

## DAFTAR PUSTAKA

- Abdul Rahman EM, El-Sherif RH. 2011 *High rates of intestinal colonization with extended-spectrum lactamase-producing Enterobacteriaceae among healthy individuals*. J Investig Med; 59: 1284 –6.
- Abraham EP, Chain E *An enzyme from bacteria able to destroy penicillin [letter]*. Nature 1940;146:837
- Alouache S, Kada M, Messai Y, Estepa V, Torres C, Bakour R. 2012. Antibiotic resistance and extended-spectrum beta-lactamases in isolated bacteria from seawater of Algiers beaches (Algeria). Microbes Environ. 27:80 –86
- Ambler, R. P., A. F. W. Coulson, J.-M. Fré're, J.-M. Ghuysen, B. Joris, M. Forsman, R. C. Levesque, G. Tiraby, and S. G. Waley. 1991. A standard numbering scheme for the class A -lactamases. Biochem. J. 276:269–270.
- Amaya E, Reyes D, Paniagua M, Calderon S, Rashid MU, Colque P, Kuhn I, Mollby R, Weintraub A, Nord CE. 2012. Antibiotic resistance patterns of Escherichia coli isolates from different aquatic environmental sources in Leon, Nicaragua. Clin. Microbiol. Infect. 18:E347–E354
- Arlet, G., and A. Philippon. 1991. Construction by polymerase chain reaction and intragenic DNA probes for three main types of transferable-lactamases (TEM, SHV, CARB). FEMS Microbiol. Lett. 82:19–26.
- Blazquez, J., M.-I. Morosini, M.-C. Negri, and F. Baquero. 2000. Selection of naturally occurring extended-spectrum TEM -lactamase variants by fluctuating -lactam pressure. Antimicrob. Agents Chemother. 44:2182–2184.
- Barthe'le'my, M., J. Pe'duzzi, and R. Labia. 1985. *Distinction entre les structures primaires des -lactamases TEM-1 et TEM-2*. Ann. Inst. Pasteur Microbiol. 136A:311–321.11.

- Barthe´lemy, M., J. Pe´duzzi, H. Bernard, C. Tancre`de, and R. Labia. 1992. Close amino acid sequence relationship between the new plasmid-mediated extended-spectrum  $\beta$ -lactamase MEN-1 and chromosomally encoded enzymes of *Klebsiella oxytoca*. *Biochim. Biophys. Acta* 1122:15–22
- Bauernfeind, A., I. Stemplinger, R. Jungwirth, S. Ernst, and J. M. Casellas. 1996. Sequences of  $\beta$ -lactamase genes encoding CTX-M-1 (MEN-1) and CTX-M-2 and relationship of their amino acid sequences with those of other  $\beta$ -lactamases. *Antimicrob. Agents Chemother.* 40:509–513.
- Bradford, P. A., Y. Yang, D. Sahm, I. Grope, D. Gardovska, and G. Storch. 1998. CTX-M-5, a novel cefotaxime-hydrolyzing  $\beta$ -lactamase from an outbreak of *Salmonella typhimurium* in Latvia. *Antimicrob. Agents Chemother.* 42:1880–1894.
- Bradford, P. A. 1999. Automated thermal cycling is superior to traditional methods for nucleotide sequencing of *bla*SHV genes. *Antimicrob. Agents Chemother.* 43:2960–2963.
- Bradford, P. A. 2001. *Extended-spectrum  $\beta$ -lactamases in the 21st century: characterization, epidemiology, and detection of this important resistance threat*. *Clin. Microbiol. Rev.* 14:933–951
- Bonnet, R., C. D. Champs, D. Sirot, C. Chanal, R. Labia, and J. Sirot. 1999. Diversity of TEM mutants in *Proteus mirabilis*. *Antimicrob. Agents Chemother.* 43:2671–2677.
- Bonnet, R., J. L. M. Sampaio, R. Labia, C. D. Champs, D. Sirot, C. Chanel, and J. Sirot. 2000. A novel CTX-M  $\beta$ -lactamase (CTX-M-8) in cefotaxime-resistant Enterobacteriaceae isolated in Brazil. *Antimicrob. Agents Chemother.* 44:1936–1942.
- Bonnet, R. 2004. Growing group of extended-spectrum beta-lactamases: the CTX-M enzymes. *Antimicrob. Agents Chemother.* 48:1–14.
- Ambler, R. P. 1980. The structure of  $\beta$ -lactamases. *Phil. Trans. R. Soc. Lond. Biol.* 289:321–331.

