. Farber. The geometry of shape space: application to influenza. *J. Theor. Biol.*, 212:57–69, 2001.

[Lau & Wong 2003]   H. Y. K. Lau and V. W. K. Wong. Immunologic control framework for automated material handling. In [Timmis *et al.* 2003], pages 57–68.

[Lau *et al.* 1994]   L. Lau, B. Jamieson, T. Somasundraram, and R. Ahmed. Cytotoxic T-cell memory without antigen. *Nature*, 369:648–652, 1994.

[Lawlor & Warren 1991]   D. A. Lawlor and E. Warren. Gorilla class I major histocompatibility complex alleles: comparison to human and chimpanzee class I. *J. Exp. Med.*, 174:6, 1491-1509 1991.

[Lawlor *et al.* 1990]   D. A. Lawlor, J. Zemmour, P. D. Ennis, and P. Parham. Evolution of class-I MHC genes and proteins: From natural selection to thymic selection. *Annu. Rev. Immunol.*, 8:23–63, 1990.

[Le Douarin *et al.* 1996]   N. Le Douarin, C. Corbel, A. Bandeira, V. Thomas-Vaslin, Y. Modigliani, A. Coutinho, and J. Salaun. Evidence for a thymus-dependent form of tolerance that is not based on elimination or anergy of reactive T cells. *Immunol. Rev.*, 149(1):35–53, 1996.

[Lee *et al.* 1999]   D. W. Lee, H. B. Jun, and K. B. Sim. Artificial immune system for realisation of co-operative strategies and group behaviour in collective autonomous mobile robots. In *Proceedings of Fourth International Symposium on Artificial Life and Robotics*, pages 232–235. AAAI, 1999.

[Lee *et al.* 2000]   P. U. Y. Lee, H. R. O. Churchill, and M. Daniels. Role of 2C T cell receptor residues in the binding of self- and allo-major histocompatibility complexes. *J. Exp. Med.*, 191:1355–1364, 2000.

[Leng & Bentwich 2002]   Q. Leng and Z. Bentwich. Beyond self and nonself: Fuzzy recognition of the immune system. *Scandinavian J. Immunol.*, 56:224–232, 2002.

[Leslie *et al.* 2004]   A. J. Leslie, K. J. Pfafferott, P. Chetty, R. Draenert, M. M. Addo, M. Feeney, Y. Tang, E. C. Holmes, T. Allen, J. G. Prado, M. Altfeld, C. Brander, C. Dixon, D. Ramduth, P. Jeena, S. A. Thomas, A. St John, T. A. Roach, B. Kupfer, G. Luzzi, A. Edwards, G. Taylor, H. Lyall, G. Tudor-Williams, V. Novelli, J. Martinez-Picado, P. Kiepiela, B. D. Walker, and P. J. Goulder. HIV evolution: CTL escape mutation and reversion after transmission. *Nat. Med.*, 10(3):282–289, 2004.

[Leslie *et al.* 2005]   A. Leslie, D. Kavanagh, I. Honeyborne, K. Pfafferott, C. Edwards, T. Pillay, L. Hilton, C. Thobakgale, D. Ramduth, R. Draenert, S. Le Gall, G. Luzzi, A. Edwards, C. Brander, A. K. Sewell, S. Moore, J. Mullins, C. Moore, S. Mallal, N. Bhardwaj, K. Yusim, R. Phillips, P. Klenerman, B. Korber, P. Kiepiela, B. Walker, and P. Goulder. Transmission and accumulation of CTL escape variants drive negative associations between HIV polymorphisms and HLA. *J. Exp. Med.*, 201(6):891–902, Mar 2005.

[Leslie 2000]   R. G. Q. Leslie. The role of complement in the acquired immune response. *Immunology*, 100(1):4–12, 2000.

[Leveton *et al.* 1989]   C. Leveton et al. T-cell-mediated protection of mice against virulent mycobacterium-tuberculosis. *Infection and Immunity*, 57(2):390–395, 1989.

[Levinthal 1969]   C. Levinthal. How to fold graciously. In P. De Brunner, J. Tsibris, and E. Munck, editors, *Mossbauer Spectroscopy in Biological Systems*. University of Illinois Press, 1969.

[Levitsky & Liu 2000]   V. Levitsky and D. Liu. Supermotif peptide binding and degeneracy of MHC: peptide recognition in an EBV peptide-specific CTL response with highly restricted TCR usage. *Hum. Immunol.*, 61(10):972–984, 2000.

[Lewinsohn *et al.* 1998]   D. M. Lewinsohn et al. Human purified protein derivative specific CD4+ T cells use both CD95-dependent and CD95-independent cytolytic mechanisms. *J. Immunol.*, 160(5):2374–2379, 1998.

[Lewontin *et al.* 1978]   R. C. Lewontin, L. R. Ginzburg, and S. D. Tuljapurkar. Heterosis as an explanation for large amounts of genic polymorphism. *Genetics*, 88:149–170, 1978.

[Li & Scheraga 1988]   Z. Li and H. A. Scheraga. Structure and free energy of complex thermodynamics systems. *J. Molec. Stru.*, 179:333–352, 1988.

[Li *et al.* 2000]   Y. Li, H. Li, R. Martin, and R. A. Mariuzza. Structural basis for the binding of an immunodominant peptide from myelin basic protein in different registers by two HLA-DR2 proteins. *J. Molec. Biol.*, 304:177–188, 2000.

[Lichtman & Abbas 1997]   A. Lichtman and A. Abbas. T-cell subsets: recruiting the right kind of help. *Current Biology*, 7(4):242–244, 4 1997.

[Lim 2000]   T. K. Lim. Human genetic susceptibility to tuberculosis. *Ann. Acad. Med.*, 29(3):298–304, 2000.

[Lipsitch & Levin 1997]   M. Lipsitch and B. R. Levin. The population dynamics of antimicrobial chemotherapy. *Antimicrobial Agents and Chemotherapy*, 41(2):363–373, 1997.

[Liu *et al.* 2002]   X. Liu, S. Dai, F. Crawford, R. Fruge, P. Marrack, and J. Kappler. Alternate interactions define the binding of peptides to the MHC molecule iab. *Proc. Natl. Acad. Sci. USA*, 99:8820–8825, 2002.

[Lively & Dybdahl 2000]   C. M. Lively and M. F. Dybdahl. Parasite adaptation to locally common host genotypes. *Nature*, 405:679–681, 2000.

[Ljung 1999]   L. Ljung. *System Identification: Theory for the User*. PRT Prentice Hall, 2nd edition, 1999.

[Lorenz 1963]   E. N. Lorenz. Deterministic nonperiodic flow. *J. Atmos. Sci.*, 20:130–141, 1963.

[Lucchiari-Hartz *et al.* 2003]   M. Lucchiari-Hartz, V. Lindo, N. Hitziger, S. Gaedicke, L. Saveanu, P. M. Van Endert, F. Greer, K. Eichmann, and G. Niedermann. Differential proteasomal processing of hydrophobic and hydrophilic protein regions: contribution to cytotoxic T lymphocyte epitope clustering in HIV-1-Nef. *Proc. Natl. Acad. Sci. USA*, 100(13):7755–7760, 2003.

[Luciani *et al.* 2001]   F. Luciani, S. Valensin, R. Vescovin, P. Sansoni, F. Fagnoni, C. Bonafe M. Franceschi, and G. Turchetti. A stochastic model for CD8+ T cell dynamics in human immunosenescence: Implications for survival and longevity. *J. Theor. Biol.*, 213:587–597, 2001.

[Lund *et al.* 2004]   O. Lund, M. Nielsen, C. Kesmir, A. G. Petersen, C. Lundegaard, P. Worning, C. Sylvester-Hvid, K. Lamberth, G. Roder, S. Justesen, S. Buus, and S. Brunak. Definition of supertypes for HLA molecules using clustering of specificity matrices. *Immunogenetics*, 55(12):797–810, 2004.

[Luscinskas *et al.* 1994]   F. Luscinskas, G. S Kansas, H. Ding, P. Pizcueta, B. E. Schleiffenbaum, T. F. Tedder, and M. A. Gimbrone. Monocyte rolling, arrest and spreading on IL-4-activated vascular endothelium under flow is mediated via sequential action of L-selectin, β_1-integrins, and β_2-integrins. *J. Cell Biol.*, 125(6):1417–1427, 6 1994.

[Luther & Cyster 2001]   Sanjiv A. Luther and Jason G. Cyster. Chemokines as regulators of T cell differentiation. *Nat. Immunol.*, (2), 2001. 10.1038/84205.

[Macken & Perelson 1989]   C. A. Macken and A. S. Perelson. Protein evolution on rugged landscapes. *Proc. Natl. Acad. Sci. USA*, 86:6191–6195, 1989.

[MacKerell Jr. *et al.* 1998]   A. D. MacKerell Jr., B. Brooks, III C. L. Brooks, L. Nilsson, B. Roux, Y. Won, and M. Karplus. CHARMM: The energy function and its parameterization with an overview of the program. In P. v. R. Schleyer et al., editors, *The Encyclopedia of Computational Chemistry*, volume 1. John Wiley and Sons, 1998.

[MacRedmond *et al.* 2005]   R. MacRedmond, C. Greene, C. Taggart, N. McElvaney, and S. O'Neill. Respiratory epithelial cells require toll-like receptor 4 for induction of human β-defensin 2 by lipopolysaccharide. *Respiratory Research*, 6:116, 2005.

[Madden *et al.* 1991]   D. R. Madden, J. C. Gorga, J. L. Strominger, and D. C. Wiley. The structure of HLA-B27 reveals nonamer self-peptides bound in an extended conformation. *Nature*, 353:321–325, 1991.

[Mallios 2001]   R. R. Mallios. Predicting class II MHC/peptide multi-level binding with an iterative stepwise discriminant analysis meta-algorithm. *Bioinformatics*, 17:942–948, 2001.

[Mamitsuka 1998]   H. Mamitsuka. Predicting peptides that bind to MHC molecules using supervised learning of hidden markov models. *Proteins*, 33:460–474, 1998.

[Manz *et al.* 2002]   R. A. Manz, S. Arce, G. Cassese, A. E. Hauser, F. Hiepe, and A. Radbruch. Humoral immunity and long-lived plasma cells. *Curr. Opin. Immunol.*, 14:517, 2002.

[Maruyama & Nei 1981]   T. Maruyama and M. Nei. Genetic variability maintained by mutation and overdominant selection in finite populations. *Genetics*, 98:441–459, 1981.

[Mason 1998]   D. Mason. A very high level of crossreactivity is an essential feature of the T-cell receptor. *Immunol. Today*, 19:395–404, 1998.

[Mason 2001]   D. Mason. Some quantitative aspects of T-cell repertoire selection: the requirement for regulatory T cells. *Immunol. Rev.*, 182:80–88, 2001.

