

REFERENCES

- Adair JR. Engineering antibodies for therapy. *Immunol Rev* 1992; 130: 5–39.
- Adams GP, Schier R, McCall AM, *et al.* Prolonged *in vivo* tumor retention of a human diabody targeting the extracellular domain of human HER2/neu. *Br J Cancer* 1998; 77: 1405–12.
- Akamatsu Y, Cole MS, Tso JY, Tsurushita N. Construction of a human Ig combinatorial library from genomic V segments and synthetic CDR3 fragments. *J Immunol* 1993; 151: 4651–9.
- Andersen PS, Stryhn A, Hansen BE, Fugger L, Engberg J, Buus S. A recombinant antibody with the antigen-specific, major histocompatibility complex-restricted specificity of T cells. *Proc Natl Acad Sci* 1996; 93: 1820–4.
- Anderson KE. Serological studies on *H. pertussis*, *H. parapertussis* and *H. bronchiseptica*. *Acta Pathol Microbiol Scan* 1953; 33: 202–24.
- Andrews R, Herceq A, Roberts C. Pertussis notifications in Australia. *Commun Dis Intell* 1997; 21: 145–8.
- Arai H and Sato H. Separation and characterization of two distinct heagglutinins contained in purified leukocytosis-promoting factor from *Bordetella pertussis*. *Biochem Biophys Acta* 1976; 44: 765–82.
- Arap W, Haedicke W, Bernasconi M, *et al.* Targeting the prostate for destruction through a vascular address. *Proc Natl Acad Sci USA* 2002; 99: 1527–31.
- Armstrong GD, Howard LA, Peppler MS. Use of glycosyltransferases to restore pertussis toxin receptor activity to asialoagalactofetuin. *J Biol Chem* 1988; 263: 8677–84.
- Babu MM, Bhargavi J, Singh Saund R, Singh SK. Virulence factors in *Bordetella pertussis*. *Current Science* 2001; 80: 1512–22.
- Baca M, Presta LG, O'Connor SJ, Wells JA. Antibody humanization using monovalent phage display. *J Biol Chem* 1997; 272: 10678–84.
- Banfield MJ, King DJ, Mountain A, Brady RL. VL:VH domain rotations in engineered antibodies: crystal structures of the Fab fragments from two murine anti-tumor antibodies and their engineered human constructs. *Proteins: Struct Funct Genet* 1997; 29: 161–71.

- Baraff LJ, Wilkins J, Wehrle PF. The role of antibodies, immunizations and adenoviruses in pertussis. *Pediatrics* 1978; 61: 224-30.
- Barbas CF, Kang AS, Lerner RA, Benkovic SJ. Assembly of combinatorial antibody libraries on phage surfaces: the gene III site. *Proc Natl Acad Sci USA* 1991; 88: 7978-81.
- Bass JB and Siber GR. Protective effects of pertussis immunoglobulin (P-IGIV) in the aerosol challenge model. *Clin Diag Lab Immuno* 1999; 6: 464-70.
- Bass JB. Erythromycin for treatment and prevention of pertussis. *Pediatr Infect Dis* 1986; 5: 154-7.
- Bass JW, Wittler RR. Return of epidemic pertussis in the United States. *Pediatr Infect Dis J* 1994; 13: 343-5.
- Bass S, Greene R, Wells JA. Hormone phage: an enrichment method for variant proteins with altered binding properties. *Proteins* 1990; 8: 309-14.
- Benhar I, Pastan I. Cloning, expression, and characterization of the Fv fragments of the anti-carbohydrate MAbs B1 and B5 as single chain immunotoxins. *Protein Eng* 1994; 7: 1509-15.
- Berman HM, Westbrook J, Feng Z, *et al.* The protein data bank. *Nucleic Acids Research* 2000; 28: 235-42.
- Bessette PH, Aslund F, Beckwith J, Georgiou G. Efficient folding of proteins with multiple disulfide bonds in the *Escherichia coli* cytoplasm. *Proc Natl Acad Sci USA* 1999; 96: 13703-8.
- Better M, Chang CP, Robinson RR, Horwitz A. *Escherichia coli* expression of an active chimeric antibody fragment. *Science* 1988; 240: 1041-43.
- Blewitt MG, Chung LA, London E. Effect of pH on the conformation of diphtheria toxin and its implications for membrane penetration. *Biochemistry* 1985; 24: 5458-64.
- Bothmann H, Pluckthun A. Selection for a periplasmic factor improving phage display and functional periplasmic expression. *Nat Biotechnol* 1998; 16: 376-80.
- Boulianne GL, Hozumi N, Shulman MJ. Production of functional chimeric mouse/human antibody. *Nature* 1984; 312: 643-6.

- Bradford MM. A rapid and sensitive method for quantitation of microgram quantities of protein utilizing the principle of protein-dye-binding. *Anal Biochem* 1976; 72: 248-54.
- Brennan MJ, David JL, Kenimer JG, Manclark CR. Lectin-like binding of pertussis toxin to a 165-kilodalton Chinese hamster ovary cell glycoprotein. *J Biol Chem* 1988; 263: 4895-9.
- Brody M, Sorley RG. Neurological complications following administration of pertussis vaccine. *N Y State J Med* 1947; 47: 1016-7.
- Bruggemann M, Taussig MJ. Production of human antibody repertoires in transgenic mice. *Curr Opin Biotechnol* 1997; 8: 455-8.
- Bruni P, Burns DL, Hewlett EL, Moss J. Effects of pertussis toxin on cAMP and cGMP responses to carbamylcholine in N1E-115 neuroblastoma cells. *Mol Pharmacol* 1985; 28: 229-34.
- Buchner J, Pastan I, Brinkmann U. A method for increasing the yield of properly folded recombinant fusion proteins: single-chain immunotoxins from renaturation of bacterial inclusion bodies. *Anal Biochem* 1992; 205: 263-70.
- Buchner J, Rudolph R. Renaturation, purification and characterization of recombinant Fab-fragments produced in *Escherichia coli*. *Bio-Technology* 1991; 9: 157-62.
- Buchwald UK, Pirofski L. Immune therapy for infectious diseases at the dawn of the 21st century: the past, present and future role of antibody therapy, therapeutic vaccination and biological response modifiers. *Curr Pharm Des* 2003; 9: 945-68.
- Burks EA, Chen G, Georgiou G, Iverson BL. *In vitro* scanning saturation mutagenesis of an antibody binding pocket. *Proc Natl Acad Sci USA* 1997; 94: 412-7.
- Burns DL, Kenimer JG, Manclark CR. Role of the A subunit of pertussis toxin in alteration of Chinese hamster ovary cell morphology. *Infect Immun* 1987; 55: 24-8.
- Byers RK, Moll FC. Encephalopathies following prophylactic pertussis vaccination. *Pediatrics* 1948; 1: 437-57.
- Cabilly S, Cabilly AD. Immunoglobulin transcripts and molecular history of a hybridoma that produces antibody to carcinoembryonic antigen. *Gene* 1985; 40: 157- 61.

