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Beyond bottlenecks in membrane protein production

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Document Version

Publisher's PDF, also known as Version of record

Publication date:

2010

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Citation for published version (APA):

Marreddy, R. K. R. (2010). *Beyond bottlenecks in membrane protein production*. s.n.

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Bibliography

1. **Akermoun, M., M. Koglin, D. Zvalova-looss, N. Folschweiller, S. J. Dowell, and K. L. Gearing.** 2005. Characterization of 16 human G protein-coupled receptors expressed in baculovirus-infected insect cells. *Protein Expr. Purif.* **44**:65-74.
2. **Alban, A., S. O. David, L. Bjorkesten, C. Andersson, E. Sloge, S. Lewis, and I. Currie.** 2003. A novel experimental design for comparative two-dimensional gel analysis: two-dimensional difference gel electrophoresis incorporating a pooled internal standard. *Proteomics.* **3**:36-44.
3. **Altamura, N., N. Capitanio, N. Bonnefoy, S. Papa, and G. Dujardin.** 1996. The *Saccharomyces cerevisiae* OXA1 gene is required for the correct assembly of cytochrome c oxidase and oligomycin-sensitive ATP synthase. *FEBS Lett.* **382**:111-115.
4. **Andre, N., N. Cherouati, C. Prual, T. Steffan, G. Zeder-Lutz, T. Magnin, F. Pattus, H. Michel, R. Wagner, and C. Reinhart.** 2006. Enhancing functional production of G protein-coupled receptors in *Pichia pastoris* to levels required for structural studies via a single expression screen. *Protein Sci.* **15**:1115-1126.
5. **Arechaga, I., B. Miroux, S. Karrasch, R. Huijbregts, B. de Kruijff, M. J. Runswick, and J. E. Walker.** 2000. Characterisation of new intracellular membranes in *Escherichia coli* accompanying large scale over-production of the b subunit of F(1)F(o) ATP synthase. *FEBS Lett.* **482**:215-219.
6. **Aslanidis, C. and P. J. de Jong.** 1990. Ligation-independent cloning of PCR products (LIC-PCR). *Nucleic Acids Res.* **18**:6069-6074.
7. **Baggerman, G., E. Vierstraete, A. de Loof, and L. Schoofs.** 2005. Gel-based versus gel-free proteomics: a review. *Comb. Chem. High Throughput. Screen.* **8**:669-677.
8. **Bannwarth, M. and G. E. Schulz.** 2003. The expression of outer membrane proteins for crystallization. *Biochim. Biophys. Acta* **1610**:37-45.
9. **Bartus, C. L., V. P. Jaakola, R. Reusch, H. H. Valentine, P. Heikinheimo, A. Levay, L. T. Potter, H. Heimo, A. Goldman, and G. J. Turner.** 2003. Downstream coding region determinants of bacterio-opsin, muscarinic acetylcholine receptor and adrenergic receptor expression in *Halobacterium salinarum*. *Biochim. Biophys. Acta* **1610**:109-123.
10. **Basile, G. and M. Peticca.** 2009. Recombinant protein expression in *Leishmania tarentolae*. *Mol. Biotechnol.* **43**:273-278.

11. **Berger, I., D. J. Fitzgerald, and T. J. Richmond.** 2004. Baculovirus expression system for heterologous multiprotein complexes. *Nat. Biotechnol.* **22**:1583-1587.
12. **Berggren, K., E. Chernokalskaya, T. H. Steinberg, C. Kemper, M. F. Lopez, Z. Diwu, R. P. Haugland, and W. F. Patton.** 2000. Background-free, high sensitivity staining of proteins in one- and two-dimensional sodium dodecyl sulfate-polyacrylamide gels using a luminescent ruthenium complex. *Electrophoresis* **21**:2509-2521.
13. **Berntsson, R. P., O. N. Alia, F. Fusetti, A. M. Thunnissen, B. Poolman, and D. J. Slotboom.** 2009. Selenomethionine incorporation in proteins expressed in *Lactococcus lactis*. *Protein Sci.* **18**:1121-1127.
14. **Berntsson, R. P., M. K. Doeven, F. Fusetti, R. H. Durkens, D. Sengupta, S. J. Marrink, A. M. Thunnissen, B. Poolman, and D. J. Slotboom.** 2009. The structural basis for peptide selection by the transport receptor OppA. *EMBO J.* **28**:1332-1340.
15. **Biemans-Oldehinkel, E., N. A. Mahmood, and B. Poolman.** 2006. A sensor for intracellular ionic strength. *Proc. Natl. Acad. Sci. U. S. A* **103**:10624-10629.
16. **Biemans-Oldehinkel, E. and B. Poolman.** 2003. On the role of the two extracytoplasmic substrate-binding domains in the ABC transporter OpuA. *EMBO J.* **22**:5983-5993.
17. **Bill, R. M.** 2001. Yeast—a panacea for the structure-function analysis of membrane proteins? *Curr. Genet.* **40**:157-171.
18. **Bjellqvist, B., K. Ek, P. G. Righetti, E. Gianazza, A. Gorg, R. Westermeier, and W. Postel.** 1982. Isoelectric focusing in immobilized pH gradients: principle, methodology and some applications. *J. Biochem. Biophys. Methods* **6**:317-339.
19. **Bonander, N., R. A. Darby, L. Grgic, N. Bora, J. Wen, S. Brogna, D. R. Poyner, M. A. O'Neill, and R. M. Bill.** 2009. Altering the ribosomal subunit ratio in yeast maximizes recombinant protein yield. *Microb. Cell Fact.* **8**:10.
20. **Bonander, N., K. Hedfalk, C. Larsson, P. Mostad, C. Chang, L. Gustafsson, and R. M. Bill.** 2005. Design of improved membrane protein production experiments: quantitation of the host response. *Protein Sci.* **14**:1729-1740.
21. **Bongers, R. S., J. W. Veening, M. Van Wieringen, O. P. Kuipers, and M. Kleerebezem.** 2005. Development and characterization of a subtilin-regulated expression system in *Bacillus subtilis*: strict control of gene expression by addition of subtilin. *Appl. Environ. Microbiol.* **71**:8818-8824.
22. **Boon, J. M. and B. D. Smith.** 2002. Chemical control of phospholipid distribution across bilayer membranes. *Med. Res. Rev.* **22**:251-281.

23. **Breitling, R., S. Klingner, N. Callewaert, R. Pietrucha, A. Geyer, G. Ehrlich, R. Hartung, A. Muller, R. Contreras, S. M. Beverley, and K. Alexandrov.** 2002. Non-pathogenic trypanosomatid protozoa as a platform for protein research and production. *Protein Expr. Purif.* **25**:209-218.
24. **Brooijmans, R. J., B. Poolman, G. K. Schuurman-Wolters, W. M. de Vos, and J. Hugenholtz.** 2007. Generation of a membrane potential by *Lactococcus lactis* through aerobic electron transport. *J. Bacteriol.* **189**:5203-5209.
25. **Brouwer, R. W. W., J. P. C. Pinto, A. Zeyniyev, O. P. Kuipers, and J. Kok.** 2010. The growth-phase dependent transcriptome of *Lactococcus lactis*. *In* .
26. **Budin-Verneuil, A., V. Pichereau, Y. Auffray, D. Ehrlich, and E. Maguin.** 2007. Proteome phenotyping of acid stress-resistant mutants of *Lactococcus lactis* MG1363. *Proteomics.* **7**:2038-2046.
27. **Budin-Verneuil, A., V. Pichereau, Y. Auffray, D. S. Ehrlich, and E. Maguin.** 2005. Proteomic characterization of the acid tolerance response in *Lactococcus lactis* MG1363. *Proteomics.* **5**:4794-4807.
28. **Carrette, O., P. R. Burkhard, J. C. Sanchez, and D. F. Hochstrasser.** 2006. State-of-the-art two-dimensional gel electrophoresis: a key tool of proteomics research. *Nat. Protoc.* **1**:812-823.
29. **Celis, J. E., G. P. Ratz, P. Madsen, B. Gesser, J. B. Lauridsen, S. Kwee, H. H. Rasmussen, H. V. Nielsen, D. Cruger, B. Basse, and .** 1989. Comprehensive, human cellular protein databases and their implication for the study of genome organization and function. *FEBS Lett.* **244**:247-254.
30. **Chang, D. E., D. J. Smalley, and T. Conway.** 2002. Gene expression profiling of *Escherichia coli* growth transitions: an expanded stringent response model. *Mol. Microbiol.* **45**:289-306.
31. **Chang, G., R. H. Spencer, A. T. Lee, M. T. Barclay, and D. C. Rees.** 1998. Structure of the MscL homolog from *Mycobacterium tuberculosis*: a gated mechanosensitive ion channel. *Science* **282**:2220-2226.
32. **Chebolu, S. and H. Daniell.** 2009. Chloroplast-derived vaccine antigens and biopharmaceuticals: expression, folding, assembly and functionality. *Curr. Top. Microbiol. Immunol.* **332**:33-54.
33. **Chen, E. I., J. Hewel, B. Felding-Habermann, and J. R. Yates, III.** 2006. Large scale protein profiling by combination of protein fractionation and multidimensional protein identification technology (MudPIT). *Mol. Cell Proteomics.* **5**:53-56.
34. **Chen, M., J. C. Samuelson, F. Jiang, M. Muller, A. Kuhn, and R. E. Dalbey.** 2002. Direct interaction of YidC with the Sec-independent Pf3 coat protein during its membrane protein insertion. *J. Biol. Chem.* **277**:7670-7675.

