

Nachweis der verwendeten Quellen

- Abe, A., Heczko, U., Hegele, R.G. and Finlay, B.B.: Two enteropathogenic *Escherichia coli* type III secreted proteins, EspA and EspB, are virulence factors. *J. Exp. Med.* 188 (1998) 1907-1916.
- Abe, A.B., Kenny, B., Stein, M. and Finlay, B.B.: Characterization of two virulence proteins secreted by rabbit enteropathogenic *Escherichia coli*, EspA and EspB, whose maximal expression is sensitive to host body temperature. *Infect. Immun.* 65 (1997) 3547-3555.
- Achtman, M.: Microevolution during epidemic spread of *Neisseria meningitidis*. *Electrophoresis* 19 (1998) 593-596.
- Adu-Bobie, J., Frankel, G., Bain, C., Goncalves, A.G., Trabulsi, L.R., Douce, G., Knutton, S. and Dougan, G.: Detection of intimins alpha, beta, gamma, and delta, four intimin derivatives expressed by attaching and effacing microbial pathogens. *J. Clin. Microbiol.* 36 (1998a) 662-668.
- Adu-Bobie, J., Trabulsi, L.R., Carneiro-Sampaio, M.M., Dougan, G. and Frankel, G.: Identification of immunodominant regions within the C-terminal cell binding domain of intimin alpha and intimin beta from enteropathogenic *Escherichia coli*. *Infect. Immun.* 66 (1998b) 5643-5649.
- Agin, T.S. and Wolf, M.K.: Identification of a family of intimins common to *Escherichia coli* causing attaching-effacing lesions in rabbits, humans, and swine. *Infect. Immun.* 65 (1997) 320-326.
- An, H., Fairbrother, J.M., Dubreuil, J.D. and Harel, J.: Cloning and characterization of the *eae* gene from a dog attaching and effacing *Escherichia coli* strain 4221. *FEMS Microbiol. Lett.* 148 (1997) 239-245.
- Arber, W.: Evolution of prokaryotic genomes. *Gene* 135 (1993) 49-56.
- Bäumler, A.J.: The record of horizontal gene transfer in *Salmonella*. *Trends Microbiol.* 5 (1997) 318-322.

- Bäumler, A.J., Gilde, A.J., Tsois, R.M., van der Velden, A.W., Ahmer, B.M. and F., H.:** Contribution of horizontal gene transfer and deletion events to development of distinctive patterns of fimbrial operons during evolution of *Salmonella* serotypes. *J Bacteriol.* 179 (1997) 317-322.
- Benkel, P., Hudel, M. and Chakraborty, T.:** The localisation of the LEE-region in the O26:H- Shiga toxin-producing *Escherichia coli* strain 413/89-1, 49. Kongreß der DGHM. Einhorn-Press Verlag, Jena, Germany, 1997, pp. 53.
- Bergthorsson, U. and Ochman, H.:** Chromosomal changes during experimental evolution in laboratory populations of *Escherichia coli*. *J. Bacteriol.* 181 (1999) 1360-1363.
- Bisercic, M., Feutrier, J.Y. and Reeves, P.R.:** Nucleotide Sequence of the *gnd* Genes from Nine Natural Isolates of *Escherichia coli*: Evidence of Intragenic Recombination as a Contributing Factor in the Evolution of the Polymorphic *gnd* Locus. *J. Bacteriol.* 173 (1991) 3894-3900.
- Bisercic, M. and Ochman, H.:** The Ancestry of Insertion Sequences Common to *Escherichia coli* and *Salmonella typhimurium*. *J. Bacteriol.* 175 (1993a) 7863-7868.
- Bisercic, M. and Ochman, H.:** Natural Populations of *Escherichia coli* and *Salmonella typhimurium* Harbor the Same Classes of Insertion Sequences. *Genetics* 133 (1993b) 449-454.
- Blattner, F.R., Plunkett, G., 3rd, Bloch, C.A., Perna, N.T., Burland, V., Riley, M., Collado-Vides, J., Glasner, J.D., Rode, C.K., Mayhew, G.F., Gregor, J., Davis, N.W., Kirkpatrick, H.A., Goeden, M.A., Rose, D.J., Mau, B. and Shao, Y.:** The complete genome sequence of *Escherichia coli* K-12. *Science* 277 (1997) 1453-1474.
- Blum, G., Ott, M., Lischewski, A., Ritter, A., Imrich, H., Tschape, H. and Hacker, J.:** Excision of large DNA regions termed pathogenicity islands from tRNA- specific loci in the chromosome of an *Escherichia coli* wild-type pathogen. *Infect. Immun.* 62 (1994) 606-614.
- Bork, P., Dandekar, T., Snel, B. and Huynen, M.:** Genome Comparisons To Monitor Molecular Evolution In Genome Comparisons To Monitor Molecular Evolution, 50th Congress of the DGHM 25th Annual Meeting of the DGI.: Microbial Evolution and Infection. Einhorn-Press Verlag GmbH, Reinbeck, 1998, pp. 80.