- Cai X, Garen A. Anti-melanoma antibodies from melanoma patients immunized with genetically modified autologous tumor cells: selection of specific antibodies from single-chain Fv fusion phage libraries. *Proc Natl Acad Sci* 1995; 92: 6537–41.
- Carbonetti NH, Artamonova GV, Andreasen C, Bushar N. Pertussis toxin and adenylate cyclase toxin provide a one-two punch for establishment of *Bordetella pertussis* infection of the respiratory tract. *Infect Immun* 2005; 73: 2698-703.
- Carbonetti NH, Artamonova GV, Mays RM, Worthington ZEV. Pertussis toxin plays an early role in respiratory tract colonization by *Bordetella pertussis*. *Infect Immun* 2003; 71: 6358-66.
- Carroll WF, Mendel E, Levy S. Hybridoma fusion cell lines contain an aberrant kappa transcript. *Mol Immunol* 1988; 25: 991–5.
- Carter P, Kelley RF, Rodrigues ML, *et al.* High level *Escherichia coli* expression and production of a bivalent humanized antibody fragment. *Bio-Technology* 1992; 10: 163–67.
- Casadevall A, Pirofski LA. Antibody-mediated regulation of cellular immunity and the inflammatory response. *Trends Immunol* 2003; 24: 474–8.
- Casadevall A, Scharff MD. Return to the past: the case for antibody-based therapies in infectious diseases. *Clin Infect Dis* 1995; 21: 150–61.
- Casadevall A, Scharff MD. Serum therapy revisited: animal models of infection and the development of passive antibody therapy. *Antimicrob Agents Chemother* 1994; 38: 1695–702.
- Casey JL, Coley AM, Tilley LM, Foley M. Green fluorescent antibodies: novel *in vitro* tools. *Protein Engin* 2000; 13: 445–52.
- Castillo J, Goodson B, Winter J. T7 displayed peptides as targets for selecting peptide specific scFvs from M13 scFv display libraries. *J Immunol Meth* 2001; 257: 117–22.
- Castro MG, McNamara U, Carbonetti NH. Expression, activity and cytotoxicity of pertussis toxin S1 subunit in transfected mammalian cells. *Cell Microbiol* 2001; 3: 45-54.
- Cattaneo A, Biocca S. The selection of intracellular antibodies. *Trends Biotechnol* 1999; 17:115–21.

- Chaffin KE, Beals CR, Wilkie TM, Forbush KA, Simon MI, Perlmutter RM. Dissection of thymocyte signaling pathways by *in vivo* expression of pertussis toxin ADP-ribosyltransferase. *EMBO J* 1990; **9**: 3821-9.
- Charlton K, Harris WJ, Porter AJ. The isolation of super-sensitive anti-hapten antibodies from combinatorial antibody libraries derived from sheep. *Biosens Bioelectron* 2001; **16**: 639-46.
- Chen G, Dubrawsky I, Mendez P, Georgiou G, Iverson BL. *In vitro* scanning saturation mutagenesis of all the specificity determining residues in an antibody binding site. *Protein Eng* 1999; **12**: 349-56.
- Chester KA, Begent RH, Robson L, *et al.* Phage libraries for generation of clinically useful antibodies. *Lancet* 1994; **343**: 455-6.
- Chester KA, Hawkins RE. Clinical issues in antibody design. *Trends Biotechnol* 1995; **13**: 294-300.
- Choo Y, Sánchez-García I, Klug A. *In vivo* repression by a site-specific DNA-binding protein designed against an oncogenic sequence. *Nature* 1994; **372**: 642-5.
- Chothia C, Lesk AM. Canonical structures for the hypervariable regions of immunoglobulins. *J Mol Biol* 1987; **196**: 901-17.
- Clackson T, Hoogenboom HR, Griffiths AD, Winter G. Making antibody fragments using phage display libraries. *Nature* 1991; **352**: 624-8.
- Clackson T, Wells JA. A hot spot of binding energy in a hormone-receptor interface. *Science* 1995; **267**: 383-6.
- Clark MA, Hammond FR, Papaioannou A, Hawkins NJ, Ward RL. Regulation and expression of human Fabs under the control of the *Escherichia coli* arabinose promoter, pBAD. *Immunotechnology* 1997; **3**: 217-26.
- Congeni BL, Orenstein DM, Nankervis GA. Three infants with neonatal pertussis: because of its atypical presentations, pertussis in the neonate may easily be overlooked. *Clin Pediatr* 1978; **17**: 113-8.
- Connolly SE, Benach JL. Cutting edge: the spirochetemia of murine relapsing fever is cleared by complement-independent bactericidal antibodies. *J Immunol* 2001; **167**: 3029-32.

- Danielsen S, Eklund M, Deussen H-J, Graslund T, Nygren PA, Borchert TV. *In vitro* selection of enzymatically active lipase variants from phage libraries using a mechanism based inhibitor. *Gene* 2001;272: 267-74.
- Danner S, Belasco JG. T7 phage display: a novel genetic selection system for cloning RNA-binding proteins from cDNA libraries. *Proc Nat Acad Sci USA* 2001; 98: 12954-9.
- Daugherty P, Chen G, Iverson B, Georgiou G. Quantitative analysis of the effect of the mutation frequency on the affinity maturation of antibodies. *Proc Natl Acad Sci USA* 2000; 97: 2029-34.
- Davies J, Riechmann L. 'Camelising' human antibody fragments: NMR studies on VH domains. *FEBS Lett.* 1994; 339: 285-90.
- Davies J, Riechmann L. Single antibody domains as small recognition units: design and *in vitro* antigen selection of camelized, human VH domains with improved protein stability. *Protein Eng* 1996; 9: 531-7.
- de Bernardez, Clark E. Refolding of recombinant proteins. *Curr Opin Biotech* 1998; 9: 157-63.
- de Bruin R, Spelt K, Mol J, Koes R, Quattrocchio F. Selection of high-affinity phage antibodies from phage display libraries. *Nat Biotech* 1999; 17: 397-9.
- de Haard H, Kazemier B, van der Bent A, *et al.* Vernier zone residue 4 of mouse subgroup II kappa light chains is a critical determinant for antigen recognition. *Immunotechnology* 1999; 4: 203-15
- De Jaeger C, De Wilde C, Eeckhout D, Fiers E, Depicker A. The plantibody approach: expression of antibody genes in plants to modulate plant metabolism or to obtain pathogen resistance. *Plant Mol Biol* 2000; 43: 419-28.
- de Kruif J, Terstappen L, Boel E, Logtenberg T. Rapid selection of cell subpopulation-specific human monoclonal antibodies from a synthetic phage antibody library. *Proc Natl Acad Sci U S A* 1995; 92: 3938-42.
- De Serres G, Bouliane N, Douville-Fradet M, Duval B. Pertussis in Quebec: ongoing epidemic since the late 1980s. *Can Commun Dis Rep* 1995; 15: 45-8.
- Debouck C, Goodfellow PN. DNA microarrays in drug discovery and development. *Nature Genetics (supplement)* 1999; 21: 48-50.

- Decanniere K, Desmyter A, Lauwereys M, *et al.* A single-domain antibody fragment in complex with RNase A: non-canonical loop structures and nanomolar affinity using two CDR loops. *Structure* 1999; 7: 361-70.
- Delagrave S, Catalan J, Sweet C, *et al.* Effects of humanization by variable domain resurfacing on the antiviral activity of a single-chain antibody against respiratory syncytial virus. *Protein Eng* 1999; 12: 357-62.
- Dennis MS, Lazarus RA. Kunitz domain inhibitors of tissue-factor VIIa. I. Potent inhibitors selected from libraries by phage display. *J Biol Chem* 1994; 269: 22129-36.
- Dente L, Cesareni G, Micheli G, *et al.* Monoclonal antibodies that recognize filamentous phage: tools for phage display technology. *Gene* 1994;148:7-13.
- Derman AI, Prinz WA, Belin D, Beckwith J. Mutations that allow disulfide bond formation in the cytoplasm of *Escherichia coli*. *Science* 1993; 262: 1744-47.
- Desmyter A, Transue TR, Ghahroudi MA, *et al.* Crystal structure of a camel single-domain VH antibody fragment in complex with lysozyme. *Nat Struct Biol* 1996; 3: 803-11.
- Dolby JM, Dolby DE, Bronne-Shanbury CJ. The effects of humoral, cellular and non-specific immunity on intracerebral *Bordetella pertussis* infections in mice. *J Hyg* 1975; 74: 85-102.
- Dress BL. Progress and variations in two-hybrid and three hybrid technologies. *Curr Opin Chem Biol* 1999; 3: 64-70.
- Duan L, Pomerantz RJ. Elimination of endogenous aberrant kappa chain transcripts from sp2/0-derived hybridoma cells by specific ribozyme cleavage: utility in genetic therapy of HIV-1 infections. *Nucleic Acids Res* 1994; 22: 5433-8.
- Duenas M, Ayala M, Vazquez J, *et al.* A point mutation in a murine immunoglobulin Vregion strongly influences the antibody yield in *Escherichia coli*. *Gene* 1995; 158: 61-6.
- Duenas M, Borrebaeck CA. Clonal selection and amplification of phage displayed antibodies by linking antigen recognition and phage replication. *Bio-Technology* 1994; 12: 999-1002.
- Dumont ME, Richards FM. The pH-dependent conformational change of diphtheria toxin. *J Biol Chem* 1988; 263: 2087-97.