[Mata & Cohn 2006a]   J. Mata and M. Cohn. A cellular automata based synthetic immune system (SIS) that can be used to evaluate hypotheses describing responsiveness. *Immunol. Rev.*, in press, 2006.

[Mata & Cohn 2006b]   J. Mata and M. Cohn. The tritope model for restrictive recognition of antigen by T-cells: III. a computer program (TUNI I) to analyze the parameters of the model. *Molecular Immunology*, in press, 2006.

[Maturana & Varela 1980]   H. R. Maturana and F. J. Varela. *Autopoiesis and Cognition*. Reidel, 1980.

[Matzinger *et al.* 1984]   P. Matzinger, R. Zamoyska, and H. Waldmann. Self tolerance is H-2-restricted. *Nature*, 308:738–741, 1984.

[Matzinger 1994a]   P. Matzinger. Memories are made of this? *Nature*, 369:605–606, 1994.

[Matzinger 1994b]   P. Matzinger. Tolerance, danger and the extended family. *Ann. Rev. Immunol.*, 12:991–1045, 1994.

[Matzinger 2002]   P. Matzinger. The danger model: A renewed sense of self. *Science*, 296:301–305, 2002.

[McDonough *et al.* 1993]   K. McDonough, Y. Kress, and B. Bloom. Pathogenesis of tuberculosis: interaction of mycobacterium tuberculosis with macrophages. *Infect. Immun.*, 61:2763–2773, 1993.

[McFarland *et al.* 1999]   B. J. McFarland, A. J. Sant, T. P. Lybrand, and C. Beeson. Ovalbumin (323-339) peptide bind to the major histocompatibility complex class II , I-A(d) protein using two functionally distinct registers. *Biochemistry*, 38:16663–16670, 1999.

[McHeyzer-Williams & McHeyzer-Williams 2005]   L. J. McHeyzer-Williams and M. G. McHeyzer-Williams. Antigen-specific memory B cell development. *Ann. Rev. Immunol.*, 23:487–513, 2005.

[McIntyre *et al.* 2003]   T. McIntyre, S. Prescott, A. Weyrich, and G. Zimmerman. Cell-cell interactions: leukocyte-endothelial interactions. *Curr. Op. Hematology*, 10(2):150–158, 3 2003.

[McKenna & Kapp 2004]   K. C. McKenna and J. A. Kapp. Ocular immune privilege and CTL tolerance. *Immunol Res*, 29:103–112, 2004.

[McKenna *et al.* 2005]   K. McKenna, A. S. Beignon, and N. Bhardwaj. Plasmacytoid dendritic cells: Linking innate and adaptive immunity. *J. Virology*, 79(1):17–27, 1 2005.

[McKenzie & Pecon-Slattery 1992]   L. M. McKenzie and J. Pecon-Slattery. Taxonomic hierarchy of HLA class I allele sequences. *Genes Immunol.*, 1(2):120–129, 1992.

[McKenzie *et al.* 2006]   B. S. McKenzie, R. A. Kastelein, and D. J. Cua. Understanding the IL-23-IL-17 immune pathway. *Trends in Immunology*, 27(1):17–23, 2006.

[McLachlan 1982]   A. D. McLachlan. Rapid comparison of protein structures. *Acta Cryst.*, A38:871–873, 1982.

[McSparron *et al.* 2003]   H. McSparron, M. J. Blythe, C. Zygouri, I. A. Doytchinova, and D. R. Flower. Jenpep: A novel computational information resource for immunobiology and vaccinology. *J. Chem. Inf. Comp. Sc.*, 43:1276–1287, 2003.

[Meade & Sonneborn 1996]   A. J. Meade and H. C. Sonneborn. Numerical solution of a calculus of variations problem using the feedforward neural network architecture. *Advances in Engineering Software*, 27:213–225, 1996.

[Medzhitov & Janeway 2000]   R. Medzhitov and C. A. Janeway. How does the immune system distinguish self from nonself? *Seminars in Immunology*, 12(3):185–188, 2000.

[Medzhitov & Janeway 2002]   R. Medzhitov and C. A. Janeway. Decoding the patterns of self and nonself by the innate immune system. *Science*, 296(5566):298–300, 2002.

[Meerwijk *et al.* 1997]   J. P. Van Meerwijk, S. Marguerat, R. K. Lees, R. N. Germain, B. J. Fowlkes, and H. R. MacDonald. Quantitative impact of thymic clonal deletion on the T cell repertoire. *J. Exp. Med.*, 185:377–383, 1997.

[Meier-Schellersheim & Mack 1999]   M. Meier-Schellersheim and G. Mack. SIMMUNE, a tool for simulating and analyzing immune system behavior, 1999. http://www-library.desy.de/.

[Mellor *et al.* 2002]   A. L. Mellor, P. Chandler, G. K. Lee, T. Johnson, D. B. Keskin, and D. H. Munn. Indoleamine 2,3-dioxygenase, immunosuppression and pregnancy. *J. Reprod. Immunol.*, 57(1-2):143–150, 2002.

[Mendez-Samperio & Jimenez-Zamudio 1991]   P. Mendez-Samperio and L. Jimenez-Zamudio. Peptide competition at the level of MHC-binding sites using T cell clones from a rheumatoid arthritis patient. *J. Autoimmunity*, 4(5):795–806, 1991.

[Merkenschlager *et al.* 1997]   M. Merkenschlager, D. Graf, M. Lovatt, U. Bommhardt, R. Zamoyska, and A. G. Fisher. How many thymocytes audition for selection? *J. Exp. Med.*, 186:1149–1158, 1997.

[Meyer *et al.* 1998]   C. G. Meyer, J. May, and K. Stark. Human leukocyte antigens in tuberculosis and leprosy. *Trends in Microbiology*, 6(4):148–154, 1998.

[Middleton *et al.* 2003]   D. Middleton, L. Menchaca, H. Rood, and R. Komerofsky. New allele frequency database: http://www.allelefrequencies.net. *Tissue Antigens*, 61(5):403–407, 2003.

[Mikko & Andersson 1995]   S. Mikko and L. Andersson. Low major histocompatibility complex class II diversity in European and North American moose. *Proc. Natl. Acad. Sci. USA*, 92(10):4259–4263, 1995.

[Milik *et al.* 1998]   M. Milik, D. Sauer, L. Brunmark, A. P.and Yuan, A. Vitiello, MR. Jackson, P. A. Peterson, J. Skolnick, and C. A. Glass. Application of an artificial neural network to predict specific class I MHC binding peptide sequences. *Nature Biotechnology*, 16:753–756, 1998.

[Miller & Basten 1996]   J. Miller and A. Basten. Mechanism of tolerance to self. *Curr. Op. Immunol*, 8:815–821, 1996.

[Miller *et al.* 1998]   D. M. Miller et al. Human cytomegalovirus inhibits major histocompatibility complex class II expression by disruption of the Jak/Stat pathway. *J. Exp. Med.*, 187(5):675–83, 1998.

[Miller 2004]   J. Miller. Self-nonself discrimination by T lymphocytes. *C.R. Biologies*, 327:399–408, 2004.

[Mitchell 1997]   T. Mitchell. *Machine Learning*. McGraw-Hill, 1997.

[Mohan *et al.* 2001]   V. Mohan et al. Effects of tumor necrosis factor alpha on host immune response in chronic persistent tuberculosis: possible role for limiting pathology. *Infection and Immunity*, 69:1847–1855, 2001.

[Moller 1988]   G. Moller. Do suppressor T-cells exist? *Scandinavian J. Immunol.*, 27(3):247–250, 1988.

[Moodley *et al.* 2000]   Y. P. Moodley et al. Correlation of CD4 : CD8 ratio and tumour necrosis factor (TNF)alpha levels in induced sputum with bronchoalveolar lavage fluid in pulmonary sarcoidosis. *Thorax*, 55(8):696–699, 2000.

[Moore *et al.* 2002]   C. B. Moore, M. John, I. R. James, F. T. Christiansen, C. S. Witt, and S. A. Mallal. Evidence of HIV-1 adaptation to HLA-restricted immune responses at a population level. *Science*, 296:1439–1443, 2002.

[Moreno *et al.* 1998]   C. Moreno, A. Mehlert, and J. Lamb. The inhibitory effects of mycobacterial lipoarabinomannan and polysaccharides upon polyclonal and monoclonal human T cell proliferation. *Clin. Exp. Immunol.*, 74(2):206–10, 1998.

[Mosmann & Coffman 1989]   T. R. Mosmann and R. L. Coffman. Th1-Cell And Th2-Cell - different patterns of lymphokine secretion lead to different functional properties. *Ann. Rev. Immunol.*, 7:145–173, 1989.

[Muller *et al.* 1987]   I. Muller et al. Impaired resistance to Mycobacterium tuberculosis infection after selective in vivo depletion of L3T4+ and Lyt-2+ T cells. *Infect. Immun.*, 55(9):2037–2041, 1987.

[Murphy *et al.* 2002]   B. M. Murphy, B. H. Singer, S. Anderson, and D. Kirschner. Comparing epidemic TB in demographically distinct heterogeneous populations. *Math. Biosci.*, 180:161–185, 2002.

[Murphy *et al.* 2003]   B. M. Murphy, B. H. Singer, and D. Kirschner. On the treatment of TB in heterogeneous populations. *J. Theor. Biol.*, 223(391-404), 2003.

[Murray 1990]   J. D. Murray. *Mathematical Biology*. Springer, corrected 2nd edition, 1990.

[Měch & Prusinkiewicz 1996]   R. Měch and P. Prusinkiewicz. Visual models of plants interacting with their environment. In *SIGGRAPH 96*, pages 397–410. ACM Press, 1996.

[Myrvik *et al.* 1984]   Q. Myrvik, E. Leake, and M. M. Wright. Disruption of phagosomal membranes of normal alveolar macrophages by the H37Rv strain of Mycobacterium tuberculosi. *Am. Rev. Respir. Dis*, 129:322–328, 1984.

[Napolitani *et al.* 2005]   G. Napolitani, A. Rinaldi, F. Bertoni, F. Sallusto, and A. Lanzavecchia. Selected toll-like receptor agonist combinations synergistically trigger a T helper type 1-polarizing program in dendritic cells. *Nat. Immunol.*, 6(8):769–776, 2005.

[Nasaroui *et al.* 2002]   O. Nasaroui, F. González, and D Dasgupta. The fuzzy artificial immune system: Motivations, basic concepts, and application to clustering and web profiling. In *IEEE International Conference on Fuzzy Systems*, pages 711–716, Hawaii, HI, 2002.

[Nathan *et al.* 1983]   C. Nathan et al. Identification of interferon-gamma as the lymphokine that activates human macrophage oxidative metabolism and antimicrobial activity. *J. Exp. Med.*, 158(670-689), 1983.

[Neal 2002]   M. Neal. An artificial immune system for continuous analysis of time-varying data. In [Timmis & Bentley 2002], pages 76–85.

[Neal 2003]   M. Neal. Meta-stable memory in an artificial immune network. In [Timmis *et al.* 2003], pages 168–180.