- Boyd, E.F.:** Analysis of the Type 1 Pilin Gene Cluster *fim* in *Salmonella*: Its Distinct Evolutionary Histories in the 5' and 3' Regions. *J. Bacteriol.* 181 (1999) 1301-1308.
- Boyd, E.F. and Hartl, D.L.:** Recent horizontal transmission of plasmids between natural populations of *Escherichia coli* and *Salmonella enterica*. *J. Bacteriol.* 179 (1997) 1622-1627.
- Boyd, E.F., Nelson, K., Wang, F.S., Whittam, T.S. and Selander, R.K.:** Molecular genetic basis of allelic polymorphism in *malate dehydrogenase (mdh)* in natural populations of *Escherichia coli* and *Salmonella enterica*. *Proc. Natl. Acad. Sci. USA* 91 (1994) 1280-1284.
- Briggs, C.E. and Fratamico, P.M.:** Molecular characterization of an antibiotic resistance gene cluster of *Salmonella typhimurium* DT104. *Antimicrob. Agents Chemother.* 43 (1999) 846-849.
- Brown, A.H.D., Feldman, M.W. and Nevo, E.:** Multilocus structure of natural populations of *Hordeum spontaneum*. *Genetics* 96 (1980) 523-526.
- Casalino, M., Latella, M.C., Prosseda, G. and Colonna, B.:** CadC Is the Preferential Target of a convergent Evolution Driving Enteroinvasive *Escherichia coli* toward a Lysine Decarboxylase-Defective Phenotype. *Infect. Immun.* 71 (2003) 5472-5479.
- Caugant, D.A., Levin, B.R., Orskov, I., Orskov, F., Svanborg, E.C. and Selander, R.K.:** Genetic diversity in relation to serotype in *Escherichia coli*. *Infect. Immun.* 49 (1985) 407-413.
- Caugant, D.A., Mocca, L.F., Frasc, C.E., Froholm, L.O., Zollinger, W.D. and Selander, R.K.:** Genetic structure of *Neisseria meningitidis* populations in relation to serogroup, serotype, and outer membrane protein pattern. *J. Bacteriol.* 169 (1987) 2781-2792.
- Chan, M.S., Maiden, M.C. and Spratt, B.G.:** Database-driven multi locus sequence typing (MLST) of bacterial pathogens. *Bioinformatics* 17 (2001) 1077-1083.
- Cid, D., Ruiz-Santa-Quiteria, J.A., Marin, I., Sanz, R., Orden, J.A., Amils, R. and de la Fuente, R.:** Association between intimin (*eae*) and EspB gene subtypes in attaching and effacing *Escherichia coli* strains isolated from diarrhoeic lambs and goat kids. *Microbiology* 147 (2001) 2341-2353.

- Clarke, S.C., Haigh, R.D., Freestone, P.P. and Williams, P.H.: Virulence of enteropathogenic *Escherichia coli*, a global pathogen. *Clin. Microbiol. Rev.* 16 (2003) 365-378.
- Deibel, C., Krämer, S., Chakraborty, T. and Ebel, F.: EspE, a novel secreted protein of attaching and effacing bacteria, is directly translocated into infected host cells, where it appears as a tyrosin-phosphorylated 90kDa protein. *Mol. Microbiol.* 28 (1998) 463-474.
- Donnenberg, M.S., Kaper, J.B. and Finlay, B.B.: Interactions between enteropathogenic *Escherichia coli* and host epithelial cells. *Trends Microbiol.* 5 (1997a) 109-114.
- Donnenberg, M.S., Lai, L.C. and Taylor, K.A.: The locus of enterocyte effacement pathogenicity island of enteropathogenic *Escherichia coli* encodes secretion functions and remnants of transposons at its extreme right end. *Gene* 184 (1997b) 107-114.
- Donnenberg, M.S. and Whittam, T.S.: Pathogenesis and evolution of virulence in enteropathogenic and enterohemorrhagic *Escherichia coli*. *J. Clin. Invest.* 107 (2001) 539-548.
- Donnenberg, M.S., Yu, J. and Kaper, J.B.: A Second Chromosomal Gene Necessary for Intimate Attachment of Enteropathogenic *Escherichia coli* to Epithelial Cells. *J. Bacteriol.* 175 (1993) 4670-4680.
- Dykhuizen, D.E. and Green, L.: DNA sequence variation, DNA phylogeny and recombination. *Genetics* 113 (1986) 71.
- Dykhuizen, D.E. and Green, L.: Recombination in *Escherichia coli* and the definition of biological species. *J. Bacteriol.* 173 (1991) 7257-7268.
- Dykhuizen, D.E., Polin, D.S., Dunn, J., Wilske, B., Reac-Musric, V., Dattwyler, R.J. and Luft, B.J.: *Borrelia burgdorferi* is clonal: implications for taxonomy and vaccine development. *Proc. Natl. Acad. Sci. USA* 90 (1992) 10162-10167.
- Ebel, F., Podzadel, T., Rohde, M., Kresse, A.U., Kramer, S., Deibel, C., Guzmán, C.A. and Chakraborty, T.: Initial binding of Shiga toxin-producing *Escherichia coli* to host cells and subsequent induction of actin rearrangements depend on filamentous EspA-containing surface appendages. *Mol. Microbiol.* 30 (1998) 147-161.