- Eldering G, Hornbeck C, Baker J. Serological study of *Bordetella pertussis* and related species. *J Bacteriol* 1957; 74: 133-6.
- Farfel Z, Kaslow HR, Bourne HR. A regulatory component of adenylate cyclase is located on the inner surface of human erythrocyte membranes. *Biochem Biophys Res Commun* 1979; 90: 1237-41.
- Fishwild DM, O'Donnell SL, Bengoechea T, *et al.* High-avidity human IgG kappa monoclonal antibodies from a novel strain of minilocus transgenic mice. *Nat Biotechnol* 1996; 14: 845-51.
- Foote J, Winter G. Antibody framework residues affecting the conformation of the hypervariable loops. *J Mol Biol* 1992; 224: 487-99.
- Forsberg G, Forsgren M, Jaki M, *et al.* Identification of framework residues in a secreted recombinant antibody fragment that controls production level and localization in *Escherichia coli*. *J Biol Chem* 1997; 272: 12430-6.
- Francisco JA, Campbell R, Iverson BL, Georgiou G. Production and fluorescence-activated cell sorting of *Escherichia coli* expressing a functional antibody fragment on the external surface. *Proc Natl Acad Sci* 1993; 90: 10444-8.
- Fuchs P, Breitling F, Dubel S, Seehaus T, Little M. Targeting recombinant antibodies to the surface of *Escherichia coli*: fusion to a peptidoglycan associated lipoprotein. *Bio-Technology* 1991; 9: 1369-72.
- Gadella TWJ, van der Krogt GNM, Bisseling T. GFP-based FRET microscopy in living plant cells. *Trends Plant Sci* 1999; 4: 287-91.
- Garrard LJ, Henner DJ. Selection of an anti-IGF-1 Fab from a Fab phage library created by mutagenesis of multiple CDR loops. *Gene* 1993; 128: 103-9.
- Geier MR, Stanboro H, Merrill CR. Endotoxin in commercial vaccine. *Appl Environ Microbiol* 1978; 36: 445-9.
- Georgiou G, Stathopoulos C, Daugherty PS, *et al.* Display of heterologous proteins on the surface of microorganisms: from the screening of combinatorial libraries to live recombinant vaccines. *Nat Biotechnol* 1997; 15: 29-34.
- Gerhardt MA, Neubig RR. Multiple Gi protein subtypes regulate a single effector mechanism. *Mol Pharmacol* 1991; 40: 707-11.

- Goldenberg MM. Trastuzumab, a recombinant DNA-derived humanized monoclonal antibody, a novel agent for the treatment of metastatic breast cancer. *Clin Ther* 1999; 21: 309-18.
- Goldman WE, Klapper DG, Baseman JB. Detection, isolation, and analysis of a released *Bordetella pertussis* product toxic to cultured tracheal cells. *Infect Immun* 1982; 36: 782-94.
- Gordon JE, Hood RI. Whooping cough and its epidemiological anomalies. *Am J Med Sci* 1951; 222: 333-61.
- Granstone M, Olinder M, Holmblad P, *et al.* Specific immunoglobulin for treatment of whooping cough. *Lancet* 1991; 38: 1230-3.
- Green LL. Antigen-specific human monoclonal antibodies from mice engineered with human Ig heavy and light chain YACs. *Nature Genet* 1994; 7: 13-21.
- Greenwood J, Hunter GJ, Perham RN. Regulation of filamentous bacteriophage length by modification of electrostatic interactions between coat protein and DNA. *J Mol Biol* 1991; 217: 223-7.
- Griffiths AD, Duncan AR. Strategies for selection of antibodies by phage display. *Curr Opin Biotechnol* 1998; 9: 102-8.
- Griffiths AD, Malmqvist M, Marks JD, *et al.* Human anti-self antibodies with high specificity from phage display libraries. *EMBO J* 1993; 12: 725-34.
- Griffiths AD, Williams SC, Hartley O, *et al.* Isolation of high affinity human antibodies directly from large synthetic repertoires. *EMBO* 1994; 13: 3245-60.
- Gunneriusson E, Samuelson P, Uhlen M, Nygren PA, Stahl S. Surface display of a functional single-chain Fv antibody on staphylococci. *J Bacteriol* 1996; 178:1341-6.
- Haab BB, Dunham MJ, Brown PO. Protein microarrays for highly parallel detection and quantification of specific proteins and antibodies in complex solutions. *Genome Biol* 2001; 2: 1004.1-4.13.
- Halperin SA, Issekutz TB, Kasina A. Modulation of *Bordetella pertussis* infection with monoclonal antibodies to pertussis toxin. *J Infect Dis* 1991; 163: 355-361.
- Hamers-Casterman C, Atarhouch T, Muyldermans S, *et al.* Naturally occurring antibodies devoid of light chains. *Nature* 1993; 363: 446-8.

- Hanes J, Jermutus L, Weber-Bornhauser S, Bosshard HR, Pluckthun A. Ribosome display efficiently selects and evolves high-affinity antibodies *in vitro* from immune libraries. *Proc Natl Acad Sci USA* 1998; 95: 14130-5.
- Hanes J, Pluckthun A. *In vitro* selection methods for screening of peptide and protein libraries. *Curr Top Microbiol Immunol* 1999; 243: 107-22.
- Hansson SF, Puchades M, Blennow K, Sjogren M, Davidsson P. Validation of a prefractionation method followed by two-dimensional electrophoresis-Applied to cerebrospinal fluid proteins from frontotemporal dementia patients. *Proteome Sci* 2004, 2:7-11.
- Harlow E, Lane D. *Antibodies: a Laboratory Manual*. New York: Cold Spring Harbor Laboratory, 1988.
- Hawkins RE, Russell SJ, Winter G. Selection of phage antibodies by binding affinity. Mimicking affinity maturation. *J Mol Biol* 1992; 226: 889-96.
- Hayhurst A, Harris WJ. *Escherichia coli* *skp* chaperone coexpression improves solubility and phage display of single-chain antibody fragments. *Protein Exp Purif* 1999; 15: 336-43.
- He M, Hamon M, Liu H, Kang A, Taussig MJ. Functional expression of a single-chain anti-progesterone antibody fragment in the cytoplasm of a mutant *Escherichia coli*. *Nucleic Acids Res* 1995; 23: 4009-10.
- He M, Taussig MJ. Antibody-ribosome- mRNA (ARM) complexes as efficient selection particles for *in vitro* display and evolution of antibody combining sites. *Nucleic Acids Res* 1997; 25: 5132-4.
- Hennecke F, Krebber C, Pluckthun A. Non-repetitive single-chain Fv linkers selected by selectively infective phage (SIP) technology. *Protein Eng* 1998; 11: 405-10.
- Hewlett EL, Sauer KT, Myers GA, Cowell JL, Guerrant RL. Induction of a novel morphological response in Chinese hamster ovary cells by pertussis toxin. *Infect Immun* 1983; 40: 1198-203.
- Hewlett EL. Pertussis: current concepts of pathogenesis and prevention. *Pediatr Infect Dis J* 1997; 16: 78-84.
- Hill HR, Stockley PG. Phage presentation. *Mol Microbiol* 1997; 20: 685-92.
- Ho SN, Hunt HD, Horton RM, Pullen JK, Pease LR. Site-directed mutagenesis by overlap extension using the polymerase chain reaction. *Gene* 1989; 77: 51-9.