[Newborough & Stepney 2005]   R. Newborough and S. Stepney. A generic framework for population based algorithms. In [Jacob *et al.* 2005].

[Ngo & Marks 1992]   J. T. Ngo and J. Marks. Computational complexity of a problem in molecular-structure prediction. *Protein Eng.*, 5(4):313–321, 1992.

[Ngo *et al.* 1994]   J. T. Ngo, J. Marks, and M. Karplus. Computational complexity, protein structure prediction, and the levinthal paradox. In K. Merz and S. Le Grand, editors, *The Protein Folding Problem and Tertiary Structure Prediction*. Birkhauser, 1994.

[Nicosia *et al.* 2004]   G. Nicosia, V. Cutello, P. Bentley, and J. Timmis, editors. *Proc. of the 3rd International Conference on Artificial Immune Systems (ICARIS)*, volume 3239 of *LNCS*. Springer, 2004.

[Nicosia 2004]   G. Nicosia. *Immune Algorithms for Optimization and Protein Structure Prediction*. PhD thesis, University of Catania, 2004.

[Noss *et al.* 2000]   E. H. Noss, C. V. Harding, and W. H. Boom. Mycobacterium tuberculosis inhibits MHC class II antigen processing in murine bone marrow macrophages. *Cell*, 201(1):63–74, 2000.

[Nossal 1994]   G. J. Nossal. Negative selection of lymphocytes. *Cell*, 76:229–239, 1994.

[Novitsky *et al.* 2003]   V. Novitsky, P. Gilbert, T. Peter, M. F. McLane, S. Gaolekwe, N. Rybak, I. Thior, T. Ndung'u, R. Marlink, T. H. Lee, and

M. Essex. Association between virus-specific T-cell responses and plasma viral load in human immunodeficiency virus type 1 subtype C infection. *J. Virol.*, 77(2):882–890, January 2003.

[Nowak & May 2000]   M. A. Nowak and R. A. May. *Virus dynamics*. Oxford University Press, 2000.

[Nowak *et al.* 1992]   M. A. Nowak, K. Tarczy-Hornoch, and J. M. Austyn. The optimal number of major histocompatibility complex molecules in an individual. *Proc. Natl. Acad. Sci. USA*, 89:10896–10899, 1992.

[Ober *et al.* 1997]   C. Ober, L. R. Weitkamp, N. Cox, H. Dytch, D. Kostyu, and S. Elias. HLA and mate choice in humans. *Am. J. Hum. Genet.*, 61:497–504, 1997.

[O'Brien & Yuhki 1999]   S. J. O'Brien and N. Yuhki. Comparative genome organization of the major histocompatibility complex: lessons from the Felidae. *Immunol. Rev.*, 167:133–144, February 1999.

[Ochsenbein & Zinkernagel 2000]   A. Ochsenbein and R. Zinkernagel. Natural antibodies and complement link innate and acquired immunity. *Immunology Today*, 21(12), 12 2000.

[O'Connor 2002]   D. H. O'Connor. Acute phase cytotoxic T lymphocyte escape is a hallmark of simian immunodeficiency virus infection. *Nature Med.*, 8:493–499, 2002.

[Ohki *et al.* 1987]   H. Ohki, C. Martin, C. Corbel, Coltey, and N. Le Douarin. Tolerance induced by thymic epithelial grafts in birds. *Science*, 237:1032–1035, 1987.

[Oksendal 2003]   B. Oksendal. *Stochastic Differential Equations: An Introduction with Applications*. Springer, 2003.

[Orange *et al.* 2002]   J. S. Orange, M. S. Fassett, L. A. Koopman, J. E. Boyson, and J. L. Strominger. Viral evasion of natural killer cells. *Nat. Immunol.*, 3(11):1006–1012, 2002.

[Orme & Cooper 1999]   I. M. Orme and A. M. Cooper. Cytokine/chemokine cascades in immunity to tuberculosis. *Immunol. Today*, 20(7):307–312, 1999.

[Orme 1999a]   I. M. Orme. Beyond BCG: the potential for a more effective TB vaccine. *Mol. Med. Today*, 5(11):487–492, 1999.

[Orme 1999b]   I. M. Orme. New vaccines against tuberculosis. the status of current research. *Infect. Dis. Clin. North. Am.*, 13(1):169–185, 1999.

[Orme 1999c]   I. M. Orme. Vaccination against tuberculosis: recent progress. *Adv. Vet. Med.*, 41:135–143, 1999.

[Ott 1993]   E. Ott. *Chaos in dynamical systems*. Cambridge University Press, 1993.

[Ottaviani & Franceschi 1996]   E. Ottaviani and C. Franceschi. The Neuroimmunology of stress from invertebrates to man. *Progress in Neurobiology*, 48:421–440, 1996.

[Ottenhoff *et al.* 1998]   T. H. Ottenhoff, D. Kumararatne, and J. L. Casanova. Novel human immunodeficiencies reveal the essential role of type-I cytokines in immunity to intracellular bacteria. *Immunol. Today*, 19(11):491–494, 1998.

[Pagie & Hogeweg 2000]   L. Pagie and P. Hogeweg. Individual- and population-based diversity in restriction-modification systems. *Bull. Math. Biol.*, 62:759–774, 2000.

[Pai 2002]   R. K. Pai. Regulation of class II MHC expression in APCs: roles of types I, III, and IV class II transactivator. *J. Immunol.*, 169(3):1326–33, 2002.

[Paine & Flower 2002]   K. Paine and D. R. Flower. Bacterial bioinformatics: Pathogenesis and the genome. *Journal of Molecular and Microbial Biotechnology*, 4:357–365, 2002.

[Panka *et al.* 1988]   D. J. Panka, M. Mudgett-Huner, D. R. Parks, L. L. Peterson, L. A. Herzenberg, E. Haber, and M. N. Margolies. Variable region framework differences results in decreased or increased affinity of variant anti-digoxin antibodies. *Proc. Natl. Acad. Sci. USA*, 85:3080–3084, 1988.

[Pantophlet *et al.* 2003]   R. Pantophlet, E. O. Saphire, P. Poignard, P. W. H. I. Parren, I. A. Wilson, and D. R. Burton. Fine mapping of the interaction of neutralizing and nonneutralizing monoclonal antibodies with the CD4 binding site of human immunodeficiency virus type 1 gp120. *J. Virol.*, 77:642–658, 2003.

[Parham & Ohta 1996]   P. Parham and T. Ohta. Population biology of antigen presentation by MHC class I molecules. *Science*, 272:67–74, 1996.

[Parham *et al.* 1989a]   P. Parham, R. J. Benjamin, B. P. Chen, C. Clayberger, P. D. Ennis, A. M. Krensky, D. A. Lawlor, D. R. Littman, A. M. Norment, H. T. Orr, R. D. Salter, and J. Zemmour. Diversity of class I HLA molecules: Functional and evolutionary interactions with T cells. *Cold Spring Harbor Symp. Quant. Biol.*, 54:529–543, 1989.

[Parham *et al.* 1989b]   P. Parham, D. A. Lawlor, C. E. Lomen, and P. D. Ennis. Diversity and diversification of HLA A,B,C alleles. *J. Immunol.*, 142:3937–3950, 1989.

[Park & Deem 2004]   J. M. Park and M. W. Deem. Correlations in the T-cell response to altered peptide ligands. *Physica A*, 341:455–470, 2004.

[Parker *et al.* 1994]   K. C. Parker, M. A. Bednarek, and J. E. Coligan. Scheme for ranking potential HLA-A2 binding peptides based on independent binding of individual peptide side-chains. *J. Immunol.*, 152:163–175, 1994.

[Parks & Weigle 1980]   D. E. Parks and W. O. Weigle. Maintenance of immunologic unresponsiveness to human gamma globulin: evidence for irreversible inactivation in B lymphocytes. *J. Immunol.*, 124:1230–1236, 1980.

[Parks *et al.* 1978]   D. E. Parks, M. V. Doyle, and W. O. Weigle. Induction and mode of action of suppressor cells generated against human gamma globulin. I. an immunologic unresponsive state devoid of demonstrable suppressor cells. *J. Exp. Med.*, 148:625–638, 1978.

[Parnes 2004]   O. Parnes. From interception to incorporation: Degeneracy and promiscuous recognition as precursors of a paradigm shift in immunology. *Molecular Immunology*, 40:985–991, 2004.

[Paul *et al.* 1951]   J. R. Paul, J. T. Riordan, and J. L. Melnick. Antibodies to three different antigenic types of poliomyelitis in sera from north alaskan eskimos. *Am. J. Hyg.*, 54:275–285, 1951.

[Paul 1999]   W. E. Paul. *Fundamental Immunology*. Raven Press, 1999.

[Peitgen & Richter 1986]   H. O. Peitgen and D. H. Richter. *The Beauty of Fractals: Images of Complex Dynamical Systems*. Springer, 1986.

[Penn *et al.* 2002]   D. J. Penn, K. Damjanovich, and W. K. Potts. MHC heterozygosity confers a selective advantage against multiple-strain infections. *Proc. Natl. Acad. Sci. USA*, 99:11260–11264, 2002.

[Penn 2002]   D. J. Penn. The scent of genetic compatibility: Sexual selection and the major histocompatibility complex. *Ethology*, 108:1–21, 2002.

[Percus *et al.* 1993]   J. K. Percus, O. E. Percus, and A. S. Perelson. Predicting the size of the antibody combining region from consideration of efficient self-nonself discrimination. *Proc. Natl. Acad. Sci. USA*, 90:1691–1695, 1993.

[Perelson & Macken 1995]   A. S. Perelson and C. A. Macken. Protein evolution on partially correlated landscape. *Proc. Natl. Acad. Sci. USA*, 92:9657–9661, 1995.

[Perelson & Oster 1979]   A. S. Perelson and G. F. Oster. Theoretical studies of clonal selection: minimal antibody repertoire size and reliability of self–non-self discrimination. *J. Theor. Biol.*, 81:645–670, 1979.

[Perelson & Weisbuch 1997]   A. S. Perelson and G. Weisbuch. Immunology for physicists. *Rev. Mod. Phys.*, 69(4):1219–1267, 1997.

[Perelson *et al.* 1976]   A. S. Perelson, M. Mirmirani, and G. F. Oster. Optimal strategies in immunology. I. B-cell differentiation and proliferation. *J. Math. Biol.*, 3:325–367, 1976.

[Perelson 1989]   A. S. Perelson. Immune network theory. *Immunological Review*, 110:5–36, 1989.

[Perelson 2002]   A. Perelson. Modelling viral and immune system dynamics. *Nature*, 2:28–36, 2002.

[Perutz 1970]   M. F. Perutz. Stereochemistry of cooperative effects of hemoglobin. *Nature*, 228:726–739, 1970.

[Petrovsky & Brusic 2004]   N. Petrovsky and V. Brusic. Virtual models of the HLA class I antigen processing pathway. *Methods*, 34(4):429–35, 2004.