35. **Chen, Y., J. Song, S. F. Sui, and D. N. Wang.** 2003. DnaK and DnaJ facilitated the folding process and reduced inclusion body formation of magnesium transporter CorA overexpressed in *Escherichia coli*. *Protein Expr. Purif.* **32**:221-231.
36. **Chen, Y. J., O. Pornillos, S. Lieu, C. Ma, A. P. Chen, and G. Chang.** 2007. X-ray structure of EmrE supports dual topology model. *Proc. Natl. Acad. Sci. U. S. A* **104**:18999-19004.
37. **Chloupkova, M., A. Pickert, J. Y. Lee, S. Souza, Y. T. Trinh, S. M. Connelly, M. E. Dumont, M. Dean, and I. L. Urbatsch.** 2007. Expression of 25 human ABC transporters in the yeast *Pichia pastoris* and characterization of the purified ABCC3 ATPase activity. *Biochemistry* **46**:7992-8003.
38. **Chong, B. E., F. Yan, D. M. Lubman, and F. R. Miller.** 2001. Chromatofocusing nonporous reversed-phase high-performance liquid chromatography/electrospray ionization time-of-flight mass spectrometry of proteins from human breast cancer whole cell lysates: a novel two-dimensional liquid chromatography/mass spectrometry method. *Rapid Commun. Mass Spectrom.* **15**:291-296.
39. **Dalbey, R. E. and A. Kuhn.** 2004. YidC family members are involved in the membrane insertion, lateral integration, folding, and assembly of membrane proteins. *J. Cell Biol.* **166**:769-774.
40. **Daniell, H., M. S. Khan, and L. Allison.** 2002. Milestones in chloroplast genetic engineering: an environmentally friendly era in biotechnology. *Trends Plant Sci.* **7**:84-91.
41. **Daniell, H., S. J. Streatfield, and K. Wycoff.** 2001. Medical molecular farming: production of antibodies, biopharmaceuticals and edible vaccines in plants. *Trends Plant Sci.* **6**:219-226.
42. **Dassa, E. and P. Bouige.** 2001. The ABC of ABCS: a phylogenetic and functional classification of ABC systems in living organisms. *Res. Microbiol.* **152**:211-229.
43. **Davies, A. H.** 1994. Current methods for manipulating baculoviruses. *Biotechnology (N. Y.)* **12**:47-50.
44. **de Groot, B. L., A. Engel, and H. Grubmuller.** 2001. A refined structure of human aquaporin-1. *FEBS Lett.* **504**:206-211.
45. **de Ruyter, P. G., O. P. Kuipers, and W. M. de Vos.** 1996. Controlled gene expression systems for *Lactococcus lactis* with the food-grade inducer nisin. *Appl. Environ. Microbiol.* **62**:3662-3667.
46. **de Vos, W. M.** 1999. Gene expression systems for lactic acid bacteria. *Curr. Opin. Microbiol.* **2**:289-295.

47. **de Marco, A.** 2007. Protocol for preparing proteins with improved solubility by co-expressing with molecular chaperones in *Escherichia coli*. *Nat. Protoc.* **2**:2632-2639.
48. **de Smet, L., V. Kostanjevecki, Y. Guisez, and J. Van Beeumen.** 2001. A novel system for heterologous expression of flavocytochrome c in phototrophic bacteria using the *Allochrochromatium vinosum* *rbcA* promoter. *Arch. Microbiol.* **176**:19-28.
49. **den Hengst, C. D., M. Groeneveld, O. P. Kuipers, and J. Kok.** 2006. Identification and functional characterization of the *Lactococcus lactis* CodY-regulated branched-chain amino acid permease BcaP (CtrA). *J. Bacteriol.* **188**:3280-3289.
50. **den Hengst, C. D., S. A. van Hijum, J. M. Geurts, A. Nauta, J. Kok, and O. P. Kuipers.** 2005. The *Lactococcus lactis* CodY regulon: identification of a conserved cis-regulatory element. *J. Biol. Chem.* **280**:34332-34342.
51. **Detmers, F. J., F. C. Lanfermeijer, R. Abele, R. W. Jack, R. Tampe, W. N. Konings, and B. Poolman.** 2000. Combinatorial peptide libraries reveal the ligand-binding mechanism of the oligopeptide receptor OppA of *Lactococcus lactis*. *Proc. Natl. Acad. Sci. U. S. A* **97**:12487-12492.
52. **Dressaire, C., E. Redon, H. Milhem, P. Besse, P. Loubiere, and M. Cacaïgn-Bousquet.** 2008. Growth rate regulated genes and their wide involvement in the *Lactococcus lactis* stress responses. *BMC. Genomics* **9**:343.
53. **Drew, D., M. Lerch, E. Kunji, D. J. Slotboom, and J. W. De Gier.** 2006. Optimization of membrane protein overexpression and purification using GFP fusions. *Nat. Methods* **3**:303-313.
54. **Drew, D., S. Newstead, Y. Sonoda, H. Kim, H. G. von, and S. Iwata.** 2008. GFP-based optimization scheme for the overexpression and purification of eukaryotic membrane proteins in *Saccharomyces cerevisiae*. *Nat. Protoc.* **3**:784-798.
55. **Drew, D., D. Sjostrand, J. Nilsson, T. Urbig, C. N. Chin, J. W. de Gier, and H. G. von.** 2002. Rapid topology mapping of *Escherichia coli* inner-membrane proteins by prediction and PhoA/GFP fusion analysis. *Proc. Natl. Acad. Sci. U. S. A* **99**:2690-2695.
56. **Drew, D. E., H. G. von, P. Nordlund, and J. W. de Gier.** 2001. Green fluorescent protein as an indicator to monitor membrane protein overexpression in *Escherichia coli*. *FEBS Lett.* **507**:220-224.
57. **Driessen, A. J., S. de Jong, and W. N. Konings.** 1987. Transport of branched-chain amino acids in membrane vesicles of *Streptococcus cremoris*. *J. Bacteriol.* **169**:5193-5200.

58. **Du, D., T. Kato, F. Suzuki, and E. Y. Park.** 2009. Expression of protein complex comprising the human prorenin and (pro)renin receptor in silkworm larvae using *Bombyx mori* nucleopolyhedrovirus (BmNPV) bacmids for improving biological function. *Mol. Biotechnol.* **43**:154-161.
59. **Duurkens, R. H., M. B. Tol, E. R. Geertsma, H. P. Permentier, and D. J. Slotboom.** 2007. Flavin binding to the high affinity riboflavin transporter RibU. *J. Biol. Chem.* **282**:10380-10386.
60. **Eaton, T., C. Shearman, and M. Gasson.** 1993. Cloning and sequence analysis of the *dnaK* gene region of *Lactococcus lactis* subsp. *lactis*. *J. Gen. Microbiol.* **139**:3253-3264.
61. **El, K. M., M. L. van Roosmalen, D. Jager, H. Metselaar, H. Permentier, K. Leenhouts, and J. Broos.** 2008. *Lactococcus lactis* as expression host for the biosynthetic incorporation of tryptophan analogues into recombinant proteins. *Biochem. J.* **409**:193-198.
62. **Elias, C. B., B. Jardin, and A. Kamen.** 2007. Recombinant protein production in large-scale agitated bioreactors using the baculovirus expression vector system. *Methods Mol. Biol.* **388**:225-246.
63. **Eymann, C., G. Homuth, C. Scharf, and M. Hecker.** 2002. *Bacillus subtilis* functional genomics: global characterization of the stringent response by proteome and transcriptome analysis. *J. Bacteriol.* **184**:2500-2520.
64. **Felder, C. C., J. S. Veluz, H. L. Williams, E. M. Briley, and L. A. Matsuda.** 1992. Cannabinoid agonists stimulate both receptor- and non-receptor-mediated signal transduction pathways in cells transfected with and expressing cannabinoid receptor clones. *Mol. Pharmacol.* **42**:838-845.
65. **Frelet-Barrand, A., S. Boutigny, L. Moyet, A. Deniaud, D. Seigneurin-Berny, D. Salvi, F. Bernaudat, P. Richaud, E. Pebay-Peyroula, J. Joyard, and N. Rolland.** 2010. *Lactococcus lactis*, an alternative system for functional expression of peripheral and intrinsic Arabidopsis membrane proteins. *PLoS. One.* **5**:e8746.
66. **Funes, S., A. Hasona, H. Bauerschmitt, C. Grubbauer, F. Kauff, R. Collins, P. J. Crowley, S. R. Palmer, L. J. Brady, and J. M. Herrmann.** 2009. Independent gene duplications of the *YidC/Oxa/Alb3* family enabled a specialized cotranslational function. *Proc. Natl. Acad. Sci. U. S. A* **106**:6656-6661.
67. **Gasson, M. J.** 1983. Plasmid complements of *Streptococcus lactis* NCDO 712 and other lactic streptococci after protoplast-induced curing. *J. Bacteriol.* **154**:1-9.
68. **Geertsma, E. R., M. Groeneveld, D. J. Slotboom, and B. Poolman.** 2008. Quality control of overexpressed membrane proteins. *Proc. Natl. Acad. Sci. U. S. A* **105**:5722-5727.

69. **Geertsma, E. R. and B. Poolman.** 2007. High-throughput cloning and expression in recalcitrant bacteria. *Nat. Methods* **4**:705-707.
70. **Geissendorfer, M. and W. Hillen.** 1990. Regulated expression of heterologous genes in *Bacillus subtilis* using the Tn10 encoded tet regulatory elements. *Appl. Microbiol. Biotechnol.* **33**:657-663.
71. **Gitton, C., M. Meyrand, J. Wang, C. Caron, A. Trubuil, A. Guillot, and M. Y. Mistou.** 2005. Proteomic signature of *Lactococcus lactis* NCDO763 cultivated in milk. *Appl. Environ. Microbiol.* **71**:7152-7163.
72. **Goldman, R. C., B. L. Trus, and L. Leive.** 1983. Quantitative double-label radiography of two-dimensional protein gels using color negative film and computer analysis. *Eur. J. Biochem.* **131**:473-480.
73. **Gomez, N., C. Carrillo, J. Salinas, F. Parra, M. V. Borca, and J. M. Escribano.** 1998. Expression of immunogenic glycoprotein S polypeptides from transmissible gastroenteritis coronavirus in transgenic plants. *Virology* **249**:352-358.
74. **Gomord, V. and L. Faye.** 2004. Posttranslational modification of therapeutic proteins in plants. *Curr. Opin. Plant Biol.* **7**:171-181.
75. **Gonzales, E. B., T. Kawate, and E. Gouaux.** 2009. Pore architecture and ion sites in acid-sensing ion channels and P2X receptors. *Nature* **460**:599-604.
76. **Gonzalez-Montalban, N., E. Garcia-Fruitos, and A. Villaverde.** 2007. Recombinant protein solubility - does more mean better? *Nat. Biotechnol.* **25**:718-720.
77. **Gordon, E., R. Horsefield, H. G. Swarts, J. J. de Pont, R. Neutze, and A. Snijder.** 2008. Effective high-throughput overproduction of membrane proteins in *Escherichia coli*. *Protein Expr. Purif.* **62**:1-8.
78. **Gorg, A., W. Postel, and S. Gunther.** 1988. The current state of two-dimensional electrophoresis with immobilized pH gradients. *Electrophoresis* **9**:531-546.
79. **Gorg, A., W. Weiss, and M. J. Dunn.** 2004. Current two-dimensional electrophoresis technology for proteomics. *Proteomics.* **4**:3665-3685.
80. **Gorgens, J. F., W. H. van Zyl, J. H. Knoetze, and B. Hahn-Hagerdal.** 2005. Amino acid supplementation improves heterologous protein production by *Saccharomyces cerevisiae* in defined medium. *Appl. Microbiol. Biotechnol.* **67**:684-691.
81. **Greengauz-Roberts, O., H. Stoppler, S. Nomura, H. Yamaguchi, J. R. Goldenring, R. H. Podolsky, J. R. Lee, and W. S. Dynan.** 2005. Saturation labeling with cysteine-reactive cyanine fluorescent dyes provides increased