- Hoogenboom HR, de Bruïne AP, Hufton SE, Hoet RM, Arends JW, Roovers RC
Antibody phage display and its applications. *Immunotechnology* 1998; 4: 1-20.
- Hoogenboom HR, Winter G. By-passing immunisation. Human antibodies from synthetic repertoires of germline VH segments rearranged *in vitro*. *J Mol Biol* 1992; 227: 381-88.
- Hoogenboom HR. Designing and optimising library selection strategies for generating high-affinity antibodies. *TIBTECH* 1997; 15: 62-70.
- Hoogenboom HR. Overview of antibody phage-display technology and its applications. *Methods Mol Biol* 2002; 178: 1-37.
- Hudnall SD, Molina CP. Marked increase in L-selectin negative T cells in neonatal pertussis: the lymphocytosis explained? *Am J Clin Pathol* (2000) 114, 35–40.
- Hudson PJ. Recombinant antibody constructs in cancer therapy. *Curr Opin Immunol* 1999; 11: 548-57.
- Humphreys DP, Weir N, Lawson A, Mountain A, Lund PA. Co-expression of human protein disulphide isomerase (PDI) can increase the yield of an antibody Fab' fragment expressed in *Escherichia coli*. *FEBS Lett* 1996; 380: 194-7.
- Huse WD, Sastry L, Iverson SA, *et al*. Generation of a large combinatorial library of the immunoglobulin repertoire in phage lambda. *Science* 1989; 246: 1275-81.
- Huston JS, Levinson D, Mudgett-Hunter M, *et al*. Protein engineering of antibody binding sites: recovery of specific activity in an antidigoxin single-chain Fv analogue produced in *Escherichia coli*. *Proc Natl Acad Sci USA* 1988; 85: 5879-83.
- Iliades P, Kortt AA, Hudson PJ. Triabodies: single chain Fv fragments without a linker form trivalent trimers. *FEBS Lett* 1997; 409: 437-41
- Janicot M, Fouque F, Desbuquois B. Activation of rat liver adenylate cyclase by cholera toxin requires toxin internalization and processing in endosomes. *J Biol Chem* 1991; 266: 12858-65.
- Jernelius H. Pertussis with pulmonary complications: a follow up study. *Acta Pediatr* 1964; 53: 247-54.
- Johns M, George AJT, Ritter MA. *In vivo* selection of scFv from phage display libraries. *J Immunol Meth* 2000; 239: 137-51.

- Jones PT, Dear PH, Foote J, Neuberger MS, Winter G. Replacing the complementarity determining regions in a human antibody with those from a mouse. *Nature* 1986; 321: 522-5.
- Jung S, Pluckthun A. Improving *in vivo* folding and stability of a single-chain Fv antibody fragment by loop grafting. *Protein Eng* 1997; 10: 959-66.
- Kabat EA, Wu TT, Reid-Miller M, Perry HM, Gottesman KS, eds. 1991. Sequences of Proteins of Immunological Interest. Bethesda, MD: US Department of Health and Human Service. 5th edition.
- Kang AS, Barbas CF, Janda KD, Benkovic SJ, Lerner RA. Linkage of recognition and replication functions by assembling combinatorial antibody Fab libraries along phage surfaces. *Proc Natl Acad Sci USA* 1991;88:4363-6.
- Kang AS, Burton DR, Lerner RA. Combinatorial immunoglobulin libraries in phage. *Methods Companion Methods Enzymol* 1991; 2: 111-8.
- Kashmiri SVS, De Pascalis R, Gonzales NR, Schlom J. SDR grafting: a new approach to antibody humanization. *Methods* 2005; 36: 25-34
- Kaslow HR, Burns DL. Pertussis toxin and target eukaryotic cells: binding, entry, and activation. *FASEB J* 1992; 6: 2684-90.
- Kaslow HR, Lesikar DD. Sulfhydryl-alkylating reagents inactivate the NAD glycohydrolase activity of pertussis toxin. *Biochemistry* 1987; 26: 4397-402.
- Katada T, Tamura M, Ui M. The A protomer of islet-activating protein, pertussis toxin, as an active peptide catalyzing ADP-ribosylation of a membrane protein. *Arch Biochem Biophys* 1983; 224: 290-8.
- Katada T, Ui M. Direct modification of the membrane adenylate cyclase system by islet-activating protein due to ADP-ribosylation of a membrane protein. *Proc Natl Acad Sci USA* 1982; 79: 3129-33.
- Katada T, Ui M. Islet-activating protein: enhanced insulin secretion and cyclic AMP accumulation in pancreatic islets due to activation of native calcium ionophores. *J Biol Chem* 1979; 254: 469-479
- Kaufman S and Bruyn HB. Pertussis: a clinical study. *Am J Dis Child* 1960; 99: 417-22.

- Kay BK, Hoess RH. Principles and applications of phage display. In: B.K. Kay, J. Winter and J. McCafferty (eds.). *Phage Display of Peptides and Proteins*, Academic Press, 1996; pp. 21-34.
- Kay BK, Kasanov J, Knight S, Kurakin A. Convergent evolution with combinatorial peptides. *FEBS Lett* 2000; 480: 55-62.
- Kenimer JG, Kim KJ, Probst PG, Manclark CR, Burstyn DG, Cowell JL. Monoclonal antibodies to pertussis toxin: utilization as probes of toxin function. *Hybridoma* 1989; 8: 37-51.
- Kerr JR, Rigg GP, Matthews RC, Burnie JP. The Bpel locus encodes type III secretion machinery in *Bordetella pertussis*. *Microb Pathog* 1999; 27: 349-67.
- Khoudi H, Laberge S, Ferullo JM, *et al.* Production of a diagnostic monoclonal antibody in perennial alfalfa plants. *Biotechnol Bioeng* 1999; 64: 135-43.
- Kipriyanov SM, Little M, Kropshofer H, *et al.* Affinity enhancement of a recombinant antibody: formation of complexes with multiple valency by a single-chain Fv fragment-core streptavidin fusion. *Protein Eng* 1996; 9: 203-11.
- Kipriyanov SM, Moldenhauer G, Little M. High level production of soluble single chain antibodies in small-scale *Escherichia coli* cultures. *J Immunol Methods* 1997; 200: 69-77.
- Kipriyanov SM, Moldenhauer G, Martin AC, Kupriyanova OA, Little M. Two amino acid mutations in an antihuman CD3 single chain Fv antibody fragment that affect the yield on bacterial secretion but not the affinity. *Protein Eng* 1997; 10: 445-53.
- Kirkham PM, Neri D, Winter G. Towards the design of an antibody that recognises a given protein epitope. *J Mol Biol* 1999; 285: 909-15.
- Knight DM, Wagner C, Jordan R, *et al.* The immunogenicity of the 7E3 murine monoclonal Fab antibody fragment variable region is dramatically reduced in humans by substitution of human for murine constant regions. *Mol Immunol* 1995; 32: 1271-81.
- Kodadek T. Protein microarrays: prospects and problems. *Chem Biol* 8: 105-15.
- Kohler G, Milstein C. Continuous cultures of fused cells secreting antibody of predefined specificity. *Nature* 1975; 256: 495-8.