[Peyerl *et al.* 2004]   F. W. Peyerl, H. S. Bazick, M. H. Newberg, D. H. Barouch, J. Sodroski, and N. L. Letvin. Fitness costs limit viral escape from cytotoxic T lymphocytes at a structurally constrained epitope. *J. Virol.*, 78(24):13901–13910, 2004.

[Picca & Caton 2005]   C. C. Picca and A. J. Caton. The role of self-peptides in the development of CD4+ CD25+ regulatory cells. *Curr. Op. Immunol.*, 17:131–136, 2005.

[Pichler 2002]   W. J. Pichler. Modes of presentation of chemical neoantigens to the immune system. *Toxicology*, 181:49–54, 2002.

[Pile 1999]   K. Pile. Broadsheet number 51: HLA and disease associations. *Pathology*, 31:202–212, 1999.

[Pinch 1993]   E. R. Pinch. *Optimal Control and the Calculus of Variations*. Oxford Science Publications, OUP, 1993.

[Polani *et al.* 2001]   D. Polani, T. Martinetz, and J. T. Kim. An information-theoretic approach for the quantification of relevance. In *ECAL 2001*, volume 2159 of *LNCS*, pages 704–713. Springer, 2001.

[Pollastri *et al.* 2002]   G. Pollastri, D. Przybylski, B. Rost, and P. Baldi. Improving the prediction of protein secondary structure in three and eight classes using recurrent neural networks and profiles. *Proteins*, 47(2):228–235, 2002.

[Poole & Claman 2004]   J. A. Poole and H. N. Claman. Immunology of pregnancy. implications for the mother. *Clin. Rev. Allergy Immunol.*, 26:161–170, 2004.

[Potts *et al.* 1991]   W. K. Potts, C. J. Manning, and E. K. Wakeland. Mating patterns in seminatural populations of mice influenced by MHC genotype. *Nature*, 352:619–621, 1991.

[Probst-Kepper *et al.* 2001]   M. Probst-Kepper, V. Stroobant, R. Kridel, B. Gaugler, C. Landry, F. Brasseur, J. P. Cosyns, B. Weynand, T. Boon, and B. J van den Eynde. An alternative open reading frame of the human macrophage colony-stimulating factor gene is independently translated and codes for an antigenic peptide of 14 amino acids recognized by tumor-infiltrating CD8 T lymphocytes. *J. Exp. Med.*, 193:1189–1198, 2001.

[Probst-Kepper *et al.* 2004]   M. Probst-Kepper, H. J. Hecht, H. Herrmann, V. Janke, F. Ocklenburg, J. Klempnauer, B. J. van den Eynde, and S. Weiss. Conformational restraints and flexibility of 14-meric peptides in complex with HLA-B*3501. *J. Immunol.*, 173:5610–5616, 2004.

[Profit Program]   Profit Program. http://www.bioinf.org.uk/software/.

[Prusinkiewicz & Lindenmayer 1990]   P. Prusinkiewicz and A. Lindenmayer. *The Algorithmic Beauty of Plants*. Springer, 1990.

[Pulendran 2005]   B. Pulendran. Variegation of the immune response with dendritic cells and pathogen recognition receptors. *J. Immunol.*, 173:2457–2465, 2005.

[Purisima & Scheraga 1987]   E. O. Purisima and H. A. Scheraga. An approach to the multiple-minima problem in protein folding by relaxing dimensionality test on enkephalin. *J. Molec. Biol.*, 196:697–709, 1987.

[Quick & Dautenhahn 1999]   T. Quick and K. Dautenhahn. Making embodiment measurable. In *Embodied Mind / Alife Workshop, KogWis'99*, 1999.

[Quick *et al.* 1999]   T. Quick, K. Dautenhahn, C. L. Nehaniv, and G. Roberts. On bots and bacteria: ontology independent embodiment. In *ECAL'99*, volume 1674 of *LNAI*, pages 339–343. Springer, 1999.

[Quick *et al.* 2000]   T. Quick, K. Dautenhahn, C. L. Nehaniv, and G. Roberts. The essence of embodiment: A framework for understanding and exploiting structural coupling between system and environment. In *CASYS'99*, volume 517 of *AIP Conference Proceedings*, pages 649–660, 2000.

[Rabow & Scheraga 1996]   A. A. Rabow and H. A. Scheraga. Improved genetic algorithm for the protein folding problem by use of cartesian combination operators. *Protein Science*, 5:1800–1815, 1996.

[Rajalingam *et al.* 1996]   R. Rajalingam et al. Polymerase chain reaction–based sequence-specific oligonucleotide hybridization analysis of HLA class II antigens in pulmonary tuberculosis: relevance to chemotherapy and disease severity. *J. Infect. Dis.*, 173(3):669–676, 1996.

[Ramachandran & Sassiekharan 1968]   G. B. Ramachandran and V. Sassiekharan. Conformation of polypeptides and proteins. *Adv. Protein Chem.*, 23:283–437, 1968.

[Rammensee *et al.* 1995]   H. G. Rammensee, T. Friede, and S. Stevanovic. MHC ligands and peptide motifs: first listing. *Immunogenetics*, 41:178–228., 1995.

[Rammensee *et al.* 1999]   H. G. Rammensee, J. Bachmann, N. P. Emmerich, OA. Bachor, and S. Stevanovic. SYFPEITHI, a database for MHC ligands and peptide motifs. *Immunogenetics*, 50:213–219, 1999.

[Ramsay 1972]   W. S. Ramsay. Analysis of individual leucocyte behaviour during chemotaxis. *Exp. Cell. Res.*, 70:129–139, 1972.

[Reche & Reinherz 2003]   P. A. Reche and E. L. Reinherz. Sequence variability analysis of human class I and class II MHC molecules: functional and structural correlates of amino acid polymorphisms. *J. Molec. Biol.*, 331(3):623–641, 2003.

[Reddehase *et al.* 1989]   M. J. Reddehase, J. B. Rothbard, and U. H. Koszinowski. A pentapeptide as minimal antigenic determinant for MHC class I-restricted T lymphocytes. *Nature*, 337:651–653, 1989.

[Reinhardt *et al.* 2001]   R. L. Reinhardt, A. Khoruts, R. Merica, T. Zell, and M. K. Jenkins. Visualizing the generation of memory CD4 T cells in the whole body. *Nature*, 410(6824):101–105, 2001.

[Remondini *et al.* 2003]   D. Remondini, A. Bazzani, C. Franceschi, F. Bersani, E. Verondini, and G. C . Castellani. Role of connectivity in immune and neural network models: memory development and aging. *Riv. Biol*, 96:225–39, 2003.

[Reusch *et al.* 2001]   T. B. Reusch, M. A. Haberli, P. B. Aeschlimann, and M. Milinski. Female sticklebacks count alleles in a strategy of sexual selection explaining MHC polymorphism. *Nature*, 414:300–302, 2001.

[Richman *et al.* 2003]   D. D. Richman, T. Wrin, S. J. Little, and C. J. Petropoulos. Rapid evolution of the neutralizing antibody response to HIV type 1 infection. *Proc. Natl. Acad. Sci. USA*, 100:4144–4149, 2003.

[Riegler 2002]   A. Riegler. When is a cognitive system embodied? *Cognitive Systems Research*, 3:339–348, 2002.

[Roberts *et al.* 1987]   S. Roberts, J. C. Cheetham, and A. R. Rees. Generation of an antibody with enhanced affinity and specificity for its antigen by protein. *Nature*, 328:731–734, 1987.

[Robinson *et al.* 2003]   J. Robinson, M. J. Waller, P. Parham, N. de Groot, R. Bontrop, L. J. Kennedy, P. Stoehr, and S. G. E. Marsh. IMGT/HLA and IMGT/MHC: sequence databases for the study of the major histocompatibility complex. *Nucl. Acids Res.*, 31:311, 2003.

[Robinson *et al.* 2005]   J. Robinson, M. J. Waller, P. Stoehr, and S. G. E. Marsh. IPD–the Immuno Polymorphism Database. *Nucl. Acids Res.*, 33:D523–D526, January 2005.

[Rodgers & Cook 2002]   J. R. Rodgers and R. G. Cook. MHC class IB molecules bridge innate and acquired immunity. *Nat. Rev. Imm.*, 5(6):459–471, 2002.

[Rognan *et al.* 1999]   D. Rognan, S. L. Lauemoller, A. Holm, S. Buus, and V. Tschinke. Predicting binding affinities of protein ligands from three-dimensional models: application to peptide binding to class I major histocompatibility proteins. *J. Med. Chem.*, 4(42):4650–8, 1999.

[Roitt 1997]   I. Roitt. *Essential Immunology*. Blackwell Science, 9th edition, 1997.

[Rossi & Young 2005]   M. Rossi and J. W. Young. Human dendritic cells: Potent antigen-presenting cells at the crossroads of innate and adaptive immunity. *J. Immunol.*, 175(3):1373–1381, 2005.

[Rothbard *et al.* 1994]   J. B. Rothbard, K. Marshall, K. J. Wilson, L. Fugger, and D. Zaller. Prediction of peptide affinity to HLA DRB1*0401. *Int. Arch. Allergy Immunol.*, 105:1–7, 1994.

[Rudikoff *et al.* 1982]   S. Rudikoff, A. M. Ginsti, W. D. Cook, and M. D. Scharff. Single amino-acid substitution altering antigen binding specificity. *Proc. Natl. Acad. Sci. USA*, 79:1979–1983, 1982.

[Ruppert *et al.* 1993]   J. Ruppert, J. Sidney, E. Celis, R. T. Kubo, H. M. Grey, and A. Sette. Prominent role of secondary anchor residues in peptide binding to HLA-A*0201 molecules. *Cell*, 74:929–937, 1993.

[Santambrogio *et al.* 1999]   L. Santambrogio et al. Abundant empty class II MHC molecules on the surface of immature dendritic cells. *Proc. Natl. Acad. Sci. USA*, 96(26):15050–5, 1999.

[Saper *et al.* 1991]   M. A. Saper, P. J. Bjorkman, and D. C. Wiley. Refined structure of the human histocompatibility antigen HLA-A2 at 2.6A resolution. *J. Molec. Biol.*, 219:277–319, 1991.

[Saunders & Cooper 2000]   B. Saunders and A. Cooper. Restraining mycobacteria: role of granulomas in mycobacterial infection. *Immunol Cell Biol*, 78:334–341, 2000.

[Saunders 1993]   P. T. Saunders. The organism as a dynamical system. In W. D. Stein and F. J. Varela, editors, *Thinking About Biology*. Addison-Wesley, 1993.

[Sawyer 1931]   W. Sawyer. The persistance of yellow fever immunity. *J. Prev. Med.*, 5:413–428, 1931.

[Saxova *et al.* 2003]   P. Saxova, S. Buus, S. Brunak, and C. Kesmir. Predicting proteasomal cleavage sites: a comparison of available methods. *Int. Immunol.*, 15:781–787, 2003.