Efron, B., Halloran, E. and Holmes, S.: Bootstrap confidence levels for phylogenetic trees. Proc. Natl. Acad. Sci. USA 93 (1996) 13429-13434.

Elliott, S.J., Wainwright, L.A., McDaniel, T.K., Jarvis, K.G., Deng, Y.K., Lai, L.C., McNamara, B.P., Donnenberg, M.S. and Kaper, J.B.: The complete sequence of the locus of enterocyte effacement (LEE) from enteropathogenic *Escherichia coli* E2348/69. Mol. Microbiol. 28 (1998) 1-4.

Enright, M.C. and Spratt, B.G.: Multilocus sequence typing. Trends Microbiol. 7 (1999) 482-487.

Feil, E.J., Holmes, E.C., Bessen, D.E., Chan, M.S., Day, N.P., Enright, M.C., Goldstein, R., Hood, D.W., Kalia, A., Moore, C.E., Zhou, J. and Spratt, B.G.: Recombination within natural populations of pathogenic bacteria: short-term empirical estimates and long-term phylogenetic consequences. Proc. Natl. Acad. Sci. USA 98 (2001) 182-187.

Feil, E.J., Maiden, M.C., Achtman, M. and Spratt, B.G.: The relative contributions of recombination and mutation to the divergence of clones of *Neisseria meningitidis*. Mol. Biol. Evol. 16 (1999) 1496-1502.

Feil, E.J., Smith, J.M., Enright, M.C. and Spratt, B.G.: Estimating recombinational parameters in *Streptococcus pneumoniae* from multilocus sequence typing data. Genetics 154 (2000) 1439-1450.

Felsenstein, J.: Confidence limits on phylogenies: An approach using the bootstrap. Evolution 39 (1985) 783-791.

Feng, P., Lampel, K.A., Karch, H. and Whittam, T.S.: Genotypic and phenotypic changes in the emergence of *Escherichia coli* O157:H7. J. Infect. Dis. 177 (1998) 1750-1753.

Fields, P.I., Blom, K., Hughes, H.J., Hessel, L.O., Feng, P. and Swaminathan, B.: Molecular characterization of the gene encoding H antigen in *Escherichia coli* and development of a PCR-restriction fragment length polymorphism test for identification of *E. coli* O157:H7 and O157:NM. J. Clin. Microbiol. 35 (1997) 1066-1070.

Fitch, W.: Toward defining the course of evolution: Minimal change. Syst. Zool. 20 (1971) 406-416.

- Foubister, V., Rosenshine, I., Donnenberg, M.S. and Finlay, B.B.: The *eaeB* Gene of Enteropathogenic *Escherichia coli* is Necessary for Signal Transduction in Epithelial Cells. Infect. Immun. 62 (1994) 3038-3040.**
- Franke, S., Harmsen, D., Caprioli, A., Pierard, D., Wieler, L.H. and Karch, H.: Clonal relatedness of Shiga-like toxin-producing *Escherichia coli* O101 strains of human and porcine origin. J. Clin. Microbiol. 33 (1995) 3174-3178.**
- Frankel, G., Candy, D.C., Everest, P. and Dougan, G.: Characterization of the C-terminal domains of intimin-like proteins of enteropathogenic and enterohemorrhagic *Escherichia coli*, *Citrobacter freundii*, and *Hafnia alvei*. Infect. Immun. 62 (1994) 1835-1842.**
- Gannon, V.P., Rashed, M., King, R.K. and Thomas, E.J.: Detection and characterization of the *eae* gene of Shiga-like toxin-producing *Escherichia coli* using polymerase chain reaction. J. Clin. Microbiol. 31 (1993) 1268-1274.**
- Groisman, E.A. and Ochman, H.: How to become a pathogen? Trends Microbiol. 2 (1994) 289-294.**
- Guttman, D.S. and Dykhuizen, D.E.: Clonal divergence in *Escherichia coli* as a result of recombination, not mutation. Science 25 (1994) 1380-1383.**
- Hacker, J., Blum-Oehler, G., Mühldorfer, I. and Tschäpe, H.: Pathogenicity islands of virulent bacteria: structure, function and impact on microbial evolution. Mol. Microbiol. 23 (1997) 1089-1097.**
- Hacker, J. and Heesemann, J.: Molekulare Infektionsbiologie. Gustav Fischer Verlag, Heidelberg, 2000**
- Jenkins, C., Chart, H., H.R., S., Hartland, E.L., Batchelor, M., Delahay, R.M., Dougan, G. and G., F.: Antibody response of patients infected with verocytotoxin-producing *Escherichia coli* to protein antigens encoded on the LEE locus. J. Med. Microbiol. 49 (2000) 97-101.**
- Jores, J., Zehmke, K., Eichberg, J., Rumer, L. and Wieler, L.H.: Description of a novel intimin variant (type zeta) in the bovine O84:H- Shigatoxin-producing *E. coli* strain 537/89 and the diagnostic value of intimin typing. Emp. Biol. Med. 228 (2003) 369-375.**