- Burgess, D. S., R. G. Hall, Jr., J. S. Lewis, Jr., J. H. Jorgensen, and J. E. Patterson. 2003. *Clinical and microbiologic analysis of a hospital's extended-spectrum beta-lactamase-producing isolates over a 2-year period*. *Pharmacotherapy* 23:1232–1237
- Bush, K., and S. B. Singer. 1989. Biochemical characteristics of extended broad spectrum -lactamases. *Infection* 17:429–433.
- Bush, K., G. A. Jacoby, and A. A. Medeiros. 1995. A functional classification scheme for -lactamases and its correlation with molecular structure. *Antimicrob. Agents Chemother.* 39:1211–1233.
- Cars O, Ho"ggberg LD, Murray M, Nordberg O, Sivaraman S, et al. 2008. *Meeting the challenge of antibiotic resistance*. *BMJ* 337: 1438–1441.
- Chagas TP, Seki LM, Cury JC, Oliveira JA, Davila AM, Silva DM, Asensi MD. 2011. Multiresistance, beta-lactamase-encoding genes and bacterial diversity in hospital wastewater in Rio de Janeiro, Brazil. *J. Appl. Microbiol.* 111:572–581
- Chen H, Shu W, Chang X, Chen JA, Guo Y, Tan Y. 2010. The profile of antibiotics resistance and integrons of extended-spectrum beta-lactamase producing thermotolerant coliforms isolated from the Yangtze River basin in Chongqing. *Environ. Pollut.* 158:2459 –2464.
- Chouchani C, Marrakchi R, Henriques I, Correia A. 2013. Occurrence of IMP-8, IMP-10, and IMP-13 metallo-beta-lactamases located on class 1 integrons and other extended-spectrum beta-lactamases in bacterial isolates from Tunisian rivers. *Scand. J. Infect. Dis.* 45:95–103.
- Coque TM, Novais A, Carattoli A, Poirel L, Pitout J, Peixe L, Baquero F, Cantón R, Nordmann P: Dissemination of clonally related *Escherichia coli* strains expressing extended-spectrum  $\beta$ -lactamase CTX-M-15. *Emerg Infect Dis* 2008, 14:195–200
- Cornelissen C. N.Fisher, B. D. & Harvey R.A..2013. Lippincott's Illustrated Reviews: Microbiology.3th. Philadelphia : Lippincott Williams & Wilkins, a Wolters Kluwer business.p. 111-5

