

Table 4. Location of the various genes
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 Originally modified from AAC 1999 43:2823-30 with permission from ASM Journals

Gene	Number	Genera
METHYLASES		
<i>erm</i> (A)	11	<i>Aggregatibacter</i> ^L , <i>Bacteriodes</i> , <i>Enterococcus</i> ^e , <i>Haemophilus</i> ^r , <i>Helcococcus</i> , <i>Klesiella</i> , <i>Listeria</i> , <i>Peptostreptococcus</i> ^a , <i>Prevotella</i> ^a , <i>Staphylococcus</i> , <i>Streptococcus</i>
<i>erm</i> (B)	36	<i>Aggregatibacter</i> ^l , <i>Acinetobacter</i> , <i>Aerococcus</i> , <i>Arcanobacterium</i> , <i>Bacillus</i> , <i>Bacteriodes</i> ^a , <i>Campylobacter</i> ^{af} , <i>Citrobacter</i> , <i>Corynebacterium</i> , <i>Clostridium</i> ^a , <i>Enterobacter</i> , <i>Escherichia</i> , <i>Eubacterium</i> ^a , <i>Enterococcus</i> , <i>Fusobacterium</i> ^a , <i>Gemella</i> , <i>Haemophilus</i> , <i>Klebsiella</i> , <i>Lactobacillus</i> , <i>Listeria</i> ^{cc} , <i>Micrococcus</i> , <i>Neisseria</i> , <i>Pantoeae</i> , <i>Pediococcus</i> , <i>Peptostreptococcus</i> ^a , <i>Porphyromonas</i> ^a , <i>Proteus</i> , <i>Pseudomonas</i> , <i>Rothia</i> , <i>Ruminococcus</i> ^a , <i>Serratia</i> , <i>Shigella</i> ^{ag} , <i>Staphylococcus</i> , <i>Streptococcus</i> , <i>Ureaplasma</i> ^o , <i>Wollinella</i> ^a , <i>Treponema</i> ^b
<i>erm</i> (C)	35	<i>Aeromonas</i> ^y , <i>Aggregatibacter</i> ^L , <i>Actinomyces</i> , <i>Arcanobacterium</i> ⁿ , <i>Bacillus</i> , <i>Bacteriodes</i> ^a , <i>Brevundimonas</i> ^y , <i>Burkholderia</i> ^y , <i>Campylocater</i> , <i>Capnocytopaga</i> ^{a,ca} , <i>Chryseomonas</i> ^y , <i>Clostridium</i> ^{a,n} , <i>Corynebacterium</i> , <i>Escherichia</i> ⁿ , <i>Eubacterium</i> ^a , <i>Enterococcus</i> , <i>Fusobacterium</i> ^{a,br} , <i>Haemophilus</i> ^r , <i>Lactobacillus</i> , <i>Listeria</i> , <i>Macroccoccus</i> , <i>Micrococcus</i> , <i>Neisseria</i> , <i>Paenibacillus</i> ^y , <i>Pasteurella</i> ^y , <i>Prevotella</i> ^a , <i>Peptostreptococcus</i> ^a , <i>Pseudomonas</i> ^y , <i>Pseudoramibacter</i> ^{a,br} , <i>Rhizobium</i> ^y , <i>Salmonella</i> , <i>Serratia</i> , <i>Sinorhizobium</i> ^y , <i>Sphingomonas</i> ^y , <i>Stenotrophomans</i> ^y , <i>Staphylococcus</i> , <i>Streptococcus</i> , <i>Streptomyces</i> ^y , <i>Wolinella</i> ^a
<i>erm</i> (D)	2	<i>Bacillus</i> , <i>Salmonella</i>
<i>erm</i> (E)	7	<i>Bacteriodes</i> ^a , <i>Eubacterium</i> ^a , <i>Fusobacterium</i> ^a , <i>Ruminococcus</i> ^a , <i>Saccharopolyspora</i> ⁿ , <i>Shigella</i> , <i>Streptomyces</i>
<i>erm</i> (F)	29	<i>Aggregatibacter</i> ^L , <i>Actinomyces</i> , <i>Bacteriodes</i> ^a , <i>Campylocater</i> , <i>Capnocytophaga</i> ^{a,ca} , <i>Clostridium</i> ^a , <i>Corynebacterium</i> , <i>Eubacterium</i> ^a , <i>Enterococcus</i> , <i>Escherichia</i> , <i>Fusobacterium</i> ^a , <i>Gardnerella</i> , <i>Haemophilus</i> ^r , <i>Lactobacillus</i> , <i>Mobiluncus</i> ^a , <i>Neisseria</i> , <i>Porphyromonas</i> ^a , <i>Prevotella</i> ^a , <i>Peptostreptococcus</i> ^a , <i>Riemerella</i> ^{am} , <i>Ruminococcus</i> ^a , <i>Salmonella</i> , <i>Shigella</i> , <i>Selenomonas</i> ^a , <i>Staphylococcus</i> , <i>Streptococcus</i> , <i>Treponema</i> ^b , <i>Veillonella</i> ^a , <i>Wolinella</i> ^a

