

## REFERENCES

- Agaisse, H., Gominet, M., Økstad, O. A., Kolstø, A. B. and Lereclus, D. (1999).** PlcR is a pleiotropic regulator of extracellular virulence factor gene expression in *Bacillus thuringiensis*. *Mol Microbiol* **32**, 1043-1053.
- Ahn, S. J. and Burne, R. A. (2006).** The *atIA* operon of *Streptococcus mutans*: role in autolysin maturation and cell surface biogenesis. *J Bacteriol* **188**, 6877-6888.
- Aizawa, S.-I., Zhulin, I. B., Marquez-Magana, L. and Ordal, G. W. (2001).** *Bacillus subtilis*: from Cells to Genes and from Genes to Cells. In *Bacillus subtilis and its closest relatives: from genes to cells*, pp. 437-452. Edited by A. L. Sonenshein, J. A. Hoch and R. Losick. Washington, D.C.: ASM press.
- Allesen-Holm, M., Barken, K. B., Yang, L., Klausen, M., Webb, J. S., Kjelleberg, S., Molin, S., Givskov, M. and Tolker-Nielsen, T. (2006).** A characterization of DNA release in *Pseudomonas aeruginosa* cultures and biofilms. *Mol Microbiol* **59**, 1114-1128.
- Allison, D. G., Ruiz, B., SanJose, C., Jaspe, A. and Gilbert, P. (1998).** Extracellular products as mediators of the formation and detachment of *Pseudomonas fluorescens* biofilms. *FEMS Microbiol Lett* **167**, 179-184.
- Allison, D. G. (2003).** The biofilm matrix. *Biofouling* **19**, 139-150.
- Altschul, S. F., Gish, W., Miller, W., Myers, E. W. and Lipman, D. J. (1990).** Basic local alignment search tool. *J Mol Biol* **215**, 403-410.
- Araki, Y., Nakatani, T., Nakayama, K. and Ito, E. (1972).** Occurrence of N-nonsubstituted glucosamine residues in peptidoglycan of lysozyme-resistant cell walls from *Bacillus cereus*. *J Biol Chem* **247**, 6312-6322.
- Arends, S. J., Kustus, R. J. and Weiss, D. S. (2009).** ATP-binding site lesions in FtsE impair cell division. *J Bacteriol* **191**, 3772-3784.
- Asai, Y., Kojima, S., Kato, H., Nishioka, N., Kawagishi, I. and Homma, M. (1997).** Putative channel components for the fast-rotating sodium-driven flagellar motor of a marine bacterium. *J Bacteriol* **179**, 5104-5110.
- Auger, S., Krin, E., Aymerich, S. and Gohar, M. (2006).** Autoinducer 2 affects biofilm formation by *Bacillus cereus*. *Appl Environ Microbiol* **72**, 937-941.
- Ausubel, F. M., Brent, R., Kingston, R. E., Moore, D. D., Seidman, J. G., Smith, J. A. and Struhl, K. (2002).** *Short Protocols in Molecular Biology*, 5 edn: John Wiley & Sons.
- Avashia, S. B., Riggins, W. S., Lindley, C., Hoffmaster, A., Drumgoole, R., Nekomoto, T., Jackson, P. J., Hill, K. K., Williams, K., Lehman, L., Libal, M. C., Wilkins, P. P., Alexander, J., Tvaryanas, A. and Betz, T. (2007).** Fatal pneumonia among metalworkers due to inhalation exposure to *Bacillus cereus* containing *Bacillus anthracis* toxin genes. *Clin Infect Dis* **44**, 414-416.

- Avery, O. T., Macleod, C. M. and McCarty, M. (1944).** Studies on the chemical nature of the substance inducing transformation of pneumococcal types: Induction of transformation by a desoxyribonucleic acid fraction isolated from *Pneumococcus* type III. *J Exp Med* **89**, 137-158.
- Bacon Schneider, K., Palmer, T. M. and Grossman, A. D. (2002).** Characterization of comQ and comX, two genes required for production of ComX pheromone in *Bacillus subtilis*. *J Bacteriol* **184**, 410-419.
- Bai, U., Mandic-Mulec, I. and Smith, I. (1993).** SinI modulates the activity of SinR, a developmental switch protein of *Bacillus subtilis*, by protein-protein interaction. *Genes Dev* **7**, 139-148.
- Bais, H. P., Fall, R. and Vivanco, J. M. (2004).** Biocontrol of *Bacillus subtilis* against infection of *Arabidopsis* roots by *Pseudomonas syringae* is facilitated by biofilm formation and surfactin production. *Plant Physiol* **134**, 307-319.
- Banse, A. V., Chastanet, A., Rahn-Lee, L., Hobbs, E. C. and Losick, R. (2008).** Parallel pathways of repression and antirepression governing the transition to stationary phase in *Bacillus subtilis*. *Proc Natl Acad Sci U S A* **105**, 15547-15552.
- Barlass, P. J., Houston, C. W., Clements, M. O. and Moir, A. (2002).** Germination of *Bacillus cereus* spores in response to L-alanine and to inosine: the roles of gerL and gerQ operons. *Microbiology* **148**, 2089-2095.
- Bassler, B. L., Wright, M. and Silverman, M. R. (1994).** Multiple signalling systems controlling expression of luminescence in *Vibrio harveyi*: sequence and function of genes encoding a second sensory pathway. *Mol Microbiol* **13**, 273-286.
- Bassler, B. L., Greenberg, E. P. and Stevens, A. M. (1997).** Cross-species induction of luminescence in the quorum-sensing bacterium *Vibrio harveyi*. *J Bacteriol* **179**, 4043-4045.
- Beecher, D. J., Schoeni, J. L. and Wong, A. C. (1995).** Enterotoxic activity of hemolysin BL from *Bacillus cereus*. *Infect Immun* **63**, 4423-4428.
- Beenken, K. E., Dunman, P. M., McAleese, F., Macapagal, D., Murphy, E., Projan, S. J., Blevins, J. S. and Smeltzer, M. S. (2004).** Global gene expression in *Staphylococcus aureus* biofilms. *J Bacteriol* **186**, 4665-4684.
- Beeston, A. L. and Surette, M. G. (2002).** pfs-dependent regulation of autoinducer 2 production in *Salmonella enterica* serovar Typhimurium. *J Bacteriol* **184**, 3450-3456.
- Berg, H. C. (2003).** The rotary motor of bacterial flagella. *Annu Rev Biochem* **72**, 19-54.
- Berg, J. M., Tymoczko, J. L., Stryer, L. and Clarke, N. D. (2002).** *Biochemistry*, 5 edn. New York: W. H. Freeman and Company.
- Birnboim, H. C. and Doly, J. (1979).** A rapid alkaline extraction procedure for screening recombinant plasmid DNA. *Nucleic Acids Res* **7**, 1513-1523.

- Biswas, R., Voggu, L., Simon, U. K., Hentschel, P., Thumm, G. and Gotz, F. (2006).** Activity of the major staphylococcal autolysin Atl. *FEMS Microbiol Lett* **259**, 260-268.
- Blackman, S. A., Smith, T. J. and Foster, S. J. (1998).** The role of autolysins during vegetative growth of *Bacillus subtilis* 168. *Microbiology* **144** ( Pt 1), 73-82.
- Blair, D. F. and Berg, H. C. (1988).** Restoration of torque in defective flagellar motors. *Science* **242**, 1678-1681.
- Blair, D. F. (2003).** Flagellar movement driven by proton translocation. *FEBS Lett* **545**, 86-95.
- Blair, K. M., Turner, L., Winkelman, J. T., Berg, H. C. and Kearns, D. B. (2008).** A molecular clutch disables flagella in the *Bacillus subtilis* biofilm. *Science* **320**, 1636-1638.
- Block, S. M. and Berg, H. C. (1984).** Successive incorporation of force-generating units in the bacterial rotary motor. *Nature* **309**, 470-472.
- Bone, E. J. and Ellar, D. J. (1989).** Transformation of *Bacillus thuringiensis* by electroporation. *FEMS Microbiol Lett* **49**, 171-177.
- Boyle, J. S. and Lew, A. M. (1995).** An inexpensive alternative to glassmilk for DNA purification. *Trends Genet* **11**, 8.
- Branda, S. S., González-Pastor, J. E., Ben-Yehuda, S., Losick, R. and Kolter, R. (2001).** Fruiting body formation by *Bacillus subtilis*. *Proc Natl Acad Sci U S A* **98**, 11621-11626.
- Branda, S. S., González-Pastor, J. E., Dervyn, E., Ehrlich, S. D., Losick, R. and Kolter, R. (2004).** Genes involved in formation of structured multicellular communities by *Bacillus subtilis*. *J Bacteriol* **186**, 3970-3979.
- Branda, S. S., Chu, F., Kearns, D. B., Losick, R. and Kolter, R. (2006).** A major protein component of the *Bacillus subtilis* biofilm matrix. *Mol Microbiol* **59**, 1229-1238.
- Braun, T. F. and Blair, D. F. (2001).** Targeted disulfide cross-linking of the MotB protein of *Escherichia coli*: evidence for two H(+) channels in the stator Complex. *Biochemistry* **40**, 13051-13059.
- Britton, R. A., Eichenberger, P., Gonzalez-Pastor, J. E., Fawcett, P., Monson, R., Losick, R. and Grossman, A. D. (2002).** Genome-wide analysis of the stationary-phase sigma factor (sigma-H) regulon of *Bacillus subtilis*. *J Bacteriol* **184**, 4881-4890.
- Camilli, A., Portnoy, A. and Youngman, P. (1990).** Insertional mutagenesis of *Listeria monocytogenes* with a novel Tn917 derivative that allows direct cloning of DNA flanking transposon insertions. *J Bacteriol* **172**, 3738-3744.
- Chagneau, C. and Saier, M. H., Jr. (2004).** Biofilm-defective mutants of *Bacillus subtilis*. *J Mol Microbiol Biotechnol* **8**, 177-188.

- Chai, Y., Chu, F., Kolter, R. and Losick, R. (2007).** Bistability and biofilm formation in *Bacillus subtilis*. *Mol Microbiol* **67**, 229-231.
- Chai, Y., Kolter, R. and Losick, R. (2009).** A widely conserved gene cluster required for lactate utilization in *Bacillus subtilis* and its involvement in biofilm formation. *J Bacteriol* **191**, 2423-2430.
- Chen, X., Schauder, S., Potier, N., Van Dorselaer, A., Pelczer, I., Bassler, B. L. and Hughson, F. M. (2002).** Structural identification of a bacterial quorum-sensing signal containing boron. *Nature* **415**, 545-549.
- Chevance, F. F. and Hughes, K. T. (2008).** Coordinating assembly of a bacterial macromolecular machine. *Nat Rev Microbiol* **6**, 455-465.
- Chomczynski, P. and Sacchi, N. (1987).** Single-step method of RNA isolation by acid guanidinium thiocyanate-phenol-chloroform extraction. *Anal Biochem* **162**, 156-159.
- Chu, F., Kearns, D. B., Branda, S. S., Kolter, R. and Losick, R. (2006).** Targets of the master regulator of biofilm formation in *Bacillus subtilis*. *Mol Microbiol* **59**, 1216-1228.
- Chu, F., Kearns, D. B., McLoon, A., Chai, Y., Kolter, R. and Losick, R. (2008).** A novel regulatory protein governing biofilm formation in *Bacillus subtilis*. *Mol Microbiol* **68**, 1117-1127.
- Chun, S. Y. and Parkinson, J. S. (1988).** Bacterial motility: membrane topology of the *Escherichia coli* MotB protein. *Science* **239**, 276-278.
- Clements, M. O. and Moir, A. (1998).** Role of the gerI operon of *Bacillus cereus* 569 in the response of spores to germinants. *J Bacteriol* **180**, 6729-6735.
- Corbin, B. D., Wang, Y., Beuria, T. K. and Margolin, W. (2007).** Interaction between cell division proteins FtsE and FtsZ. *J Bacteriol* **189**, 3026-3035.
- Core, L. and Perego, M. (2003).** TPR-mediated interaction of RapC with ComA inhibits response regulator-DNA binding for competence development in *Bacillus subtilis*. *Mol Microbiol* **49**, 1509-1522.
- Costerton, J. W., Lewandowski, Z., Caldwell, D. E., Korber, D. R. and Lappin-Scott, H. M. (1995).** Microbial biofilms. *Annu Rev Microbiol* **49**, 711-745.
- Costerton, J. W., Stewart, P. S. and Greenberg, E. P. (1999).** Bacterial biofilms: a common cause of persistent infections. *Science* **284**, 1318-1322.
- Crielly, E. M., Logan, N. A. and Anderton, A. (1994).** Studies on the *Bacillus* flora of milk and milk products. *J Appl Bacteriol* **77**, 256-263.
- Davey, M. E. and O'Toole, G. A. (2000).** Microbial biofilms: from ecology to molecular genetics. *Microbiol Mol Biol Rev* **64**, 847-867.