- sensitivity for protein expression profiling of laser-microdissected clinical specimens. *Proteomics*. **5**:1746-1757.
82. **Griffith, D. A., C. Delipala, J. Leadsham, S. M. Jarvis, and D. Oesterhelt.** 2003. A novel yeast expression system for the overproduction of quality-controlled membrane proteins. *FEBS Lett.* **553**:45-50.
 83. **Grisshammer, R.** 2006. Understanding recombinant expression of membrane proteins. *Curr. Opin. Biotechnol.* **17**:337-340.
 84. **Grisshammer, R., R. Duckworth, and R. Henderson.** 1993. Expression of a rat neurotensin receptor in *Escherichia coli*. *Biochem. J.* **295 (Pt 2)**:571-576.
 85. **Grisshammer, R. and C. G. Tate.** 1995. Overexpression of integral membrane proteins for structural studies. *Q. Rev. Biophys.* **28**:315-422.
 86. **Guedon, E., P. Serror, S. D. Ehrlich, P. Renault, and C. Delorme.** 2001. Pleiotropic transcriptional repressor CodY senses the intracellular pool of branched-chain amino acids in *Lactococcus lactis*. *Mol. Microbiol.* **40**:1227-1239.
 87. **Guedon, E., B. Sperandio, N. Pons, S. D. Ehrlich, and P. Renault.** 2005. Overall control of nitrogen metabolism in *Lactococcus lactis* by CodY, and possible models for CodY regulation in Firmicutes. *Microbiology* **151**:3895-3909.
 88. **Gygi, S. P. and R. Aebersold.** 1999. Absolute quantitation of 2-D protein spots. *Methods Mol. Biol.* **112**:417-421.
 89. **Gygi, S. P., B. Rist, S. A. Gerber, F. Turecek, M. H. Gelb, and R. Aebersold.** 1999. Quantitative analysis of complex protein mixtures using isotope-coded affinity tags. *Nat. Biotechnol.* **17**:994-999.
 90. **Gygi, S. P., Y. Rochon, B. R. Franza, and R. Aebersold.** 1999. Correlation between protein and mRNA abundance in yeast. *Mol. Cell Biol.* **19**:1720-1730.
 91. **Hagting, A., J. Knol, B. Hasemeier, M. R. Streutker, G. Fang, B. Poolman, and W. N. Konings.** 1997. Amplified expression, purification and functional reconstitution of the dipeptide and tripeptide transport protein of *Lactococcus lactis*. *Eur. J. Biochem.* **247**:581-587.
 92. **Hannig, G. and S. C. Makrides.** 1998. Strategies for optimizing heterologous protein expression in *Escherichia coli*. *Trends Biotechnol.* **16**:54-60.
 93. **Haq, T. A., H. S. Mason, J. D. Clements, and C. J. Arntzen.** 1995. Oral immunization with a recombinant bacterial antigen produced in transgenic plants. *Science* **268**:714-716.
 94. **Harwood, S.** 2007. Small-scale protein production with the baculovirus expression vector system. *Methods Mol. Biol.* **388**:211-224.

95. **Hasona, A., P. J. Crowley, C. M. Levesque, R. W. Mair, D. G. Cvitkovitch, A. S. Bleiweis, and L. J. Brady.** 2005. Streptococcal viability and diminished stress tolerance in mutants lacking the signal recognition particle pathway or YidC2. *Proc. Natl. Acad. Sci. U. S. A* **102**:17466-17471.
96. **Helenius, A. and M. Aebi.** 2004. Roles of N-linked glycans in the endoplasmic reticulum. *Annu. Rev. Biochem.* **73**:1019-1049.
97. **Henderson, R. and P. N. Unwin.** 1975. Three-dimensional model of purple membrane obtained by electron microscopy. *Nature* **257**:28-32.
98. **Henzel, W. J., T. M. Billeci, J. T. Stults, S. C. Wong, C. Grimley, and C. Watanabe.** 1993. Identifying proteins from two-dimensional gels by molecular mass searching of peptide fragments in protein sequence databases. *Proc. Natl. Acad. Sci. U. S. A* **90**:5011-5015.
99. **Hiroaki, Y., K. Tani, A. Kamegawa, N. Gyobu, K. Nishikawa, H. Suzuki, T. Walz, S. Sasaki, K. Mitsuoka, K. Kimura, A. Mizoguchi, and Y. Fujiyoshi.** 2006. Implications of the aquaporin-4 structure on array formation and cell adhesion. *J. Mol. Biol.* **355**:628-639.
100. **Hollenberg, C. P. and G. Gellissen.** 1997. Production of recombinant proteins by methylotrophic yeasts. *Curr. Opin. Biotechnol.* **8**:554-560.
101. **Holo, H. and I. F. Nes.** 1989. High-Frequency Transformation, by Electroporation, of *Lactococcus lactis* subsp. *cremoris* Grown with Glycine in Osmotically Stabilized Media. *Appl. Environ. Microbiol.* **55**:3119-3123.
102. **Hopkins, A. L. and C. R. Groom.** 2002. The druggable genome. *Nat. Rev. Drug Discov.* **1**:727-730.
103. **Hoving, S., H. Voshol, and J. van Oostrum.** 2000. Towards high performance two-dimensional gel electrophoresis using ultrazoom gels. *Electrophoresis* **21**:2617-2621.
104. **Hu, Q., R. J. Noll, H. Li, A. Makarov, M. Hardman, and C. R. Graham.** 2005. The Orbitrap: a new mass spectrometer. *J. Mass Spectrom.* **40**:430-443.
105. **Hu, Y., G. Wang, G. Y. Chen, X. Fu, and S. Q. Yao.** 2003. Proteome analysis of *Saccharomyces cerevisiae* under metal stress by two-dimensional differential gel electrophoresis. *Electrophoresis* **24**:1458-1470.
106. **Huber, D., D. Boyd, Y. Xia, M. H. Olma, M. Gerstein, and J. Beckwith.** 2005. Use of thioredoxin as a reporter to identify a subset of *Escherichia coli* signal sequences that promote signal recognition particle-dependent translocation. *J. Bacteriol.* **187**:2983-2991.
107. **Ideker, T., V. Thorsson, J. A. Ranish, R. Christmas, J. Buhler, J. K. Eng, R. Bumgarner, D. R. Goodlett, R. Aebersold, and L. Hood.** 2001. Integrated

- genomic and proteomic analyses of a systematically perturbed metabolic network. *Science* **292**:929-934.
108. **Ishihama, Y., Y. Oda, T. Tabata, T. Sato, T. Nagasu, J. Rappsilber, and M. Mann.** 2005. Exponentially modified protein abundance index (emPAI) for estimation of absolute protein amount in proteomics by the number of sequenced peptides per protein. *Mol. Cell Proteomics*. **4**:1265-1272.
 109. **Jacobson, A. and S. W. Peltz.** 1996. Interrelationships of the pathways of mRNA decay and translation in eukaryotic cells. *Annu. Rev. Biochem.* **65**:693-739.
 110. **James, P., M. Quadroni, E. Carafoli, and G. Gonnet.** 1993. Protein identification by mass profile fingerprinting. *Biochem. Biophys. Res. Commun.* **195**:58-64.
 111. **Jarvie, K. R., M. Tiberi, C. Silvia, J. A. Gingrich, and M. G. Caron.** 1993. Molecular cloning, stable expression and desensitization of the human dopamine D1b/D5 receptor. *J. Recept. Res.* **13**:573-590.
 112. **Jensen, P. R. and K. Hammer.** 1993. Minimal Requirements for Exponential Growth of *Lactococcus lactis*. *Appl. Environ. Microbiol.* **59**:4363-4366.
 113. **Jidenko, M., R. C. Nielsen, T. L. Sorensen, J. V. Moller, M. M. Le, P. Nissen, and C. Jaxel.** 2005. Crystallization of a mammalian membrane protein overexpressed in *Saccharomyces cerevisiae*. *Proc. Natl. Acad. Sci. U. S. A* **102**:11687-11691.
 114. **Jin, R., S. K. Singh, S. Gu, H. Furukawa, A. I. Sobolevsky, J. Zhou, Y. Jin, and E. Gouaux.** 2009. Crystal structure and association behaviour of the GluR2 amino-terminal domain. *EMBO J.* **28**:1812-1823.
 115. **Jordan, P., P. Fromme, H. T. Witt, O. Klukas, W. Saenger, and N. Krauss.** 2001. Three-dimensional structure of cyanobacterial photosystem I at 2.5 Å resolution. *Nature* **411**:909-917.
 116. **Junge, F., B. Schneider, S. Reckel, D. Schwarz, V. Dotsch, and F. Bernhard.** 2008. Large-scale production of functional membrane proteins. *Cell Mol. Life Sci.* **65**:1729-1755.
 117. **Kalmbach, R., I. Chizhov, M. C. Schumacher, T. Friedrich, E. Bamberg, and M. Engelhard.** 2007. Functional cell-free synthesis of a seven helix membrane protein: in situ insertion of bacteriorhodopsin into liposomes. *J. Mol. Biol.* **371**:639-648.
 118. **Kanehisa, M., M. Araki, S. Goto, M. Hattori, M. Hirakawa, M. Itoh, T. Katayama, S. Kawashima, S. Okuda, T. Tokimatsu, and Y. Yamanishi.** 2008. KEGG for linking genomes to life and the environment. *Nucleic Acids Res.* **36**:D480-D484.