<i>erm</i> (G)	9	<i>Bacillus</i> , <i>Bacteroides</i> ^a , <i>Catenibacterium</i> ^a , <i>Clostridiodes</i> ^{a,by} , <i>Listeria</i> , <i>Lactobacillus</i> , <i>Prevotella</i> ^a , <i>Porphyromonas</i> ^a , <i>Staphylococcus</i>
<i>erm</i> (H)	1	<i>Streptomyces</i>
<i>erm</i> (I)	1	<i>Streptomyces</i>
<i>erm</i> (N)	1	<i>Streptomyces</i>
<i>erm</i> (O)	1	<i>Streptomyces</i>
<i>erm</i> (Q)	6	<i>Aggregatibacter</i> ^L , <i>Bacteroides</i> ^a , <i>Clostridiodes</i> ^{a,by} , <i>Staphylococcus</i> , <i>Streptococcus</i> <i>Wolinella</i> ^a
<i>erm</i> (R)	2	<i>Arthrobacter</i> , <i>Aeromicrobium</i> ⁿ
<i>erm</i> (S)	1	<i>Streptomyces</i>
<i>erm</i> (T)	9	<i>Enterococcus</i> , <i>Escherichia</i> , <i>Erysipelothri</i> ^{aj} , <i>Haemophilus</i> ^{ai} , <i>Lactobacillus</i> , <i>Listeria</i> , <i>Streptococcus</i> , <i>Salmonella</i> , <i>Staphylococcus</i> ^m
<i>erm</i> (U)	1	<i>Streptomyces</i>
<i>erm</i> (V)	11	<i>Brevundimonas</i> ^y , <i>Chryseomonas</i> ^y , <i>Eubacterium</i> ^a , <i>Fusobacterium</i> ^a , <i>Leifsonia</i> ^y , <i>Mesorhizobium</i> ^y , <i>Paenibacillus</i> ^y , <i>Pseudomonas</i> ^y , <i>Rhizobium</i> ^y , <i>Shewanella</i> ^y , <i>Streptomyces</i>
<i>erm</i> (W)	1	<i>Micromonospora</i>
<i>erm</i> (X)	16	<i>Acinetobaculum</i> ^{ae} , <i>Actinobacillus</i> ^{bp} , <i>Arcanobacterium</i> , <i>Bifidobacterium</i> ^a , <i>Burkholderia</i> ^y , <i>Brevundimonas</i> ^y , <i>Corynebacterium</i> , <i>Leifsonia</i> ^y , <i>Paenibacillus</i> ^y , <i>Cutibacterium</i> ^{a,bp} , (<i>Propionibacterium</i> ^a), <i>Pseudomonas</i> ^y , <i>Rhizobium</i> ^y , <i>Shewanella</i> ^y , <i>Sphingomonas</i> ^y , <i>Stenotrophomans</i> ^y , <i>Streptomyces</i> ^y
<i>erm</i> (Y)	1	<i>Staphylococcus</i>
<i>erm</i> (Z)	1	<i>Streptomyces</i>
<i>erm</i> (30)	1	<i>Streptomyces</i>
<i>erm</i> (31)	1	<i>Streptomyces</i>
<i>erm</i> (32)	1	<i>Streptomyces</i>
<i>erm</i> (33)	1	<i>Staphylococcus</i>
<i>erm</i> (34)	1	<i>Bacillus</i>
<i>erm</i> (35)	1	<i>Bacteriodes</i> ^a
<i>erm</i> (36)	1	<i>Micrococcus</i>
<i>erm</i> (37)	1	<i>Mycobacterium</i>
<i>erm</i> (38)	1	<i>Mycobacterium</i>
<i>erm</i> (39)	1	<i>Mycobacterium</i>