- Davey, M. E., Caiazza, N. C. and O'Toole, G. A. (2003).** Rhamnolipid surfactant production affects biofilm architecture in *Pseudomonas aeruginosa* PAO1. *J Bacteriol* **185**, 1027-1036.
- Davies, D. G., Parsek, M. R., Pearson, J. P., Iglewski, B. H., Costerton, J. W. and Greenberg, E. P. (1998).** The involvement of cell-to-cell signals in the development of a bacterial biofilm. *Science* **280**, 295-298.
- Day, W. A., Jr., Rasmussen, S. L., Carpenter, B. M., Peterson, S. N. and Friedlander, A. M. (2007).** Microarray analysis of transposon insertion mutations in *Bacillus anthracis*: global identification of genes required for sporulation and germination. *J Bacteriol* **189**, 3296-3301.
- de Leeuw, E., Graham, B., Phillips, G. J., ten Hagen-Jongman, C. M., Oudega, B. and Luirink, J. (1999).** Molecular characterization of *Escherichia coli* FtsE and FtsX. *Mol Microbiol* **31**, 983-993.
- De Mot, R. and Vanderleyden, J. (1994).** The C-terminal sequence conservation between OmpA-related outer membrane proteins and MotB suggests a common function in both gram-positive and gram-negative bacteria, possibly in the interaction of these domains with peptidoglycan. *Mol Microbiol* **12**, 333-334.
- Declerck, N., Bouillaut, L., Chaix, D., Rugani, N., Slamti, L., Hoh, F., Lereclus, D. and Arold, S. T. (2007).** Structure of PlcR: Insights into virulence regulation and evolution of quorum sensing in Gram-positive bacteria. *Proc Natl Acad Sci U S A* **104**, 18490-18495.
- Degano, M., Gopaul, D. N., Scapin, G., Schramm, V. L. and Sacchettini, J. C. (1996).** Three-dimensional structure of the inosine-uridine nucleoside N-ribohydrolase from *Crithidia fasciculata*. *Biochemistry* **35**, 5971-5981.
- Desrosier, J. P. and Lara, J. C. (1984).** Synthesis of the exosporium during sporulation of *Bacillus cereus*. *J Gen Microbiol* **130**, 935-940.
- Dierick, K., Van Coillie, E., Swiecicka, I., Meyfroidt, G., Devlieger, H., Meulemans, A., Hoedemaekers, G., Fourie, L., Heyndrickx, M. and Mahillon, J. (2005).** Fatal family outbreak of *Bacillus cereus*-associated food poisoning. *J Clin Microbiol* **43**, 4277-4279.
- Donachie, W. D. (1993).** The cell cycle of *Escherichia coli*. *Annu Rev Microbiol* **47**, 199-230.
- Dubnau, D. and Losick, R. (2006).** Bistability in bacteria. *Mol Microbiol* **61**, 564-572.
- Ebbole, D. J. and Zalkin, H. (1987).** Cloning and characterization of a 12-gene cluster from *Bacillus subtilis* encoding nine enzymes for de novo purine nucleotide synthesis. *J Biol Chem* **262**, 8274-8287.
- Ederer, G. M., Lund, M. E., Blazevic, D. J., Reller, L. B. and Mirrett, S. (1975).** Motility-indole-lysine-sulfide medium. *J Clin Microbiol* **2**, 266-267.

- Egea, P. F., Stroud, R. M. and Walter, P. (2005).** Targeting proteins to membranes: structure of the signal recognition particle. *Curr Opin Struct Biol* **15**, 213-220.
- Ehling-Schulz, M., Svensson, B., Guinebretiere, M. H. , Lindbäck, T., Andersson, M., Schulz, A., Fricker, M., Christiansson, A., Granum, P. E., Märklbauer, E., Nguyen-The, C., Salkinoja-Salonen, M. and Scherer, S. (2005).** Emetic toxin formation of *Bacillus cereus* is restricted to a single evolutionary lineage of closely related strains. *Microbiology* **151**, 183-197.
- Ehling-Schulz, M., Fricker, M., Grallert, H., Rieck, P., Wagner, M. and Scherer, S. (2006).** Cereulide synthetase gene cluster from emetic *Bacillus cereus*: structure and location on a mega virulence plasmid related to *Bacillus anthracis* toxin plasmid pXO1. *BMC Microbiol* **6**, 20.
- Errington, J. (2003).** Regulation of endospore formation in *Bacillus subtilis*. *Nat Rev Microbiol* **1**, 117-126.
- Errington, J., Daniel, R. A. and Scheffers, D. J. (2003).** Cytokinesis in bacteria. *Microbiol Mol Biol Rev* **67**, 52-65, table of contents.
- Flemming, H. C., Neu, T. R. and Wozniak, D. J. (2007).** The EPS matrix: the "house of biofilm cells". *J Bacteriol* **189**, 7945-7947.
- Flint, S. H., Bremer, P. J. and Brooks, J. D. (1997).** Biofilms in dairy manufacturing plant - description, current concerns and methods of control. *Biofouling* **11**, 81-97.
- Foerster, H. F. and Foster, J. W. (1966).** Response of *Bacillus* spores to combinations of germinative compounds. *J Bacteriol* **91**, 1168-1177.
- Francis, N. R., Sosinsky, G. E., Thomas, D. and DeRosier, D. J. (1994).** Isolation, characterization and structure of bacterial flagellar motors containing the switch complex. *J Mol Biol* **235**, 1261-1270.
- Freeman, J. A. and Bassler, B. L. (1999).** A genetic analysis of the function of LuxO, a two-component response regulator involved in quorum sensing in *Vibrio harveyi*. *Mol Microbiol* **31**, 665-677.
- Fujita, M., Gonzalez-Pastor, J. E. and Losick, R. (2005).** High- and low-threshold genes in the Spo0A regulon of *Bacillus subtilis*. *J Bacteriol* **187**, 1357-1368.
- Fukushima, S., Yoshimura, M., Chibazakura, T., Sato, T. and Yoshikawa, H. (2006).** The putative ABC transporter YheH/YheI is involved in the signalling pathway that activates KinA during sporulation initiation. *FEMS Microbiol Lett* **256**, 90-97.
- Garti-Levi, S., Hazan, R., Kain, J., Fujita, M. and Ben-Yehuda, S. (2008).** The FtsEX ABC transporter directs cellular differentiation in *Bacillus subtilis*. *Mol Microbiol* **69**, 1018-1028.
- Gaur, N. K., Cabane, K. and Smith, I. (1988).** Structure and expression of the *Bacillus subtilis* sin operon. *J Bacteriol* **170**, 1046-1053.

- Gaur, N. K., Oppenheim, J. and Smith, I. (1991).** The *Bacillus subtilis* *sin* gene, a regulator of alternate developmental processes, codes for a DNA-binding protein. *J Bacteriol* **173**, 678-686.
- Geesey, G. G., Richardson, W. T., Yeomans, H. G., Irvin, R. T. and Costerton, J. W. (1977).** Microscopic examination of natural sessile bacterial populations from an alpine stream. *Can J Microbiol* **23**, 1733-1736.
- Gill, D. R., Hatfull, G. F. and Salmond, G. P. (1986).** A new cell division operon in *Escherichia coli*. *Mol Gen Genet* **205**, 134-145.
- Gill, D. R. and Salmond, G. P. (1987).** The *Escherichia coli* cell division proteins FtsY, FtsE and FtsX are inner membrane-associated. *Mol Gen Genet* **210**, 504-508.
- Gominet, M., Slamti, L., Gilois, N., Rose, M. and Lereclus, D. (2001).** Oligopeptide permease is required for expression of the *Bacillus thuringiensis* *plcR* regulon and for virulence. *Mol Microbiol* **40**, 963-975.
- Gonzalez Barrios, A. F., Zuo, R., Hashimoto, Y., Yang, L., Bentley, W. E. and Wood, T. K. (2006).** Autoinducer 2 controls biofilm formation in *Escherichia coli* through a novel motility quorum-sensing regulator (MqsR, B3022). *J Bacteriol* **188**, 305-316.
- Gopaul, D. N., Meyer, S. L., Degano, M., Sacchettini, J. C. and Schramm, V. L. (1996).** Inosine-uridine nucleoside hydrolase from *Crithidia fasciculata*. Genetic characterization, crystallization, and identification of histidine 241 as a catalytic site residue. *Biochemistry* **35**, 5963-5970.
- Granum, P. E. and Lund, T. (1997).** *Bacillus cereus* and its food poisoning toxins. *FEMS Microbiol Lett* **157**, 223-228.
- Granum, P. E., O'Sullivan, K. and Lund, T. (1999).** The sequence of the non-haemolytic enterotoxin operon from *Bacillus cereus*. *FEMS Microbiol Lett* **177**, 225-229.
- Grossman, A. D. (1995).** Genetic networks controlling the initiation of sporulation and the development of genetic competence in *Bacillus subtilis*. *Annu Rev Genet* **29**, 477-508.
- Guiton, P. S., Hung, C. S., Kline, K. A., Roth, R., Kau, A. L., Hayes, E., Heuser, J., Dodson, K. W., Caparon, M. G. and Hultgren, S. J. (2009).** Contribution of autolysin and Sortase a during *Enterococcus faecalis* DNA-dependent biofilm development. *Infect Immun* **77**, 3626-3638.
- Hahn, J., Luttinger, A. and Dubnau, D. (1996).** Regulatory inputs for the synthesis of ComK, the competence transcription factor of *Bacillus subtilis*. *Mol Microbiol* **21**, 763-775.
- Hall-Stoodley, L., Costerton, J. W. and Stoodley, P. (2004).** Bacterial biofilms: from the natural environment to infectious diseases. *Nat Rev Microbiol* **2**, 95-108.
- Hall, T. A. (1999).** BioEdit: a user-friendly biological sequence alignment editor and analysis program for Windows 95/98/NT. *Nucl Acids Symp Ser* **41**, 95-98.

- Hamon, M. A. and Lazazzera, B. A. (2001).** The sporulation transcription factor Spo0A is required for biofilm development in *Bacillus subtilis*. *Mol Microbiol* **42**, 1199-1209.
- Hamon, M. A., Stanley, N. R., Britton, R. A., Grossman, A. D. and Lazazzera, B. A. (2004).** Identification of AbrB-regulated genes involved in biofilm formation by *Bacillus subtilis*. *Mol Microbiol* **52**, 847-860.
- Han, C. S., Xie, G., Challacombe, J. F., Altherr, M. R., Bhotika, S. S., Brown, N., Bruce, D., Campbell, C. S., Campbell, M. L., Chen, J., Chertkov, O., Cleland, C., Dimitrijevic, M., Doggett, N. A., Fawcett, J. J., Glavina, T., Goodwin, L. A., Green, L. D., Hill, K. K., Hitchcock, P., Jackson, P. J., Keim, P., Kewalramani, A. R., Longmire, J., Lucas, S., Malfatti, S., McMurry, K., Meincke, L. J., Misra, M., Moseman, B. L., Mundt, M., Munk, A. C., Okinaka, R. T., Parson-Quintana, B., Reilly, L. P., Richardson, P., Robinson, D. L., Rubin, E., Saunders, E., Tapia, R., Tesmer, J. G., Thayer, N., Thompson, L. S., Tice, H., Ticknor, L. O., Wills, P. L., Brettin, T. S. and Gilna, P. (2006).** Pathogenomic sequence analysis of *Bacillus cereus* and *Bacillus thuringiensis* isolates closely related to *Bacillus anthracis*. *J Bacteriol* **188**, 3382-3390.
- Hartman, S. C. and Buchanan, J. M. (1959).** Nucleic acids, purines, pyrimidines (nucleotide synthesis). *Annu Rev Biochem* **28**, 365-410.
- Hayashi, H., Araki, Y. and Ito, E. (1973).** Occurrence of glucosamine residues with free amino groups in cell wall peptidoglycan from bacilli as a factor responsible for resistance to lysozyme. *J Bacteriol* **113**, 592-598.
- Heilmann, C., Gerke, C., Perdreau-Remington, F. and Gotz, F. (1996).** Characterization of Tn917 insertion mutants of *Staphylococcus epidermidis* affected in biofilm formation. *Infect Immun* **64**, 277-282.
- Heilmann, C., Hussain, M., Peters, G. and Gotz, F. (1997).** Evidence for autolysin-mediated primary attachment of *Staphylococcus epidermidis* to a polystyrene surface. *Mol Microbiol* **24**, 1013-1024.
- Helgason, E., Økstad, O. A., Caugant, D. A., Johansen, H. A., Fouet, A., Mock, M., Hegna, I. and Kolstø, A. B. (2000).** *Bacillus anthracis*, *Bacillus cereus*, and *Bacillus thuringiensis*—one species on the basis of genetic evidence. *Appl Environ Microbiol* **66**, 2627-2630.
- Henrici, A. T. (1933).** Studies of Freshwater Bacteria: I. A Direct Microscopic Technique. *J Bacteriol* **25**, 277-287.
- Hentzer, M., Teitzel, G. M., Balzer, G. J., Heydorn, A., Molin, S., Givskov, M. and Parsek, M. R. (2001).** Alginate overproduction affects *Pseudomonas aeruginosa* biofilm structure and function. *J Bacteriol* **183**, 5395-5401.
- Higgins, D. G. and Sharp, P. M. (1988).** CLUSTAL: a package for performing multiple sequence alignment on a microcomputer. *Gene* **73**, 237-244.