- Kortt AA, Guthrie RE, Hinds MG, *et al.* Solution properties of Escherichia coli-expressed VH domain of anti-neuraminidase antibody NC41. *J Protein Chem* 1995; 14:167-78.
- Kortt AA, Lah M, Oddie GW, *et al.* Single-chain Fv fragments of anti-neuraminidase antibody NC10 containing five- and ten residue linkers form dimers and with zero residue linker a trimer. *Protein Eng* 1997; 10: 423-33.
- Krebber A, Bornhauser S, Burmester J, *et al.* Reliable cloning of functional antibody variable domains from hybridomas and spleen cell repertoires employing a reengineered phage display system. *J Immunol Methods* 1997; 201: 35–55.
- Kupsch JM, Tidman NH, Kang NV, *et al.* Isolation of human tumor-specific antibodies by selection of an antibody phage library on melanoma cells. *Clin Cancer Res* 1999; 5: 925-31.
- Laemmli UK. Cleavage of structural proteins during the assembly of the head of bacteriophage T4. *Nature* 1970; 227: 680-5.
- Lander ES. Array of hope. *Nature Genetics (supplement)* 2001; 21: 3-4.
- Lang AB, Ganss MT, Cryz SJ Jr. Monoclonal antibodies that define neutralizing epitopes of pertussis toxin: conformational dependence and epitope mapping. *Infect Immunol* 1989; 57: 2660-65.
- Lang IM, Barbas CF 3rd, Schleef RR. Recombinant rabbit Fab with binding activity to type-1 plasminogen activator inhibitor derived from a phage-display library against human alpha-granules. *Gene* 1996; 172: 295-8.
- Larrick JW, Danielsson L, Brenner CA, *et al.* Rapid cloning of rearranged immunoglobulin genes from human hybridoma cells using mixed primers and the polymerase chain reaction. *Biochem Biophys Res Commun* 1989; 160: 1250-6.
- Lawrence LJ, Kortt AA, Iliades P, Tulloch PA, Hudson PJ. Orientation of antigen binding sites in dimeric and trimeric single chain Fv antibody fragments. *FEBS Lett* 1998; 425: 479-84.
- Le Gall F, Kipriyanov SM, Moldenhauer G, Little M. Di-, tri- and tetrameric single chain Fv antibody fragments against human CD19: effect of valency on cell binding. *FEBS Lett* 1999; 453: 164-68.

- Leget GA, Czuczman MS. Use of Rituximab, the new FDA-approved antibody. *Curr Opin Oncol* 1998;10: 548-51.
- Lilie H, Schwarz E, Rudolph R. Advances in refolding of proteins produced in *E. coli*. *Curr Opin Biotechnol* 1998; 9: 497-501.
- Lim LK, Sekura RD, Kaslow HR. Adenine nucleotides directly stimulate pertussis toxin. *J Biol Chem* 1985; 260: 2585-8.
- Litvak AM, Gibel H, Rosental SE *et al.* Cerebral complication in pertussis. *J Pediatr* 1984; 32: 357-79.
- Livey I, Wardlaw AC. Production and properties of *Bordetella pertussis* heat labile toxin. *J Med Microbiol* 1984 17: 91-103
- Locht C, Keith JM. Pertussis toxin gene: nucleotide sequence and genetic organization. *Science* 1986; 232: 1258-64.
- Locht C, Lobet Y, Feron C, Cieplak W, Keith JM. The role of cysteine 41 in the enzymatic activities of the pertussis toxin S1 subunit as investigated by site-directed mutagenesis. *J Biol Chem* 1990; 265: 4552-9.
- Locht C. Molecular aspects of *Bordetella pertussis* pathogenesis. *Int Microbiol* 1999; 2: 137-44.
- Lowman HB, Wells JA. Affinity maturation of human growth hormone by monovalent phage display. *J Mol Biol* 1993; 234: 564-78.
- Maeda Y, Yamada H, Ueda T, Imoto T. Effect of additives on the renaturation of reduced lysozyme in the presence of 4 M urea. *Protein Eng* 1996; 9: 461-5.
- Malmborg AC, Duenas M, Ohlin M, Soderlind E, Borrebaeck CA. Selection of binders from phage displayed antibody libraries using the BIAcore biosensor. *J Immunol Methods* 1996; 198: 51-7.
- Marks JD, Hoogenboom HR, Bonnert TP, McCafferty J, Griffiths AD, Winter G. Bypassing immunisation. Human antibodies from V-gene libraries displayed on phage. *J Mol Biol* 1991; 222: 581-97.
- Martineau P, Jones P, Winter G. Expression of an antibody fragment at high levels in the bacterial cytoplasm. *J Mol Biol* 1998; 280: 117-27.
- Mateo C, Moreno E, Amour K, *et al.* Humanization of a mouse monoclonal antibody that blocks the epidermal growth factor receptor: recovery of antagonistic activity. *Immunotechnology* 1997; 3: 71-81.

- Mattera R, Codina J, Sekura RD, Birnbaumer L. The interaction of nucleotides with pertussis toxin. *J Biol Chem* 1986; 261: 11173-9.
- Mattheakis LC, Bhatt RR, Dower WJ. An *in vitro* polysome display system for identifying ligands from very large peptide libraries. *Proc Natl Acad Sci USA* 1994; 91: 9022-6.
- Matthews DJ. Substrate phage. In: B.K. Kay, J. Winter and J. McCafferty (eds.), *Phage display of peptides and proteins*, Academic Press, 1996; pp. 255-9.
- Matthews RC. Preclinical assessment of the efficacy of mycograb, a human recombinant antibody against fungal HSP90. *Antimicrob Agents Chemother* 2003; 47: 2208-16.
- Mavrangelos C, Thiel M, Adamson PJ, *et al.* Increased yield and activity of soluble single-chain antibody fragments by combining high-level expression and the Skp periplasmic chaperonin. *Protein Expr Purif* 2001; 23: 289-95.
- McCafferty J, Griffiths AD, Winter G, Chiswell DJ. Phage antibodies: filamentous phage displaying antibody variable domains. *Nature* 1990; 348: 552-4.
- McCafferty J, Johnson KS. Construction and screening of antibody display libraries. In: B.K. Kay, J. Winter and J. McCafferty (eds.), *Phage Display of Peptides and Proteins*, Academic Press, 1996; pp. 79-111.
- McCafferty J. Phage display: factors affecting panning efficiency. In: B.K. Kay, J. Winter and J. McCafferty (eds.), *Phage display of peptides and proteins*, Academic Press, 1996: 261-76.
- McPherson MJ, Harrison DJ. 2001. Protease inhibitors and directed evolution: enhancing plant resistance to nematodes. In :A. Berry and S.E. Radford (eds.). *From Protein Folding to New Enzymes*. Cambridge University Press, Cambridge, U.K.
- Mead DA, Kemper B. Chimeric single-stranded DNA phage-plasmid cloning vectors. *Biotechnology* 1988; 10: 85-102.
- Meade BD, Kind PD, and Manclark CR. Lymphocytosis promoting factor of *Bordetella pertussis* alters mononuclear phagocyte circulation and response to inflammation. *Infect Immun* 1984; 46: 733-9.
- Medical Research Council. The prevention of whooping-cough by vaccination. *BMJ* 1951; 1: 1463-71.

- Mendelsohn AR, Brent R. Protein interaction methods—towards an endgame. *Science* 1999; 18: 1948-50.
- Mendez M, Green L, Corvalan J, *et al.* Functional transplant of megabase human immunoglobulin loci recapitulates human antibody response in mice. *Nat Genet* 1997; 15: 146-56.
- Merk H, Stiege W, Tsumoto K, Kumagai I, Erdmann VA. Cell-free expression of two single chain monoclonal antibodies against lysozyme: effect of domain arrangement on the expression. *J. Biochem* 1999; 125: 328-33.
- Moragues MD. A monoclonal antibody directed against a *Candida albicans* cell wall mannoprotein exerts three anti-Calbicans activities. *Infect Immun* 2003; 71: 5273-9.
- Morino K, Katsumi H, Akahori Y, *et al.* Antibody fusions with fluorescent proteins: a versatile reagent for profiling protein expression. *J Immunol Meth* 2001; 257: 175-84.
- Morrison SL, Johnson MJ, Herzenberg LA, Oi VT. Chimeric antibody molecules: mouse antigen binding domains with human constant region domains. *Proc Natl Acad Sci USA* 1984; 81: 6851-5.
- Morse SI, Riester SK. Studies on the leukocytosis and lymphocytosis induced by *Bordetella pertussis*. I. Autoradiographic analysis of the circulating cells in mice undergoing pertussis-induced hyperleucocytosis. *J Exp Med* 1967; 125: 401-8.
- Moss J, Bruni P, Hsia JA, *et al.* Pertussis-catalyzed ADP-ribosylation: effects of coupling of inhibitory receptors to the adenylate cyclase system. *J Recept Res* 1984; 4:459-74.
- Moss J, Stanley SJ, Watkins PA, *et al.* Stimulation of the thiol-dependent ADPribosyltransferase and NAD glycohydrolase activities of *Bordetella pertussis* toxin by adenine nucleotides, phospholipids, and detergents. *Biochemistry* 1986;25: 2720-5.
- Mukherjee J, Zuckier L, Scharff MD, Casadevall A. Therapeutic efficacy of monoclonal antibodies to *Cryptococcus neoformans* glucuronoxylomannan alone and in combination with amphotericin B. *Antimicrob Agents Chemother* 1994; 38: 580-7.