- Costa D, Poeta P, Brinas L, Saenz Y, Rodrigues J, Torres C. 2004. strains from healthy pets in Portugal. J. Antimicrob. Chemother. 54:960 –96  
Detection of CTX-M-1 and TEM-52 beta-lactamases in Escherichia coli
- De Boeck H, Lunguya O, Muyembe JJ, Glupczynski Y, Jacobs J. 2012. Presence of extended-spectrum beta-lactamase-producing Enterobacteriaceae in waste waters, Kinshasa, the Democratic Republic of the Congo. Eur. J. Clin. Microbiol. Infect. Dis. 31:3085–3088
- Dhanji H, Murphy NM, Akhigbe C, Doumith M, Hope R, Livermore DM, Woodford N. 2011. Isolation of fluoroquinolone-resistant O25b: H4-ST131 Escherichia coli with CTX-M-14 extended-spectrum beta-lactamase from UK river water. J. Antimicrob. Chemother. 66:512–516.
- Diwan V, Chandran SP, Tamhankar AJ, Stalsby Lundborg C, Macaden R. 2012. Identification of extended-spectrum beta-lactamase and quinolone resistance genes in Escherichia coli isolated from hospital wastewater from central India. J. Antimicrob. Chemother. 67:857–859.
- Dolejska M, Frolkova P, Florek M, Jamborova I, Purgertova M, Kutilova I, Cizek A, Guenther S, Literak I. 2011. CTX-M-15-producing Escherichia coli clone B2-O25b-ST131 and Klebsiella spp. isolates in municipal wastewater treatment plant effluents. J. Antimicrob. Chemother. 66:2784 –2790.
- Doucet-Populaire, F., J. C. Ghnassia, R. Bonnet, and J. Sirot. 2000. First isolation of a CTX-M-3-producing Enterobacter cloacae in France. Antimicrob. Agents Chemother. 44:3239–3240.
- Doumith M, Dhanji H, Ellington MJ, Hawkey P, Woodford N. 2012. *Characterization of plasmids encoding extended-spectrum beta-lactamases and their addiction systems circulating among Escherichia coli clinical isolates in the UK.* J Antimicrob Chemother 67: 878–885
- El Harrif-Heraud, Z., C. Arpin, S. Benliman, and C. Quentin. 1997. Molecular epidemiology of a nosocomial outbreak due to SHV-4 producing strains of Citrobacter diversus. J. Clin. Microbiol. 35:2561–2567.

- Ewers C, Grobbel M, Stamm I, Kopp PA, Diehl I, Semmler T, Fruth A, Beutlich J, Guerra B, Wieler LH, Guenther S. 2010. Emergence of human pandemic O25:H4-ST131 CTX-M-15 extended-spectrum-beta-lactamase-producing *Escherichia coli* among companion animals. *J. Antimicrob. Chemother.* 65:651–660
- Gallego, L., A. Umanan, J. Garaizar, K. Colom, and R. Cisterna. 1990. Digoxigenin-labeled DNA probe to detect TEM type  $\beta$ -lactamases. *J. Microbiol. Methods* 11:261–267.
- Gazouli, M., N. J. Legakis, and L. S. Tzouveleakis. 1998. Effect of substitution of Asn for Arg-276 in the cefotaxime-hydrolysing class A  $\beta$ -lactamase CTX-M-4. *FEMS Microbiol. Lett.* 169:289–293.
- Geser N, Stephan R, Hachler H. 2012. Occurrence and characteristics of extended-spectrum  $\beta$ -lactamase (ESBL) producing Enterobacteriaceae in food producing animals, minced meat and raw milk. *BMC Vet. Res.* 8:21. doi:10.1186/1746-6148-8-21.
- Gniadkowski, M., A. Palucha, P. Grzesioski, and W. Hryniewicz. 1998. Outbreak of ceftazidime-resistant *Klebsiella pneumoniae* in a pediatric hospital in Warsaw, Poland: clonal spread of the TEM-47 extended-spectrum-lactamase (ESBL)-producing strain and transfer of a plasmid carrying the SHV-5-like ESBL-encoding gene. *Antimicrob. Agents Chemother.* 42:3079–3085.
- Hassing RJ, Alsmas J, Arcilla MS et al. 2015 *International travel and acquisition of multidrug-resistant Enterobacteriaceae: a systematic review.* *Euro Surveill*; 20; pii=30074
- Hawkey PM, Jones AM. 2009. *The changing epidemiology of resistance.* *J Antimicrob Chemother*; 64 Suppl 1: 3–10.
- Heddi A, Cars O, Qiang S, Tomson G .2009. *Antibiotic resistance in China—a major future challenge.* *Lancet* 373: 30
- Hernandez J, Stedt J, Bonnedahl J, Molin Y, Drobni M, Calisto-Ulloa N, Gomez-Fuentes C, Astorga-Espana MS, Gonzalez-Acuna D, Waldenstrom J, Blomqvist M, Olsen B. 2012. Human-associated extended-