**Hoch, J. A. (1993).** Regulation of the phosphorelay and the initiation of sporulation in *Bacillus subtilis*. *Annu Rev Microbiol* **47**, 441-465.

**Hofemeister, J., Conrad, B., Adler, B., Hofemeister, B., Feesche, J., Kucheryava, N., Steinborn, G., Franke, P., Grammel, N., Zwintscher, A., Leenders, F., Hitzeroth, G. and Vater, J. (2004).** Genetic analysis of the biosynthesis of non-ribosomal peptide- and polyketide-like antibiotics, iron uptake and biofilm formation by *Bacillus subtilis* A1/3. *Mol Genet Genomics* **272**, 363-378.

**Hoffmaster, A. R., Ravel, J., Rasko, D. A., Chapman, G. D., Chute, M. D., Marston, C. K., De, B. K., Sacchi, C. T., Fitzgerald, C., Mayer, L. W., Maiden, M. C., Priest, F. G., Barker, M., Jiang, L., Cer, R. Z., Rilstone, J., Peterson, S. N., Weyant, R. S., Galloway, D. R., Read, T. D., Popovic, T. and Fraser, C. M. (2004).** Identification of anthrax toxin genes in a *Bacillus cereus* associated with an illness resembling inhalation anthrax. *Proc Natl Acad Sci U S A* **101**, 8449-8454.

**Hoffmaster, A. R., Hill, K. K., Gee, J. E., Marston, C. K., De, B. K., Popovic, T., Sue, D., Wilkins, P. P., Avashia, S. B., Drumgoole, R., Helma, C. H., Ticknor, L. O., Okinaka, R. T. and Jackson, P. J. (2006).** Characterization of *Bacillus cereus* isolates associated with fatal pneumonias: strains are closely related to *Bacillus anthracis* and harbor *B. anthracis* virulence genes. *J Clin Microbiol* **44**, 3352-3360.

**Hofmann, K. and Stoffel, W. (1993).** TMbase - A database of membrane spanning proteins segments. *Biol Chem* **374**, 166.

**Honzatko, R. B. and Fromm, H. J. (1999).** Structure-function studies of adenylosuccinate synthetase from *Escherichia coli*. *Arch Biochem Biophys* **370**, 1-8.

**Hornstra, L. M., de Vries, Y. P., de Vos, W. M., Abee, T. and Wells-Bennik, M. H. (2005).** gerR, a novel ger operon involved in L-alanine- and inosine-initiated germination of *Bacillus cereus* ATCC 14579. *Appl Environ Microbiol* **71**, 774-781.

**Hornstra, L. M., de Vries, Y. P., Wells-Bennik, M. H., de Vos, W. M. and Abee, T. (2006).** Characterization of germination receptors of *Bacillus cereus* ATCC 14579. *Appl Environ Microbiol* **72**, 44-53.

**Hoton, F. M., Andrup, L., Swiecicka, I. and Mahillon, J. (2005).** The cereulide genetic determinants of emetic *Bacillus cereus* are plasmid-borne. *Microbiology* **151**, 2121-2124.

**Hoyle, B. D., Williams, L. J. and Costerton, J. W. (1993).** Production of mucoid exopolysaccharide during development of *Pseudomonas aeruginosa* biofilms. *Infect Immun* **61**, 777-780.

**Hsueh, Y. H., Somers, E. B., Lereclus, D. and Wong, A. C. (2006).** Biofilm formation by *Bacillus cereus* is influenced by PlcR, a pleiotropic regulator. *Appl Environ Microbiol* **72**, 5089-5092.

**Hsueh, Y. H., Somers, E. B., Lereclus, D., Ghelardi, E. and Wong, A. C. (2007).** Biosurfactant production and surface translocation are regulated by PlcR in *Bacillus cereus* ATCC 14579 under low-nutrient conditions. *Appl Environ Microbiol* **73**, 7225-7231.

Iino, T., Komeda, Y., Kutsukake, K., Macnab, R. M., Matsumura, P., Parkinson, J. S., Simon, M. I. and Yamaguchi, S. (1988). New unified nomenclature for the flagellar genes of *Escherichia coli* and *Salmonella typhimurium*. *Microbiol Rev* **52**, 533-535.

Imae, Y. and Atsumi, T. (1989). Na<sup>+</sup>-driven bacterial flagellar motors. *J Bioenerg Biomembr* **21**, 705-716.

Inoue, H., Nojima, H. and Okayama, H. (1990). High efficiency transformation of *Escherichia coli* with plasmids. *Gene* **96**, 23-28.

Isezaki, M., Hosoya, S., Takeuchi, M. and Sato, T. (2001). A putative ATP-binding cassette transporter YbdA involved in sporulation of *Bacillus subtilis*. *FEMS Microbiol Lett* **204**, 239-245.

Ito, M., Hicks, D. B., Henkin, T. M., Guffanti, A. A., Powers, B. D., Zvi, L., Uematsu, K. and Krulwich, T. A. (2004). MotPS is the stator-force generator for motility of alkaliphilic *Bacillus*, and its homologue is a second functional Mot in *Bacillus subtilis*. *Mol Microbiol* **53**, 1035-1049.

Ito, M., Terahara, N., Fujinami, S. and Krulwich, T. A. (2005). Properties of motility in *Bacillus subtilis* powered by the H<sup>+</sup>-coupled MotAB flagellar stator, Na<sup>+</sup>-coupled MotPS or hybrid stators MotAS or MotPB. *J Mol Biol* **352**, 396-408.

Ivanova, N., Sorokin, A., Anderson, I., Galleron, N., Candelon, B., Kapatral, V., Bhattacharyya, A., Reznik, G., Mikhailova, N., Lapidus, A., Chu, L., Mazur, M., Goltsman, E., Larsen, N., D'Souza, M., Walunas, T., Grechkin, Y., Pusch, G., Haselkorn, R., Fonstein, M., Ehrlich, S. D., Overbeek, R. and Kyrpides, N. (2003). Genome sequence of *Bacillus cereus* and comparative analysis with *Bacillus anthracis*. *Nature* **423**, 87-91.

Izano, E. A., Amarante, M. A., Kher, W. B. and Kaplan, J. B. (2008). Differential roles of poly-N-acetylglucosamine surface polysaccharide and extracellular DNA in *Staphylococcus aureus* and *Staphylococcus epidermidis* biofilms. *Appl Environ Microbiol* **74**, 470-476.

Jensen, G. B., Hansen, B. M., Eilenberg, J. and Mahillon, J. (2003). The hidden lifestyles of *Bacillus cereus* and relatives. *Environ Microbiol* **5**, 631-640.

Jiang, M., Shao, W., Perego, M. and Hoch, J. A. (2000). Multiple histidine kinases regulate entry into stationary phase and sporulation in *Bacillus subtilis*. *Mol Microbiol* **38**, 535-542.

Jones, M. B. and Blaser, M. J. (2003). Detection of a luxS-signaling molecule in *Bacillus anthracis*. *Infect Immun* **71**, 3914-3919.

Kadurugamuwa, J. L. and Beveridge, T. J. (1995). Virulence factors are released from *Pseudomonas aeruginosa* in association with membrane vesicles during normal growth and exposure to gentamicin: a novel mechanism of enzyme secretion. *J Bacteriol* **177**, 3998-4008.

- Karimova, G., Dautin, N. and Ladant, D. (2005).** Interaction network among *Escherichia coli* membrane proteins involved in cell division as revealed by bacterial two-hybrid analysis. *J Bacteriol* **187**, 2233-2243.
- Kearns, D. B., Chu, F., Branda, S. S., Kolter, R. and Losick, R. (2005).** A master regulator for biofilm formation by *Bacillus subtilis*. *Mol Microbiol* **55**, 739-749.
- Kearns, D. B. and Losick, R. (2005).** Cell population heterogeneity during growth of *Bacillus subtilis*. *Genes Dev* **19**, 3083-3094.
- Kim, S. Y., Lee, S. E., Kim, Y. R., Kim, C. M., Ryu, P. Y., Choy, H. E., Chung, S. S. and Rhee, J. H. (2003).** Regulation of *Vibrio vulnificus* virulence by the LuxS quorum-sensing system. *Mol Microbiol* **48**, 1647-1664.
- Klausen, M., Aaes-Jorgensen, A., Molin, S. and Tolker-Nielsen, T. (2003).** Involvement of bacterial migration in the development of complex multicellular structures in *Pseudomonas aeruginosa* biofilms. *Mol Microbiol* **50**, 61-68.
- Klee, S. R., Özel, M., Appel, B., Boesch, C., Ellerbrok, H., Jacob, D., Holland, G., Leendertz, F. H., Pauli, G., Grunow, R. and Nattermann, H. (2006).** Characterization of *Bacillus anthracis*-like bacteria isolated from wild great apes from Cote d'Ivoire and Cameroon. *J Bacteriol* **188**, 5333-5344.
- Kojima, S. and Blair, D. F. (2004).** The bacterial flagellar motor: structure and function of a complex molecular machine. *Int Rev Cytol* **233**, 93-134.
- Kontinen, V. P. and Sarvas, M. (1988).** Mutants of *Bacillus subtilis* defective in protein export. *J Gen Microbiol* **134**, 2333-2344.
- Kreth, J., Merritt, J., Shi, W. and Qi, F. (2005).** Co-ordinated bacteriocin production and competence development: a possible mechanism for taking up DNA from neighbouring species. *Mol Microbiol* **57**, 392-404.
- Larkin, M. A., Blackshields, G., Brown, N. P., Chenna, R., McGettigan, P. A., McWilliam, H., Valentin, F., Wallace, I. M., Wilm, A., Lopez, R., Thompson, J. D., Gibson, T. J. and Higgins, D. G. (2007).** Clustal W and Clustal X version 2.0. *Bioinformatics* **23**, 2947-2948.
- Laszlo, D. J., Niwano, M., Goral, W. W. and Taylor, B. L. (1984).** *Bacillus cereus* electron transport and proton motive force during aerotaxis. *J Bacteriol* **159**, 820-824.
- Lazarevic, V., Soldo, B., Médico, N., Pooley, H., Bron, S. and Karamata, D. (2005).** *Bacillus subtilis*  $\alpha$ -phosphoglucosyltransferase is required for normal cell morphology and biofilm formation. *Appl Environ Microbiol* **71**, 39-45.
- Leendertz, F. H., Ellerbrok, H., Boesch, C., Couacy-Hymann, E., Mätz-Rensing, K., Hakenbeck, R., Bergmann, C., Abaza, P., Junglen, S., Moebius, Y., Vigilant, L., Formenty, P. and Pauli, G. (2004).** Anthrax kills wild chimpanzees in a tropical rainforest. *Nature* **430**, 451-452.

- Leendertz, F. H., Yumlu, S., Pauli, G., Boesch, C., Couacy-Hymann, E., Vigilant, L., Junglen, S., Schenk, S. and Ellerbrok, H. (2006).** A new *Bacillus anthracis* found in wild chimpanzees and a gorilla from West and Central Africa. *PLoS Pathog* **2**, e8.
- Lenz, D. H., Mok, K. C., Lilley, B. N., Kulkarni, R. V., Wingreen, N. S. and Bassler, B. L. (2004).** The small RNA chaperone Hfq and multiple small RNAs control quorum sensing in *Vibrio harveyi* and *Vibrio cholerae*. *Cell* **118**, 69-82.
- Lequette, Y. and Greenberg, E. P. (2005).** Timing and localization of rhamnolipid synthesis gene expression in *Pseudomonas aeruginosa* biofilms. *J Bacteriol* **187**, 37-44.
- Lereclus, D., Agaisse, H., Gominet, M., Salamitou, S. and Sanchis, V. (1996).** Identification of a *Bacillus thuringiensis* gene that positively regulates transcription of the phosphatidylinositol-specific phospholipase C gene at the onset of the stationary phase. *J Bacteriol* **178**, 2749-2756.
- Lereclus, D., Agaisse, H., Grandvalet, C., Salamitou, S. and Gominet, M. (2000).** Regulation of toxin and virulence gene transcription in *Bacillus thuringiensis*. *Int J Med Microbiol* **290**, 295-299.
- Leskela, S., Kontinen, V. P. and Sarvas, M. (1996).** Molecular analysis of an operon in *Bacillus subtilis* encoding a novel ABC transporter with a role in exoprotein production, sporulation and competence. *Microbiology* **142** ( Pt 1), 71-77.
- Leskela, S., Wahlstrom, E., Hyrylainen, H. L., Jacobs, M., Palva, A., Sarvas, M. and Kontinen, V. P. (1999).** Ecs, an ABC transporter of *Bacillus subtilis*: dual signal transduction functions affecting expression of secreted proteins as well as their secretion. *Mol Microbiol* **31**, 533-543.
- Lewis, R. J., Brannigan, J. A., Smith, I. and Wilkinson, A. J. (1996).** Crystallisation of the *Bacillus subtilis* sporulation inhibitor SinR, complexed with its antagonist, SinI. *FEBS Lett* **378**, 98-100.
- Liang, L., He, X., Liu, G. and Tan, H. (2008).** The role of a purine-specific nucleoside hydrolase in spore germination of *Bacillus thuringiensis*. *Microbiology* **154**, 1333-1340.
- Lindsay, D., Brözel, V. S., Mostert, J. F. and von Holy, A. (2000).** Physiology of dairy-associated *Bacillus* spp. over a wide pH range. *Int J Food Microbiol* **54**, 49-62.
- Liu, J., Tan, K. and Stormo, G. D. (2003).** Computational identification of the Spo0A-phosphate regulon that is essential for the cellular differentiation and development in Gram-positive spore-forming bacteria. *Nucleic Acids Res* **31**, 6891-6903.
- Lloyd, S. A., Tang, H., Wang, X., Billings, S. and Blair, D. F. (1996).** Torque generation in the flagellar motor of *Escherichia coli*: evidence of a direct role for FliG but not for FliM or FliN. *J Bacteriol* **178**, 223-231.
- Lloyd, S. A. and Blair, D. F. (1997).** Charged residues of the rotor protein FliG essential for torque generation in the flagellar motor of *Escherichia coli*. *J Mol Biol* **266**, 733-744.