119. **Kanehisa, M., S. Goto, M. Hattori, K. F. oki-Kinoshita, M. Itoh, S. Kawashima, T. Katayama, M. Araki, and M. Hirakawa.** 2006. From genomics to chemical genomics: new developments in KEGG. *Nucleic Acids Res.* **34**:D354-D357.
120. **Kappler, U. and A. G. McEwan.** 2002. A system for the heterologous expression of complex redox proteins in *Rhodobacter capsulatus*: characterisation of recombinant sulphite:cytochrome c oxidoreductase from *Starkeya novella*. *FEBS Lett.* **529**:208-214.
121. **Kapust, R. B. and D. S. Waugh.** 1999. *Escherichia coli* maltose-binding protein is uncommonly effective at promoting the solubility of polypeptides to which it is fused. *Protein Sci.* **8**:1668-1674.
122. **Katzen, F., T. C. Peterson, and W. Kudlicki.** 2009. Membrane protein expression: no cells required. *Trends Biotechnol.* **27**:455-460.
123. **Kawate, T., J. C. Michel, W. T. Birdsong, and E. Gouaux.** 2009. Crystal structure of the ATP-gated P2X(4) ion channel in the closed state. *Nature* **460**:592-598.
124. **Kernec, F., M. Unlu, W. Labeikovskiy, J. S. Minden, and A. P. Koretsky.** 2001. Changes in the mitochondrial proteome from mouse hearts deficient in creatine kinase. *Physiol Genomics* **6**:117-128.
125. **Keynan, S., Y. J. Suh, B. I. Kanner, and G. Rudnick.** 1992. Expression of a cloned gamma-aminobutyric acid transporter in mammalian cells. *Biochemistry* **31**:1974-1979.
126. **Kiefer, H.** 2003. In vitro folding of alpha-helical membrane proteins. *Biochim. Biophys. Acta* **1610**:57-62.
127. **Kigawa, T., T. Yabuki, N. Matsuda, T. Matsuda, R. Nakajima, A. Tanaka, and S. Yokoyama.** 2004. Preparation of *Escherichia coli* cell extract for highly productive cell-free protein expression. *J. Struct. Funct. Genomics* **5**:63-68.
128. **Kilstrup, M., S. Jacobsen, K. Hammer, and F. K. Vogensen.** 1997. Induction of heat shock proteins DnaK, GroEL, and GroES by salt stress in *Lactococcus lactis*. *Appl. Environ. Microbiol.* **63**:1826-1837.
129. **Kim, D. M. and C. Y. Choi.** 1996. A semicontinuous prokaryotic coupled transcription/translation system using a dialysis membrane. *Biotechnol. Prog.* **12**:645-649.
130. **Klaassen, C. H. and W. J. DeGrip.** 2000. Baculovirus expression system for expression and characterization of functional recombinant visual pigments. *Methods Enzymol.* **315**:12-29.
131. **Kleerebezem, M., M. M. Beerthuyzen, E. E. Vaughan, W. M. de Vos, and O. P. Kuipers.** 1997. Controlled gene expression systems for lactic acid bacteria:

- transferable nisin-inducible expression cassettes for *Lactococcus*, *Leuconostoc*, and *Lactobacillus* spp. *Appl. Environ. Microbiol.* **63**:4581-4584.
132. **Klose, J.** 1975. Protein mapping by combined isoelectric focusing and electrophoresis of mouse tissues. A novel approach to testing for induced point mutations in mammals. *Humangenetik.* **26**:231-243.
133. **Knowles, M. R., S. Cervino, H. A. Skynner, S. P. Hunt, C. de Felipe, K. Salim, G. Meneses-Lorente, G. McAllister, and P. C. Guest.** 2003. Multiplex proteomic analysis by two-dimensional differential in-gel electrophoresis. *Proteomics.* **3**:1162-1171.
134. **Koch, H. G., T. Hengelage, C. Neumann-Haefelin, J. MacFarlane, H. K. Hoffschulte, K. L. Schimz, B. Mechler, and M. Muller.** 1999. In vitro studies with purified components reveal signal recognition particle (SRP) and SecA/SecB as constituents of two independent protein-targeting pathways of *Escherichia coli*. *Mol. Biol. Cell* **10**:2163-2173.
135. **Korepanova, A., F. P. Gao, Y. Hua, H. Qin, R. K. Nakamoto, and T. A. Cross.** 2005. Cloning and expression of multiple integral membrane proteins from *Mycobacterium tuberculosis* in *Escherichia coli*. *Protein Sci.* **14**:148-158.
136. **Kost, T. A., J. P. Condreay, and D. L. Jarvis.** 2005. Baculovirus as versatile vectors for protein expression in insect and mammalian cells. *Nat. Biotechnol.* **23**:567-575.
137. **Kuipers, O. P., A. de Jong, R. J. Baerends, S. A. van Hijum, A. L. Zomer, H. A. Karsens, C. D. den Hengst, N. E. Kramer, G. Buist, and J. Kok.** 2002. Transcriptome analysis and related databases of *Lactococcus lactis*. *Antonie Van Leeuwenhoek* **82**:113-122.
138. **Kuipers, O. P., P. G. G. A. de Ruyter, M. Kleerebezem, and W. M. de Vos.** 1998. Quorum sensing-controlled gene expression in lactic acid bacteria. *Journal of Biotechnology* **64**:15-21.
139. **Kunji, E. R., K. W. Chan, D. J. Slotboom, S. Floyd, R. O'Connor, and M. Monne.** 2005. Eukaryotic membrane protein overproduction in *Lactococcus lactis*. *Curr. Opin. Biotechnol.* **16**:546-551.
140. **Kunji, E. R., A. Hagting, C. J. De Vries, V. Juillard, A. J. Haandrikman, B. Poolman, and W. N. Konings.** 1995. Transport of beta-casein-derived peptides by the oligopeptide transport system is a crucial step in the proteolytic pathway of *Lactococcus lactis*. *J. Biol. Chem.* **270**:1569-1574.
141. **Kunji, E. R., D. J. Slotboom, and B. Poolman.** 2003. *Lactococcus lactis* as host for overproduction of functional membrane proteins. *Biochim. Biophys. Acta* **1610**:97-108.

142. **Kunji, E. R., E. J. Smid, R. Plapp, B. Poolman, and W. N. Konings.** 1993. Di-tripeptides and oligopeptides are taken up via distinct transport mechanisms in *Lactococcus lactis*. *J. Bacteriol.* **175**:2052-2059.
143. **Kurland, C. and J. Gallant.** 1996. Errors of heterologous protein expression. *Curr. Opin. Biotechnol.* **7**:489-493.
144. **Kushnir, S., K. Gase, R. Breitling, and K. Alexandrov.** 2005. Development of an inducible protein expression system based on the protozoan host *Leishmania tarentolae*. *Protein Expr. Purif.* **42**:37-46.
145. **Lau, F. W., S. Nauli, Y. Zhou, and J. U. Bowie.** 1999. Changing single side-chains can greatly enhance the resistance of a membrane protein to irreversible inactivation. *J. Mol. Biol.* **290**:559-564.
146. **Lenoir, G., T. Menguy, F. Corre, C. Montigny, P. A. Pedersen, D. Thines, M. M. Le, and P. Falson.** 2002. Overproduction in yeast and rapid and efficient purification of the rabbit SERCA1a Ca(2+)-ATPase. *Biochim. Biophys. Acta* **1560**:67-83.
147. **Lewinson, O., A. T. Lee, and D. C. Rees.** 2008. The funnel approach to the precrystallization production of membrane proteins. *J. Mol. Biol.* **377**:62-73.
148. **Li, M., F. A. Hays, Z. Roe-Zurz, L. Vuong, L. Kelly, C. M. Ho, R. M. Robbins, U. Pieper, J. D. O'Connell, III, L. J. Miercke, K. M. Giacomini, A. Sali, and R. M. Stroud.** 2009. Selecting optimum eukaryotic integral membrane proteins for structure determination by rapid expression and solubilization screening. *J. Mol. Biol.* **385**:820-830.
149. **Li, Y., A. Z. Kijac, S. G. Sligar, and C. M. Rienstra.** 2006. Structural analysis of nanoscale self-assembled discoidal lipid bilayers by solid-state NMR spectroscopy. *Biophys. J.* **91**:3819-3828.
150. **Liang, B. and L. K. Tamm.** 2007. Structure of outer membrane protein G by solution NMR spectroscopy. *Proc. Natl. Acad. Sci. U. S. A* **104**:16140-16145.
151. **Linares, D. M., E. R. Geertsma, and B. Poolman.** 2010. Evolved *Lactococcus lactis* strains for enhanced expression of recombinant membrane proteins, *In* .
152. **Link, A. J., G. Skretas, E. M. Strauch, N. S. Chari, and G. Georgiou.** 2008. Efficient production of membrane-integrated and detergent-soluble G protein-coupled receptors in *Escherichia coli*. *Protein Sci.* **17**:1857-1863.
153. **Liu, Q., M. Z. Li, D. Leibham, D. Cortez, and S. J. Elledge.** 1998. The univector plasmid-fusion system, a method for rapid construction of recombinant DNA without restriction enzymes. *Curr. Biol.* **8**:1300-1309.
154. **Llull, D. and I. Poquet.** 2004. New expression system tightly controlled by zinc availability in *Lactococcus lactis*. *Appl. Environ. Microbiol.* **70**:5398-5406.

155. **Locher, K. P., A. T. Lee, and D. C. Rees.** 2002. The E. coli BtuCD structure: a framework for ABC transporter architecture and mechanism. *Science* **296**:1091-1098.
156. **Long, A. D., H. J. Mangalam, B. Y. Chan, L. Toller, G. W. Hatfield, and P. Baldi.** 2001. Improved statistical inference from DNA microarray data using analysis of variance and a Bayesian statistical framework. *Analysis of global gene expression in Escherichia coli K12. J. Biol. Chem.* **276**:19937-19944.
157. **Luckow, V. A.** 1993. Baculovirus systems for the expression of human gene products. *Curr. Opin. Biotechnol.* **4**:564-572.
158. **Luckow, V. A., S. C. Lee, G. F. Barry, and P. O. Olins.** 1993. Efficient generation of infectious recombinant baculoviruses by site-specific transposon-mediated insertion of foreign genes into a baculovirus genome propagated in *Escherichia coli*. *J. Virol.* **67**:4566-4579.
159. **Luecke, H., H. T. Richter, and J. K. Lanyi.** 1998. Proton transfer pathways in bacteriorhodopsin at 2.3 angstrom resolution. *Science* **280**:1934-1937.
160. **Lundstrom, K.** 2007. Structural genomics and drug discovery. *J. Cell Mol. Med.* **11**:224-238.
161. **Macfarlane, D. E.** 1983. Use of benzyldimethyl-n-hexadecylammonium chloride ("16-BAC"), a cationic detergent, in an acidic polyacrylamide gel electrophoresis system to detect base labile protein methylation in intact cells. *Anal. Biochem.* **132**:231-235.
162. **Madin, K., T. Sawasaki, T. Ogasawara, and Y. Endo.** 2000. A highly efficient and robust cell-free protein synthesis system prepared from wheat embryos: plants apparently contain a suicide system directed at ribosomes. *Proc. Natl. Acad. Sci. U. S. A* **97**:559-564.
163. **Magnani, F., Y. Shibata, M. J. Serrano-Vega, and C. G. Tate.** 2008. Co-evolving stability and conformational homogeneity of the human adenosine A2a receptor. *Proc. Natl. Acad. Sci. U. S. A* **105**:10744-10749.
164. **Mahmood, N. A., E. Biemans-Oldenhinkel, and B. Poolman.** 2009. Engineering of ion sensing by the cystathionine beta-synthase module of the ABC transporter OpuA. *J. Biol. Chem.* **284**:14368-14376.
165. **Maliga, P.** 2002. Engineering the plastid genome of higher plants. *Curr. Opin. Plant Biol.* **5**:164-172.
166. **Mancia, F. and W. A. Hendrickson.** 2007. Expression of recombinant G-protein coupled receptors for structural biology. *Mol. Biosyst.* **3**:723-734.
167. **Mancia, F., S. D. Patel, M. W. Rajala, P. E. Scherer, A. Nemes, I. Schieren, W. A. Hendrickson, and L. Shapiro.** 2004. Optimization of protein production