- Muller AS, Leewenburg J, Patt DS. Pertussis: epidemiology and control. Bull WHO 1986; 64 (2): 321-31.
- Muller KM, Arndt KM, Pluckthun A. Model and simulation of multivalent binding to fixed ligands. Anal Biochem 1998; 261: 149-58.
- Nicosia A, Perugini M, Franzini C, *et al.* Cloning and sequencing of the pertussis toxin genes: operon structure and gene duplication. Proc Natl Acad Sci USA 1986; 83: 4631-5.
- Nieba L, Honegger A, Krebber C, Pluckthun A. Disrupting the hydrophobic patches at the antibody variable/constant domain interface: improved *in vivo* folding and physical characterization of an engineered scFv fragment. Protein Eng 1997; 10: 435-44.
- Nissim A, Hoogenboom HR, Tomlinson IA, *et al.* Antibody fragments from a 'single-pot' phage display library as immunological reagents. EMBO J 1994; 13: 692-7.
- Ohage E, Steipe B. Intrabody construction and expression: I. The critical role of VL domain stability. J Mol Biol 1999; 291: 1119-28.
- Ohage EC, Wirtz P, Barnikow J, Steipe B. Intrabody construction and expression: II. A synthetic catalytic Fv fragment. J Mol Biol 1999; 291: 1129-34.
- Orlandi R, Gussow DH, Jones PT, Winter G. Cloning immunoglobulin variable domains for expression by the polymerase chain reaction. Proc Natl Acad Sci USA 1989; 86: 3833-7.
- Owen M, Gandecha A, Cockburn B, Whitelam G. Synthesis of a functional anti-phytochrome single-chainFv protein in transgenic tobacco. Biotechnology 1992; 10: 790-4.
- Padlan EA. A possible procedure for reducing the immunogenicity of antibody variable domains while preserving their ligand-binding properties. Mol Immunol 1991; 28: 489-98.
- Padlan EA. Anatomy of the antibody molecule. Mol Immunol 1994; 31:169-217.
- Pantoliano M, Bird RE, Johnson S, *et al.* Conformational stability, folding, and ligand-binding affinity of single-chain Fv immunoglobulin fragments expressed in *Escherichia coli*. Biochemistry 1991; 30: 10117-25.
- Pasqualini R, Ruoslahti E. Organ targeting *in vivo* using phage display peptide libraries. Nature 1996;380:364-6.

- Pei XY, Holliger P, Murzin A, Williams RL. The 2.0 °A resolution crystal structure of a trimeric antibody fragment with non-cognate VH/VL domain pairs shows a rearrangement of VH CDR3. *Proc Natl Acad Sci USA*. 1997; 94: 9637-42.
- Perisic O, Webb PA, Holliger P, Winter G, Williams RL. Crystal structure of a diabody, a bivalent antibody fragment. *Structure* 1994; 2: 1217-26.
- Petrenko VA, Smith GP. Phages from landscape libraries as substitutes for antibodies. *Protein Engin* 2000; 13: 589-92.
- Pittman M. Pertussis toxin: the cause of the harmful effects and prolonged immunity of whooping cough: A hypothesis. *Rev Infect Dis* 1979; 1: 401-02.
- Pittman M. The concept of pertussis as a toxin mediated disease. *Pediatr Infec Dis J* 1984; 3: 467-86.
- Pluckthun A, Pack P. New protein engineering approaches to multivalent and bispecific antibody fragments. *Immunotechnology* 1997; 3: 83-105.
- Pluckthun A, Skerra A. Expression of functional antibody Fv and Fab fragments in *Escherichia coli*. *Methods Enzymol* 1989; 178: 497-515.
- Popov S, Hubbard JG, Ward ES. A novel, and efficient route for the isolation of antibodies that recognise T cell receptor V alpha(s). *Mol Immunol* 1996; 33: 493-502.
- Preston NW. Recognizing whooping cough. *Br Med J* 1986; 292: 901-2.
- Proba K, Ge L, Pluckthun A. Functional antibody single-chain fragments from the cytoplasm of *Escherichia coli*: influence of thioredoxin reductase (TrxB). *Gene* 1995; 159: 203-7.
- Proba K, Honegger A, Pluckthun A. A natural antibody missing a cysteine in VH: consequences for thermodynamic stability and folding. *J Mol Biol* 1997; 265: 161-72.
- Proba K, Worn A, Honegger A, Pluckthun A. Antibody scFv fragments without disulfide bonds made by molecular evolution. *J Mol Biol* 1998; 275: 245-3.
- Rader C, Cheresch DA, Barbas CF. A phage display approach for rapid antibody humanization: designed combinatorial V gene libraries. *Proc Natl Acad Sci USA* 1998; 95: 8910-5.

- Reiter Y, Schuck P, Boyd LF, Plaksin D. An antibody single-domain phage display library of a native heavy chain variable region: isolation of functional single domain VH molecules with a unique interface. *J Mol Biol* 1999; 290: 685-98.
- Relman D, Tuomanen E, Falkow S, Golenbock DT, Saukkonen K, Wright SD. Recognition of a bacterial adhesion by an integrin: macrophage CR3 (alpha M beta 2, CD11b/CD18) binds filamentous hemagglutinin of *Bordetella pertussis*. *Cell* 1990; 61: 1375-82.
- Relman, DA. *Bordetella pertussis*: determinants of virulence. In Handbook of Natural Toxins. Moss, J., Iglewski B., Vaughan M., and Tu A.T. (eds). New York: Marcel Dekker, Vol. 8, 1995; 367-405.
- Ribi HO, Ludwig DS, Mercer KL, Schoolnick GK, Kornberg RD Three-dimensional structure of cholera toxin penetrating a lipid membrane. *Science* 1988; 239: 1272-6.
- Riechmann L, Clark M, Waldmann H. Winter G. Reshaping human antibodies for therapy. *Nature* 1988; 332: 323-7.
- Roberts BL, Markland W, Siranosian K, Saxena MJ, Guterman SK, Ladner RC. Protease inhibitor display M13 phage: selection of high-affinity neutrophil elastase inhibitors. *Gene* 1992; 121: 9-15.
- Roberts R, Szostak JW. RNA peptide fusions for the *in vitro* selection of peptides and proteins. *Proc Natl Acad Sci USA* 1997; 94: 12297-302.
- Roberts RW. Totally *in vitro* protein selection using mRNA-protein fusions and ribosome display. *Curr Opin Chem Biol* 1999; 3: 268-73.
- Robinson C and Sauer R. Optimizing the stability of single chain proteins by linker length and compositional mutagenesis. *Proc Natl Acad Sci USA* 1998; 95: 5929-34.
- Rodi DJ, Makowski L, Kay BK. One from column A and two from column B: the benefits of phage display in molecular-recognition studies. *Curr Opin Chem Biol* 2001; 6: 92-6.
- Rodi DJ, Makowski L. Phage-display technology-finding a needle in a vast molecular haystack. *Curr Opin Biotechnol* 1999; 10: 87-93.