- Lombardía, E., Rovetto, A. J., Arabolaza, A. L. and Grau, R. R. (2006).** A LuxS-dependent cell-to-cell language regulates social behavior and development in *Bacillus subtilis*. *J Bacteriol* **188**, 4442-4452.
- Lopez, D., Fischbach, M. A., Chu, F., Losick, R. and Kolter, R. (2009).** Structurally diverse natural products that cause potassium leakage trigger multicellularity in *Bacillus subtilis*. *Proc Natl Acad Sci U S A* **106**, 280-285.
- Luirink, J., ten Hagen-Jongman, C. M., van der Weijden, C. C., Oudega, B., High, S., Dobberstein, B. and Kusters, R. (1994).** An alternative protein targeting pathway in *Escherichia coli*: studies on the role of FtsY. *EMBO J* **13**, 2289-2296.
- Lund, T., De Buyser, M. L. and Granum, P. E. (2000).** A new cytotoxin from *Bacillus cereus* that may cause necrotic enteritis. *Mol Microbiol* **38**, 254-261.
- Lutkenhaus, J. and Addinall, S. G. (1997).** Bacterial cell division and the Z ring. *Annu Rev Biochem* **66**, 93-116.
- Luxananil, P., Atomi, H., Panyim, S. and Imanaka, T. (2001).** Isolation of bacterial strains colonizable in mosquito larval guts as novel host cells for mosquito control. *J Biosci Bioeng* **92**, 342-345.
- Mader, U., Antelmann, H., Buder, T., Dahl, M. K., Hecker, M. and Homuth, G. (2002).** *Bacillus subtilis* functional genomics: genome-wide analysis of the DegS-DegU regulon by transcriptomics and proteomics. *Mol Genet Genomics* **268**, 455-467.
- Magnuson, R., Solomon, J. and Grossman, A. D. (1994).** Biochemical and genetic characterization of a competence pheromone from *B. subtilis*. *Cell* **77**, 207-216.
- Mahler, H., Pasi, A., Kramer, J. M., Schulte, P., Scoging, A. C., Bär, W. and Krähenbühl, S. (1997).** Fulminant liver failure in association with the emetic toxin of *Bacillus cereus*. *N Engl J Med* **336**, 1142-1148.
- Mann, E. E., Rice, K. C., Boles, B. R., Endres, J. L., Ranjit, D., Chandramohan, L., Tsang, L. H., Smeltzer, M. S., Horswill, A. R. and Bayles, K. W. (2009).** Modulation of eDNA release and degradation affects *Staphylococcus aureus* biofilm maturation. *PLoS One* **4**, e5822.
- Manson, M. D., Tedesco, P., Berg, H. C., Harold, F. M. and Van der Drift, C. (1977).** A protonmotive force drives bacterial flagella. *Proc Natl Acad Sci U S A* **74**, 3060-3064.
- Mantsala, P. and Zalkin, H. (1992).** Cloning and sequence of *Bacillus subtilis* *purA* and *guaA*, involved in the conversion of IMP to AMP and GMP. *J Bacteriol* **174**, 1883-1890.
- Marchler-Bauer, A. and Bryant, S. H. (2004).** CD-Search: protein domain annotations on the fly. *Nucleic Acids Res* **32**, W327-331.
- Margulis, L., Jorgensen, J. Z., Dolan, S., Kolchinsky, R., Rainey, F. A. and Lo, S. C. (1998).** The *Arthromitus* stage of *Bacillus cereus*: intestinal symbionts of animals. *Proc Natl Acad Sci U S A* **95**, 1236-1241.

- Marshall, O. (2007).** Graphical design of primers with PerlPrimer. *Methods Mol Biol* **402**, 403-414.
- Marshall, O. J. (2004).** PerlPrimer: cross-platform, graphical primer design for standard, bisulphite and real-time PCR. *Bioinformatics* **20**, 2471-2472.
- McNab, R., Ford, S. K., El-Sabaeny, A., Barbieri, B., Cook, G. S. and Lamont, R. J. (2003).** LuxS-based signaling in *Streptococcus gordonii*: autoinducer 2 controls carbohydrate metabolism and biofilm formation with *Porphyromonas gingivalis*. *J Bacteriol* **185**, 274-284.
- Merino, S., Altarriba, M., Gavin, R., Izquierdo, L. and Tomas, J. M. (2001).** The cell division genes (*ftsE* and *ftsX*) of *Aeromonas hydrophila* and their relationship with opsonophagocytosis. *FEMS Microbiol Lett* **198**, 183-188.
- Merritt, J., Qi, F., Goodman, S. D., Anderson, M. H. and Shi, W. (2003).** Mutation of luxS affects biofilm formation in *Streptococcus mutans*. *Infect Immun* **71**, 1972-1979.
- Merritt, J., Kreth, J., Shi, W. and Qi, F. (2005).** LuxS controls bacteriocin production in *Streptococcus mutans* through a novel regulatory component. *Mol Microbiol* **57**, 960-969.
- Miller, J. M., Hair, J. G., Hebert, M., Hebert, L., Roberts, F. J., Jr. and Weyant, R. S. (1997).** Fulminating bacteremia and pneumonia due to *Bacillus cereus*. *J Clin Microbiol* **35**, 504-507.
- Miller, M. B. and Bassler, B. L. (2001).** Quorum sensing in bacteria. *Annu Rev Microbiol* **55**, 165-199.
- Miller, M. B., Skorupski, K., Lenz, D. H., Taylor, R. K. and Bassler, B. L. (2002).** Parallel quorum sensing systems converge to regulate virulence in *Vibrio cholerae*. *Cell* **110**, 303-314.
- Mirel, D. B., Lustre, V. M. and Chamberlin, M. J. (1992).** An operon of *Bacillus subtilis* motility genes transcribed by the sigma D form of RNA polymerase. *J Bacteriol* **174**, 4197-4204.
- Mock, M. and Fouet, A. (2001).** Anthrax. *Annu Rev Microbiol* **55**, 647-671.
- Molle, V., Fujita, M., Jensen, S. T., Eichenberger, P., Gonzalez-Pastor, J. E., Liu, J. S. and Losick, R. (2003).** The Spo0A regulon of *Bacillus subtilis*. *Mol Microbiol* **50**, 1683-1701.
- Morikawa, M., Kagihiro, S., Haruki, M., Takano, K., Branda, S., Kolter, R. and Kanaya, S. (2006).** Biofilm formation by a *Bacillus subtilis* strain that produces  $\gamma$ -polyglutamate. *Microbiology* **152**, 2801-2807.
- Moscoso, M., Garcia, E. and Lopez, R. (2006).** Biofilm formation by *Streptococcus pneumoniae*: role of choline, extracellular DNA, and capsular polysaccharide in microbial accretion. *J Bacteriol* **188**, 7785-7795.

- Moussatova, A., Kandt, C., O'Mara, M. L. and Tieleman, D. P. (2008).** ATP-binding cassette transporters in *Escherichia coli*. *Biochim Biophys Acta* **1778**, 1757-1771.
- Msadek, T., Kunst, F., Klier, A. and Rapoport, G. (1991).** DegS-DegU and ComP-ComA modulator-effector pairs control expression of the *Bacillus subtilis* pleiotropic regulatory gene degQ. *J Bacteriol* **173**, 2366-2377.
- O'Toole, G., Kaplan, H. B. and Kolter, R. (2000).** Biofilm formation as microbial development. *Annu Rev Microbiol* **54**, 49-79.
- O'Toole, G. A. and Kolter, R. (1998).** Flagellar and twitching motility are necessary for *Pseudomonas aeruginosa* biofilm development. *Mol Microbiol* **30**, 295-304.
- O'Toole, G. A., Pratt, L. A., Watnick, P. I., Newman, D. K., Weaver, V. B. and Kolter, R. (1999).** Genetic approaches to study of biofilms. *Methods Enzymol* **310**, 91-109.
- Okinaka, R., Pearson, T. and Keim, P. (2006).** Anthrax, but not *Bacillus anthracis*? *PLoS Pathog* **2**, e122.
- Økstad, O. A., Gominet, M., Purnelle, B., Rose, M., Lereclus, D. and Kolstø, A. B. (1999).** Sequence analysis of three *Bacillus cereus* loci carrying PlcR-regulated genes encoding degradative enzymes and enterotoxin. *Microbiology* **145** ( Pt 11), 3129-3138.
- Oosthuizen, M. C., Steyn, B., Lindsay, D., Brözel, V. S. and von Holy, A. (2001).** Novel method for the proteomic investigation of a dairy-associated *Bacillus cereus* biofilm. *FEMS Microbiol Lett* **194**, 47-51.
- Oosthuizen, M. C., Steyn, B., Theron, J., Cosette, P., Lindsay, D., Von Holy, A. and Brözel, V. S. (2002).** Proteomic analysis reveals differential protein expression by *Bacillus cereus* during biofilm formation. *Appl Environ Microbiol* **68**, 2770-2780.
- Parkin, D. W., Horenstein, B. A., Abdulah, D. R., Estupinan, B. and Schramm, V. L. (1991a).** Nucleoside hydrolase from *Crithidia fasciculata*. Metabolic role, purification, specificity, and kinetic mechanism. *J Biol Chem* **266**, 20658-20665.
- Parkin, D. W., Mentch, F., Banks, G. A., Horenstein, B. A. and Schramm, V. L. (1991b).** Transition-state analysis of a  $V_{max}$  mutant of AMP nucleosidase by the application of heavy-atom kinetic isotope effects. *Biochemistry* **30**, 4586-4594.
- Perego, M. (1997).** A peptide export-import control circuit modulating bacterial development regulates protein phosphatases of the phosphorelay. *Proc Natl Acad Sci U S A* **94**, 8612-8617.
- Perkins, J. B. and Youngman, P. J. (1984).** A physical and functional analysis of Tn917, a Streptococcus transposon in the Tn3 family that functions in *Bacillus*. *Plasmid* **12**, 119-138.
- Pfaffl, M. W., Horgan, G. W. and Dempfle, L. (2002).** Relative expression software tool (REST) for group-wise comparison and statistical analysis of relative expression results in real-time PCR. *Nucleic Acids Res* **30**, e36.