- in mammalian cells with a coexpressed fluorescent marker. *Structure*. **12**:1355-1360.
168. **Mann, M., P. Hojrup, and P. Roepstorff**. 1993. Use of mass spectrometric molecular weight information to identify proteins in sequence databases. *Biol. Mass Spectrom.* **22**:338-345.
169. **Marnell, L. L. and D. F. Summers**. 1984. Characterization of the phosphorylated small enzyme subunit, NS, of the vesicular stomatitis virus RNA polymerase. *J. Biol. Chem.* **259**:13518-13524.
170. **Marreddy, R. K., J. P. Pinto, J. C. Wolters, E. R. Geertsma, F. Fusetti, H. Permentier, J. Kok, and B. Poolman**. 2010. **The response of *Lactococcus lactis* to membrane protein production**, *In* .
171. **Marreddy, R. K. R., E. R. Geertsma, H. P. Permentier, J. P. C. Pinto, J. Kok, and B. Poolman**. 2010. Amino Acid Accumulation Limits the Overexpression of Proteins in *Lactococcus lactis*. *PLoS ONE* **5**:e10317.
172. **Martinez, B., A. L. Zomer, A. Rodriguez, J. Kok, and O. P. Kuipers**. 2007. Cell envelope stress induced by the bacteriocin Lcn972 is sensed by the Lactococcal two-component system CesSR. *Mol. Microbiol.* **64**:473-486.
173. **Masi, M., J. M. Pages, and E. Pradel**. 2003. Overexpression and purification of the three components of the *Enterobacter aerogenes* AcrA-AcrB-TolC multidrug efflux pump. *J. Chromatogr. B Analyt. Technol. Biomed. Life Sci.* **786**:197-205.
174. **Mason, H. S., D. M. Lam, and C. J. Arntzen**. 1992. Expression of hepatitis B surface antigen in transgenic plants. *Proc. Natl. Acad. Sci. U. S. A* **89**:11745-11749.
175. **Massey-Gendel, E., A. Zhao, G. Boulting, H. Y. Kim, M. A. Balamotis, L. M. Seligman, R. K. Nakamoto, and J. U. Bowie**. 2009. Genetic selection system for improving recombinant membrane protein expression in *E. coli*. *Protein Sci.* **18**:372-383.
176. **Mierau, I. and M. Kleerebezem**. 2005. 10 years of the nisin-controlled gene expression system (NICE) in *Lactococcus lactis*. *Appl. Microbiol. Biotechnol.* **68**:705-717.
177. **Miroux, B. and J. E. Walker**. 1996. Over-production of proteins in *Escherichia coli*: mutant hosts that allow synthesis of some membrane proteins and globular proteins at high levels. *J. Mol. Biol.* **260**:289-298.
178. **Miyoshi, A., E. Jamet, J. Commissaire, P. Renault, P. Langella, and V. Azevedo**. 2004. A xylose-inducible expression system for *Lactococcus lactis*. *FEMS Microbiol. Lett.* **239**:205-212.

179. **Monne, M., K. W. Chan, D. J. Slotboom, and E. R. Kunji.** 2005. Functional expression of eukaryotic membrane proteins in *Lactococcus lactis*. *Protein Sci.* **14**:3048-3056.
180. **Moore, M., M. S. Harrison, E. C. Peterson, and R. Henry.** 2000. Chloroplast Oxa1p homolog *albino3* is required for post-translational integration of the light harvesting chlorophyll-binding protein into thylakoid membranes. *J. Biol. Chem.* **275**:1529-1532.
181. **Morello, E., L. G. Bermudez-Humaran, D. Llull, V. Sole, N. Miraglio, P. Langella, and I. Poquet.** 2008. *Lactococcus lactis*, an efficient cell factory for recombinant protein production and secretion. *J. Mol. Microbiol. Biotechnol.* **14**:48-58.
182. **Morth, J. P., B. P. Pedersen, M. S. Toustrup-Jensen, T. L. Sorensen, J. Petersen, J. P. Andersen, B. Vilsen, and P. Nissen.** 2007. Crystal structure of the sodium-potassium pump. *Nature* **450**:1043-1049.
183. **Mulligan, C., E. R. Geertsma, E. Severi, D. J. Kelly, B. Poolman, and G. H. Thomas.** 2009. The substrate-binding protein imposes directionality on an electrochemical sodium gradient-driven TRAP transporter. *Proc. Natl. Acad. Sci. U. S. A* **106**:1778-1783.
184. **Murata, K., K. Mitsuoka, T. Hirai, T. Walz, P. Agre, J. B. Heymann, A. Engel, and Y. Fujiyoshi.** 2000. Structural determinants of water permeation through aquaporin-1. *Nature* **407**:599-605.
185. **Nagamori, S., I. N. Smirnova, and H. R. Kaback.** 2004. Role of YidC in folding of polytopic membrane proteins. *J. Cell Biol.* **165**:53-62.
186. **Newbury, S. F., N. H. Smith, E. C. Robinson, I. D. Hiles, and C. F. Higgins.** 1987. Stabilization of translationally active mRNA by prokaryotic REP sequences. *Cell* **48**:297-310.
187. **Newman, A.** 1998. RNA splicing. *Curr. Biol.* **8**:R903-R905.
188. **Newstead, S., H. Kim, H. G. von, S. Iwata, and D. Drew.** 2007. High-throughput fluorescent-based optimization of eukaryotic membrane protein overexpression and purification in *Saccharomyces cerevisiae*. *Proc. Natl. Acad. Sci. U. S. A* **104**:13936-13941.
189. **Ng, D. T., J. D. Brown, and P. Walter.** 1996. Signal sequences specify the targeting route to the endoplasmic reticulum membrane. *J. Cell Biol.* **134**:269-278.
190. **Ngo, J. T., J. A. Champion, A. Mahdavi, I. C. Tanrikulu, K. E. Beatty, R. E. Connor, T. H. Yoo, D. C. Dieterich, E. M. Schuman, and D. A. Tirrell.** 2009. Cell-selective metabolic labeling of proteins. *Nat. Chem. Biol.* **5**:715-717.

191. **Nie, L., G. Wu, and W. Zhang.** 2006. Correlation between mRNA and protein abundance in *Desulfovibrio vulgaris*: a multiple regression to identify sources of variations. *Biochem. Biophys. Res. Commun.* **339**:603-610.
192. **Niebauer, R. T., A. Wedekind, and A. S. Robinson.** 2004. Decreases in yeast expression yields of the human adenosine A2a receptor are a result of translational or post-translational events. *Protein Expr. Purif.* **37**:134-143.
193. **Nishida, M., M. Cadene, B. T. Chait, and R. MacKinnon.** 2007. Crystal structure of a Kir3.1-prokaryotic Kir channel chimera. *EMBO J.* **26**:4005-4015.
194. **Niu, Y., J. Kong, and Y. Xu.** 2008. A novel GFP-fused eukaryotic membrane protein expression system in *Lactococcus lactis* and its application to overexpression of an Elongase. *Curr. Microbiol.* **57**:423-428.
195. **Nolan, T., R. E. Hands, and S. A. Bustin.** 2006. Quantification of mRNA using real-time RT-PCR. *Nat. Protoc.* **1**:1559-1582.
196. **Nomura, S. M., S. Kondoh, W. Asayama, A. Asada, S. Nishikawa, and K. Akiyoshi.** 2008. Direct preparation of giant proteo-liposomes by in vitro membrane protein synthesis. *J. Biotechnol.* **133**:190-195.
197. **Nozawa, A., H. Nanamiya, T. Miyata, N. Linka, Y. Endo, A. P. Weber, and Y. Tozawa.** 2007. A cell-free translation and proteoliposome reconstitution system for functional analysis of plant solute transporters. *Plant Cell Physiol* **48**:1815-1820.
198. **O'Farrell, P. H.** 1975. High resolution two-dimensional electrophoresis of proteins. *J. Biol. Chem.* **250**:4007-4021.
199. **O'Farrell, P. Z., H. M. Goodman, and P. H. O'Farrell.** 1977. High resolution two-dimensional electrophoresis of basic as well as acidic proteins. *Cell* **12**:1133-1141.
200. **Olesen, C., M. Picard, A. M. Winther, C. Gyruup, J. P. Morth, C. Oxvig, J. V. Moller, and P. Nissen.** 2007. The structural basis of calcium transport by the calcium pump. *Nature* **450**:1036-1042.
201. **Ong, S. E., B. Blagoev, I. Kratchmarova, D. B. Kristensen, H. Steen, A. Pandey, and M. Mann.** 2002. Stable isotope labeling by amino acids in cell culture, SILAC, as a simple and accurate approach to expression proteomics. *Mol. Cell Proteomics.* **1**:376-386.
202. **Opekarova, M. and W. Tanner.** 2003. Specific lipid requirements of membrane proteins--a putative bottleneck in heterologous expression. *Biochim. Biophys. Acta* **1610**:11-22.
203. **Osterberg, M., H. Kim, J. Warringer, K. Melen, A. Blomberg, and H. G. von.** 2006. Phenotypic effects of membrane protein overexpression in *Saccharomyces cerevisiae*. *Proc. Natl. Acad. Sci. U. S. A* **103**:11148-11153.