- spectrum beta-lactamase in the Antarctic. *Appl. Environ. Microbiol.* 78: 2056–2058.
- Hijazi, M.S, Fawzi, M.A., Ali F. M. Abd El Gali, K. H. 2016. Prevalence and characterization of extended-spectrum beta-lactamases producing Enterobacteriaceae in healthy children and associated risk factors . *Ann Clin Microbiol Antimicrob* 15:3.
- Huber H, Zweifel C, Wittenbrink MM, Stephan R. 2013. ESBL-producing uropathogenic *Escherichia coli* isolated from dogs and cats in Switzerland. *Vet. Microbiol.* 162:992–996.
- Huletsky, A., J. R. Knox, and R. C. Levesque. 1993. Role of Ser-238 and Lys-240 in the hydrolysis of 3rd-generation cephalosporins by SHV-type beta-lactamases probed by site-directed mutagenesis and 3-dimensional modeling. *J. Biol. Chem.* 268:3690–3697.
- Huovinen, S., P. Huovinen, and G. A. Jacoby. 1988. Detection of plasmid-mediated  $\beta$ -lactamases with DNA probes. *Antimicrob. Agents Chemother.* 32:175–179.
- Ibuka, A., A. Taguchi, M. Ishiguro, S. Fushinobu, Y. Ishii, S. Kamitori, K. Okuyama, K. Yamaguchi, M. Konno, and H. Matsuzawa. 1999. Crystal structure of the E166A mutant of extended-spectrum  $\beta$ -lactamase Toho-1 at 1.8 Å resolution. *J. Mol. Biol.* 285:2079–2087.
- Ishii, Y., A. Ohno, H. Taguchi, S. Imajo, M. Ishiguro, and H. Matsuzawa. 1995. Cloning and sequence of the gene encoding a cefotaxime-hydrolyzing class A  $\beta$ -lactamase isolated from *Escherichia coli*. *Antimicrob. Agents Chemother.* 39:2269–2275.
- Jacoby, G. A., and A. A. Medeiros. 1991. More extended-spectrum  $\beta$ -lactamases. *Antimicrob. Agents Chemother.* 35:1697–1704.
- Jacoby, G. A., and L. Sutton. 1991. Properties of plasmids responsible for production of extended-spectrum  $\beta$ -lactamases. *Antimicrob. Agents Chemother.* 35:164–169.
- Johnson JR, Miller S, Johnston B, Clabots C, Debroy C. 2009. Sharing of *Escherichia coli* sequence type ST131 and other multidrug-resistant

and urovirulent *E. coli* strains among dogs and cats within a household. *J. Clin. Microbiol.* 47:3721–3725.

Kluytmans JA, Overdeest IT, Willemsen I, Kluytmans-van den Bergh MF, van der Zwaluw K, Heck M, Rijnsburger M, Vandenbroucke-Grauls CM, Savelkoul PH, Johnston BD, Gordon D, Johnson JR. 2013. Extended-spectrum beta-lactamase-producing *Escherichia coli* from retail chicken meat and humans: comparison of strains, plasmids, resistance genes, and virulence factors. *Clin. Infect. Dis.* 56:478–487

Kim J, Kang HY, Lee Y. 2008. The identification of CTX-M-14, TEM-52, and CMY-1 enzymes in *Escherichia coli* isolated from the Han River in Korea. *J. Microbiol.* 46:478–481.

Levy, S.B. 1998. *The challenge of antibiotic resistance. Scientific American*; 278, 46-53

Leverstein-van Hall MA, Dierikx CM, Cohen Stuart J, Voets GM, van den Munckhof MP, van Essen-Zandbergen A, Platteel T, Fluit AC, van de Sande-Bruinsma N, Scharinga J, Bonten MJ, Mevius DJ. 2011. Dutch patients, retail chicken meat and poultry share the same ESBL genes, plasmids and strains. *Clin. Microbiol. Infect.* 17:873–880