[Scherer *et al.* 2004]   A. Scherer et al. Quantifiable cytotoxic T lymphocyte responses and HLA-related risk of progression to AIDS. *Proc. Natl. Acad. Sci. USA*, 101:12266–12270, 2004.

[Schluns & Lefrancois 2003]   K. S. Schluns and L. Lefrancois. Cytokine control of memory T-cell development and survival. *Nat. Rev. Imm.*, 3:269–279, 2003.

[Schnare *et al.* 2001]   M. Schnare, G. M. Barton, A. C. Holt, K. Takeda, S. Akira, and R. Medzhitov. Toll-like receptors control activation of adaptive immune responses. *Nat Immunol*, 2:947–950, 2001.

[Schomburg *et al.* 2002]   I. Schomburg, A. Chang, O. Hofmann, C. Ebeling, F. Ehrentreich, and D. Schomburg. BRENDA: a resource for enzyme data and metabolic information. *Trends Biochem Sc*, 27:54–56, 2002.

[Schonbach *et al.* 2000]   C. Schonbach, J. L. Y. Koh, X. Sheng, L. Wong, and V. Brusic. FIMM, a database of functional molecular immunology. *Nucleic Acids Res*, 28:222–224, 2000.

[Schonbach *et al.* 2005]   C. Schonbach, J. L. Koh, D. R. Flower, and V. Brusic. An update on the functional molecular immunology (FIMM) database. *Appl. Bioinformatics*, 4:25–31, 2005.

[Schumacher & Heemels 1990]   T. N. Schumacher and M. T. Heemels. Direct binding of peptide to empty MHC class I molecules on intact cells and in vitro. *Cell*, 62(3):563–567, 1990.

[Scollay *et al.* 1980]   R. G. Scollay, E. C. Butcher, and I. L. Weissman. Thymus cell migration. Quantitative aspects of cellular traffic from the thymus to the periphery in mice. *Eur. J. Immunol.*, 10:210–218, 1980.

[Scott 1999]   A. Scott. *Nonlinear Science*. Oxford, 1999.

[Searle 1980]   John Searle. Minds, brains, and programs. *Behavioral and Brain Sciences*, 3:417–424, 1980.

[Secker *et al.* 2003a]   A. Secker, A. Freitas, and J. Timmis. AISEC: An artificial immune system for email classification. In *Proc. of Congress on Evolutionary Computation (CEC)*, pages 131–139, 2003.

[Secker *et al.* 2003b]   A. Secker, A. Freitas, and J. Timmis. A danger theory inspired approach to web mining. In [Timmis *et al.* 2003], pages 156–167.

[Segal & Perelson 1988]   L. A. Segal and A. S. Perelson. Computations in shape-space: a new approach to immune network theory. In *Theoretical Immunology, Part two*, 1988.

[Segovia-Juarez *et al.* 2004]   J. L. Segovia-Juarez, S. Ganguli, and D. Kirschner. Identifying control mechanisms of granuloma formation during M. tuberculosis infection using an agent-based model. *J. Theor. Biol.*, 231(3):357–76, 2004.

[Selin *et al.* 1994]   L. Selin, S. Nahill, and R. Welsh. Cross-reactivities in memory cytotoxic T-lymphocyte recognition of heterologous viruses. *J. Exp. Med.*, 179:1933–1943, 1994.

[Selin *et al.* 2004]   L. K. Selin, M. Cornberg, M. A. Brehm, S. K. Kim, C. Calcagno, D. Ghersi, R. Puzone, F. Celada, and R. M. Welsh. CD8 memory T cells: cross-reactivity and heterologous immunity. *Semin. Immunol.*, 16:335–347, 2004.

[Selvaraj *et al.* 1998]   P. Selvaraj, H. Uma, A. M. Reetha, S. M. Kurian, T. Xavier, R. Prabhakar, and P. R. Narayanan. HLA antigen profile in pulmonary tuberculosis patients and their spouses. *The Indian Journal Of Medical Research*, 107:155–158, 1998.

[Serbina & Flynn 1999]   N. V. Serbina and J. L. Flynn. Early emergence of CD8+ T cells primed for production of type 1 cytokines in the lungs of Mycobacterium tuberculosis-infected mice. *Infection and Immunity*, 67:3980–3988, 1999.

[Serbina *et al.* 2000]   N. V. Serbina, C. C. Liu, C. A. Scanga, and J. L. Flynn. CD8+ CTL from lungs of mycobacterium tuberculosis-infected mice express perforin in vivo and lyse infected macrophages. *J. Immunol.*, 165(1):353–363, 2000.

[Sercarz & Maverakis 2004]   Eli E. Sercarz and E. Maverakis. Recognition and function in a degenerate immune system. *Molecular Immunology*, 40:1003–1008, 2004.

[Sette & Livingston 2001]   A. Sette and B. Livingston. The development of multi-epitope vaccines: Epitope identification, vaccine design and clinical evaluation. *Biologicals*, 29(3-4):271–276, 2001.

[Sette & Sidney 1998]   A. Sette and J. Sidney. HLA supertypes and supermotifs: a functional perspective on HLA polymorphism. *Curr. Op. Immunol.*, 10(4):478–482, 1998.

[Sette & Sidney 1999]   A. Sette and J. Sidney. Nine major HLA class I supertypes account for the vast preponderance of HLA-A and -B polymorphism. *Immunogenetics.*, 50:201–212, 1999.

[Sette *et al.* 1989]   A. Sette, S. Buus, E. Appella, J. A. Smith, R. Chesnut, C. Miles, S. M. Colon, and H. M. Grey. Prediction of major histocompatibility complex binding regions of protein antigens by sequence pattern analysis. *Proc. Natl. Acad. Sci. USA*, 86:3296–3300, 1989.

[Sette *et al.* 1994a]   A. Sette, J. Sidney, S. del Guercio, M. F.and Southwood, J. Ruppert, C. Dalberg, H. M. Grey, and R. T. Kubo. Peptide binding to the most frequent HLA-A class I alleles measured by quantitative molecular binding assays. *Molecular Immunology*, 31:813–822, 1994.

[Sette *et al.* 1994b]   A. Sette, A. Vitiello, B. Reherman, P. Fowler, R. Nayersina, W. M. Kast, C. Melief, C. J. Oseroff, L. Yuan, and J. Ruppert. The relationship between class I binding affinity and immunogenicity of potential cytotoxic T cell epitopes. *J. Immunol.*, 153:5586–5592, 1994.

[Shakhnovich 1993]   Shakhnovich. Ground state of random copolymers and the discrete random energy model. *J. Chem. Phys.*, 98:8174–8177, 1993.

[Shepard 1963]   R. N. Shepard. Analysis of proximities as a technique for the study of information processing in man. *Human Factors*, 5:33–48, 1963.

[Shepard 1964]   R. N. Shepard. Attention and the metric structure of the stimulus space. *J. Math. Psychol.*, 1:54–87, 1964.

[Shortman *et al.* 1991]   K. Shortman, D. Vremec, and M. Egerton. The kinetics of T cell antigen receptor expression by subgroups of $CD4^+8^+$ thymocytes: delineation of $CD4^+8^+3^{2+}$ thymocytes as post-selection intermediates leading to mature T cells. *J. Exp. Med.*, 173:323–332, 1991.

[Sidney *et al.* 1996a]   J. Sidney, H. M. Grey, R. T. Kubo, and A. Sette. Practical, biochemical and evolutionary implications of the discovery of HLA class I supermotifs. *Immunol Today*, 17(6):261–266, 1996.

[Sidney *et al.* 1996b]   J. Sidney, H. M. Grey, S. Southwood, E. Celis, P. A. Wentworth, M. F. del Guercio, R. T. Kubo, R. W. Chesnut, and A. Sette. Definition of an HLA-A 3-like supermotif demonstrates the overlapping peptide-binding repertoires of common HLA molecules. *Hum. Immunol.*, 45(2):79–93, 1996.

[Sidney *et al.* 2003]   J. Sidney, S. Southwood, V. Pasquetto, and A. Sette. Simultaneous prediction of binding capacity for multiple molecules of the HLA B44 supertype. *J. Immunol.*, 171(11):5964–5974, 2003.

[Sidney *et al.* 2005]   J. Sidney, S. Southwood, and A. Sette. Classification of A1- and A24-supertype molecules by analysis of their MHC-peptide binding repertoires. *Immunogenetics*, 57(6):393–408, 2005.

[Silver *et al.* 1992]   M. L. Silver, H. C. Guo, J. L. Strominger, and D. C. Wiley. Atomic structure of a human MHC molecule presenting an influenza virus peptide. *Nature*, 360:367–369, 1992.

[Silver *et al.* 1998]   R. Silver, Q. Li, and J. Ellner. Expression of virulence of mycobacterium tuberculosis within human monocytes: virulence correlates with intracellular growth and induction of tumor necrosis factor alpha but not with evasion of lymphocyte-dependent monocyte effector functions. *Infection and Immunity*, 66:1190–1199, 1998.

[Silverstein & Rose 1997]   A. Silverstein and N. Rose. On the mystique of the immunological self. *Immunol. Rev.*, 159:197–206, 1997.

[Silverstein & Rose 2000]   A. M. Silverstein and N. R. Rose. There is only one immune system! The view from immunopathology. *Seminars in Immunology*, 12(3):173–178, 2000.

[Simon 1996]   H. A. Simon. *The Sciences of the Artificial*. MIT Press, 3rd edition, 1996.

[Singer & Kirschner 2004]   B. Singer and D. E. Kirschner. Influence of backward bifurcation on interpretation on R_0 in a model of epidemic tuberculosis with reinfection. *Mathematical Biosciences and Engineering*, 1(1):81–93, 2004.

[Singer & Linderman 1990]   D. F. Singer and J. J. Linderman. The relationship between antigen concentration, antigen internalization, and antigenic complexes: modeling insights into antigen processing and presentation. *J. Cell Bio.*, 111(1):55–68, 1990.

[Singer & Linderman 1991]   D. F. Singer and J. J. Linderman. Antigen processing and presentation: how can a foreign antigen be recognized in a sea of self proteins? *J. Theor. Biol.*, 151(3):385–404, 1991.

[Singh *et al.* 1983]   S. P. N. Singh et al. Human leukocyte antigen (HLA)-linked control of susceptibility to pulmonary tuberculosis and association with HLA-DR types. *J. Infect. Dis.*, 148(4):676–681, 1983.

[Slade & McCallum 1992]   R. W. Slade and H. I. McCallum. Overdominant *versus* frequency-dependent selection at MHC loci. *Genetics*, 132:861–864, 1992.

[Slifka *et al.* 1998]   M. K. Slifka, R. Antia, and J. K. Whitmire an R. Ahmed. Humoral immunity due to long-lived plasma cells. *Immunity*, 8:363–372, 1998.