<i>erm</i> (40)	1	<i>Mycobacterium</i>
<i>erm</i> (41) ^{bi}	1	<i>Mycobacterium</i>
<i>erm</i> (42)	8	<i>Escherichia, Enterobacter, Klebsiella, Mannheimia, Morganella, Pasteurella, Photobacterium, Salmonella</i>
<i>erm</i> (43)	1	<i>Staphylococcus</i>
<i>erm</i> (44)	1	<i>Staphylococcus</i>
<i>erm</i> (44) _v	1	<i>Staphylococcus</i>
<i>erm</i> (45)	1	<i>Staphylococcus</i>
<i>erm</i> (46)	2	<i>Rhodococcus, Listeria</i>
<i>erm</i> (47)	1	<i>Helcococcus</i>
<i>erm</i> (48) ^{as}	1	<i>Staphylococcus</i>
<i>erm</i> (49) ^{bd}	1	<i>Bifidobacterium</i> ^a
<i>erm</i> (50) ^{br}	1	<i>Cutibacterium</i> ^a (<i>Propionibacterium</i>) ^{bp}
<i>erm</i> (51) ^{bw}	1	<i>Rhodococcus</i>

S-ADENYOSYLMETHIONINE rRNA METHYLASES PhLOPS_A^q

<i>cfr</i>	14	<i>Bacillus, Citrobacter, Clostridiodes</i> ^{by} , <i>Enterococcus, Escherichia</i> ^{ab} , <i>Jeotgalicoccus</i> ^z , <i>Listeria, Klebsiella, Macrocooccus</i> ^z , <i>Proteus</i> ^x , <i>Providencia, Salmonella, Staphylococcus, Streptococcus</i> ^{az}
<i>cfr</i> (B) ^{ak}	2	<i>Bacillus</i> ^{at} , <i>Clostridiodes</i> ^{a,by} , <i>Enterococcus, Paenibacillus</i> ^{bz}
<i>cfr</i> (C) ^{at}	4	<i>Campylobacter, Clostridiodes</i> ^{a,by} , <i>Clostridium</i> ^a , <i>Klebsiella</i>
<i>cfr</i> (D) ^{bh}	1	<i>Enterococcus</i>
<i>cfr</i> (E) ^{bu}	1	<i>Clostridiodes</i> ^{a,by}

ATP-F PROTEIN RIBOSOMAL PROTECTION^{bj}

<i>lsa</i> (A)	4	<i>Clostridiodes</i> ^a , <i>Clostridium</i> ^a , <i>Enterococcus, Listeria</i>
<i>lsa</i> (B)	1	<i>Staphylococcus</i>
<i>lsa</i> (C)	2	<i>Gardnerella, Streptococcus</i> ^p
<i>lsa</i> (D) ^{bv}	1	<i>Lactococcus</i>
<i>lsa</i> (E)	5	<i>Enterococcus, Erysipelothrix</i> ^{aq} , <i>Listeria</i> ^{cc} , <i>Staphylococcus, Streptococcus</i> ^{av}
<i>lsa</i> (E) _ψ ^{aa}	2	<i>Stenotrophomonas, Ureaplasma</i> ^o
<i>msr</i> (A)	17	<i>Bacteroides</i> ^{av} , <i>Brevundimonas</i> ^y , <i>Burkholderia</i> ^y , <i>Chryseomonas</i> ^y , <i>Corynebacterium, Enterobacter, Enterococcus, Gemella, Listeria, Lysinibacillus</i> ^y , <i>Photobacterium</i> ^y , <i>Pseudomonas, Shewanella</i> ^y , <i>Staphylococcus, Streptococcus, Streptomyces</i> ^y , <i>Ureaplasma</i> ^o