- Piggot, P. J. and Hilbert, D. W. (2004).** Sporulation of *Bacillus subtilis*. *Curr Opin Microbiol* **7**, 579-586.
- Pratt, L. A. and Kolter, R. (1998).** Genetic analysis of *Escherichia coli* biofilm formation: roles of flagella, motility, chemotaxis and type I pili. *Mol Microbiol* **30**, 285-293.
- Pratt, L. A. and Kolter, R. (1999).** Genetic analyses of bacterial biofilm formation. *Curr Opin Microbiol* **2**, 598-603.
- Predich, M., Nair, G. and Smith, I. (1992).** *Bacillus subtilis* early sporulation genes kinA, spo0F, and spo0A are transcribed by the RNA polymerase containing sigma H. *J Bacteriol* **174**, 2771-2778.
- Priest, F. G., Barker, M., Baillie, L. W., Holmes, E. C. and Maiden, M. C. (2004).** Population structure and evolution of the *Bacillus cereus* group. *J Bacteriol* **186**, 7959-7970.
- Qin, Z., Ou, Y., Yang, L., Zhu, Y., Tolker-Nielsen, T., Molin, S. and Qu, D. (2007).** Role of autolysin-mediated DNA release in biofilm formation of *Staphylococcus epidermidis*. *Microbiology* **153**, 2083-2092.
- Ramakers, C., Ruijter, J. M., Deprez, R. H. and Moorman, A. F. (2003).** Assumption-free analysis of quantitative real-time polymerase chain reaction (PCR) data. *Neurosci Lett* **339**, 62-66.
- Ramirez-Arcos, S., Salimnia, H., Bergevin, I., Paradis, M. and Dillon, J. A. (2001).** Expression of *Neisseria gonorrhoeae* cell division genes *ftsZ*, *ftsE* and *minD* is influenced by environmental conditions. *Res Microbiol* **152**, 781-791.
- Rasko, D. A., Ravel, J., Økstad, O. A., Helgason, E., Cer, R. Z., Jiang, L., Shores, K. A., Fouts, D. E., Tourasse, N. J., Angiuoli, S. V., Kolonay, J., Nelson, W. C., Kolstø, A. B., Fraser, C. M. and Read, T. D. (2004).** The genome sequence of *Bacillus cereus* ATCC 10987 reveals metabolic adaptations and a large plasmid related to *Bacillus anthracis* pXO1. *Nucleic Acids Res* **32**, 977-988.
- Rasko, D. A., Altherr, M. R., Han, C. S. and Ravel, J. (2005).** Genomics of the *Bacillus cereus* group of organisms. *FEMS Microbiol Rev* **29**, 303-329.
- Rasko, D. A., Rosovitz, M. J., Økstad, O. A., Fouts, D. E., Jiang, L., Cer, R. Z., Kolstø, A. B., Gill, S. R. and Ravel, J. (2007).** Complete sequence analysis of novel plasmids from emetic and periodontal *Bacillus cereus* isolates reveals a common evolutionary history among the *B. cereus*-group plasmids, including *Bacillus anthracis* pXO1. *J Bacteriol* **189**, 52-64.
- Read, T. D., Peterson, S. N., Tourasse, N., Baillie, L. W., Paulsen, I. T., Nelson, K. E., Tettelin, H., Fouts, D. E., Eisen, J. A., Gill, S. R., Holtzapple, E. K., Økstad, O. A., Helgason, E., Rilstone, J., Wu, M., Kolonay, J. F., Beanan, M. J., Dodson, R. J., Brinkac, L. M., Gwinn, M., DeBoy, R. T., Madpu, R., Daugherty, S. C., Durkin, A. S., Haft, D. H., Nelson, W. C., Peterson, J. D., Pop, M., Khouri, H. M., Radune, D., Benton, J. L., Mahamoud, Y., Jiang, L., Hance, I. R., Weidman, J. F., Berry, K. J., Plaut, R. D., Wolf, A. M., Watkins, K. L., Nierman, W. C., Hazen, A., Cline, R., Redmond, C., Thwaite, J. E., White, O., Salzberg, S. L., Thomason, B., Friedlander, A. M., Koehler, T. M., Hanna,**



- P. C., Kolstø, A. B. and Fraser, C. M. (2003).** The genome sequence of *Bacillus anthracis* Ames and comparison to closely related bacteria. *Nature* **423**, 81-86.
- Reddy, M. (2007).** Role of FtsEX in cell division of *Escherichia coli*: viability of *ftsEX* mutants is dependent on functional SufI or high osmotic strength. *J Bacteriol* **189**, 98-108.
- Redmond, C., Baillie, L. W., Hibbs, S., Moir, A. J. and Moir, A. (2004).** Identification of proteins in the exosporium of *Bacillus anthracis*. *Microbiology* **150**, 355-363.
- Reid, S. W., Leake, M. C., Chandler, J. H., Lo, C. J., Armitage, J. P. and Berry, R. M. (2006).** The maximum number of torque-generating units in the flagellar motor of *Escherichia coli* is at least 11. *Proc Natl Acad Sci U S A* **103**, 8066-8071.
- Ren, D., Bedzyk, L. A., Setlow, P., Thomas, S. M., Ye, R. W. and Wood, T. K. (2004).** Gene expression in *Bacillus subtilis* surface biofilms with and without sporulation and the importance of *yveR* for biofilm maintenance. *Biotechnol Bioeng* **86**, 344-364.
- Renelli, M., Matias, V., Lo, R. Y. and Beveridge, T. J. (2004).** DNA-containing membrane vesicles of *Pseudomonas aeruginosa* PAO1 and their genetic transformation potential. *Microbiology* **150**, 2161-2169.
- Resch, A., Leicht, S., Saric, M., Pásztor, L., Jakob, A., Götz, F. and Nordheim, A. (2006).** Comparative proteome analysis of *Staphylococcus aureus* biofilm and planktonic cells and correlation with transcriptome profiling. *Proteomics* **6**, 1867-1877.
- Rice, K. C., Firek, B. A., Nelson, J. B., Yang, S. J., Patton, T. G. and Bayles, K. W. (2003).** The *Staphylococcus aureus* cidAB operon: evaluation of its role in regulation of murein hydrolase activity and penicillin tolerance. *J Bacteriol* **185**, 2635-2643.
- Rice, K. C., Mann, E. E., Endres, J. L., Weiss, E. C., Cassat, J. E., Smeltzer, M. S. and Bayles, K. W. (2007).** The cidA murein hydrolase regulator contributes to DNA release and biofilm development in *Staphylococcus aureus*. *Proc Natl Acad Sci U S A* **104**, 8113-8118.
- Rice, K. C. and Bayles, K. W. (2008).** Molecular control of bacterial death and lysis. *Microbiol Mol Biol Rev* **72**, 85-109, table of contents.
- Rozen, S. and Skaletsky, H. (2000).** Primer3 on the WWW for general users and for biologist programmers. *Methods Mol Biol* **132**, 365-386.
- Ruijter, J. M., Ramakers, C., Hoogaars, W. M., Karlen, Y., Bakker, O., van den Hoff, M. J. and Moorman, A. F. (2009).** Amplification efficiency: linking baseline and bias in the analysis of quantitative PCR data. *Nucleic Acids Res.*
- Salamitou, S., Ramisse, F., Brehélin, M., Bourguet, D., Gilois, N., Gominet, M., Hernandez, E. and Lereclus, D. (2000).** The *plcR* regulon is involved in the opportunistic properties of *Bacillus thuringiensis* and *Bacillus cereus* in mice and insects. *Microbiology* **146** ( Pt 11), 2825-2832.
- Saleh, S. M., Harris, R. F. and Allen, O. N. (1970).** Fate of *Bacillus thuringiensis* in soil: effect of soil pH and organic amendment. *Can J Microbiol* **16**, 677-680.

- Salmond, G. P. and Plakidou, S. (1984).** Genetic analysis of essential genes in the *ftsE* region of the *Escherichia coli* genetic map and identification of a new cell division gene, *ftsS*. *Mol Gen Genet* **197**, 304-308.
- Sambrook, J. and Russel, D. W. (2001).** *Molecular Cloning: a laboratory manual*, 3 edn. N.Y.: Cold Spring Harbor Laboratory Press.
- Sauer, K. and Camper, A. K. (2001).** Characterization of phenotypic changes in *Pseudomonas putida* in response to surface-associated growth. *J Bacteriol* **183**, 6579-6589.
- Sauer, K., Camper, A. K., Ehrlich, G. D., Costerton, J. W. and Davies, D. G. (2002).** *Pseudomonas aeruginosa* displays multiple phenotypes during development as a biofilm. *J Bacteriol* **184**, 1140-1154.
- Saxild, H. H. and Nygaard, P. (2000).** The *yexA* gene product is required for phosphoribosylformylglycinamide synthetase activity in *Bacillus subtilis*. *Microbiology* **146** ( Pt 4), 807-814.
- Schauder, S., Shokat, K., Surette, M. G. and Bassler, B. L. (2001).** The LuxS family of bacterial autoinducers: biosynthesis of a novel quorum-sensing signal molecule. *Mol Microbiol* **41**, 463-476.
- Schendel, F. J., Mueller, E., Stubbe, J., Shiau, A. and Smith, J. M. (1989).** Formylglycinamide ribonucleotide synthetase from *Escherichia coli*: cloning, sequencing, overproduction, isolation, and characterization. *Biochemistry* **28**, 2459-2471.
- Schmidt, K. L., Peterson, N. D., Kustusch, R. J., Wissel, M. C., Graham, B., Phillips, G. J. and Weiss, D. S. (2004).** A predicted ABC transporter, FtsEX, is needed for cell division in *Escherichia coli*. *J Bacteriol* **186**, 785-793.
- Serrano, M., Zilhao, R., Ricca, E., Ozin, A. J., Moran, C. P., Jr. and Henriques, A. O. (1999).** A *Bacillus subtilis* secreted protein with a role in endospore coat assembly and function. *J Bacteriol* **181**, 3632-3643.
- Setlow, P. (2003).** Spore germination. *Curr Opin Microbiol* **6**, 550-556.
- Sezonov, G., Joseleau-Petit, D. and D'Ari, R. (2007).** *Escherichia coli* physiology in Luria-Bertani broth. *J Bacteriol* **189**, 8746-8749.
- Shafikhani, S. H., Mandic-Mulec, I., Strauch, M. A., Smith, I. and Leighton, T. (2002).** Postexponential regulation of *sin* operon expression in *Bacillus subtilis*. *J Bacteriol* **184**, 564-571.
- Shaw, J. H. and Clewell, D. B. (1985).** Complete nucleotide sequence of macrolide-lincosamide-streptogramin B-resistance transposon Tn917 in *Streptococcus faecalis*. *J Bacteriol* **164**, 782-796.

- Shibata, Y., Kawada, M., Nakano, Y., Toyoshima, K. and Yamashita, Y. (2005).** Identification and characterization of an autolysin-encoding gene of *Streptococcus mutans*. *Infect Immun* **73**, 3512-3520.
- Silverman, M. and Simon, M. (1974).** Flagellar rotation and the mechanism of bacterial motility. *Nature* **249**, 73-74.
- Slamti, L. and Lereclus, D. (2002).** A cell-cell signaling peptide activates the PlcR virulence regulon in bacteria of the *Bacillus cereus* group. *EMBO J* **21**, 4550-4559.
- Solomon, J. M., Magnuson, R., Srivastava, A. and Grossman, A. D. (1995).** Convergent sensing pathways mediate response to two extracellular competence factors in *Bacillus subtilis*. *Genes Dev* **9**, 547-558.
- Solomon, J. M., Lazazzera, B. A. and Grossman, A. D. (1996).** Purification and characterization of an extracellular peptide factor that affects two different developmental pathways in *Bacillus subtilis*. *Genes Dev* **10**, 2014-2024.
- Sonenshein, A. L., Hoch, J. A. and Losick, R. (2001).** *Bacillus subtilis*: from Cells to Genes and from Genes to Cells. In *Bacillus subtilis and Its Closest Relatives: From Genes to Cells*, pp. 3-5. Edited by A. L. Sonenshein, J. A. Hoch and R. Losick. Washington, D.C.: ASM press.
- Southern, E. M. (1975).** Detection of specific sequences among DNA fragments separated by gel electrophoresis. *J Mol Biol* **98**, 503-517.
- Stanley, N. R., Britton, R. A., Grossman, A. D. and Lazazzera, B. A. (2003).** Identification of catabolite repression as a physiological regulator of biofilm formation by *Bacillus subtilis* by use of DNA microarrays. *J Bacteriol* **185**, 1951-1957.
- Stanley, N. R. and Lazazzera, B. A. (2005).** Defining the genetic differences between wild and domestic strains of *Bacillus subtilis* that affect poly- $\gamma$ -DL-glutamic acid production and biofilm formation. *Mol Microbiol* **57**, 1143-1158.
- Stark, W. H., Stadler, J. and McCoy, E. (1938).** Some factors affecting the bacterial population of freshwater lakes. *J Bacteriol* **36**, 653-654.
- Steichen, C., Chen, P., Kearney, J. F. and Turnbough, C. L., Jr. (2003).** Identification of the immunodominant protein and other proteins of the *Bacillus anthracis* exosporium. *J Bacteriol* **185**, 1903-1910.
- Stepanovic, S., Vukovic, D., Dakic, I., Savic, B. and Svabic-Vlahovic, M. (2000).** A modified microtiter-plate test for quantification of staphylococcal biofilm formation. *J Microbiol Methods* **40**, 175-179.
- Stewart, P. S. and Costerton, J. W. (2001).** Antibiotic resistance of bacteria in biofilms. *Lancet* **358**, 135-138.
- Stover, A. G. and Driks, A. (1999).** Control of synthesis and secretion of the *Bacillus subtilis* protein YqxM. *J Bacteriol* **181**, 7065-7069.