Lo WU, Ho PL, Chow KH et al. 2010 *Fecal carriage of CTXM type extended-spectrum b-lactamase-producing organisms by children and their household contacts.* *J Infect*; 60: 286–92

Luvsansharav UO, Hirai I, Nakata A, Imura K, Yamauchi K, et al. 2012 *Prevalence of and risk factors associated with faecal carriage of CTX-M beta-lactamase-producing Enterobacteriaceae in rural Thai communities.* *J Antimicrob Chemother* 67: 1769–1774

Lu SY, Zhang YL, Geng SN, Li TY, Ye ZM, Zhang DS, Zou F, Zhou HW. 2010. High diversity of extended-spectrum beta-lactamase-producing bacteria in an urban river sediment habitat. *Appl. Environ. Microbiol.* 76:5972–5976

Ma, L., Y. Ishii, M. Ishiguro, H. Matsuzawa, and K. Yamaguchi. 1998. Cloning and sequencing of the gene encoding Toho-2, a class A  $\beta$ -lactamase

- preferentially inhibited by tazobactam. *Antimicrob. Agents Chemother.* 42:1181–1186.
- Marshall BM, Levy SB. 2011. Food animals and antimicrobials: impacts on human health. *Clin. Microbiol. Rev.* 24:718 –733
- M. E. Rupp and P. D. Fey, “Extended spectrum  $\beta$  -lactamase (ESBL)-producing Enterobacteriaceae: considerations for diagnosis, prevention and drug treatment,” *Drugs*, 63(4): 353–365 (2003)
- Mishra, S.K & Agrawal, D. 2013. A concise manual of pathogenic microbiology. New Jersey : John Wiley & Sons, Inc.p. 71
- O’Keefe A, Hutton TA, Schifferli DM, Rankin SC. 2010. First detection of CTX-M and SHV extended-spectrum beta-lactamases in Escherichia coli urinary tract isolates from dogs and cats in the United States. *Antimicrob. Agents Chemother.* 54:3489 –3492
- Paterson, D.L., Ko, W.C., Von, G.A., Casellas, J.M., Mulazimoglu, L., Klugman, K.P., Bonomo, R.A., Rice, L.B., McCormack, J.G., Yu, V.L., 2001. *Outcome of cephalosporin treatment for serious infections due to apparently susceptible organisms producing extended-spectrum  $\beta$ -lactamases: implications for the clinical microbiology laboratory.* *J. Clin. Microbiol.* 39, 2206–2212.
- Livermore, D.M. beta-Lactamases in laboratory and clinical resistance. *Clin Microbiol Rev.* 8 : 557-584 (1995)
- Mugnier, P., P. Dubrous, I. Casin, G. Arlet, and E. Collatz. 1996. A TEM-derived extended-spectrum  $\beta$ -lactamase in Pseudomonas aeruginosa. *Antimicrob. Agents Chemother.* 40:2488–2493.
- Naas, T., L. Philippon, L. Poirel, E. Ronco, and P. Nordman. 1999. An SHV-derived extended-spectrum  $\beta$ -lactamase in Pseudomonas aeruginosa. *Antimicrob. Agents Chemother.* 43:1281–1284.
- Paterson, D.L., Bonomo, R.A., 2005. *Extended-spectrum  $\beta$ -lactamases: a clinical update.* *Clin. Microbiol. Rev.* 18, 657–686.



