38. Durfee T, Nelson R, Baldwin S, Plunkett G III, Burland V, Mau B, et al. The complete genome sequence of *Escherichia coli* DH10B: insights into the biology of a laboratory workhorse. J Bacteriol. 2008;190:2597–606. http://dx.doi.org/10.1128/JB.01695-07
39. Langmead B, Salzberg SL. Fast gapped-read alignment with Bowtie 2. Nat Methods. 2012;9:357–9. http://dx.doi.org/10.1038/nmeth.1923
40. Karim A, Poirel L, Nagarajan S, Nordmann P. Plasmid-mediated extended-spectrum beta-lactamase (CTX-M-3 like) from India and gene association with insertion sequence ISEcp1. FEMS Microbiol Lett. 2001;201:237–41.
41. McGann P, Snesrud E, Ong AC, Appalla L, Koren M, Kwak YI, et al. War wound treatment complications due to transfer of an IncN plasmid harboring $bla_{OXA-181}$ from *Morganella morganii* to CTX-M-27-producing sequence type 131 *Escherichia coli.* Antimicrob Agents Chemother. 2015;59:3556–62. http://dx.doi.org/10.1128/AAC.04442-14
42. Potron A, Nordmann P, Lafeuille E, Al Maskari Z, Al Rashdi F, Poirel L. Characterization of OXA-181, a carbapenem-hydrolyzing class D beta-lactamase from *Klebsiella pneumoniae.* Antimicrob Agents Chemother. 2011;55:4896–9. http://dx.doi.org/10.1128/AAC.00481-11
43. Potron A, Rondinaud E, Poirel L, Belmonte O, Boyer S, Camiade S, et al. Genetic and biochemical characterisation of OXA-232, a carbapenem-hydrolysing class D β-lactamase from Enterobacteriaceae. Int J Antimicrob Agents. 2013;41:325–9. http://dx.doi.org/10.1016/j.ijantimicag.2012.11.007
44. Chen L, Al Laham N, Chavda KD, Mediavilla JR, Jacobs MR, Bonomo RA, et al. First report of an OXA-48-producing multidrug-resistant *Proteus mirabilis* strain from Gaza, Palestine. Antimicrob Agents Chemother. 2015;59:4305–7. http://dx.doi.org/10.1128/AAC.00565-15
45. Papagiannitsis CC, Študentová V, Izdebski R, Oikonomou O, Pfeifer Y, Petinaki E, et al. Matrix-assisted laser desorption ionization-time of flight mass spectrometry meropenem hydrolysis assay with NH4HCO3, a reliable tool for direct detection of carbapenemase activity. J Clin Microbiol. 2015;53:1731–5. http://dx.doi.org/10.1128/JCM.03094-14
46. Tijet N, Boyd D, Patel SN, Mulvey MR, Melano RG. Evaluation of the Carba NP test for rapid detection of carbapenemase-producing *Enterobacteriaceae* and *Pseudomonas aeruginosa*. Antimicrob Agents Chemother. 2013;57:4578–80. http://dx.doi.org/10.1128/AAC.00878-13
47. Chea N, Bulens SN, Kongphet-Tran T, Lynfield R, Shaw KM, Vagnone PS, et al. Improved phenotype-based definition for identifying carbapenemase producers among carbapenem-resistant *Enterobacteriaceae.* Emerg Infect Dis. 2015;21:1611–6. http://dx.doi.org/10.3201/eid2109.150198
48. Carrër A, Poirel L, Eraksoy H, Cagatay AA, Badur S, Nordmann P. Spread of OXA-48-positive carbapenem-resistant *Klebsiella pneumoniae* isolates in Istanbul, Turkey. Antimicrob Agents Chemother. 2008;52:2950–4. http://dx.doi.org/10.1128/AAC.01672-07
49. Poirel L, Bonnin RA, Nordmann P. Genetic features of the widespread plasmid coding for the carbapenemase OXA-48. Antimicrob Agents Chemother. 2012;56:559–62. http://dx.doi.org/10.1128/AAC.05289-11
50. Villa L, Carattoli A, Nordmann P, Carta C, Poirel L. Complete sequence of the IncT-type plasmid pT-OXA-181 carrying the blaOXA-181 carbapenemase gene from *Citrobacter freundii*. Antimicrob Agents Chemother. 2013;57:1965–7. http://dx.doi.org/10.1128/AAC.01297-12

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etymologia

TEM

Joaquim Ruiz

In 1965, the transferability of ampicillin resistance was reported, and the plasmid-encoded mechanism of resistance for 2 *Salmonella* sp. isolates from the United Kingdom and 1 *Escherichia coli* isolate from Greece was determined. Resistance (R) factors from *Salmonella* sp. isolates were designated R1818 and R7268 (R7268 encoding the current TEM-1). The *E. coli* isolate and its plasmid were named TEM (encoding the current TEM-2) because the isolate was recovered from a feces culture of an Athenian patient named Temoniera in 1963.

β-lactam resistance is a problem worldwide; >2,000 β-lactamases are currently identified. Of these β-lactamases, >200 enzymes are classified within TEM family, including extended-spectrum β-lactamases (ESBLs). However, the original TEM-1 and TEM-2 hydrolyze only penicillin derivatives.

Sources

1. Ambler RP, Scott GK. Partial amino acid sequence of penicillinase coded by *Escherichia coli* plasmid R6K. Proc Natl Acad Sci U S A. 1978;75:3732–6. http://dx.doi.org/10.1073/pnas.75.8.3732
2. Anderson ES, Datta N. Resistance to penicillins and its transfer in *Enterobacteriaceae*. Lancet. 1965;1:407–9. http://dx.doi.org/10.1016/S0140-6736(65)90004-8
3. Bonomo RA. β-lactamases: a focus on current challenges. Cold Spring Harb Perspect Med. 2017;7:a025239. http://dx.doi.org/10.1101/cshperspect.a025239
4. Bush K, Jacoby GA, Medeiros AA. A functional classification scheme for beta-lactamases and its correlation with molecular structure. Antimicrob Agents Chemother. 1995;39:1211–33. http://dx.doi.org/10.1128/AAC.39.6.1211
5. Datta N, Kontomichalou P. Penicillinase synthesis controlled by infectious R factors in *Enterobacteriaceae*. Nature. 1965;208:239–41. http://dx.doi.org/10.1038/208239a0
6. Kontomichalou P. Studies on resistance transfer factors. Pathol Microbiol (Basel). 1967;30:71–93.
7. Medeiros AA. β-lactamases. Br Med Bull. 1984;40:18–27. http://dx.doi.org/10.1093/oxfordjournals.bmb.a071942
8. Sutcliffe JG. Nucleotide sequence of the ampicillin resistance gene of *Escherichia coli* plasmid pBR322. Proc Natl Acad Sci U S A. 1978;75:3737–41. http://dx.doi.org/10.1073/pnas.75.8.3737

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