[Smith *et al.* 1996a]   K. J. Smith, A. J. Reid, S. W.and Harlos, A. J. McMichael, D. I. Stuart, Bell. J. I., and E. Y. Jones. Bound water structure and polymorphic amino acids act together to allow the binding of different peptides to MHC class I HLA-B53. *Immunity*, 4:215–228, 1996.

[Smith *et al.* 1996b]   K. J. Smith, S. W. Reid, D. I. Stuart, A. J. McMichael, E. Y. Jones, and Bell. J. I. An altered position of the alpha 2 helix of MHC class I is revealed by the crystal structure of HLA-B*3501. *Immunity*, 4:203–213, 1996.

[Smith *et al.* 1997]   D. J. Smith, S. Forrest, R. Hightower, and A. S. Perelson. Deriving shape space parameters from immunological data. *J. Theor. Biol.*, 189:141–150, 1997.

[Smith *et al.* 1999]   D. J. Smith, S. Forrest, D. H. Ackley, and A. S. Perelson. Variable efficacy of repeated annual influenza vaccination. *Proc. Natl. Acad. Sci. USA*, 96:14001–14006, 1999.

[Smith *et al.* 2004]   D. J. Smith, A. S. Lapedes, J. C. De Jong, T. M. Besteborer, G. F. Rimmelzwaan, A. D. M. E. Osterhaus, and R. A. M. Fouchier. Mapping the antigenic and genetic evolution of influenza virus. *Science*, 305:371–376, 2004.

[Snell 1968]   G. D. Snell. The H-2 locus of the mouse: observations and speculations concerning its comparative genetics and its polymorphism. *Folia. Biol. (Praha)*, 14:335–358, 1968.

[Snir & Otto 1998]   M. Snir and S. Otto. *MPI-The Complete Reference: The MPI Core*. MIT Press, 1998.

[Soderberg *et al.* 2005]   K. A. Soderberg, G. W. Payne, A. Sato, R. Medzhitov, S. S. Segal, and A. Iwasaki. Innate control of adaptive immunity via remodelling of lymph node feed arteriole. *Proc. Natl. Acad. Sci. USA*, 102(45):16315–16320, 2005.

[Sompayrac 2002]   L. Sompayrac. *How the immune system works*. Blackwell, 2002.

[Southwood *et al.* 1998]   S. Southwood, J. Sidney, A. Kondo, M. F. del Guercio, E. Appella, R. T. Hoffman, S. Kubo, R. W. Chesnut, H. M. Grey, and A. Sette. Several common HLA-DR types share largely overlapping peptide binding repertoires. *J. Immunol.*, 60(7):3363–73., 1998.

[Speir *et al.* 2001]   J. A. Speir, J. Stevens, E. Joly, Butcher. G. W., and I. A. Wilson. Two different, highly exposed, bulged structures for an unusually long peptide bound to rat MHC class I RT1-Aa. *Immunity*, 14:81–92, 2001.

[Spivey 1992]   J. M. Spivey. *The Z Notation: a reference manual*. Prentice Hall, 2nd edition, 1992.

[Starovasnik *et al.* 1997]   M. A. Starovasnik, A. C., Braisted, and J. A. Wells. Structural mimicry of a native protein by a minimized binding domain. *Proc. Nat. Acad. Sci. USA*, 94:10080–10085, 1997.

[Stepney *et al.* 2004]   S. Stepney, R. E. Smith, J. Timmis, and A. M. Tyrrell. Towards a conceptual framework for artificial immune systems. In [Nicosia *et al.* 2004], pages 53–64.

[Stepney *et al.* 2005a]   S. Stepney, S. Braunstein, J. Clark, A. Tyrrell, A. Adamatzky, R. Smith, T. Addis, C. Johnson, J. Timmis, P. Welch, R. Milner, and D. Partridge. Journeys in non-classical computation I: A grand challange for computing research. *International Journal of Parallel, Emergent and Distributed Systems*, 20:97–125, 2005.

[Stepney *et al.* 2005b]   S. Stepney, R. Smith, J. Timmis, A. Tyrrell, M. Neal, and A. Hone. Conceptual frameworks for artificial immune systems. *Int. J. Unconventional Computing*, 1(3):315–338, 2005.

[Stibor *et al.* 2004]   T. Stibor, K. M. Bayarou, and C. Eckert. An investigation of R-chunk detector generation on higher alphabets. In *Proc. of Genetic and Evolutionary Computation Conference (GECCO)*, LNCS, pages 299–307. Springer, 2004.

[Stibor *et al.* 2005a]   T. Stibor, P. Mohr, J. Timmis, and C. Eckert. Is negative selection appropriate for anomaly detection? In *Proc. of Genetic and Evolutionary Computation Conference (GECCO)*, LNCS. Springer, 2005.

[Stibor *et al.* 2005b]   T. Stibor, J. Timmis, and C. Eckert. A comparative study of real-valued negative selection to statistical anomaly detection techniques. In [Jacob *et al.* 2005], pages 262–275.

[Stolzenberg *et al.* 1997]   E. Stolzenberg, G. Anderson, M. Ackermann, R. Whit-lock, and M. Zasloff. Epithelial antibiotic induced in states of disease. *Proc. Natl. Acad. Sci. USA*, 94:8686–8690, 1997.

[Streilein 1999]   J. W. Streilein. Regional immunity and ocular immune privilege. *Chem. Immunol.*, 73:11–38, 1999.

[Streilein 2003]   J. W. Streilein. Ocular immune privilege: therapeutic opportunities from an experiment of nature. *Nat. Rev. Imm.*, 3(879-889), 2003.

[Strogatz 1994]   S. H. Strogatz. *Nonlinear Dynamics and Chaos: with applications to physics, biology, chemistry, and engineering.* Westview Press, 1994.

[Stryhn *et al.* 1996]   A. Stryhn, P. S. Andersen, L. O. Pedersen, A. Svejgaard, A. Holm, C. J. Thorpe, L. Fugger, S. Buus, and J. Engberg. Shared fine speci-ficity between T-cell receptors and an antibody recognizing a peptide major his-tocompatibility class I complex. *Proc. Natl. Acad. Sci. USA*, 93:10338–10342, 1996.

[Stuber & Dillner 1995]   G. Stuber and J. Dillner. HLA-A0201 and HLA-B7 bind-ing peptides in the EBV-encoded EBNA-1, EBNA-2 and BZLF-1 proteins de-tected in the MHC class I stabilization assay. Low proportion of binding motifs for several HLA class I alleles in EBNA-1. *Int Immunol*, 7(4):653–63, 1995.

[Sturgill-Koszycki *et al.* 1994]   S. Sturgill-Koszycki et al. Lack of acidification in Mycobacterium phagosomes produced by exclusion of the vesicular proton-ATPase. *Science*, (678-681), 1994.

[Sturniolo *et al.* 1999]   T. Sturniolo, E. Bono, J. Ding, L. Raddrizzani, O. Tuereci, U. Sahin, M. Braxenthaler, F. Gallazzi, M. P. Protti, F. Sinigaglia, and J. Ham-mer. Generation of tissue-specific and promiscuous HLA ligand databases using DNA microarrays and virtual HLA class II matrices. *Nature Biotechnology*, 17:555–5561, 1999.

[Styblo *et al.* 1969]   K. Styblo, J. Meijer, and I. Sutherland. The transmission of tubercle bacilli: its trend in a human population. *Bulletin of the International Union of Tuberculosis*, 42:5–104, 1969.

[Su & Anderson 2004]   M. A. Su and M. S. Anderson. Aire: an update. *Curr. Op. Immunol.*, 16:746–752, 2004.

[Sudo & Kamikawaji 1995]   T. Sudo and N. Kamikawaji. Differences in MHC class I self peptide repertoires among HLA-A2 subtypes. *J. Immunol.*, 155(10):4749–4756, 1995.

[Sullivan *et al.* 2001]   A. D. Sullivan, J. Wigginton, and D. Kirschner. The core-ceptor mutation CCR5 Delta32 influences the dynamics of HIV epidemics and is selected for by HIV. *Proc. Natl. Acad. Sci. USA*, 98(18):10214–10219, 2001.

[Sun & Jang 1996]   Z. Sun and B. J. Jang. Patterns and conformations commonly occurring supersecondary structures (basic motifs) in protein data bank. *J. Protein Chem.*, 15:675–690, 1996.

[Sun *et al.* 1997]   Z. Sun, X. Rao, L. Peng, and D. Xu. Prediction of protein su-persecondary structures based on the artificial neural network method. *Protein Eng.*, 10:763–769, 1997.

[Surh & Sprent 1994]   C. D. Surh and J. Sprent. T-cell apoptosis detected in situ during positive and negative selection in the thymus. *Nature*, 372:100–103, 1994.

[Swain *et al.* 1983]   S. L. Swain, R. W. Dutton, R. Schwab, and J. Yamamoto. Xenogeneic human anti-mouse T cell responses are due to the activity of the same functional T cell subsets responsible for allospecific and major histocom-patibility complex-restricted responses. *J. Exp. Med.*, 157:720–729, 1983.

[Sylvester-Hvid *et al.* 2004]   C. Sylvester-Hvid, M. Nielsen, K. Lamberth, G. Roder, S. Justesen, C. Lundegaard, P. Worning, H. Thomadsen, O. Lund, S. Brunak, and S. Buus. SARS CTL vaccine candidates; HLA supertype-, genome-wide scanning and biochemical validation. *Tissue Antigens*, 63(5):395–400, 2004.

[Takahata & Nei 1990]   N. Takahata and M. Nei. Allelic genealogy under overdominant and frequency-dependent selection and polymorphism of major histocompatibility complex loci. *Genetics*, 124:967–978, 1990.

[Takahata 1995]   N. Takahata. MHC diversity and selection. *Immunol. Rev.*, 143:225–247, 1995.

[Tan *et al.* 1997]   J. Tan et al. Human alveolar T lymphocyte responses to mycobacterium tuberculosis antigens: Role for CD4+ and CD8+ cytotoxic T cells and relative resistance of alveolar macrophages to lysis. *J. Immunol.*, 159:290–297, 1997.

[Tanchot & Rocha 1995]   C. Tanchot and B. Rocha. The peripheral T-cell repertoire: Independent homeostatic regulation of virgin and activated CD8+ T-cell pools. *Eur. J. Immunol*, 25:2127–2136, 1995.

[Tascon *et al.* 1998]   R. E. Tascon et al. Protection against mycobacterium tuberculosis infection by CD8+ T cells requires the production of gamma interferon. *Infection and Immunity*, 66(2):830–4, 1998.

[Tato *et al.* 2006]   C. M. Tato, A. Laurence, and J. J. O Shea. Helper T cell differentiation enters a new era: Le roi est mort; vive le roi! *J. Exp. Med.*, 203(4):809–812, 2006.

[Tauber 2000]   A. I. Tauber. Moving beyond the immune self? *Seminars in Immunology*, 12(3):241–248, 2000.