- Perilli, M., A. Felici, N. Franceschini, A. D. Santis, L. Pagani, F. Luzzaro, A. Oratore, G. A. Oratore, G. M. Rossolini, J. R. Knox, and G. Amicosante. 1997. Characterization of a new TEM-derived  $\beta$ -lactamase produced in a *Serratia marcescens* strain. *Antimicrob. Agents Chemother.* 41:2374–2382.
- Platell JL, Cobbold RN, Johnson JR, Heisig A, Heisig P, Clabots C, Kuskowski MA, Trott DJ. 2011. Commonality among fluoroquinolone-resistant sequence type ST131 extraintestinal *Escherichia coli* isolates from humans and companion animals in Australia. *Antimicrob. Agents Chemother.* 55:3782–3787.
- Poirel L, Nordmann P, Ducroz S, Boulouis HJ, Arne P, Millemann Y. 2013. Extended-spectrum  $\beta$ -lactamase CTX-M-15-producing *Klebsiella pneumoniae* of sequence type ST274 in companion animals. *Antimicrob. Agents Chemother.* 57:2372–2375
- Public Health Agency of Sweden, National Veterinary Institute. 2014 *SWEDRES SVARM - Consumption of Antibiotics and Occurrence of Antibiotic Resistance in Sweden*
- Rasheed, J. K., C. Jay, B. Metchock, F. Berkowitz, L. Weigel, J. Crellin, C. Steward, B. Hill, A. A. Medeiros, and F. C. Tenover. 1997. Evolution of extended-spectrum  $\beta$ -lactam resistance (SHV-8) in a strain of *Escherichia coli* during multiple episodes of bacteremia. *Antimicrob. Agents Chemother.* 41:647–653.
- Reinthaler FF, Feierl G, Galler H, Haas D, Leitner E, Mascher F, Melkes A, Posch J, Winter I, Zarfel G, Marth E. 2010. ESBL-producing *E. coli* in Austrian sewage sludge. *Water Res.* 44:1981–1985
- Rice L.B., Willey S.H., Papanicolaou G.A., Medeiros A.A., Eliopoulos G.M., Moellering R.C.J., Jacoby G.A. *Outbreak of ceftazidime resistance caused by extended-spectrum  $\beta$ -lactamases at a Massachusetts chronic-care facility.* *Antimicrob. Agents Chemother.* 1990;34(11):2193–2199
- Rishi H.-P. Dhillon and John Clark. 2012. *ESBLs: A Clear and Danger? Critical Care Research and Practice.*

- Rodriguez-Bano J, Lopez-Cerero L, Navarro MD et al. 2008. *Faecal carriage of extended-spectrum  $\beta$ -lactamase-producing Escherichia coli: prevalence, risk factors and molecular epidemiology*. J Antimicrob Chemother;62: 1142–9.
- Rosenau, A., B. Cattier, N. Gousset, P. Harriau, A. Philippon, and R. Quentin. 2000. Capnocytophaga ochracea: characterization of a plasmid-encoded extended-spectrum TEM-17  $\beta$ -lactamase in the phylum Flavobacter-Bacteroides. Antimicrob. Agents Chemother. 44:760–762.
- Sabate´, M., R. Tarrago´, F. Navarro, E. Miro´, C. Verge´s, J. Barbe´, and G. Prats. 2000. Cloning and sequence of the gene encoding a novel cefotaxime-hydrolyzing  $\beta$ -lactamase (CTX-M-9) from Escherichia coli in Spain. Antimicrob. Agents Chemother. 44:1970–1973.
- Sasaki T, Hirai I, Niki M et al. 2010. *High prevalence of CTX-M  $\beta$ -lactamase-producing Enterobacteriaceae in stool specimens obtained from healthy individuals in Thailand*. J Antimicrob Chemother; 65: 666–8.
- Schoevaerdt D, Verroken A, Huang TD, Frennet M, Berhin C, Jamart J, Bogaerts P, Swine C, Glupczynski Y. 2012. Multidrug-resistant bacteria colonization amongst patients newly admitted to a geriatric unit: a prospective cohort study. J. Infect. 65:109–118.
- Severin JA, Lestari ES, Kloezen W, Lemmens-den Toom N, Mertaniasih NM, Kuntaman K, Purwanta M, Offra Duerink D, Hadi U, van Belkum A, Verbrugh HA, Goessens WH. 2012. *Faecal carriage of extended-spectrum  $\beta$ -lactamase-producing Enterobacteriaceae among humans in Java, Indonesia, in 2001–2002*. Trop. Med. Int. Health 17:455–461
- Sougakoff, W., S. Goussard, and P. Courvalin. 1988. The TEM-3  $\beta$ -lactamase, which hydrolyzes broad-spectrum cephalosporins, is derived from the TEM-2 penicillinase by two amino acid substitutions. FEMS Microbiol.Lett. 56:343–348.