204. **Palanivelu, D. V., D. E. Kozono, A. Engel, K. Suda, A. Lustig, P. Agre, and T. Schirmer.** 2006. Co-axial association of recombinant eye lens aquaporin-0 observed in loosely packed 3D crystals. *J. Mol. Biol.* **355**:605-611.
205. **Palczewski, K., T. Kumasaka, T. Hori, C. A. Behnke, H. Motoshima, B. A. Fox, T. Le, I. D. C. Teller, T. Okada, R. E. Stenkamp, M. Yamamoto, and M. Miyano.** 2000. Crystal structure of rhodopsin: A G protein-coupled receptor. *Science* **289**:739-745.
206. **Pappin, D. J., P. Hojrup, and A. J. Bleasby.** 1993. Rapid identification of proteins by peptide-mass fingerprinting. *Curr. Biol.* **3**:327-332.
207. **Patton, W. F.** 2000. A thousand points of light: the application of fluorescence detection technologies to two-dimensional gel electrophoresis and proteomics. *Electrophoresis* **21**:1123-1144.
208. **Patton, W. F.** 2002. Detection technologies in proteome analysis. *J. Chromatogr. B Analyt. Technol. Biomed. Life Sci.* **771**:3-31.
209. **Paulson, L., P. Martin, A. Persson, C. L. Nilsson, E. Ljung, A. Westman-Brinkmalm, P. S. Eriksson, K. Blennow, and P. Davidsson.** 2003. Comparative genome- and proteome analysis of cerebral cortex from MK-801-treated rats. *J. Neurosci. Res.* **71**:526-533.
210. **Pinto, J. P., O. P. Kuipers, R. K. Marreddy, B. Poolman, and J. Kok.** 2010. **Efficient overproduction of membrane proteins in *Lactococcus lactis* relies on the cell envelope stress sensor/regulator couple CesSR, *In* .**
211. **Poolman, B. and W. N. Konings.** 1988. Relation of growth of *Streptococcus lactis* and *Streptococcus cremoris* to amino acid transport. *J. Bacteriol.* **170**:700-707.
212. **Poolman, B., E. J. Smid, H. Veldkamp, and W. N. Konings.** 1987. Bioenergetic consequences of lactose starvation for continuously cultured *Streptococcus cremoris*. *J. Bacteriol.* **169**:1460-1468.
213. **Quick, M. and J. A. Javitch.** 2007. Monitoring the function of membrane transport proteins in detergent-solubilized form. *Proc. Natl. Acad. Sci. U. S. A* **104**:3603-3608.
214. **Quick, M. and E. M. Wright.** 2002. Employing *Escherichia coli* to functionally express, purify, and characterize a human transporter. *Proc. Natl. Acad. Sci. U. S. A* **99**:8597-8601.
215. **Rabilloud, T.** 2002. Two-dimensional gel electrophoresis in proteomics: old, old fashioned, but it still climbs up the mountains. *Proteomics.* **2**:3-10.
216. **Rabilloud, T., C. Adessi, A. Giraudel, and J. Lunardi.** 1997. Improvement of the solubilization of proteins in two-dimensional electrophoresis with immobilized pH gradients. *Electrophoresis* **18**:307-316.

217. **Rallu, F., A. Gruss, and E. Maguin.** 1996. *Lactococcus lactis* and stress. *Antonie Van Leeuwenhoek* **70**:243-251.
218. **Rapoport, T. A.** 2007. Protein translocation across the eukaryotic endoplasmic reticulum and bacterial plasma membranes. *Nature* **450**:663-669.
219. **Reuben, M., L. Rising, C. Prinz, S. Hersey, and G. Sachs.** 1994. Cloning and expression of the rabbit gastric CCK-A receptor. *Biochim. Biophys. Acta* **1219**:321-327.
220. **Righetti, P. G. and J. W. Drysdale.** 1973. Small-scale fractionation of proteins and nucleic acids by isoelectric focusing in polyacrylamide gels. *Ann. N. Y. Acad. Sci.* **209**:163-186.
221. **Roosild, T. P., J. Greenwald, M. Vega, S. Castronovo, R. Riek, and S. Choe.** 2005. NMR structure of Mistic, a membrane-integrating protein for membrane protein expression. *Science* **307**:1317-1321.
222. **Ross, P. L., Y. N. Huang, J. N. Marchese, B. Williamson, K. Parker, S. Hattan, N. Khainovski, S. Pillai, S. Dey, S. Daniels, S. Purkayastha, P. Juhász, S. Martin, M. Bartlett-Jones, F. He, A. Jacobson, and D. J. Pappin.** 2004. Multiplexed protein quantitation in *Saccharomyces cerevisiae* using amine-reactive isobaric tagging reagents. *Mol. Cell Proteomics.* **3**:1154-1169.
223. **Sakai, J., H. Ishikawa, S. Kojima, H. Satoh, S. Yamamoto, and M. Kanaoka.** 2003. Proteomic analysis of rat heart in ischemia and ischemia-reperfusion using fluorescence two-dimensional difference gel electrophoresis. *Proteomics.* **3**:1318-1324.
224. **Santoni, V., M. Molloy, and T. Rabilloud.** 2000. Membrane proteins and proteomics: un amour impossible? *Electrophoresis* **21**:1054-1070.
225. **Sarkar, C. A., I. Dodevski, M. Kenig, S. Dudli, A. Mohr, E. Hermans, and A. Pluckthun.** 2008. Directed evolution of a G protein-coupled receptor for expression, stability, and binding selectivity. *Proc. Natl. Acad. Sci. U. S. A* **105**:14808-14813.
226. **Savage, D. F., C. L. Anderson, Y. Robles-Colmenares, Z. E. Newby, and R. M. Stroud.** 2007. Cell-free complements in vivo expression of the *E. coli* membrane proteome. *Protein Sci.* **16**:966-976.
227. **Sawasaki, T., M. D. Gouda, T. Kawasaki, T. Tsuboi, Y. Tozawa, K. Takai, and Y. Endo.** 2005. The wheat germ cell-free expression system: methods for high-throughput materialization of genetic information. *Methods Mol. Biol.* **310**:131-144.
228. **Sawasaki, T., Y. Hasegawa, M. Tsuchimochi, N. Kamura, T. Ogasawara, T. Kuroita, and Y. Endo.** 2002. A bilayer cell-free protein synthesis system for high-throughput screening of gene products. *FEBS Lett.* **514**:102-105.

229. **Schahs, M., R. Strasser, J. Stadlmann, R. Kunert, T. Rademacher, and H. Steinkellner.** 2007. Production of a monoclonal antibody in plants with a humanized N-glycosylation pattern. *Plant Biotechnol. J.* **5**:657-663.
230. **Schena, M., D. Shalon, R. W. Davis, and P. O. Brown.** 1995. Quantitative monitoring of gene expression patterns with a complementary DNA microarray. *Science* **270**:467-470.
231. **Schlame, M.** 2008. Cardiolipin synthesis for the assembly of bacterial and mitochondrial membranes. *J. Lipid Res.* **49**:1607-1620.
232. **Schumann, W.** 2007. Production of recombinant proteins in *Bacillus subtilis*. *Adv. Appl. Microbiol.* **62**:137-189.
233. **Schunemann, D.** 2004. Structure and function of the chloroplast signal recognition particle. *Curr. Genet.* **44**:295-304.
234. **Schurmann, A., I. Monden, H. G. Joost, and K. Keller.** 1992. Subcellular distribution and activity of glucose transporter isoforms GLUT1 and GLUT4 transiently expressed in COS-7 cells. *Biochim. Biophys. Acta* **1131**:245-252.
235. **Schwarz, D., F. Junge, F. Durst, N. Frolich, B. Schneider, S. Reckel, S. Sobhanifar, V. Dotsch, and F. Bernhard.** 2007. Preparative scale expression of membrane proteins in *Escherichia coli*-based continuous exchange cell-free systems. *Nat. Protoc.* **2**:2945-2957.
236. **Scotti, P. A., M. L. Urbanus, J. Brunner, J. W. de Gier, H. G. von, van der Does C., A. J. Driessen, B. Oudega, and J. Luirink.** 2000. YidC, the *Escherichia coli* homologue of mitochondrial Oxa1p, is a component of the Sec translocase. *EMBO J.* **19**:542-549.
237. **Serek, J., G. Bauer-Manz, G. Struhalla, L. van den Berg, D. Kiefer, R. Dalbey, and A. Kuhn.** 2004. *Escherichia coli* YidC is a membrane insertase for Sec-independent proteins. *EMBO J.* **23**:294-301.
238. **Serrano-Vega, M. J., F. Magnani, Y. Shibata, and C. G. Tate.** 2008. Conformational thermostabilization of the beta1-adrenergic receptor in a detergent-resistant form. *Proc. Natl. Acad. Sci. U. S. A* **105**:877-882.
239. **Shukla, A. K., W. Haase, C. Reinhart, and H. Michel.** 2007. Heterologous expression and characterization of the recombinant bradykinin B2 receptor using the methylotrophic yeast *Pichia pastoris*. *Protein Expr. Purif.* **55**:1-8.
240. **Simon, D. and A. Chopin.** 1988. Construction of a vector plasmid family and its use for molecular cloning in *Streptococcus lactis*. *Biochimie* **70**:559-566.
241. **Skyner, H. A., T. W. Rosahl, M. R. Knowles, K. Salim, L. Reid, R. Cothliff, G. McAllister, and P. C. Guest.** 2002. Alterations of stress related proteins in genetically altered mice revealed by two-dimensional differential in-gel electrophoresis analysis. *Proteomics.* **2**:1018-1025.