- Rodrigues M. Human antibodies against a purified glucosylceramide from *Cryptococcus neoformans* inhibit cell budding and fungal growth. *Infect Immun* 2000; 68: 7049-60.
- Rondot S, Koch J, Breitling F, Dübel S. A helper phage to improve single-chain antibody presentation in phage display. *Nature Biotechnol* 2001; 19: 75-8.
- Rosenthal RS, Nogami W, Cookson BT, Goldman WE, Folkening WJ. Major fragment of soluble peptidoglycan released from growing *Bordetella pertussis* is tracheal cytotoxin. *Infect Immun* 1987; 55: 2117-20.
- Ruberti F, Cattaneo A, Bradbury A. The use of the RACE method to clone hybridoma cDNA when V region primers fail. *J Immunol Methods* 1994; 173: 33-9.
- Rudolph R, Lilie H. *In vitro* folding of inclusion body proteins. *FASEB J* 1996; 10: 49-56.
- Russel M. Filamentous phage assembly. *Mol Microbiol* 1991; 5: 1607-13.
- Saengjaruk P, Chaicumpa W, Watt G, Bunyaraksyotin G, Wuthiekanun V, Tapchaisri P, *et al.* Diagnosis of human leptospirosis by monoclonal antibody-based antigen detection in urine. *J Clin Microbiol* 2002; 40: 480-9.
- Sanchez L, Ayala M, Freyre F, *et al.* High cytoplasmic expression in *E. coli*, purification, and *in vitro* refolding of a single chain Fv antibody fragment against the hepatitis B surface antigen. *J Biotechnol* 1999; 72: 13-20.
- Sanna PP, Williamson RA, De Logu A, Bloom FE, Burton DR. Directed selection of recombinant human monoclonal antibodies to herpes simplex virus glycoproteins from phage display libraries. *Proc Natl Acad Sci U S A* 1995; 92: 6439-43.
- Sanz I. Multiple mechanisms participate in the generation of diversity of human H chain CDR3 regions. *J Immunol* 1991; 147: 1720-9.
- Sato H, Ito A, Chiba J, and Sato Y. Monoclonal antibody against pertussis toxin: effect on toxin activity and pertussis infections. *Infect Immun* 1984; 46: 422-8.
- Sato H, Sato Y, Ohishi I. Comparison of pertussis toxin (PT)-neutralizing activities and mouse-protective activities of anti-PT mouse monoclonal antibodies. *Infect Immun* 1991; 59: 3832-5.
- Sato H, Sato Y. Protective activities in mice of monoclonal antibodies against pertussis toxin. *Infect Immun* 1990; 58: 3369-74.

- Sato Y, Izumiya K, Sato H, *et al.* Role of antibody to leukocytosis promoting factor hemagglutinin and filamentous hemagglutinin in immunity to pertussis. *Infect Immun* 1981, 31: 1223-31.
- Sato Y, Kimura M, Fukumi H. Development of a pertussis component vaccine in Japan. *Lancet* 1984;1:122-6.
- Saukkonen K, Burnette WN, Mar VL, Masure HR, Tuomanen EI. Pertussis toxin has eukaryotic-like carbohydrate recognition domains. *PNAS* 1992; 89: 118-22.
- Sblattero D, Bradbury A. A definitive set of oligonucleotide primers for amplifying human V regions. *Immunotechnology* 1998; 3: 271-8.
- Schmidt MA, Schmidt W. Inhibition of pertussis toxin binding to model receptors by anti-peptide antibodies directed at an antigenic domain of the S2 subunit. *Infect Immunol* 1989; 57: 3828-33.
- Scott JK, Smith GP. Searching for peptide ligands with an epitope library. *Science* 1990; 249: 386-90
- Sekura RD, Fish F, Manclark CR, Meade B, Zhang YL. Pertussis toxin: affinity purification of a new ADP-ribosyltransferase. *J Biol Chem* 1983; 258: 14647-51
- Shimada N, Suzuki Y, Nakajima M, Conrad U, Murofushi N, Yamaguchi I. Expression of a functional single chain antibody against GA24/19 in transgenic tobacco. *Biosci Biotechnol Biochem* 1999; 63: 779-83.
- Shinohara N, Demura T, Fukuda H. Isolation of a vascular cell wall-specific monoclonal antibody recognising a cell polarity by using a phage display subtraction method. *Proc Nat Acad Sci USA* 2000; 97: 2585-90.
- Shusta EV, VanAntwerp J, Wittrup KD. Biosynthetic polypeptide libraries. *Curr Opin Biotechnol* 1999; 10: 117-22.
- Sidhu SS. Engineering M13 for phage display. *Biomol Engin* 2001; 18: 57-63.
- Siegel DL, Chang TY, Russell SL, Bunya VY. Isolation of cell surface-specific human monoclonal antibodies using phage display and magnetically-activated cell sorting: applications in immunohematology. *J Immunol Methods* 1997;206:73-85.
- Skerra A. A general vector, pASK84, for cloning, bacterial production, and single-step purification of antibody Fab fragments. *Gene* 1994; 141: 79-84.

- Skerra A, Pluckthun A. Assembly of a functional immunoglobulin Fv fragment in *Escherichia coli*. *Science* 1988; 240: 1038-41.
- Skerra A, Pluckthun A. Secretion and *in vivo* folding of the Fab fragment of the antibody McPC603 in *Escherichia coli*: influence of disulphides and cisprolines. *Protein Eng* 1991; 4: 971-9.
- Skerra A. Bacterial expression of immunoglobulin fragments. *Curr Opin Immunol* 1993; 5: 256-62.
- Smith GP, Scott JK. Libraries of peptides and proteins displayed on filamentous phage. *Methods Enzymol* 1993; 217: 228-57.
- Smith GP. Filamentous phage fusion: novel expression vectors that display cloned antigens on the surface of the viron. *Science* 1985; 228: 1315-7.
- Smith GP. Surface presentation of protein epitopes using bacteriophage expression systems. *Curr Opin Biotechnol* 1991; 2: 668-73.
- Smith MD, Glick BR. The production of antibodies in plants: an idea whose time has come? *Biotechnol Adv* 2000; 18: 85-9.
- Somerville JE Jr, Goshorn SC, Fell HP, Darveau RP. Bacterial aspects associated with the expression of a single-chain antibody fragment in *Escherichia coli*. *Appl Microbiol Biotechnol* 1994; 42: 595-603.
- Sookrung N, Chaicumpa W, Tungtrongchitr A, *et al.* *Periplaneta americana* arginine kinase as a major cockroach allergen among Thai patients with major cockroach allergies. *Environ Health Perspect* 2006; 114: 875-80.
- Spada S, Krebber C, Pluckthun A. Selectively infective phages (SIP). *Biol. Chem.* 1996; 378:445-56 64.
- Sparks AB, Adey NB, Cwirla S, Kay BK. Screening phage-displayed random peptide libraries. In: B.K. Kay, J. Winter and J. McCafferty (eds.). *Phage Display of Peptides and Proteins*. Academic Press, 1996: 227-53.
- Stewart SJ, Prpic V, Johns JA, *et al.* Bacterial toxins affect early events of T lymphocyte activation. *J Clin Invest* 1989; 83: 234-42.
- Storsaeter J, Olin P. Relative efficacy of two acellular pertussis vaccines. during three years of passive surveillance. *Vaccine* 1992; 10: 142-4
- Strauß M, Kaude F, Peisker M, Sonnewald U, Conrad U, Heineke D. Expression of an abscisic acid-binding single-chain antibody influences the subcellular