- Stragier, P. and Losick, R. (1996).** Molecular genetics of sporulation in *Bacillus subtilis*. *Annu Rev Genet* **30**, 297-241.
- Strauch, M., Webb, V., Spiegelman, G. and Hoch, J. A. (1990).** The SpoOA protein of *Bacillus subtilis* is a repressor of the *abrB* gene. *Proc Natl Acad Sci U S A* **87**, 1801-1805.
- Strauch, M. A. and Hoch, J. A. (1993).** Transition-state regulators: sentinels of *Bacillus subtilis* post-exponential gene expression. *Mol Microbiol* **7**, 337-342.
- Strauch, M. A., Bobay, B. G., Cavanagh, J., Yao, F., Wilson, A. and Le Breton, Y. (2007).** *Abh* and *AbrB* control of *Bacillus subtilis* antimicrobial gene expression. *J Bacteriol* **189**, 7720-7732.
- Sturme, M. H., Kleerebezem, M., Nakayama, J., Akkermans, A. D., Vaughn, E. E. and de Vos, W. M. (2002).** Cell to cell communication by autoinducing peptides in gram-positive bacteria. *Antonie Van Leeuwenhoek* **81**, 233-243.
- Sue, D., Hoffmaster, A. R., Popovic, T. and Wilkins, P. P. (2006).** Capsule production in *Bacillus cereus* strains associated with severe pneumonia. *J Clin Microbiol* **44**, 3426-3428.
- Surette, M. G. and Bassler, B. L. (1998).** Quorum sensing in *Escherichia coli* and *Salmonella typhimurium*. *Proc Natl Acad Sci U S A* **95**, 7046-7050.
- Sutherland, I. (2001a).** Biofilm exopolysaccharides: a strong and sticky framework. *Microbiology* **147**, 3-9.
- Sutherland, I. W. (2001b).** The biofilm matrix--an immobilized but dynamic microbial environment. *Trends Microbiol* **9**, 222-227.
- Swartzman, E., Silverman, M. and Meighen, E. A. (1992).** The *luxR* gene product of *Vibrio harveyi* is a transcriptional activator of the *lux* promoter. *J Bacteriol* **174**, 7490-7493.
- Switzr, R. L., Zalkin, H. and Saxild, H. H. (2002).** Purine, pyrimidine, and pyridine nucleotide metabolism. In *Bacillus subtilis and its relatives: from genes to cells*, pp. 255-269. Edited by A. L. Sonenshein, J. A. Hoch and R. Losick. Washinton: ASM Press.
- Taga, M. E., Miller, S. T. and Bassler, B. L. (2003).** Lsr-mediated transport and processing of AI-2 in *Salmonella typhimurium*. *Mol Microbiol* **50**, 1411-1427.
- Taschner, P. E., Huls, P. G., Pas, E. and Woldringh, C. L. (1988).** Division behavior and shape changes in isogenic *ftsZ*, *ftsQ*, *ftsA*, *pbpB*, and *ftsE* cell division mutants of *Escherichia coli* during temperature shift experiments. *J Bacteriol* **170**, 1533-1540.
- Teitzel, G. M. and Parsek, M. R. (2003).** Heavy metal resistance of biofilm and planktonic *Pseudomonas aeruginosa*. *Appl Environ Microbiol* **69**, 2313-2320.
- Terashima, H., Kojima, S. and Homma, M. (2008).** Flagellar motility in bacteria structure and function of flagellar motor. *Int Rev Cell Mol Biol* **270**, 39-85.

- Thomas, V. C., Thurlow, L. R., Boyle, D. and Hancock, L. E. (2008).** Regulation of autolysis-dependent extracellular DNA release by *Enterococcus faecalis* extracellular proteases influences biofilm development. *J Bacteriol* **190**, 5690-5698.
- Todd, S. J., Moir, A. J., Johnson, M. J. and Moir, A. (2003).** Genes of *Bacillus cereus* and *Bacillus anthracis* encoding proteins of the exosporium. *J Bacteriol* **185**, 3373-3378.
- Tortosa, P., Albano, M. and Dubnau, D. (2000).** Characterization of *ylbF*, a new gene involved in competence development and sporulation in *Bacillus subtilis*. *Mol Microbiol* **35**, 1110-1119.
- Tremblay, L. and Archibald, F. (1993).** Production of a cloned xylanase in *Bacillus cereus* and its performance in kraft pulp prebleaching. *Can J Microbiol* **39**, 853-860.
- Tsuneda, S., Aikawa, H., Hayashi, H., Yuasa, A. and Hirata, A. (2003).** Extracellular polymeric substances responsible for bacterial adhesion onto solid surface. *FEMS Microbiol Lett* **223**, 287-292.
- Turgay, K., Hamoen, L. W., Venema, G. and Dubnau, D. (1997).** Biochemical characterization of a molecular switch involving the heat shock protein ClpC, which controls the activity of ComK, the competence transcription factor of *Bacillus subtilis*. *Genes Dev* **11**, 119-128.
- Turnbull, P. C., Jørgensen, K., Kramer, J. M., Gilbert, R. J. and Parry, J. M. (1979).** Severe clinical conditions associated with *Bacillus cereus* and the apparent involvement of exotoxins. *J Clin Pathol* **32**, 289-293.
- Ukai, H., Matsuzawa, H., Ito, K., Yamada, M. and Nishimura, A. (1998).** *ftsE*(Ts) affects translocation of K<sup>+</sup>-pump proteins into the cytoplasmic membrane of *Escherichia coli*. *J Bacteriol* **180**, 3663-3670.
- Urushibata, Y., Tokuyama, S. and Tahara, Y. (2002).** Characterization of the *Bacillus subtilis* *ywsC* gene, involved in gamma-polyglutamic acid production. *J Bacteriol* **184**, 337-343.
- Vagner, V., Dervyn, E. and Ehrlich, S. D. (1998).** A vector for systematic gene inactivation in *Bacillus subtilis*. *Microbiology* **144** ( Pt 11), 3097-3104.
- Van Ness, G. B. (1971).** Ecology of anthrax. *Science* **172**, 1303-1307.
- van Sinderen, D., Luttinger, A., Kong, L., Dubnau, D., Venema, G. and Hamoen, L. (1995).** *comK* encodes the competence transcription factor, the key regulatory protein for competence development in *Bacillus subtilis*. *Mol Microbiol* **15**, 455-462.
- van Waasbergen, L. G., Hoch, J. A. and Tebo, B. M. (1993).** Genetic analysis of the marine manganese-oxidizing *Bacillus* sp. strain SG-1: protoplast transformation, Tn917 mutagenesis, and identification of chromosomal loci involved in manganese oxidation. *J Bacteriol* **175**, 7594-7603.

- Veening, J. W., Hamoen, L. W. and Kuipers, O. P. (2005).** Phosphatases modulate the bistable sporulation gene expression pattern in *Bacillus subtilis*. *Mol Microbiol* **56**, 1481-1494.
- Vendeville, A., Winzer, K., Heurlier, K., Tang, C. M. and Hardie, K. R. (2005).** Making 'sense' of metabolism: autoinducer-2, LuxS and pathogenic bacteria. *Nat Rev Microbiol* **3**, 383-396.
- Vidal, O., Longin, R., Prigent-Combaret, C., Dorel, C., Hooreman, M. and Lejeune, P. (1998).** Isolation of an *Escherichia coli* K-12 mutant strain able to form biofilms on inert surfaces: involvement of a new *ompR* allele that increases curli expression. *J Bacteriol* **180**, 2442-2449.
- Vilain, S. and Brözel, V. S. (2006).** Multivariate approach to comparing whole-cell proteomes of *Bacillus cereus* indicates a biofilm-specific proteome. *J Proteome Res* **5**, 1924-1930.
- Vilain, S., Luo, Y., Hildreth, M. B. and Brözel, V. S. (2006).** Analysis of the life cycle of the soil saprophyte *Bacillus cereus* in liquid soil extract and in soil. *Appl Environ Microbiol* **72**, 4970-4977.
- Vilain, S., Pretorius, J. M., Theron, J. and Brözel, V. S. (2009).** DNA as an adhesin: *Bacillus cereus* requires extracellular DNA to form biofilm. *Appl Environ Microbiol* **75**, 2861-2868.
- Villafane, R., Bechhofer, D. H., Narayanan, C. S. and Dubnau, D. (1987).** Replication control genes of plasmid pE194. *J Bacteriol* **169**, 4822-4829.
- Vlamakis, H., Aguilar, C., Losick, R. and Kolter, R. (2008).** Control of cell fate by the formation of an architecturally complex bacterial community. *Genes Dev* **22**, 945-953.
- von Stetten, F., Mayr, R. and Scherer, S. (1999).** Climatic influence on mesophilic *Bacillus cereus* and psychrotolerant *Bacillus weihenstephanensis* populations in tropical, temperate and alpine soil. *Environ Microbiol* **1**, 503-515.
- Vuong, C. and Otto, M. (2008).** The biofilm exopolysaccharide polysaccharide intercellular adhesin—a molecular and biochemical approach. *Methods Mol Biol* **431**, 97-106.
- Waters, C. M. and Bassler, B. L. (2005).** Quorum sensing: cell-to-cell communication in bacteria. *Annu Rev Cell Dev Biol* **21**, 319-346.
- Watnick, P. I. and Kolter, R. (1999).** Steps in the development of a *Vibrio cholerae* El Tor biofilm. *Mol Microbiol* **34**, 586-595.
- Watnick, P. I., Lauriano, C. M., Klose, K. E., Croal, L. and Kolter, R. (2001).** The absence of a flagellum leads to altered colony morphology, biofilm development and virulence in *Vibrio cholerae* O139. *Mol Microbiol* **39**, 223-235.

- Webb, J. S., Thompson, L. S., James, S., Charlton, T., Tolker-Nielsen, T., Koch, B., Givskov, M. and Kjelleberg, S. (2003).** Cell death in *Pseudomonas aeruginosa* biofilm development. *J Bacteriol* **185**, 4585-4592.
- Wen, Z. T. and Burne, R. A. (2004).** LuxS-mediated signaling in *Streptococcus mutans* is involved in regulation of acid and oxidative stress tolerance and biofilm formation. *J Bacteriol* **186**, 2682-2691.
- Whitchurch, C. B., Tolker-Nielsen, T., Ragas, P. C. and Mattick, J. S. (2002).** Extracellular DNA required for bacterial biofilm formation. *Science* **295**, 1487.
- Whiteley, M., Bangera, M. G., Bumgarner, R. E., Parsek, M. R., Teitzel, G. M., Lory, S. and Greenberg, E. P. (2001).** Gene expression in *Pseudomonas aeruginosa* biofilms. *Nature* **413**, 860-864.
- Wijman, J. G., de Leeuw, P. P., Moezelaar, R., Zwietering, M. H. and Abee, T. (2007).** Air-liquid interface biofilms of *Bacillus cereus*: formation, sporulation, and dispersion. *Appl Environ Microbiol* **73**, 1481-1488.
- Wilson, K. (2001).** Preparation of genomic DNA from bacteria. *Curr Protoc Mol Biol* **Chapter 2**, Unit 2.4.
- Xavier, K. B. and Bassler, B. L. (2003).** LuxS quorum sensing: more than just a numbers game. *Curr Opin Microbiol* **6**, 191-197.
- Xavier, K. B. and Bassler, B. L. (2005).** Regulation of uptake and processing of the quorum-sensing autoinducer AI-2 in *Escherichia coli*. *J Bacteriol* **187**, 238-248.
- Xavier, K. B., Miller, S. T., Lu, W., Kim, J. H., Rabinowitz, J., Pelczer, I., Semmelhack, M. F. and Bassler, B. L. (2007).** Phosphorylation and processing of the quorum-sensing molecule autoinducer-2 in enteric bacteria. *ACS Chem Biol* **2**, 128-136.
- Yamaguchi, S., Fujita, H., Ishihara, A., Aizawa, S. and Macnab, R. M. (1986).** Subdivision of flagellar genes of *Salmonella typhimurium* into regions responsible for assembly, rotation, and switching. *J Bacteriol* **166**, 187-193.
- Yoshida, K., Ishio, I., Nagakawa, E., Yamamoto, Y., Yamamoto, M. and Fujita, Y. (2000).** Systematic study of gene expression and transcription organization in the gntZ-ywaA region of the *Bacillus subtilis* genome. *Microbiology* **146 ( Pt 3)**, 573-579.
- Young, R. and Blasi, U. (1995).** Holins: form and function in bacteriophage lysis. *FEMS Microbiol Rev* **17**, 191-205.
- Youngman, P., Perkins, J. B. and Losick, R. (1984).** Construction of a cloning site near one end of Tn917 into which foreign DNA may be inserted without affecting transposition in *Bacillus subtilis* or expression of the transposon-borne erm gene. *Plasmid* **12**, 1-9.
- Zhou, J., Fazio, R. T. and Blair, D. F. (1995).** Membrane topology of the MotA protein of *Escherichia coli*. *J Mol Biol* **251**, 237-242.

**Zhou, J. and Blair, D. F. (1997).** Residues of the cytoplasmic domain of MotA essential for torque generation in the bacterial flagellar motor. *J Mol Biol* **273**, 428-439.