242. **Smejkal, G. B., M. H. Robinson, and A. Lazarev.** 2004. Comparison of fluorescent stains: relative photostability and differential staining of proteins in two-dimensional gels. *Electrophoresis* **25**:2511-2519.
243. **Sobolevsky, A. I., M. P. Rosconi, and E. Gouaux.** 2009. X-ray structure, symmetry and mechanism of an AMPA-subtype glutamate receptor. *Nature* **462**:745-756.
244. **Sokolova, O., L. Kolmakova-Partensky, and N. Grigorieff.** 2001. Three-dimensional structure of a voltage-gated potassium channel at 2.5 nm resolution. *Structure*. **9**:215-220.
245. **Solem, C., E. Defoor, P. R. Jensen, and J. Martinussen.** 2008. Plasmid pCS1966, a new selection/counterscreening tool for lactic acid bacterium strain construction based on the *oroP* gene, encoding an orotate transporter from *Lactococcus lactis*. *Appl. Environ. Microbiol.* **74**:4772-4775.
246. **Sommer, A. and R. R. Traut.** 1974. Diagonal polyacrylamide-dodecyl sulfate gel electrophoresis for the identification of ribosomal proteins crosslinked with methyl-4-mercaptobutyrimidate. *Proc. Natl. Acad. Sci. U. S. A* **71**:3946-3950.
247. **Sorensen, H. P., H. U. Sperling-Petersen, and K. K. Mortensen.** 2003. Production of recombinant thermostable proteins expressed in *Escherichia coli*: completion of protein synthesis is the bottleneck. *J. Chromatogr. B Analyt. Technol. Biomed. Life Sci.* **786**:207-214.
248. **Spelbrink, R. E., A. Kolkman, M. Slijper, J. A. Killian, and B. de Kruijff.** 2005. Detection and identification of stable oligomeric protein complexes in *Escherichia coli* inner membranes: a proteomics approach. *J. Biol. Chem.* **280**:28742-28748.
249. **Sreekrishna, K., R. G. Brankamp, K. E. Kropp, D. T. Blankenship, J. T. Tsay, P. L. Smith, J. D. Wierschke, A. Subramaniam, and L. A. Birkenberger.** 1997. Strategies for optimal synthesis and secretion of heterologous proteins in the methylotrophic yeast *Pichia pastoris*. *Gene* **190**:55-62.
250. **Standfuss, J., G. Xie, P. C. Edwards, M. Burghammer, D. D. Oprian, and G. F. Schertler.** 2007. Crystal structure of a thermally stable rhodopsin mutant. *J. Mol. Biol.* **372**:1179-1188.
251. **Steen, A., E. Wiederhold, T. Gandhi, R. Breitling, and D. J. Slotboom.** 2010. Physiological adaptation of the bacterium *Lactococcus lactis* in response to the production of human CFTR. *Mol. Cell Proteomics*.
252. **Stierum, R., M. Gaspari, Y. Dommels, T. Ouatas, H. Pluk, S. Jespersen, J. Vogels, K. Verhoeckx, J. Groten, and B. van Ommen.** 2003. Proteome analysis reveals novel proteins associated with proliferation and differentiation of the colorectal cancer cell line Caco-2. *Biochim. Biophys. Acta* **1650**:73-91.

253. **Stock, D., A. G. Leslie, and J. E. Walker.** 1999. Molecular architecture of the rotary motor in ATP synthase. *Science* **286**:1700-1705.
254. **Streatfield, S. J.** 2007. Approaches to achieve high-level heterologous protein production in plants. *Plant Biotechnol. J.* **5**:2-15.
255. **Sturn, A., J. Quackenbush, and Z. Trajanoski.** 2002. Genesis: cluster analysis of microarray data. *Bioinformatics.* **18**:207-208.
256. **Summers, M. D.** 2006. Milestones leading to the genetic engineering of baculoviruses as expression vector systems and viral pesticides. *Adv. Virus Res.* **68**:3-73.
257. **Surade, S., M. Klein, P. C. Stolt-Bergner, C. Muenke, A. Roy, and H. Michel.** 2006. Comparative analysis and "expression space" coverage of the production of prokaryotic membrane proteins for structural genomics. *Protein Sci.* **15**:2178-2189.
258. **Tackaberry, E. S., A. K. Dudani, F. Prior, M. Tocchi, R. Sardana, I. Altosaar, and P. R. Ganz.** 1999. Development of biopharmaceuticals in plant expression systems: cloning, expression and immunological reactivity of human cytomegalovirus glycoprotein B (UL55) in seeds of transgenic tobacco. *Vaccine* **17**:3020-3029.
259. **Takegawa, K., H. Tohda, M. Sasaki, A. Idiris, T. Ohashi, H. Mukaiyama, Y. Giga-Hama, and H. Kumagai.** 2009. Production of heterologous proteins using the fission-yeast (*Schizosaccharomyces pombe*) expression system. *Biotechnol. Appl. Biochem.* **53**:227-235.
260. **Tannu, N. S. and S. E. Hemby.** 2006. Two-dimensional fluorescence difference gel electrophoresis for comparative proteomics profiling. *Nat. Protoc.* **1**:1732-1742.
261. **Tate, C. G.** 2001. Overexpression of mammalian integral membrane proteins for structural studies. *FEBS Lett.* **504**:94-98.
262. **Tate, C. G. and R. Grisshammer.** 1996. Heterologous expression of G-protein-coupled receptors. *Trends Biotechnol.* **14**:426-430.
263. **Tate, C. G., J. Haase, C. Baker, M. Boorsma, F. Magnani, Y. Vallis, and D. C. Williams.** 2003. Comparison of seven different heterologous protein expression systems for the production of the serotonin transporter. *Biochim. Biophys. Acta* **1610**:141-153.
264. **Tate, C. G., E. Whiteley, and M. J. Betenbaugh.** 1999. Molecular chaperones stimulate the functional expression of the cocaine-sensitive serotonin transporter. *J. Biol. Chem.* **274**:17551-17558.
265. **Tatusov, R. L., N. D. Fedorova, J. D. Jackson, A. R. Jacobs, B. Kiryutin, E. V. Koonin, D. M. Krylov, R. Mazumder, S. L. Mekhedov, A. N. Nikolskaya,**

- B. S. Rao, S. Smirnov, A. V. Sverdlov, S. Vasudevan, Y. I. Wolf, J. J. Yin, and D. A. Natale.** 2003. The COG database: an updated version includes eukaryotes. *BMC. Bioinformatics.* **4**:41.
266. **Tatusov, R. L., E. V. Koonin, and D. J. Lipman.** 1997. A genomic perspective on protein families. *Science* **278**:631-637.
267. **Terpe, K.** 2006. Overview of bacterial expression systems for heterologous protein production: from molecular and biochemical fundamentals to commercial systems. *Appl. Microbiol. Biotechnol.* **72**:211-222.
268. **Terzaghi, B. E. and W. E. Sandine.** 1975. Improved Medium for Lactic Streptococci and Their Bacteriophages. *Appl. Microbiol.* **29**:807-813.
269. **Thuy Le, A. T. and W. Schumann.** 2007. A novel cold-inducible expression system for *Bacillus subtilis*. *Protein Expr. Purif.* **53**:264-269.
270. **Tolia, N. H. and L. Joshua-Tor.** 2006. Strategies for protein coexpression in *Escherichia coli*. *Nat. Methods* **3**:55-64.
271. **Toman, P. D., G. Chisholm, H. McMullin, L. M. Giere, D. R. Olsen, R. J. Kovach, S. D. Leigh, B. E. Fong, R. Chang, G. A. Daniels, R. A. Berg, and R. A. Hitzeman.** 2000. Production of recombinant human type I procollagen trimers using a four-gene expression system in the yeast *Saccharomyces cerevisiae*. *J. Biol. Chem.* **275**:23303-23309.
272. **Tonge, R., J. Shaw, B. Middleton, R. Rowlinson, S. Rayner, J. Young, F. Pognan, E. Hawkins, I. Currie, and M. Davison.** 2001. Validation and development of fluorescence two-dimensional differential gel electrophoresis proteomics technology. *Proteomics.* **1**:377-396.
273. **Torizawa, T., M. Shimizu, M. Taoka, H. Miyano, and M. Kainosho.** 2004. Efficient production of isotopically labeled proteins by cell-free synthesis: a practical protocol. *J. Biomol. NMR* **30**:311-325.
274. **Trometer, C. and P. Falson.** 2010. Mammalian membrane protein expression in baculovirus-infected insect cells. *Methods Mol. Biol.* **601**:105-117.
275. **Turner, G. J., L. J. Miercke, A. K. Mitra, R. M. Stroud, M. C. Betlach, and A. Winter-Vann.** 1999. Expression, purification, and structural characterization of the bacteriorhodopsin-aspartyl transcarbamylase fusion protein. *Protein Expr. Purif.* **17**:324-338.
276. **Ulrich, C. D., I. Ferber, E. Holicky, E. Hadac, G. Buell, and L. J. Miller.** 1993. Molecular cloning and functional expression of the human gallbladder cholecystokinin A receptor. *Biochem. Biophys. Res. Commun.* **193**:204-211.
277. **Unger, V. M., N. M. Kumar, N. B. Gilula, and M. Yeager.** 1999. Three-dimensional structure of a recombinant gap junction membrane channel. *Science* **283**:1176-1180.

278. **Unlu, M., M. E. Morgan, and J. S. Minden.** 1997. Difference gel electrophoresis: a single gel method for detecting changes in protein extracts. *Electrophoresis* **18**:2071-2077.
279. **Unwin, R. D., C. A. Evans, and A. D. Whetton.** 2006. Relative quantification in proteomics: new approaches for biochemistry. *Trends Biochem. Sci.* **31**:473-484.
280. **van Asseldonk M., A. Simons, H. Visser, W. M. de Vos, and G. Simons.** 1993. Cloning, nucleotide sequence, and regulatory analysis of the *Lactococcus lactis* dnaJ gene. *J. Bacteriol.* **175**:1637-1644.
281. **Van den Berg, G., S. Clerens, F. Vandesande, and L. Arckens.** 2003. Reversed-phase high-performance liquid chromatography prefractionation prior to two-dimensional difference gel electrophoresis and mass spectrometry identifies new differentially expressed proteins between striate cortex of kitten and adult cat. *Electrophoresis* **24**:1471-1481.
282. **van der Heide T. and B. Poolman.** 2000. Osmoregulated ABC-transport system of *Lactococcus lactis* senses water stress via changes in the physical state of the membrane. *Proc. Natl. Acad. Sci. U. S. A* **97**:7102-7106.
283. **van der Laan, M., P. Bechtluft, S. Kol, N. Nouwen, and A. J. Driessen.** 2004. F1F0 ATP synthase subunit c is a substrate of the novel YidC pathway for membrane protein biogenesis. *J. Cell Biol.* **165**:213-222.
284. **van der Vossen, J. M., D. van der Lelie, and G. Venema.** 1987. Isolation and characterization of *Streptococcus cremoris* Wg2-specific promoters. *Appl. Environ. Microbiol.* **53**:2452-2457.
285. **van der Heide. T. and B. Poolman.** 2000. Osmoregulated ABC-transport system of *Lactococcus lactis* senses water stress via changes in the physical state of the membrane. *Proc. Natl. Acad. Sci. U. S. A* **97**:7102-7106.
286. **van Hijum, S. A., A. de Jong, R. J. Baerends, H. A. Karsens, N. E. Kramer, R. Larsen, C. D. den Hengst, C. J. Albers, J. Kok, and O. P. Kuipers.** 2005. A generally applicable validation scheme for the assessment of factors involved in reproducibility and quality of DNA-microarray data. *BMC. Genomics* **6**:77.
287. **van Hijum, S. A., A. de Jong, G. Buist, J. Kok, and O. P. Kuipers.** 2003. UniFrag and GenomePrimer: selection of primers for genome-wide production of unique amplicons. *Bioinformatics.* **19**:1580-1582.
288. **van Bloois. E., H. L. Dekker, L. Froderberg, E. N. Houben, M. L. Urbanus, C. G. de Koster, J. W. de Gier, and J. Luirink.** 2008. Detection of cross-links between FtsH, YidC, HflK/C suggests a linked role for these proteins in quality control upon insertion of bacterial inner membrane proteins. *FEBS Lett.* **582**:1419-1424.