- Jores, J., Zehmke, K., Rumer, L., Kießling, S., Eichberg, J., Lautenschläger, S. and Wieler, L.H.: Phylogeny of bovine non-O157-Shigatoxin-producing *E. coli* (STEC) strains, harboring the Locus of Enterocyte Effacement (LEE), 2nd Meeting of the Members of the DFG-Priority Program "Ecology of Pathogenic Bacteria: Molecular and Evolutionary Aspects", Berlin, Germany, 2001.
- Kaper, J.B. and O'Brien, A.D.: *Escherichia coli* O157:H7 and other shiga toxin-producing *E. coli* strains. ASM Press, Washington, DC, 1998
- Karch, H., Bohm, H., Schmidt, H., Gunzer, F., Aleksic, S. and Heesemann, J.: Clonal structure and pathogenicity of Shiga-like toxin-producing, sorbitol-fermenting *Escherichia coli* O157:H. J. Clin. Microbiol. 31 (1993) 1200-1205.
- Karch, H., Schubert, S., Zhang, D., Zhang, W., Schmidt, H., Olschlager, T. and Hacker, J.: A genomic island, termed high-pathogenicity island, is present in certain non-O157 Shiga toxin-producing *Escherichia coli* clonal lineages. Infect. Immun. 67 (1999) 5994-6001.
- Kenny, B., DeVinney, R., Stein, M., Reinscheid, D.J., Frey, E.A. and Finlay, B.B.: Enteropathogenic *E.coli* (EPEC) Transfers Its Receptor for Intimate Adherence into Mammalian Cells. Cell Microbiol. 91 (1997) 511-520.
- Kenny, B., Lai, L.C., Finlay, B.B. and Donnenberg, M.S.: EspA, a protein secreted by enteropathogenic *Escherichia coli* is required to induce signals in epithelial cells. Mol. Microbiol. 20 (1995) 313-323.
- Koufopanou, V., Burt, A., Szaro, T. and Taylor, J.W.: Gene genealogies, cryptic species, and molecular evolution in the human pathogen *Coccidioides immitis* and relatives (*Ascomycota*, *Onygenales*). Mol. Biol. Evol. 18 (2001) 1246-1258.
- Kresse, A.U., Rohde, M. and Guzmán, C.A.: The EspD Protein of Enterohemorrhagic *Escherichia coli* Is Required for the Formation of Bacterial Surface Appendages and Is Incorporated in the Cytoplasmic Membranes of Target Cells. Infect. Immun. 67 (1999) 4834-4842.
- Kresse, A.U., Schulze, K., Deibel, C., Ebel, F., Rohde, M., Chakraborty, T. and Guzman, C.A.: Pas, a novel protein required for protein secretion and attaching and effacing activities of enterohemorrhagic *Escherichia coli*. J. Bacteriol. 180 (1998) 4370-4379.

Kumar, S., Tamura, K., Jakobsen, I.B. and Nei, M.: MEGA2: molecular evolutionary genetics analysis software. *Bioinformatics* 17 (2001) 1244-1245.

Le Minor, L. and Popof, M.Y.: Antigenic formulas of the *Salmonella* serovars. WHO collaborating Centre for Reference and Research on *Salmonella*, Institut Pasteur, Paris, 1987.

LeClerc, J.E., Li, B., Payne, W.L. and Cebula, T.A.: Promiscuous Origin of a Chimeric Sequence in the *Escherichia coli* O157:H7 Genome. *J. Bacteriol.* 181 (1999) 7614-7617.

Lecointre, G., Rachdi, L., Darlu, P. and Denamur, E.: *Escherichia coli* molecular phylogeny using the incongruence length difference test. *Mol. Biol. Evol.* 15 (1998) 1685-1695.

Lederberg, J.: Emerging infections: an evolutionary perspective. *Emerg. Infect. Dis.* 4 (1998) 366-371.