**Zhou, J., Sharp, L. L., Tang, H. L., Lloyd, S. A., Billings, S., Braun, T. F. and Blair, D. F. (1998).** Function of protonatable residues in the flagellar motor of *Escherichia coli*: a critical role for Asp 32 of MotB. *J Bacteriol* **180**, 2729-2735.

**ZoBell, C. E. (1937).** The influence of solid surface upon the physiological activities of bacteria in sea water. *J Bacteriol* **33**, 86.

**ZoBell, C. E. (1943).** The Effect of Solid Surfaces upon Bacterial Activity. *J Bacteriol* **46**, 39-56.

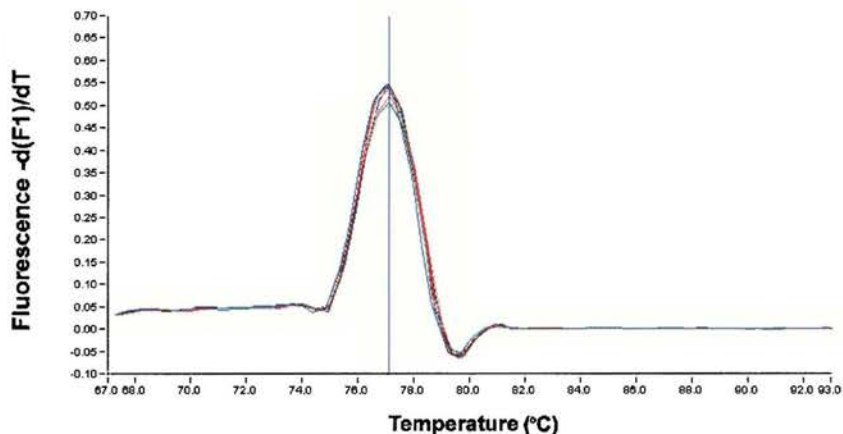


## APPENDIX 1

Melting curve analysis for each individual primer pair. Data was obtained following the last amplification cycle by continuous measurement of fluorescence between 65°C and 95°C with a temperature transition rate of 0.1°C/s.

File: C:\Documents and Settings\user\Desktop\Maree\Finale realtime ver\exp data\5-13-18.ABT Program: Melting Curve Run By: maree  
Run Date: Mar 29, 2006 18:21 Print Date:

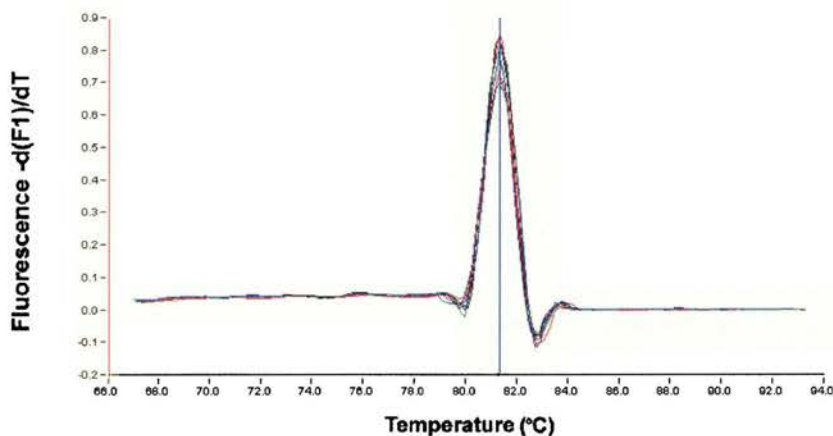
- 1 5 biofilm
- 2 Repl. of 5 biofilm
- 3 Repl. of 5 biofilm
- 4 Repl. of 5 biofilm
- 5 5 planc
- 6 Repl. of 5 planc
- 7 Repl. of 5 planc
- 8 Repl. of 5 planc
- 9 13 biofilm
- 10 Repl. of 13 biofilm
- 11 Repl. of 13 biofilm
- 12 Repl. of 13 biofilm
- 13 13 planc
- 14 Repl. of 13 planc
- 15 Repl. of 13 planc
- 16 Repl. of 13 planc
- 17 18 biofilm
- 18 Repl. of 18 biofilm
- 19 Repl. of 18 biofilm
- 20 Repl. of 18 biofilm
- 21 18 planc
- 22 Repl. of 18 planc
- 23 Repl. of 18 planc
- 24 Repl. of 18 planc



Digital Filter: Enabled Calculation Method: Polynomial  
Degrees to Average: 4.0 Red cursor Tm = 86.0000 Yellow cursor Tm = 86.0000 Green cursor Tm = 86.0000  
Color Compensation: Off Blue cursor Tm = 77.0366

File: C:\Documents and Settings\user\Desktop\Maree\Finale realtime ver\exp data\8 repeat.ABT Program: Melting Curve Run By: maree  
Run Date: Apr 06, 2006 17:19 Print Date:

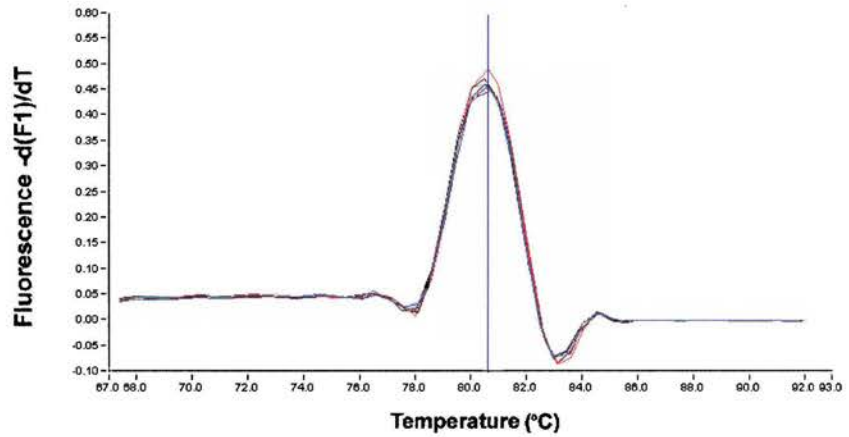
- 1 mut8 biofilm
- 2 Repl. of mut8 biofilm
- 3 Repl. of mut8 biofilm
- 4 Repl. of mut8 biofilm
- 5 mut8 planc
- 6 Repl. of mut8 planc
- 7 Repl. of mut8 planc
- 8 Repl. of mut8 planc



Digital Filter: Enabled Calculation Method: Polynomial  
Degrees to Average: 4.0 Red cursor Tm = 86.0000 Yellow cursor Tm = 86.0000 Green cursor Tm = 86.0000  
Color Compensation: Off Blue cursor Tm = 81.2767

File: C:\Documents and Settings\user\Desktop\Maree\Finale realtime werk\exp data\9-17-21-Q.ABT Program: Melting Curve Run By: maree  
 Run Date: Mar 29, 2006 15:40 Print Date:

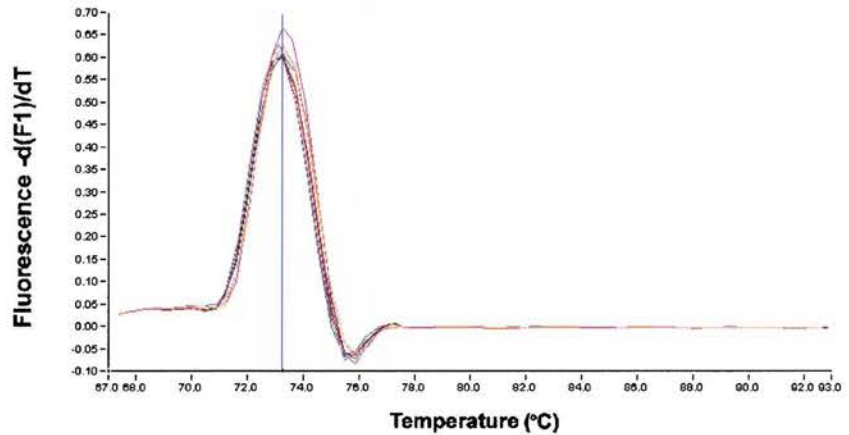
- 1 9 biofilm
- 2 Repl. of 9 biofilm
- 3 Repl. of 9 biofilm
- 4 Repl. of 9 biofilm
- 5 9 planc
- 6 Repl. of 9 planc
- 7 Repl. of 9 planc
- 8 Repl. of 9 planc
- 9 17 biofilm
- 10 Repl. of 17 biofilm
- 11 Repl. of 17 biofilm
- 12 Repl. of 17 biofilm
- 13 17 planc
- 14 Repl. of 17 planc
- 15 Repl. of 17 planc
- 16 Repl. of 17 planc
- 17 21 biofilm
- 18 Repl. of 21 biofilm
- 19 Repl. of 21 biofilm
- 20 Repl. of 21 biofilm
- 21 21 planc
- 22 Repl. of 21 planc
- 23 Repl. of 21 planc
- 24 Repl. of 21 planc
- 25 Q biofilm
- 26 Repl. of Q biofilm
- 27 Repl. of Q biofilm
- 28 Repl. of Q biofilm
- 29 Q planc
- 30 Repl. of Q planc
- 31 Repl. of Q planc
- 32 Repl. of Q planc



Digital Filter: Enabled Calculation Method: Polynomial  
 Degrees to Average: 4.3 Red cursor Tm = 86.0000 Yellow cursor Tm = 86.0000 Green cursor Tm = 86.0000  
 Color Compensation: Off Blue cursor Tm = 80.8275

File: C:\Documents and Settings\user\Desktop\Maree\Finale realtime werk\exp data\5-13-18.ABT Program: Melting Curve Run By: maree  
 Run Date: Mar 29, 2006 16:21 Print Date:

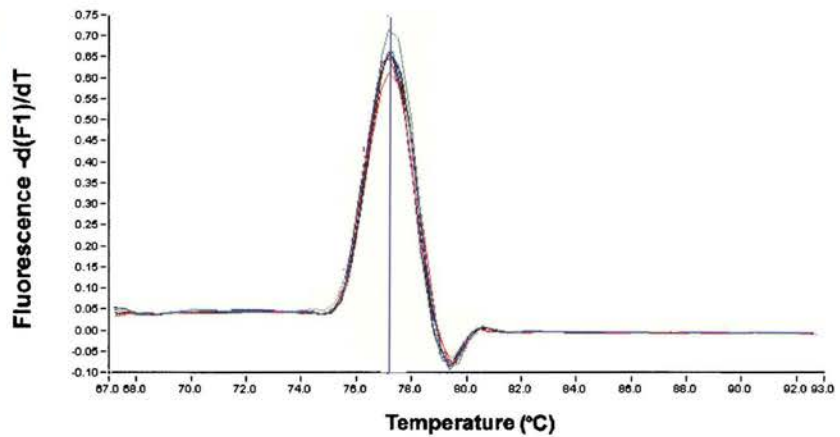
- 1 5 biofilm
- 2 Repl. of 5 biofilm
- 3 Repl. of 5 biofilm
- 4 Repl. of 5 biofilm
- 5 5 planc
- 6 Repl. of 5 planc
- 7 Repl. of 5 planc
- 8 Repl. of 5 planc
- 9 13 biofilm
- 10 Repl. of 13 biofilm
- 11 Repl. of 13 biofilm
- 12 Repl. of 13 biofilm
- 13 13 planc
- 14 Repl. of 13 planc
- 15 Repl. of 13 planc
- 16 Repl. of 13 planc
- 17 18 biofilm
- 18 Repl. of 18 biofilm
- 19 Repl. of 18 biofilm
- 20 Repl. of 18 biofilm
- 21 18 planc
- 22 Repl. of 18 planc
- 23 Repl. of 18 planc
- 24 Repl. of 18 planc



Digital Filter: Enabled Calculation Method: Polynomial  
 Degrees to Average: 4.0 Red cursor Tm = 86.0000 Yellow cursor Tm = 86.0000 Green cursor Tm = 86.0000  
 Color Compensation: Off Blue cursor Tm = 73.2272

File: C:\Documents and Settings\user\Desktop\Maree\Finale realtime werk\exp data\16A en 16B.ABT Program: Melting Curve Run By: maree  
 Run Date: Apr 04, 2006 11:27 Print Date:

- 1 16A biofilm
- 2 Repli. of 16A biofilm
- 3 Repli. of 16A biofilm
- 4 Repli. of 16A biofilm
- 5 16A planc
- 6 Repli. of 16A planc
- 7 Repli. of 16A planc
- 8 Repli. of 16A planc
- 9 16B biofilm
- 10 Repli. of 16B biofilm
- 11 Repli. of 16B biofilm
- 12 Repli. of 16B biofilm
- 13 16B planc
- 14 Repli. of 16B planc
- 15 Repli. of 16B planc
- 16 Repli. of 16B planc