289. **Varmanen, P., H. Ingmer, and F. K. Vogensen.** 2000. *ctsR* of *Lactococcus lactis* encodes a negative regulator of *clp* gene expression. *Microbiology* **146 (Pt 6)**:1447-1455.
290. **Veiga, P., C. Bulbarela-Sampieri, S. Furlan, A. Maisons, M. P. Chapot-Chartier, M. Erkelenz, P. Mervelet, P. Noirot, D. Frees, O. P. Kuipers, J. Kok, A. Gruss, G. Buist, and S. Kulakauskas.** 2007. SpxB regulates O-acetylation-dependent resistance of *Lactococcus lactis* peptidoglycan to hydrolysis. *J. Biol. Chem.* **282**:19342-19354.
291. **Velculescu, V. E., L. Zhang, B. Vogelstein, and K. W. Kinzler.** 1995. Serial analysis of gene expression. *Science* **270**:484-487.
292. **Viswanathan, S., M. Unlu, and J. S. Minden.** 2006. Two-dimensional difference gel electrophoresis. *Nat. Protoc.* **1**:1351-1358.
293. **Voet-van-Vormizeele, J. and G. Groth.** 2003. High-level expression of the *Arabidopsis thaliana* ethylene receptor protein ETR1 in *Escherichia coli* and purification of the recombinant protein. *Protein Expr. Purif.* **32**:89-94.
294. **Voss, T., E. Ergulen, H. Ahorn, V. Kubelka, K. Sugiyama, I. Maurer-Fogy, and J. Glossl.** 1993. Expression of human interferon omega 1 in Sf9 cells. No evidence for complex-type N-linked glycosylation or sialylation. *Eur. J. Biochem.* **217**:913-919.
295. **Wagner, S., L. Baars, A. J. Ytterberg, A. Klussmeier, C. S. Wagner, O. Nord, P. A. Nygren, K. J. van Wijk, and J. W. de Gier.** 2007. Consequences of membrane protein overexpression in *Escherichia coli*. *Mol. Cell Proteomics.* **6**:1527-1550.
296. **Wagner, S., M. L. Bader, D. Drew, and J. W. de Gier.** 2006. Rationalizing membrane protein overexpression. *Trends Biotechnol.* **24**:364-371.
297. **Wagner, S., M. M. Klepsch, S. Schlegel, A. Appel, R. Draheim, M. Tarry, M. Högbon, K. J. van Wijk, D. J. Slotboom, J. O. Persson, and J. W. de Gier.** 2008. Tuning *Escherichia coli* for membrane protein overexpression. *Proc. Natl. Acad. Sci. U. S. A* **105**:14371-14376.
298. **Wagner, S., O. I. Pop, G. J. Haan, L. Baars, G. Koningstein, M. M. Klepsch, P. Genevaux, J. Luirink, and J. W. de Gier.** 2008. Biogenesis of MalF and the MalFGK(2) maltose transport complex in *Escherichia coli* requires YidC. *J. Biol. Chem.* **283**:17881-17890.
299. **Waldo, G. S., B. M. Standish, J. Berendzen, and T. C. Terwilliger.** 1999. Rapid protein-folding assay using green fluorescent protein. *Nat. Biotechnol.* **17**:691-695.
300. **Walhout, A. J., G. F. Temple, M. A. Brasch, J. L. Hartley, M. A. Lorson, S. van den Heuvel, and M. Vidal.** 2000. GATEWAY recombinational cloning:

- application to the cloning of large numbers of open reading frames or ORFeomes. *Methods Enzymol.* **328**:575-592.
301. **Wallin, E. and H. G. von.** 1998. Genome-wide analysis of integral membrane proteins from eubacterial, archaean, and eukaryotic organisms. *Protein Sci.* **7**:1029-1038.
 302. **Walravens, K., J. P. Matheise, I. Knott, P. Coppe, A. Collard, C. Didembourg, F. Dessy, R. Kettmann, and J. J. Letesson.** 1996. Immunological response of mice to the bovine respiratory syncytial virus fusion glycoprotein expressed in recombinant baculovirus infected insect cells. *Arch. Virol.* **141**:2313-2326.
 303. **Walter, P., I. Ibrahimi, and G. Blobel.** 1981. Translocation of proteins across the endoplasmic reticulum. I. Signal recognition protein (SRP) binds to in-vitro-assembled polysomes synthesizing secretory protein. *J. Cell Biol.* **91**:545-550.
 304. **Warne, T., M. J. Serrano-Vega, J. G. Baker, R. Moukhametzianov, P. C. Edwards, R. Henderson, A. G. Leslie, C. G. Tate, and G. F. Schertler.** 2008. Structure of a beta1-adrenergic G-protein-coupled receptor. *Nature* **454**:486-491.
 305. **Washburn, M. P., D. Wolters, and J. R. Yates, III.** 2001. Large-scale analysis of the yeast proteome by multidimensional protein identification technology. *Nat. Biotechnol.* **19**:242-247.
 306. **Wegmann, U., M. O'Connell-Motherway, A. Zomer, G. Buist, C. Shearman, C. Canchaya, M. Ventura, A. Goesmann, M. J. Gasson, O. P. Kuipers, D. van Sinderen, and J. Kok.** 2007. Complete genome sequence of the prototype lactic acid bacterium *Lactococcus lactis* subsp. *cremoris* MG1363. *J. Bacteriol.* **189**:3256-3270.
 307. **Wei, J., J. Sun, W. Yu, A. Jones, P. Oeller, M. Keller, G. Woodnutt, and J. M. Short.** 2005. Global proteome discovery using an online three-dimensional LC-MS/MS. *J. Proteome. Res.* **4**:801-808.
 308. **Weinshank, R. L., J. M. Zgombick, M. J. Macchi, T. A. Branchek, and P. R. Hartig.** 1992. Human serotonin 1D receptor is encoded by a subfamily of two distinct genes: 5-HT1D alpha and 5-HT1D beta. *Proc. Natl. Acad. Sci. U. S. A* **89**:3630-3634.
 309. **Weiss, H. M., W. Haase, H. Michel, and H. Reilander.** 1995. Expression of functional mouse 5-HT5A serotonin receptor in the methylotrophic yeast *Pichia pastoris*: pharmacological characterization and localization. *FEBS Lett.* **377**:451-456.
 310. **Weiss, H. M., W. Haase, and H. Reilander.** 1998. Expression of an integral membrane protein, the 5HT5A receptor. *Methods Mol. Biol.* **103**:227-239.

311. **White, M. A., K. M. Clark, E. J. Grayhack, and M. E. Dumont.** 2007. Characteristics affecting expression and solubilization of yeast membrane proteins. *J. Mol. Biol.* **365**:621-636.
312. **White, S. H.** 2009. Biophysical dissection of membrane proteins. *Nature* **459**:344-346.
313. **Wilm, M., A. Shevchenko, T. Houthaeve, S. Breit, L. Schweigerer, T. Fotsis, and M. Mann.** 1996. Femtomole sequencing of proteins from polyacrylamide gels by nano-electrospray mass spectrometry. *Nature* **379**:466-469.
314. **Wittig, I., H. P. Braun, and H. Schagger.** 2006. Blue native PAGE. *Nat. Protoc.* **1**:418-428.
315. **Wittig, I., M. Karas, and H. Schagger.** 2007. High resolution clear native electrophoresis for in-gel functional assays and fluorescence studies of membrane protein complexes. *Mol. Cell Proteomics.* **6**:1215-1225.
316. **Wu, S. L., G. Choudhary, M. Ramstrom, J. Bergquist, and W. S. Hancock.** 2003. Evaluation of shotgun sequencing for proteomic analysis of human plasma using HPLC coupled with either ion trap or Fourier transform mass spectrometry. *J. Proteome. Res.* **2**:383-393.
317. **Xia, D., C. A. Yu, H. Kim, J. Z. Xia, A. M. Kachurin, L. Zhang, L. Yu, and J. Deisenhofer.** 1997. Crystal structure of the cytochrome bc₁ complex from bovine heart mitochondria. *Science* **277**:60-66.
318. **Yan, J. X., A. T. Devenish, R. Wait, T. Stone, S. Lewis, and S. Fowler.** 2002. Fluorescence two-dimensional difference gel electrophoresis and mass spectrometry based proteomic analysis of *Escherichia coli*. *Proteomics.* **2**:1682-1698.
319. **Yan, J. X., J. C. Sanchez, V. Rouge, K. L. Williams, and D. F. Hochstrasser.** 1999. Modified immobilized pH gradient gel strip equilibration procedure in SWISS-2DPAGE protocols. *Electrophoresis* **20**:723-726.
320. **Yates, J. R., III, S. Speicher, P. R. Griffin, and T. Hunkapiller.** 1993. Peptide mass maps: a highly informative approach to protein identification. *Anal. Biochem.* **214**:397-408.
321. **Zaitseva, J., S. Jenewein, T. Jumpertz, I. B. Holland, and L. Schmitt.** 2005. H662 is the linchpin of ATP hydrolysis in the nucleotide-binding domain of the ABC transporter HlyB. *EMBO J.* **24**:1901-1910.
322. **Zhang, G., M. Hubalewska, and Z. Ignatova.** 2009. Transient ribosomal attenuation coordinates protein synthesis and co-translational folding. *Nat. Struct. Mol. Biol.* **16**:274-280.

323. **Zhang, G. and Z. Ignatova.** 2009. Generic algorithm to predict the speed of translational elongation: implications for protein biogenesis. *PLoS. One.* **4**:e5036.
324. **Zhou, G., H. Li, D. DeCamp, S. Chen, H. Shu, Y. Gong, M. Flaig, J. W. Gillespie, N. Hu, P. R. Taylor, M. R. Emmert-Buck, L. A. Liotta, E. F. Petricoin, III, and Y. Zhao.** 2002. 2D differential in-gel electrophoresis for the identification of esophageal scans cell cancer-specific protein markers. *Mol. Cell Proteomics.* **1**:117-124.
325. **Zweers, J. C., T. Wiegert, and J. M. van Dijl.** 2009. Stress-responsive systems set specific limits to the overproduction of membrane proteins in *Bacillus subtilis*. *Appl. Environ. Microbiol.* **75**:7356-7364.