- Stromdahl H, Tham J, Melander E et al. 2011. *Prevalence of faecal ESBL carriage in the community and in a hospital setting in a county of Southern Sweden*. Eur J Clin Microbiol Infect Dis 30: 1159–62
- Sun, Q, Ta" rnberg M, Zhao, L, et. al. 2014. Varying High Levels of Faecal Carriage of Extended-Spectrum Beta-Lactamase Producing Enterobacteriaceae in Rural Villages in Shandong, China: Implications for Global Health
- Sun Y, Zeng Z, Chen S, Ma J, He L, Liu Y, Deng Y, Lei T, Zhao J, Liu JH. 2010. High prevalence of blaCTX-M extended-spectrum beta-lactamase genes in Escherichia coli isolates from pets and emergence of CTX-M-64 in China. Clin. Microbiol. Infect. 16:1475–1481.
- Tacao M, Correia A, Henriques I. 2012. Resistance to broad-spectrum antibiotics in aquatic systems: anthropogenic activities modulate the dissemination of blaCTX-M-like genes. Appl. Environ. Microbiol. 78:4134–4140.
- Thenmozhi, S. K. Moorthy, B. T. Sureshkuma, M. Suresh. 2014 Antibiotic Resistance Mechanism of ESBL Producing Enterobacteriaceae in Clinical Field: A Review Int. J. Pure App. Biosci. 2 (3): 207-226
- Tumbarello M, Sali M, Trecarichi EM et al. 2008. *Bloodstream infections caused by extended-spectrum-b-lactamase-producing Escherichia coli: risk factors for inadequate initial antimicrobial therapy*. Antimicrob Agents Chemother; 52: 3244–52
- Tzouvelekis, L. S., M. Gazouli, A. Markogiannakis, E. Paraskaki, N. J. Legakis, and E. Tzelepi. 1998. Emergence of resistance to third-generation cephalosporins amongst Salmonella typhimurium isolates in Greece: report of the first three cases. J. Antimicrob. Chemother. 42:273–275.
- Tzouvelekis, L. S., and R. A. Bonomo. 1999. SHV-type  $\beta$ -lactamases. Curr. Pharm. Des. 5:847–864.
- Tzouvelekis, L. S., E. Tzelepi, P. T. Tassios, and N. J. Legakis. 2000. CTX-M-type  $\beta$ -lactamases: an emerging group of extended-spectrum enzymes. Int. J. Antimicrob. Agents 14:137–143.

- Valverde A, Grill F, Coque TM, Pintado V, Baquero F, Cantón R, et al. High rate of intestinal colonization with extended-spectrum-beta-lactamase-producing organisms in household contacts of infected community patients. *J Clin Microbiol.* 2008;46(8):2796-9.
- WHO.2012.*The evolving threat of antimicrobial resistance: options for action.* Geneva: World Health Organisation
- Woerther P-L, Burdet C, Chachaty E et al. 2013. *Trends in human fecal carriage of extended-spectrum b-lactamases in the community: toward the globalization of CTX-M.* *Clin Microbiol Rev*; 26: 744–58.
- Woerther P-L, Burdet C, Chachaty E et al. 2013. *Trends in human fecal carriage of extended-spectrum b-lactamases in the community: toward the globalization of CTX-M.* *Clin Microbiol Rev*; 26: 744–58.
- Yezli S, Li H. 2012.*Antibiotic resistance amongst healthcare-associated pathogens in China.* *Int J Antimicrob Agents* 40: 389–397
- Zurfluh K, Hachler H, Nuesch-Inderbinen M, Stephan R. 2013. Characteristics of extended-spectrum beta-lactamase- and carbapenemase-producing Enterobacteriaceae isolates from rivers and lakes in Switzerland. *Appl. Environ. Microbiol.* 79:3021–3026