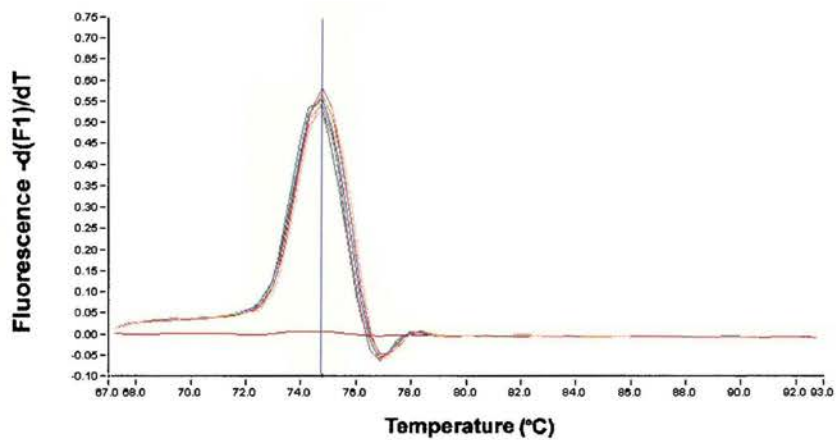
Digital Filter: Enabled      Calculation Method: Polynomial

Degrees to Average: 4.0      Red cursor Tm = 66.0000      Yellow cursor Tm = 66.0000      Green cursor Tm = 66.0000

Color Compensation: Off      Blue cursor Tm = 77.1221

File: C:\Documents and Settings\user\Desktop\Maree\Finale realtime werk\exp data\16A en 16B.ABT Program: Melting Curve Run By: maree  
 Run Date: Apr 04, 2006 11:27 Print Date:

- 1 16A biofilm
- 2 Repli. of 16A biofilm
- 3 Repli. of 16A biofilm
- 4 Repli. of 16A biofilm
- 5 16A planc
- 6 Repli. of 16A planc
- 7 Repli. of 16A planc
- 8 Repli. of 16A planc
- 9 16B biofilm
- 10 Repli. of 16B biofilm
- 11 Repli. of 16B biofilm
- 12 Repli. of 16B biofilm
- 13 16B planc
- 14 Repli. of 16B planc
- 15 Repli. of 16B planc
- 16 Repli. of 16B planc

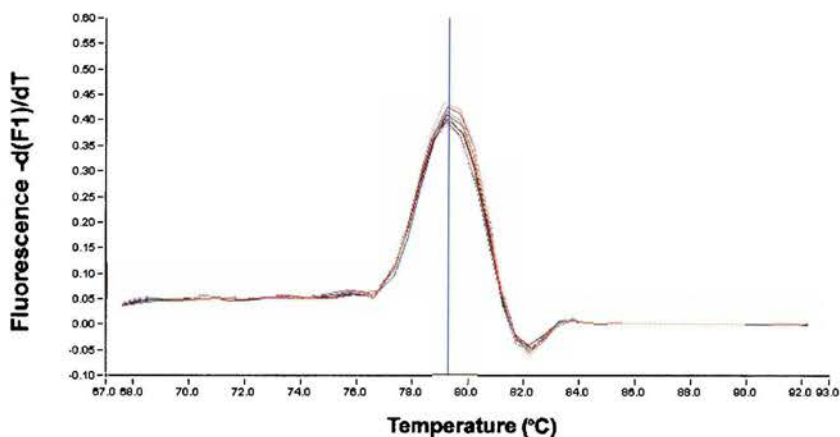


Digital Filter: Enabled      Calculation Method: Polynomial

Degrees to Average: 4.0      Red cursor Tm = 66.0000      Yellow cursor Tm = 66.0000      Green cursor Tm = 66.0000

Color Compensation: Off      Blue cursor Tm = 74.7852

- 1 9 biofilm
- 2 Repli. of 9 biofilm
- 3 Repli. of 9 biofilm
- 4 Repli. of 9 biofilm
- 5 9 planc
- 6 Repli. of 9 planc
- 7 Repli. of 9 planc
- 8 Repli. of 9 planc
- 9 17 biofilm
- 10 Repli. of 17 biofilm
- 11 Repli. of 17 biofilm
- 12 Repli. of 17 biofilm
- 13 17 planc
- 14 Repli. of 17 planc
- 15 Repli. of 17 planc
- 16 Repli. of 17 planc
- 17 21 biofilm
- 18 Repli. of 21 biofilm
- 19 Repli. of 21 biofilm
- 20 Repli. of 21 biofilm
- 21 21 planc
- 22 Repli. of 21 planc
- 23 Repli. of 21 planc
- 24 Repli. of 21 planc
- 25 Q biofilm
- 26 Repli. of Q biofilm
- 27 Repli. of Q biofilm
- 28 Repli. of Q biofilm
- 29 Q planc
- 30 Repli. of Q planc
- 31 Repli. of Q planc
- 32 Repli. of Q planc

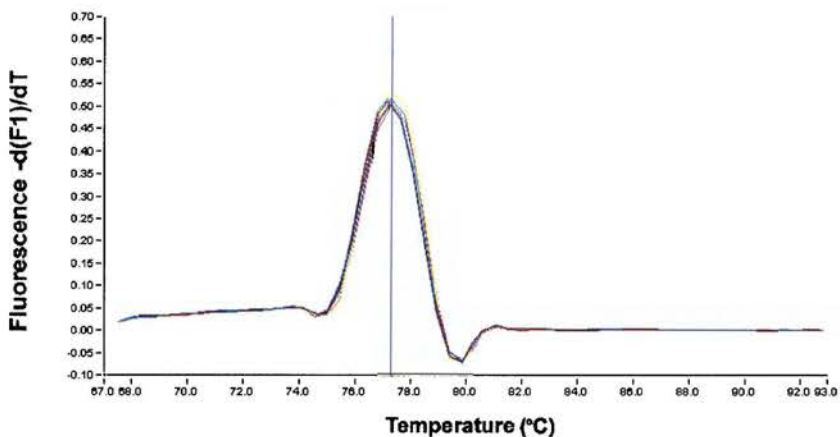


Digital Filter: Enabled      Calculation Method: Polynomial

Degrees to Average: 4.3      Red cursor Tm = 66.0000      Yellow cursor Tm = 66.0000      Green cursor Tm = 66.0000

Color Compensation: Off      Blue cursor Tm = 79.2427

- 1 5 biofilm
- 2 Repli. of 5 biofilm
- 3 Repli. of 5 biofilm
- 4 Repli. of 5 biofilm
- 5 5 planc
- 6 Repli. of 5 planc
- 7 Repli. of 5 planc
- 8 Repli. of 5 planc
- 9 13 biofilm
- 10 Repli. of 13 biofilm
- 11 Repli. of 13 biofilm
- 12 Repli. of 13 biofilm
- 13 13 planc
- 14 Repli. of 13 planc
- 15 Repli. of 13 planc
- 16 Repli. of 13 planc
- 17 18 biofilm
- 18 Repli. of 18 biofilm
- 19 Repli. of 18 biofilm
- 20 Repli. of 18 biofilm
- 21 18 planc
- 22 Repli. of 18 planc
- 23 Repli. of 18 planc
- 24 Repli. of 18 planc



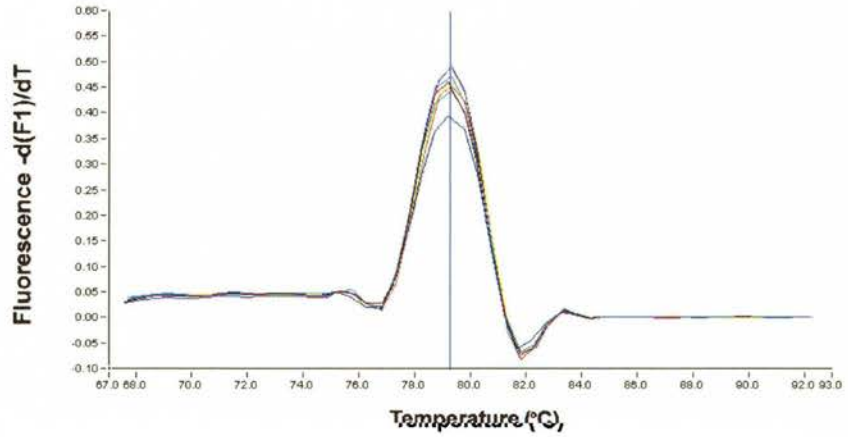
Digital Filter: Enabled      Calculation Method: Polynomial

Degrees to Average: 4.0      Red cursor Tm = 66.0000      Yellow cursor Tm = 66.0000      Green cursor Tm = 66.0000

Color Compensation: Off      Blue cursor Tm = 77.3386

File: C:\Documents and Settings\user\Desktop\Maree\Finale realtime werk\exp data\9-17-21-Q.ABT Program: Melting Curve Run By: maree  
 Run Date: Mar 29, 2006 15:40 Print Date:

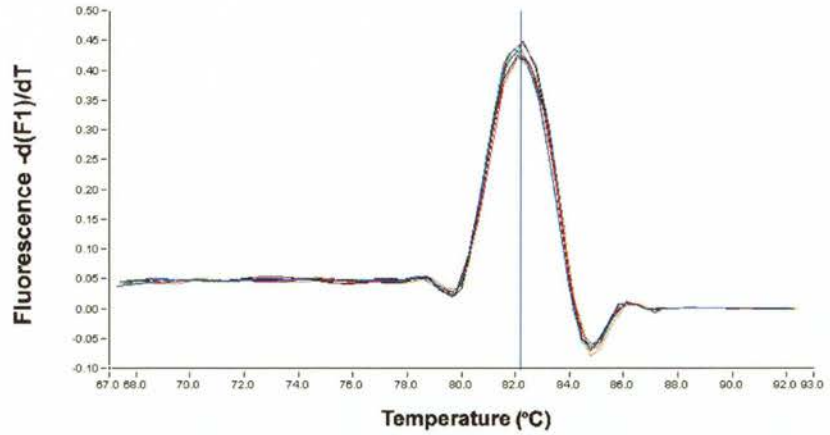
- 1 9 biofilm
- 2 Repli. of 9 biofilm
- 3 Repli. of 9 biofilm
- 4 Repli. of 9 biofilm
- 5 9 planc
- 6 Repli. of 9 planc
- 7 Repli. of 9 planc
- 8 Repli. of 9 planc
- 9 17 biofilm
- 10 Repli. of 17 biofilm
- 11 Repli. of 17 biofilm
- 12 Repli. of 17 biofilm
- 13 17 planc
- 14 Repli. of 17 planc
- 15 Repli. of 17 planc
- 16 Repli. of 17 planc
- 17 21 biofilm
- 18 Repli. of 21 biofilm
- 19 Repli. of 21 biofilm
- 20 Repli. of 21 biofilm
- 21 21 planc
- 22 Repli. of 21 planc
- 23 Repli. of 21 planc
- 24 Repli. of 21 planc
- 25 Q biofilm
- 26 Repli. of Q biofilm
- 27 Repli. of Q biofilm
- 28 Repli. of Q biofilm
- 29 Q planc
- 30 Repli. of Q planc
- 31 Repli. of Q planc
- 32 Repli. of Q planc



Digital Filter: Enabled Calculation Method: Polynomial  
 Degrees to Average: 4.3 Red cursor Tm = 66.0000 Yellow cursor Tm = 66.0000 Green cursor Tm = 66.0000  
 Color Compensation: Off Blue cursor Tm = 79.2427

File: C:\Documents and Settings\user\Desktop\Maree\Finale realtime werk\exp data\16S en 8.ABT Program: Melting Curve Run By: maree  
 Run Date: Mar 29, 2006 12:51 Print Date:

- 1 16S planc 1
- 2 Repli. of 16S planc 1
- 3 Repli. of 16S planc 1
- 4 Repli. of 16S planc 1
- 5 16S planc 2
- 6 Repli. of 16S planc 2
- 7 Repli. of 16S planc 2
- 8 16S planc 3
- 9 Repli. of 16S planc 3
- 10 Repli. of 16S planc 3
- 11 16S biofilm 1
- 12 Repli. of 16S biofilm 1
- 13 Repli. of 16S biofilm 1
- 14 Repli. of 16S biofilm 1
- 15 8 planc 1
- 16 Repli. of 8 planc 1
- 17 Repli. of 8 planc 1
- 18 Repli. of 8 planc 1
- 19 8 planc 2
- 20 Repli. of 8 planc 2
- 21 Repli. of 8 planc 2
- 22 8 planc 3
- 23 Repli. of 8 planc 3
- 24 Repli. of 8 planc 3
- 25 8 biofilm 1
- 26 Repli. of 8 biofilm 1
- 27 Repli. of 8 biofilm 1
- 28 Repli. of 8 biofilm 1



Digital Filter: Enabled Calculation Method: Polynomial  
 Degrees to Average: 4.2 Red cursor Tm = 66.0000 Yellow cursor Tm = 66.0000 Green cursor Tm = 66.0000  
 Color Compensation: Off Blue cursor Tm = 82.1656