- distribution of abscisic acid and leads to developmental changes in transgenic potato plants. *Planta* 2001; 213: 361-9.
- Strnad CF, Carchman RA. Human T lymphocyte mitogenesis in response to the B oligomer of pertussis toxin is associated with an early elevation in cytosolic calcium concentrations. *FEBS Letters* 1987; 225: 16-20.
- Stroud RM, Serwer P, Ross MJ. Assembly of bacteriophage T7. Dimensions of the bacteriophage and its capsids. *Biophys J* 1981; 36: 743-57.
- Szardenings M. Phage display of random peptide libraries: applications, limits, and potential. *J Recept Signal Transduct Res* 2003; 23: 307-49.
- Takkinan K, Laukkanen M-L, Sizmann D, *et al.* An active single-chain antibody containing a cellulase linker domain is secreted by *Escherichia coli*. *Protein Eng* 1991; 4: 837-41.
- Tamura M, Nogimori K, Murai S, *et al.* Subunit structure of islet-activating protein, pertussis toxin, in conformity with the A-B model. *Biochemistry* 1982; 21: 5516-22.
- Tamura M, Nogimori K, Yajima M, Ase K, Ui M. A role of the B-oligomer moiety of islet-activating protein, pertussis toxin, in development of the biological effects on intact cells. *J Biol Chem* 1983; 258: 6756-61.
- Tang Y, Jiang N, Parakh C, Hilvert D. Selection for linkers for a catalytic single-chain antibody using phage display technology. *J Biol Chem* 1996; 271: 15682-86.
- Tomlinson IM, Holt LJ. Protein profiling cones of age. *Genome Biol* 2001; 2: 1004.1-4.3.
- Tordsson JM, Ohlsson LG, Abrahmsen LB, Karlstrom PJ, Lando PA, Brodin TN. Phage-selected primate antibodies fused to superantigens for immunotherapy of malignant melanoma. *Cancer Immunol Immunother* 2000; 48: 691-702.
- Trill JJ, Schatzman AR, Ganguly S. Production of monoclonal antibodies in COS and CHO cells. *Curr Opin Biotechnol* 1995; 6: 553-60.
- Truong K, Ikura M. The use of FRET imaging microscopy to detect protein-protein interactions and protein conformational changes *in vivo*. *Curr Opin Struct Biol* 2001; 11: 573-8.

- Tsumoto K, Nakaoki Y, Ueda Y, *et al.* Effect of the order of antibody variable regions on the expression of the single chain HyHel10 Fv fragment in *E. coli* and the thermodynamic analysis of its antigen-binding properties. *Biochem Biophys Res Commun* 1994; 201: 546-51.
- Tungtrakanpoung R, Pitaksajjakul P, Na-Ngarm N, *et al.* Mimotope of *Leptospira* from phage-displayed random peptide library is reactive with both monoclonal antibodies and patients' sera. *Vet Microbiol* 2006; 115: 54-63.
- Tuomanen E, Towbin H, Rosenfelder G, *et al.* Receptor analogs and monoclonal antibodies that inhibit adherence of *Bordetella pertussis* to human ciliated respiratory epithelial cells. *J Exp Med* 1988; 168: 267-277.
- Turner DJ, Ritter MA and George AJ. Importance of the linker in expression of single-chain Fv antibody fragments: optimization of peptide sequence using phage display technology. *J Immunol Methods* 1997; 205: 43-54.
- Uetz P. Two-hybrid arrays. *Curr Opin Chem Biol* 2001; 6: 57-62.
- Vaughan TJ, Williams AJ, Pritchard K, *et al.* Human antibodies with sub-nanomolar affinities isolated from a large non-immunized phage display library. *Nat Biotechnol* 1996; 14: 309-14.
- Visintin M, Tse E, Axelson H, Rabbitts TH, Cattaneo A. Selection of antibodies for intracellular function using a two-hybrid *in vivo* system. *Proc Natl Acad Sci USA* 1999; 96: 11723-8.
- Ward RL, Clark MA, Lees J, Hawkins NJ. Retrieval of human antibodies from phage-display libraries using enzymatic cleavage. *J Immunol Methods* 1996;189:73–82.
- Wardlaw AC, Parton R. *Bordetella pertussis* toxin. *Pharmacol Ther* 1983; 19: 1-53.
- Waterhouse P, Griffiths AD, Johnson KS, Winter G. Combinatorial infection and *in vivo* recombination: a strategy for making large phage antibody repertoires. *Nucleic Acids Res* 1993;21:2265-6.
- Watters JM, Telleman P, Junghans RP. An optimized method for cell based phage display panning. *Immunotechnology* 1997; 3: 21-9.
- Weiss AA, Hewlett EL, Myers GA, Falkow S. Pertussis toxin and extracytoplasmic adenylate cyclase as virulence factors of *Bordetella pertussis*. *J Infect Dis* 1984; 150: 219-22

- Weiss AA, Hewlette EL. Virulence factor of *Bordetella pertussis*. *Ann Rev Microbiol* 1986; 40: 661-86.
- Whaley SR, English DS, Hu EL, Barbara PF, Belcher AM. Selection of peptides with semiconductor binding specificity for directed nanocrystal assembly. *Nature* 2000; 405: 665-8.
- Willats WGT, Gilmartin PM, Mikkelsen JD, Knox JP. Cell wall antibodies without immunisation: generation of and use of de-esterified homogalacturonan block-specific antibodies from a naïve phage display library. *Plant J* 1999; 18: 57-65.
- Willats WGT, Rasmussen SE, Kristensen T, Mikkelsen JD, Knox JP. Sugar-coated microarrays: a novel slide surface for the high throughput analysis of glycans. *Proteomics* 2002; 2: 1666-71
- Willats WGT, Steele-King CG, Knox JP. 2002b. Antibody techniques. In: P. Gilmartin and C. Bowler (eds.), *Molecular Plant Biology: a Practical Approach*, Oxford University Press, Oxford, U.K.
- Willats WGT, Steele-King CG, McCartney L, Orfila C, Marcus SE, Knox JP. Making and using antibody probes to study plant cell walls. *Plant Physiol Biochem* 2000; 38: 27-36.
- Williams MN, Fresh G, Darvill AG, Albersheim P, Hahn MG. An antibody Fab selected from a recombinant phage display library detects deesterified pectic polysaccharide rhamnogalacturonan II in plant cells. *Plant Cell* 1996; 8: 673-85.
- Wilson DS, Nock S. Functional protein microarrays. *Curr Opin Chem Biol* 2001; 6: 81-5.
- Winter G, Griffiths AD, Hawkins RE, Hoogenboom HR. Making antibodies by phage display technology. *Annu Rev Immunol* 1994; 12: 433-55.
- Winter G, Milstein C. Man-made antibodies. *Nature* 1991; 349: 293-9.
- Winter G. Making antibody and peptide ligands by repertoire selection technologies. *J Mol Recogn* 1998; 11: 126-7.
- Winter G. Synthetic human antibodies and a strategy for protein engineering. *FEBS Lett* 1998; 430: 92-4.
- Witvliet MH, Burns DL, Brennan MJ, Poolman JT, Manclark CR. Binding of pertussis toxin to eucaryotic cells and glycoproteins. *Infect Immunol* 1989; 57: 3324-30.

- Worn A, Pluckthun A. An intrinsically stable antibody scFv fragment can tolerate the loss of both disulfide bonds and fold correctly. *FEBS Lett* 1998; 427:357-61.
- Worn A, Pluckthun A. Different equilibrium stability behavior of ScFv fragments: identification, classification, and improvement by protein engineering. *Biochemistry* 1999; 38: 8739-50.
- Wu AM, Chen W, Raubitschek A, *et al.* Tumor localization of anti-CEA singlechain Fvs: improved tumor targeting by non-covalent dimers. *Immunotechnology* 1996; 2: 21-36.
- Wu H, Nie Y, Huse WD, Watkins JD. Humanization of a murine monoclonal antibody by simultaneous optimization of framework and CDR residues. *J Mol Biol* 1999; 294: 151-62.
- Yamanaka HI, Inoue T, Ikeda-Tanaka O. Chicken monoclonal antibody isolated by a phage display system. *J Immunol* 1996; 157: 1156-62.
- Yang XD, Corvalan JR, Wang P, Roy CM, Davis CG. Fully human anti interleukin- 8 monoclonal antibodies: potential therapeutics for the treatment of inflammatory disease states. *J Leukoc Biol* 1999; 66: 401-10.
- Yang XD, Jia XC, Corvalan JR, Wang P, Davis CG, Jakibovits A. Eradication of established tumors by a fully human monoclonal antibody to the epidermal growth factor receptor without concomitant chemotherapy. *Cancer Res* 1999;59:1236-43.
- Zucconi A, Dente L, Santonico E, Castagnoli L and Cesareni G. Selection of Igands by panning of domain libraries displayed on phage lambda reveals new potential partners of synaptojanin 1. *J Mol Biol* 2001; 307: 1329-39.