Li, J., Nelson, K., McWhorter, A.C., Whittam, T.S. and Selander, R.K.: Recombinational basis of serovar diversity in *Salmonella enterica*. *Proc. Natl. Acad. Sci. USA* 91 (1994) 2552-2556.

Li, W.H.: So, what about the molecular clock hypothesis? *Curr. Opin. Genet. Dev.* 3 (1993) 896-901.

Liu, S.L., Schryvers, A.B., Sanderson, K.E. and Johnston, R.N.: Bacterial phylogenetic clusters revealed by genome structure. *J. Bacteriol.* 181 (1999) 6747-6755.

Louie, M., De Azavedo, J.C., Clarke, R., Borczk, A., Lior, H., Richter, M. and Brunton, J.: Sequence heterogeneity of the *eae* gene and detection of verotoxin-producing *Escherichia coli* using serotype-specific primers. *Epidemiol. Infect.* 112 (1994) 449-461.

Louie, M., De Azavedo, J.C., Handelsman, M.Y., Clark, G., Ally, B., Dytoc, M., Sherman, P. and Brunton, J.: Expression and characterization of the *eaeA* gene product of *Escherichia coli* serotype O157:H7. *Infect. Immun.* 61 (1993) 4085-4092.

- Louie, M., Read, S., Simo, A.E., Holland, J., Louie, L., K., Z., Brunton, J. and Hii, J.:** Application of Multiplex PCR for Detection of Non-O157 Verocytotoxin-Producing *Escherichia coli* in Bloody Stools: Identification of Serogroups O26 and O111. *J. Clin. Microbiol.* 36 (1998) 3375-3377.
- Ludwig, W., Strunk, O., Klugbauer, S., Klugbauer, N., Weizenegger, M., Neumaier, J., Bachleitner, M. and Schleifer, K.H.:** Bacterial phylogeny based on comparative sequence analysis. *Electrophoresis* 19 (1998) 554-568.
- Maiden, M.C., Bygraves, J.A., Feil, E., Morelli, G., Russell, J.E., Urwin, R., Zhang, Q., Zhou, J., Zurth, K., Caugant, D.A., Feavers, I.M., Achtman, M. and Spratt, B.G.:** Multilocus sequence typing: a portable approach to the identification of clones within populations of pathogenic microorganisms. *Proc. Natl. Acad. Sci. USA* 95 (1998) 3140-3145.
- Maurelli, A.T., Fernandez, R.E., Bloch, C.A., Rode, C.K. and Fasano, A.:** "Black holes" and bacterial pathogenicity: a large genomic deletion that enhances the virulence of *Shigella spp.* and enteroinvasive *Escherichia coli*. *Proc. Natl. Acad. Sci. USA* 95 (1998) 3943-3948.
- McDaniel, T.K., Jarvis, K.G., Donnenberg, M.S. and Kaper, J.B.:** A genetic locus of enterocyte effacement conserved among diverse enterobacterial pathogens. *Proc. Natl. Acad. Sci. USA* 92 (1995) 1664-1668.
- McGraw, E.A., Li, J., Selander, R.K. and Whittam, T.S.:** Molecular evolution and mosaic structure of alpha, beta, and gamma intimins of pathogenic *Escherichia coli*. *Mol. Biol. Evol.* 16 (1999) 12-22.
- Milkman, R.:** Recombinational Exchange among Clonal Populations. ASM, 1996
- Milkman, R. and Bridges, M.M.:** Molecular evolution of the *Escherichia coli* chromosome. IV. Sequence comparisons. *Genetics* 133 (1993) 455-468.
- Morabito, S., Karch, H., Mariani-Kurkdjian, P., Schmid, H., Minelli, F., Bingen, E. and Caprioli, A.:** Enteroaggregative, Shiga Toxin-Producing *Escherichia coli* O111:H2 Associated with an Outbreak of Hemolytic-Uremic Syndrome. *J. Clin. Microbiol.* 36 (1998) 840-842.