[Tew *et al.* 1990]   J. G. Tew, M. H. Kosco, G. F. Burton, and A. K. Szakal. Follicular dendritic cells as accessory cells. *Immunol. Rev.*, pages 185–212, 1990.

[Thomas-Vaslin *et al.* 1987]   V. Thomas-Vaslin, D. Damotte, M. Coltey, N. Le Douarin, A. Coutinho, and J. Salaun. Abnormal T cell selection on nod thymic epithelium is sufficient to induce autoimmune manifestations in C57BL/6 athymic nude mice. *Proc. Natl. Acad. Sci. USA*, 94(9):4598–4603, 1987.

[Thompson & Layzell 1999]   A. Thompson and A. Layzell. Analysis of unconventional evolved electronics. *Comm. ACM*, 42(4):71–79, 1999.

[Tieri *et al.* 2005]   P. Tieri, S. Valensin, V. Latora, G. C. Castellani, M. Marchiori, D. Remondini, and C. Franceschi. Quantifying the relevance of different mediators in the human immune cell network. *Bioinformatics*, 21:1639–1643, 2005.

[Timmis & Bentley 2002]   J. Timmis and P. Bentley, editors. *Proc. of the 1st International Conference on Artificial Immune Systems (ICARIS)*. University of Kent Printing Unit, 2002.

[Timmis & Edmonds 2004]   J. Timmis and C. Edmonds. A comment on opt-AINet: An immune network algorithm for optimisation. In *Proc. of Genetic and Evolutionary Computation Conference (GECCO)*, volume 3102 of *LNCS*, pages 308–317. Springer, 2004.

[Timmis & Knight 2001]   J. Timmis and T. Knight. Artificial immune systems: Using the immune system as inspiration for data mining. In H. Abbas, A. Ruhul, A. Sarker, and S. Newton, editors, *Data Mining: A Heuristic Approach*, pages 209–230. Idea Group, 2001.

[Timmis & Neal 2001]   J. Timmis and M. Neal. A resource limited artificial immune system for data analysis. *Knowledge Based Systems*, 14(3–4):121–130, 2001.

[Timmis *et al.* 2000]   J. Timmis, M. Neal, and J. Hunt. An artificial immune system for data analysis. *Biosystems*, 55(1/3):143–150, 2000.

[Timmis *et al.* 2002]   J. Timmis, R. de Lemos, M. Ayara, and R. Duncan. Towards immune inspired fault tolerance in embedded systems. In L. Wang, J. Rajapakse, K. Fukushima, S. Lee, and X. Yao, editors, *Proceedings of 9th International Conference on Neural Information Processing*, pages 1459–1463. IEEE, 2002.

[Timmis *et al.* 2003]   J. Timmis, P. Bentley, and E. Hart, editors. *Proc. of the 2nd International Conference on Artificial Immune Systems (ICARIS)*, volume 2787 of *LNCS*. Springer, 2003.

[Timmis *et al.* 2004]   J. Timmis, C. Edmonds, and J. Kelsey. Assessing the performance of two immune inspired algorithms and a hybrid genetic algorithm for function optimisation. In *Proc. of Congress on Evolutionary Computation (CEC)*, volume 1, pages 1044–1051. IEEE, 2004.

[Timmis 2000]   J. Timmis. *Artificial Immune Systems: a novel data analysis technique inspired by the immune system* . PhD thesis, University of Wales, Aberystwyth, 2000.

[Tononi *et al.* 1999]   G. Tononi, O. Sporns, and G. M. Edelman. Measures of degeneracy and redundancy in biological networks. *Proc. Natl. Acad. Sci. USA*, 96(6):3257–3262, 1999.

[Toseland *et al.* 2005]   C. P. Toseland, D. J. Clayton, H. McSparron, S. L. Hemsley, M. J. Blythe, I. A. Paine, K. Doytchinova, P. Guan, C. K. Hattotuwagama, and D. R. Flower. Antijen: a quantitative immunology database integrating functional, thermodynamic, kinetic, biophysical, and cellular data. *Immunome Res*, 1(1):4, 2005.

[Tough & Sprent 1994]   D. Tough and J. Sprent. Turnover of naïve- and memory-phenotype cells. *J. Exp. Med.*, 179:1127–1135, 1994.

[Tough *et al.* 1996]   D. Tough, P. Borrow, and J. Sprent. Induction of bystander T-cell proliferation by viruses and type I interferon in vivo. *Science*, 272:1947–1950, 1996.

[Tracey 1997]   K. Tracey. Tumor necrosis factor. *Marcel Dekker*, pages 223–239, 1997.

[Trachtenberg *et al.* 2003]   E. Trachtenberg, B. Korber, C. Sollars, T. B. Kepler, P. T. Hraber, E. Hayes, R. Funkhouser, M. Fugate, J. Theiler, Y. S. Hsu, K. Kunstman, S. Wu, J. Phair, H. Erlich, and S. Wolinsky. Advantage of rare HLA supertype in HIV disease progression. *Nat. Med.*, 9:928–935, 2003.

[Tramontano 2006]   A. Tramontano. *Protein Structure Prediction: Concepts and Applications.* Wiley, 2006.

[Tynan *et al.* 2005a]   F. E. Tynan, N. A. Borg, J. J. Miles, T. Beddoe, D. El-Hassen, S. L. Silins, W. J. van Zuylen, A. W. Purcell, L. Kjer-Nielsen, J. McCluskey, S. R. Burrows, , and J. Rossjohn. High resolution structures of highly bulged viral epitopes bound to major histocompatibility complex class I. Implications for T-cell receptor engagement and T-cell immunodominance. *J. Biol. Chem*, 280:23900–23909, 2005.

[Tynan *et al.* 2005b]   F. E. Tynan, S. R. Burrows, A. M. Buckle, C. S. Clements, N. A. Borg, J. J. Miles, T. Beddoe, J. C. Whisstock, M. C. Wilce, S. L. Silins, J. M. Burrows, L. Kjer-Nielsen, L. Kostenko, A. W. Purcell, J. McCluskey, and J. Rossjohn. T cell receptor recognition of a 'super-bulged' major histocompatibility complex class I-bound peptide. *Nat. Immunol.*, 6:1114–1122, 2005.

[Udaka *et al.* 2001]   K. Udaka, K. H. Wiesmuller, S. Kienle, G. Jung, H. Tamamura, H. Yamagishi, K. Okumura, P. Walden, T. Suto, and T. Kawasaki. An automated prediction of MHC class I-binding peptides based on positional scanning with peptide libraries. *Immunogenetics*, 51:816–828, 2001.

[Valentine *et al.* 2004]   S. H. Valentine, S. Stepney, and I. Toyn. A Z Patterns catalogue II: definitions and laws. Technical Report YCS-2004-383, University of York, UK, 2004.

[van Boven & Weissing 2001]   M. van Boven and F. J. Weissing. Competition at the mouse T complex: rare alleles are inherently favored. *Theor. Popul. Biol.*, 60:343–358, 2001.

[van den Berg & Kiselëv 2004]   H. A. van den Berg and Y. N. Kiselëv. Expansion and contraction of the cytotoxic T lymphocyte response - an optimal control approach. *Bulletin of Mathematical Biology*, 66:1345–1369, 2004.

[van den Berg & Rand 2003]   H. A. van den Berg and D. A. Rand. Antigen presentation on MHC molecules as a diversity filter that enhances immune efficacy. *J. Theor. Biol.*, 224(2):249–267, 2003.

[van den Berg 2004]   H. A. van den Berg. Control of T-cell immunity:design principles without the wetware. Technical Report UKC/IMS/04/36, University of Kent, 2004.

[van Deventer 2001]   S. J. van Deventer. Transmembrane TNF-alpha, induction of apoptosis, and the efficacy of TNF-targeting therapies in Crohn's disease. *Gastroenterology*, 121(5):1242–6, 2001.

[van Deventer 2002]   S. J. van Deventer. Anti-tumour necrosis factor therapy in Crohn's disease: where are we now? *Gut*, 51(3):362–3, 2002.

[Varela *et al.* 1988]   F. Varela, A. Coutinho, B. Dupire, and N. Vaz. Cognitive Networks: Immune, Neural and Otherwise. *J. Theor. Imm.*, 2:359–375, 1988.

[Varela *et al.* 1991]   F. J. Varela, E. Thompson, and E. Rosch. *The Embodied Mind: cognitive science and human experience*. MIT Press, 1991.

[Varela 1981]   F. J. Varela. Autonomy and autopoiesis. In *Self Organising Systems*, pages 14–23. New York Campus Press, 1981.

[Vidal *et al.* 2000]   K. Vidal, C. Daniel, I. Vidavsky, C. A. Nelson, and P. M. Allen. Hb (64-76) epitope binds in different registers and lengths to I-Ek and I-Ak. *Mol. Immunol.*, 37:203–212, 2000.

[Vidović & Matzinger 1988]   D. Vidović and P. Matzinger. Unresponsiveness to a foreign antigen can be caused by self-tolerance. *Nature*, 336:222–225, 1988.

[Vogel *et al.* 1999]   T. U. Vogel, D. T. Evans, J. A. Urvater, D. H. O'Connor, A. L. Hughes, and D. I. Watkins. Major histocompatibility complex class I genes in primates: Coevolution with pathogens. *Immunol. Rev.*, 167:327–337, 1999.

[Von Schwedler *et al.* 2003]   U. K. Von Schwedler, K. M. Stray, J. E. Garrus, and W. I. Sundquist. Functional surfaces of the human immunodeficiency virus type 1 capsid protein. *J. Virol.*, 77(9):5439–5450, 2003.

[Von Boehmer 1994]   H. Von Boehmer. Positive selection of lymphocytes. *Cell*, 76:219–228, 1994.

[Vordermeier 1995]   H. M. Vordermeier. T-cell recognition of mycobacterial antigens. *The European Respiratory Journal*, 20:657s–667s, 1995.

[Wagner 2005]   A. Wagner. Distributed robustness versus redundancy as causes of mutational robustness. *Bioessays*, 27:176–188, 2005.

[Waldrop *et al.* 1998]   S. L. Waldrop, K. A. Davis, V. C. Maino, and L. J. Picker. Normal human CD4+ Memory T cells display broad heterogeneity in their activation threshold for cytokine synthesis. *J. Immunol.*, 161:5284–5295, 1998.

[Walker *et al.* 2002]   J. Walker, D. R. Flower, and K. Rigley. Microarrays in hematology. *Current Opinion in Hematology*, 9:23–29, 2002.

[Watkins & Salter 2005]   S. C. Watkins and R. D. Salter. Functional connectivity between immune cells mediated by tunneling nanotubes. *Immunity*, 23:309–318, 2005.

[Watkins & Timmis 2004]   A. Watkins and J. Timmis. Exploiting parallelism inherent in AIRS, an artificial immune classifier. In [Nicosia *et al.* 2004], pages 427–438.