- Neely, M.N., Dell, C.L. and Olson, E.R.: Roles of LysP and CadC in mediating the lysine requirement for acid induction of the *Escherichia coli cad* operon. *J. Bacteriol.* 176 (1994) 3278-3285.
- Neely, M.N. and Olson, E.R.: Kinetics of expression of the *Escherichia coli cad* operon as a function of pH and lysine. *J. Bacteriol.* 178 (1996) 5522-5528.
- Nelson, D.E. and Young, K.D.: Penicillin binding protein 5 affects cell diameter, contour, and morphology of *Escherichia coli*. *J. Bacteriol.* 182 (2000) 1714-1721.
- Nelson, K. and Selander, R.K.: Evolutionary genetics of the proline permease gene (*putP*) and the control region of the proline utilization operon in populations of *Salmonella* and *Escherichia coli*. *J. Bacteriol.* 174 (1992) 6886-6895.
- Nelson, K. and Selander, R.K.: Intergeneric transfer and recombination of the 6-phosphogluconate dehydrogenase gene (*gnd*) in enteric bacteria. *Proc. Natl. Acad. Sci. USA* 91 (1994) 10227-10231.
- Ochman, H. and Bergthorsson, U.: Genome evolution in enteric bacteria. *Curr. Opin. Genet. Dev.* 5 (1995) 734-738.
- Ochman, H., Elwyn, S. and Moran, N.A.: Calibrating bacterial evolution. *Proc. Natl. Acad. Sci. USA* 96 (1999) 12638-12643.
- Ochman, H. and Selander, R.K.: Evidence for clonal population structure in *Escherichia coli*. *Proc. Natl. Acad. Sci. USA* 81 (1984a) 198-201.
- Ochman, H. and Selander, R.K.: Standard Reference Strains of *Escherichia coli* from Natural Populations. *J. Bacteriol.* 157 (1984b) 690-693.
- O'Rourke, M. and Stevens, E.: Genetic structure of *Neisseria gonorrhoeae* populations: a non-clonal pathogen. *J. Gen. Microbiol.* 139 (1993) 2603-2611.
- Orskov, F. and Orskov, I.: Summary of a workshop on the clone concept in the epidemiology, taxonomy, and evolution of the *enterobacteriaceae* and other bacteria. *J. Infect. Dis.* 148 (1983) 346-357.

- Ostroff, S.M.: Emerging infectious diseases 1997-1998: the role of molecular epidemiology. Mem. Inst. Oswaldo Cruz. 94 (1999) 1-3.**
- Oswald, E., Schmidt, H., Morabito, S., Karch, H., Marches, O. and Caprioli, A.: Typing of intimin genes in human and animal enterohemorrhagic and enteropathogenic *Escherichia coli*: characterization of a new intimin variant. Infect. Immun. 68 (2000) 64-71.**
- Pearson, W.R., Robins, G. and Zhang, T.: Generalized neighbor-joining: more reliable phylogenetic tree reconstruction. Mol. Biol. Evol. 16 (1999) 806-816.**
- Penny, D., Hendy, M.D. and Steel, M.: Progress with methods for constructing evolutionary trees. Trends Ecol. Evol. 7 (1992) 73-79.**
- Perna, N.T., Mayhew, G.F., Posfai, G., Elliott, S., Donnenberg, M.S., Kaper, J.B. and Blattner, F.R.: Molecular evolution of a pathogenicity island from enterohemorrhagic *Escherichia coli* O157:H7. Infect. Immun. 66 (1998) 3810-3817.**
- Picard, B., Garcia, J.S., Gouriou, S., Duriez, P., Brahimi, N., Bingen, E., Elion, J. and Denamur, E.: The link between phylogeny and virulence in *Escherichia coli* extraintestinal infection. Infect. Immun. 67 (1999) 546-553.**
- Prada, J., Baljer, G., De Rycke, J., Steinruck, H., Zimmermann, S., Stephan, R. and Beutin, L.: Characteristics of alpha-hemolytic strains of *Escherichia coli* isolated from dogs with gastroenteritis. Vet. Microbiol. 29 (1991) 59-73.**
- Pupo, G.M., Karaolis, D.K., Lan, R., and and Reeves, P.R.: Evolutionary relationships among pathogenic and nonpathogenic *Escherichia coli* strains inferred from multilocus enzyme electrophoresis and *mdh* sequence studies. Infect. Immun. 65 (1997) 2685-2692.**
- Pupo, G.M., Lan, R. and Reeves, P.R.: Multiple independent origins of *Shigella* clones of *Escherichia coli* and convergent evolution of many of their characteristics. Proc. Natl. Acad. Sci. USA 97 (2000a) 10567-10572.**
- Pupo, G.M., Lan, R., Reeves, P.R. and Baverstock, P.R.: Population genetics of *Escherichia coli* in a natural population of native Australian rats. Environ. Microbiol. 2 (2000b) 594-610.**

- Reeves, P. and Stevenson, G.: Cloning and nucleotide sequence of the *Salmonella typhimurium* LT2 *gnd* gene and its homology with the corresponding sequence of *Escherichia coli* K12. *Mol. Gen. Genet.* 185 (1989) 473-480.
- Reeves, P.R.: Variation in O-antigens, niche-specific selection and bacterial populations. *FEMS Microbiol. Lett.* 15 (1992) 509-16.
- Reid, S.D., Herbelin, C.J., Bumbaugh, C.A., Selander, R.K. and Whittam, T.S.: Parallel evolution of virulence in pathogenic *Escherichia coli*. *Nature* 406 (2000) 64-67.
- Reid, S.D., Selander, R.K. and T.S., W.: Sequence Diversity of Flagellin (*fliC*) Alleles in Pathogenic *Escherichia coli*. *J. Bacteriol.* 181 (1999) 153-160.
- Rumer, L., Jores, J., Kirsch, P., Cavnignac, Y., Zehmke, K. and Wieler, L.H.: Dissemination of *pheU*- and *pheV*-located genomic islands among enteropathogenic (EPEC) and enterohemorrhagic (EHEC) *E. coli* and their possible role in the horizontal transfer of the locus of enterocyte effacement (LEE). *Int. J. Med. Microbiol.* 292 (2003) 463-475.
- Saitou, N. and Nei, N.: The neighbor-joining method: a new method for reconstructing phylogenetic trees. *Mol. Biol. Evol.* 4 (1987) 406-425.
- Sanderson, M.J., Baldwin, B.G., Bharathan, G., Campbell, C.S., von Dohlen, C., Ferguson, D., Porter, J.M., Wojciechowski, M.F. and Donoghue, M.J.: The growth of phylogenetic information and the need for a phylogenetic data base. *Syst. Biol.* 42 (1993) 562-568.
- Selander, R.K., Caugant, D.A., Ochman, H., Musser, J.M., Gilmour, M.N. and Whittam, T.S.: Methods of Multilocus Enzyme Electrophoresis for Bacterial Population Genetics and Systematics. *Appl. Environ. Microbiol.* 51 (1986) 873-884.
- Selander, R.K. and Lewin, B.R.: Genetic diversity and structure in *Escherichia coli* populations. *Science* 210 (1980) 545-547.
- Sharp, P.M.: Determinants of DNA sequence divergence between *Escherichia coli* and *Salmonella typhimurium*: codon usage, map position, and concerted evolution. *J. Mol. Evol.* 33 (1991) 23-33.

Sharp, P.M. and Li, W.H.: The codon adaptation index - a measure of directional synonymous codon usage bias, and its potential applications. Nucl. Acids. Res. 15 (1987a) 1281-1295.

Sharp, P.M. and Li, W.H.: The Rate of Synonymous substitution in Enterobacterial Genes Inversely to Codon Usage Bias. Mol. Biol. Evol. 4 (1987b) 222-230.

Smith, J.M.: Microbial Evolution and Infection, 50th Congress of the DGHM 25th Annual Meeting of the DGI. Einhorn Verlag., 1998.

Smith, J.M., Feil, E.J. and Smith, N.H.: Population structure and evolutionary dynamics of pathogenic bacteria. Bioessays 22 (2000) 1115-1122.

Smith, M.J. and Smith, N.H.: Detecting recombination from gene trees. Mol. Biol. Evol. 15 (1998) 590-599.

Smith, M.J., Smith, N.H., O'Rourke, M. and Spratt, B.G.: How clonal are bacteria? Proc. Natl. Acad. Sci. USA 90 (1993) 4384-4388.

Smith, N.H. and Selander, R.K.: Sequence invariance of the antigen-coding central region of the phase 1 flagellar filament gene (*fliC*) among strains of *Salmonella typhimurium*. J. Bacteriol. 172 (1990) 603-609.

Snel, B., Bork, P. and Huynen, M.A.: Genome phylogeny based on gene content. Nat. Genet. 21 (1999) 108-110.

Souza, V., Nguyen, T.T., Hudson, R.R., Pinero, D. and Lenski, R.E.: Hierarchical analysis of linkage disequilibrium in *Rhizobium* populations: evidence for sex? Proc. Natl. Acad. Sci. USA 89 (1992) 8389-8393.

Souza, V., Rocha, M., Valera, A. and Eguiarte, L.E.: Genetic structure of natural populations of *Escherichia coli* in wild hosts on different continents. Appl. Environ. Microbiol. 65 (1999) 3373-3385.

Sperandio, V., Kaper, J.B., Bortolini, M.R., Neves, B.C., Keller, R. and Trabulsi, L.R.: Characterization of the locus of enterocyte effacement (LEE) in different enteropathogenic *Escherichia coli* (EPEC) and Shiga-toxin producing *Escherichia coli* (STEC) serotypes. FEMS Microbiol. Lett. 164 (1998) 133-139.