[Watkins *et al.* 2003]   A. Watkins, B. Xintong, and A. Phadke. Parallelizing an immune-inspired algorithm for efficient pattern recognition. In *Intelligent Engineering Systems through Artificial Neural Networks: Smart Engineering System Design: Neural Networks, Fuzzy Logic, Evolutionary Programming, Complex Systems and Artificial Life*, pages 224–230. ASME Press, 2003.

[Watkins *et al.* 2004]   A. Watkins, J. Timmis, and L. Boggess. Artificial Immune Recognition System (AIRS): An Immune Inspired Supervised Machine Learning Algorithm. *Genetic Programming and Evolvable Machines*, 5(3):291–318, 2004.

[Watkins 2001]   A. Watkins. AIRS: A resource limited artificial immune classifier. Master's thesis, Mississippi State University, USA., 2001.

[Watkins 2005]   A. Watkins. *Exploiting Immunological Metaphors in the Development of Serial, Parallel and Distributed Learning Algorithms*. PhD thesis, University of Kent, UK., 2005.

[Watson & Crick 1953]   J. D. Watson and F. H. C. Crick. Genetical implications of the structure of deoxyribonucleic acid. *Nature*, 171:964–967, 1953.

[Wauben & van der Kraan 1997]   M. H. Wauben and M. van der Kraan. Definition of an extended MHC class II -peptide binding motif for the autoimmune disease-associated lewis rat RT1.BL molecule. *Int. Immunol.*, 9(2):281–290, 1997.

[Wedekind *et al.* 1995]   C. Wedekind, T. Seebeck, F. Bettens, and A. J. Paepke. MHC-dependent mate preferences in humans. *Proc. R. Soc. Lond. B. Biol. Sci.*, 260:245–249, 1995.

[Weidt *et al.* 1995]   G. Weidt, W. Deppert, S. Buchhop, H. Dralle, and F. Lehmann-Grube. Antiviral protective immunity induced by major histocompatibility complex class I molecule-restricted viral T-lymphocyte epitopes inserted in various positions in immunologically self and nonself proteins. *J. Virol.*, 69:2654–2658, 1995.

[Weinand 1990]   R.G. Weinand. Somatic mutation, affinity maturation and the antibody repertoire: a computer model. *J. Theor. Biol.*, 143:343–382, 1990.

[Weisbuch & Atlan 1988]   G. Weisbuch and H. Atlan. Control of the immune response. *Journal of Physics A: Mathematical and General*, 21(3):189–192, 1988.

[Weisbuch 1990]   G. Weisbuch. A shape space approach to the dynamics of the immune system. *J. Theor. Biol.*, 143:507–522, 1990.

[Weissing & van Boven 2001]   F. J. Weissing and M. van Boven. Selection and segregation distortion in a sex-differentiated population. *Theor. Popul. Biol.*, 60:327–341, 2001.

[Weng *et al.* 1997]   N. P. Weng, L. Granger, and R. J. Hodes. Telomere lengthening and telomerase activation during human B cell differentiation. *Proc. Natl. Acad. Sci. USA*, 94:10827–10832, 1997.

[Whisstock & Lesk 2003]   J. C. Whisstock and A. M. Lesk. Prediction of protein function from protein sequence and structure. *Q. Rev. Biophys.*, 36:307–340, 2003.

[Whitesides & Boncheva 2002]   G. M. Whitesides and M. Boncheva. Beyond molecules: Self-assembly of mesoscopic and macroscopic components. *Proc. Natl. Acad. Sci. USA*, 99(8):4769–4774, 2002.

[Wierzchon & Kuzelewska 2002]   S. Wierzchon and U. Kuzelewska. Stable clusters formation in an artificial immune system. In [Timmis & Bentley 2002], pages 68–75.

[Wigginton & Kirschner 2001]   J. E. Wigginton and D. Kirschner. A model to predict cell-mediated immune regulatory mechanisms during human infection with Mycobacterium tuberculosis. *J. Immunol.*, 166(3):1951–67, 2001.

[Wilkinson *et al.* 1999]   R. J. Wilkinson et al. Influence of polymorphism in the genes for the interleukin (IL)-1 receptor antagonist and IL-1beta on tuberculosis. *J. Exp. Med.*, 189(12):1863–74, 1999.

[Wills 1991]   C. Wills. Maintenance of multiallelic polymorphism at the MHC region. *Immunol. Rev.*, 124:165–220, 1991.

[Wilson & Garrett 2004]   W. Wilson and S. M. Garrett. Modelling immune memory for prediction and computation. In [Nicosia *et al.* 2004], pages 343–352.

[Wold & Hellberg 1987]   S. Wold and S. Hellberg, editors. *Proc. Symp. on PLS Model Building: Theory and Application*, 1987.

[Wold 1995]   S. Wold. *Chemometric Methods In Molecular Design*, chapter PLS for multivariate linear modelling, pages 195–218. 1995.

[Wolfram 1994]   S. Wolfram. *Cellular Automata and Complexity: collected papers.* Addison-Wesley, 1994.

[Wolfram 2002]   S. Wolfram. *A New Kind of Science.* Wolfram Media Incorporated, 2002.

[Wolpert & G. 1997]   D. H. Wolpert and MacReady W. G. *No Free Lunch Theorems for Optimization*, volume 1. 1997.

[World Health Organization 2001]   World Health Organization. Who report 2001: Global tuberculosis contro, 2001.

[Wu & Kabat 1970]   T. T. Wu and E. A. Kabat. An analysis of the sequences of the variable regions of bence jones proteins and myeloma light chains and their implications for antibody complementarity. *J. Exp. Med.*, 132:211–250, 1970.

[Wuensche & Lesser 1992]   A. Wuensche and M. Lesser. *The Global Dynamics of Cellular Automata.* Addison-Wesley, 1992.

[Wuensche 2002]   A. Wuensche. Finding gliders in cellular automata. In A. Adamatzky, editor, *Collision-Based Computing.* Springer, 2002.

[Wysocki *et al.* 1986]   L. Wysocki, T. Manser, and M. L. Gefter. Somatic evolution of variable region structures during an immune response. *Proc. Natl. Acad. Sci. USA*, 83:1847–1851, 1986.

[Yan *et al.* 2003]   S. S. Yan, Z. Wu, H. Zhang, G. Furtado, X. Chen, S. Yan, A. M. Schmidt, C. Brown, A. Stern, J. Lafaille, L. Chess, D. M. Stern, and H. Jiang. Suppression of experimental autoimmune encephalomyelitis by selective blockade of encephalitogenic T-cell infiltration of the central nervous system. *Nature Medicine*, 9:287–293, 2003.

[Yates *et al.* 2001]   A. Yates, C. C. W. Chan, R. E. Callard, A. J. T. George, and J. Stark. An approach to modelling in immunology. *Briefings in Bioinformatics*, 2:245–257, 2001.

[Yeager & Hughes 1999]   M. Yeager and A. L. Hughes. Evolution of the mammalian MHC: natural selection, recombination, and convergent evolution. *Immunol. Rev.*, 167:45–58, 1999.

[Young *et al.* 1994]   A. C. Young, W. Zhang, J. C. Sacchettini, and S. G. Nathenson. The three-dimensional structure of H-2Db at 2.4 A resolution: implications for antigen-determinant selection. *Cell*, 76:39–50, 1994.

[Young 2001]   D. Young. *Computational Chemistry: A Practical Guide for Applying Techniques to Real World Problems*. Wiley Inter-Science, 2001.

[Yu *et al.* 2002]   K. Yu, N. Petrovsky, C. Schonbach, J. Koh, and V. Brusic. Methods for prediction of peptide binding to MHC molecules: a comparative study. *Mol Med*, 8:137–148, 2002.

[Yusim *et al.* 2002]   K. Yusim, C. Kesmir, B. Gaschen, M. M. Addo, M. Altfeld, S. Brunak, A. Chigaev, V. Detours, and B. T. Korber. Clustering patterns of cytotoxic T-lymphocyte epitopes in human immunodeficiency virus type 1 (HIV-1) proteins reveal imprints of immune evasion on HIV-1 global variation. *J. Virol.*, 76:8757–8768, 2002.

[Zachary *et al.* 1996]   A. Zachary et al. The frequencies of HLA alleles and haplotypes and their distribution among donors and renal patients in the UNOS registry. *Transplantation*, 62(2):272–283, 1996.

[Zanetti & Croft 2001]   M. Zanetti and M. Croft. Immunological memory. In *Encyclopedia of Life Sciences*. 2001.

[Zarling *et al.* 2001]   A. L. Zarling, S. B. Ficarro, F. M. White, J. Shabanowitz, D. F. Hunt, and V. H. Engelhard. Phosphorylated peptides are naturally processed and presented by major histocompatibility complex class I molecules in vivo. *J. Exp. Med.*, 192:1755–1762, 2001.

[Zeng *et al.* 2005]   R. Zeng et al. Synergy of IL-21 and IL-15 in regulating CD8 T cell expansion and function. *J. Exp. Med.*, 201:139–148, 2005.

[Zhang *et al.* 1992]   W. Zhang, A. C. Young, M. Imarai, S. G. Nathenson, and J. L. Sacchettini. Crystal structure of the major histocompatibility complex class I H-2Kb molecule containing a single viral peptide: implications for peptide binding and T-cell receptor recognition. *Proc. Natl. Acad. Sci. USA*, 89:8403–8407, 1992.

[Zhang *et al.* 1993]   Q. J. Zhang, R. Gavioli, G. Klein, and M. G. Masucci. An HLA-A11-specific motif in nonamer peptides derived from viral and cellular proteins. *Proc. Natl. Acad. Sci. USA*, 90:2217–2221, 1993.

[Zhang *et al.* 1998]   C. Zhang, A. Anderson, and C. DeLisi. Structural principles that govern the peptide-binding motifs of class I MHC molecules. *J. Molec. Biol.*, 281(5):929–947, 1998.

[Zhao *et al.* 1998]   Z. S. Zhao, F. Granucci, L. Yeh, P. A. Schaffer, and H. Cantor. Molecular mimicry by herpes simplex virus-type 1: Autoimmune disease after viral infection. *Science*, 279:1344–1347, 1998.

[Zinkernagel & Hengartner 2004]   R. M. Zinkernagel and H. Hengartner. On immunity against infections and vaccines: Credo 2004. *Scand. J. Immunol*, 60:9–13, 2004.

[Zinkernagel *et al.* 1996]   R. M. Zinkernagel, M. F. Bachmann, T. M. Kündig, S. Oehen, H. Pirchet, and H. Hengartner. On immunological memory. *Ann. Rev. Immunol.*, 14:333–367, 1996.

[Zinkernagel 1986]   R. M. Zinkernagel. Biological role of major transplantation antigens in T cell self-recognition. *Experientia*, 42(9):970–2, 1986.

[Zinkernagel 2002]   R. M. Zinkernagel. On differences between immunity and immunological memory. *Curr. Opin. Immunol.*, (14):523–536, 2002.