- Steel, M.A., Lockhart, P.J. and Penny, D.: Confidence in evolutionary trees from biological sequence data. Nature 364 (1993) 440-442.**
- Stephens, J.C.: Statistical Methods of DNA Sequence Analysis: Detection of Intragenic Recombination or Gene Conversion. Mol. Biol. Evol. 2 (1985) 539-556.**
- Suerbaum, S., Maynard Smith, J., Bapumia, K., Morelli, G., Smith, N.H., Kunstmann, E., Dyrek, I. and Achtman, M.: Free recombination within *Helicobacter pylori*. Proc. Natl. Acad. Sci. USA 95 (1998) 12619-12624.**
- Swofford, D.L.: PAUP - Phylogenetic Analysis Using Parsimony. Sinauer Associates, Sunderland, Massachusetts 01375 USA, 1996**
- Tibayrenc, M.: Towards a unified evolutionary genetics of microorganisms. Annu. Rev. Microbiol. 50 (1996) 401-429.**
- Tzipori, S., Donnenberg, M.S., De Montigny, L., Kaper, J.B. and Donoghue-Rolfe, A.: The Role of the *eaeA* Gene in Diarrhea and Neurological Complications in an Gnotobiotic Piglet Model of Enterohemorrhagic *Escherichia coli* Infection. Infect. Immun. 63 (1995) 3621-3627.**
- van Nimwegen, E., Crutchfield, J.P. and Huynen, M.: Neutral evolution of mutational robustness. Proc. Natl. Acad. Sci. USA 96 (1999) 9716-9720.**
- Voss, E., Paton, A.W., Manning, P.A. and Paton, J.C.: Molecular Analysis of Shiga - Toxigenic *Escherichia coli* O111:NM Proteins Which React with Sera from Patients with Hemolytic-Uremic Syndrome. Infect. Immun. 66 (1998) 1467-1472.**
- Wang, L., Rothmund, D., Curd, H. and Reeves, P.R.: Sequence Diversity of the *Escherichia coli* *fliC* Genes: Implication for a DNA-Based Typing Scheme for *E. coli* O157:H7. J. Clin. Microbiol. 38 (2000) 1786-1790.**
- Whittam, T.S.: Genetic Variation and Evolutionary Processes in Natural Populations of *Escherichia coli*. In: Neidhardt, F.C. and Curtiss, R. (Eds.), *Escherichia coli* and *Salmonella* : cellular and molecular biology. ASM Press, Washington, D.C., 1996, pp. Kapitel 148.**
- Whittam, T.S.: Evolution of *Escherichia coli* O157:H7 and other Shiga Toxin-Producing *E.coli* Strains. In: Kaper, J.B. and O'Brien, A.D. (Eds.), *Escherichia coli* O157:H7 and other Shiga Toxin-Producing *E.coli* Strains. ASM Press, 1998.**

- Whittam, T.S., Ochman, H. and Selander, R.K.:** Geographic components of linkage disequilibrium in natural populations of *Escherichia coli*. *Mol. Biol. Evol.* 1 (1983a) 67-83.
- Whittam, T.S., Ochman, H. and Selander, R.K.:** Multilocus genetic structure in natural populations of *Escherichia coli*. *Proc. Natl. Acad. Sci. USA* 80 (1983b) 1751-1755.
- Wieler, L.H., McDaniel, T.K., Whittam, T.S. and Kaper, J.B.:** Insertion site of the locus of enterocyte effacement in enteropathogenic and enterohemorrhagic *Escherichia coli* differs in relation to the clonal phylogeny of the strains. *FEMS Microbiol. Lett.* 156 (1997) 49-53.
- Wieler, L.H., Vieler, E., Erpenstein, C., Schlapp, T., Steinruck, H., Bauerfeind, R., Byomi, A. and Baljer, G.:** Shiga toxin-producing *Escherichia coli* strains from bovines: association of adhesion with carriage of *eae* and other genes. *J. Clin. Microbiol.* 34 (1996) 2980-2984.
- Woese, C.:** The universal ancestor. *Proc. Natl. Acad. Sci. USA* 95 (1998) 6854-6859.
- Woese, C.:** Interpreting the universal phylogenetic tree. *Proc. Natl. Acad. Sci. USA* 97 (2000) 8392-8396.
- Woese, C.R. and Fox, G.E.:** The concept of cellular evolution. *J. Mol. Evol.* 10 (1977) 1-6.
- Wolf, M.:** Identification of a Family of Intimins Common to *Escherichia coli* Causing Attaching-Effacing Lesions in Rabbits, Humans, and Swine. *Infect. Immun.* 65 (1997) 320-326.
- Yu, J. and Kaper, J.B.:** Cloning and characterization of the *eae* gene of enterohaemorrhagic *Escherichia coli* O157:H7. *Mol. Microbiol.* 6 (1992) 411-417.
- Zhang, W.L., Kohler, B., Oswald, E., Beutin, L., Karch, H., Morabito, S., Caprioli, A., Suerbaum, S. and Schmidt, H.:** Genetic diversity of intimin genes of attaching and effacing *Escherichia coli* strains. *J. Clin. Microbiol.* 40 (2002) 4486-4492.
- Zharkikh, A. and Li, W.H.:** Estimation of confidence in phylogeny: the complete-and-partial bootstrap technique. *Mol. Phylogenet. Evol.* 4 (1995) 44-63.