<i>msr(C)</i>	1	<i>Enterococcus</i>
<i>msr(D)</i> ^c	27	<i>Acinetobacter, Bacteroides</i> ^{a,d} , <i>Citrobacter, Clostridiodes</i> ^{a,by} , <i>Corynebacterium, Enterococcus, Enterobacter, Escherichia, Erysipelothrix</i> ^{bb} , <i>Gemella, Fusobacterium</i> ^a , <i>Haemophilus, Klebsiella, Listeria, Morganella, Neisseria, Proteus, Providencia, Pseudomonas, Ralstonia, Salmonella, Staphylococcus, Streptococcus, Serratia, Ureaplasma</i> ^o
<i>msr(E)</i> ^{s,bj}	9	<i>Acinetobacter, Citrobacter, Escherichia, Klebsiella, Morganella, Pasteurella, Pseudomonas</i> ^{bq} , <i>Salmonella, Serratia</i>
<i>msr(F)</i> ^{bx}	1	<i>Macrococcus, Staphylococcus</i>
<i>msr(G)</i> ^{cd}	1	<i>Macrococcus</i>
<i>msr(H)</i> ^{bx}	1	<i>Macrococcus</i>
<i>vga(A)</i>	4	<i>Leifsonia</i> ^y , <i>Listeria, Paenibacillus</i> ^y , <i>Staphylococcus</i>
<i>vga(A)</i> _{LC}	1	<i>Staphylococcus</i>
<i>vga(A)</i> _v	1	<i>Staphylococcus</i>
<i>vga(B)</i>	2	<i>Enterococcus, Staphylococcus</i>
<i>vga(C)</i> ^k	1	<i>Staphylococcus</i>
<i>vga(D)</i> ^t	1	<i>Enterococcus</i>
<i>vga(E)</i> ^v	1	<i>Staphylococcus</i>
<i>vga(F)</i> ^{ce}	1	<i>Streptococcus</i>
<i>optrA</i> ^{ax}	2	<i>Enterococcus, Staphylococcus</i>
<i>poxtA</i> ^{cb}	3	<i>Enterococcus, Pediococcus, Staphylococcus</i>
<i>eat(A)</i> _v	1	<i>Enterococcus</i>
<i>sal(A)</i> ^{ar}	1	<i>Staphylococcus</i>
<i>varM</i>	1	<i>Streptomyces</i>
<i>vlmR</i> ^{bm}	1	<i>Bacillus</i>

ATP-F Protein [Mechanism not tested]^{bk}

<i>car(A)</i>	1	<i>Streptomyces</i>
<i>lmr(C)</i>	1	<i>Streptomyces</i>
<i>ole(B)</i>	3	<i>Lysinibacillus</i> ^y , <i>Sinorhizobium</i> ^y , <i>Streptomyces</i>
<i>ole(C)</i>	1	<i>Streptomyces</i>
<i>srm(B)</i>	1	<i>Streptomyces</i>

<i>tlr(C)</i>	1	<i>Streptomyces</i>
MAJOR FACILITATORS [Efflux]		
<i>lmr(A)</i>	1	<i>Streptomyces</i> ^{bc}
<i>mef(A)</i>	33	<i>Acinetobacter, Bacteroides</i> ^a , <i>Citrobacter, Citrobacter, Clostridiodes</i> ^{a,by} , <i>Corynebacterium, Enterococcus, Enterobacter, Escherichia, Erysipelothrix</i> ^{bb} , <i>Fusobacterium</i> ^a , <i>Gemella, Haemophilus</i> ^f , <i>Klebsiella, Lactobacillus, Listeria, Micrococcus, Morganella, Neisseria, Pantoeae, Pediococcus</i> ^{ad} , <i>Providencia, Proteus, Ralstonia, Rothia</i> ^l , <i>Pseudomonas, Salmonella, Serratia, Staphylococcus, Listeria, Streptococcus, Stenotrophomonas, Weissella</i> ^{ad}
<i>mef(B)</i>	3	<i>Escherichia, Klebsiella, Salmonella</i>
<i>mef(C)</i>	2	<i>Photobacterium, Vibrio</i>
<i>mef(D)</i> ^{bx}	1	<i>Macroccoccus, Staphylococcus</i> ^{cd}
<i>mef(F)</i> ^{cd}	1	<i>Macroccoccus</i>
ESTERASES		
<i>ere(A)</i>	16	<i>Achromobacter, Aermonas, Citrobacter, Enterobacter, Escherichia, Klebsiella, Laribacter, Morganella, Pantoeae, Providencia, Pseudomonas, Salmonella, Serratia, Staphylococcus, Stenotrophomonas, Vibrio</i>
<i>ere(B)</i>	9	<i>Acinetobacter, Citrobacter, Enterobacter, Escherichia, Klebsiella, Morganella, Proteus, Pseudomonas, Staphylococcus</i>
<i>ere(C)</i>	3	<i>Escherichia, Klebsiella, Riemerella</i>
<i>ere(D)</i> ^{ba}	3	<i>Elizabethkingia, Riemerella, Salmonella</i>
LYASES		
<i>vgb(A)</i>	2	<i>Enterococcus, Staphylococcus</i>
<i>vgb(B)</i>	1	<i>Staphylococcus</i>
TRANSFERASES		
<i>lnu(A)</i>	6	<i>Staphylococcus, Bacteroides</i> ^{av} , <i>Clostridium</i> ^a , <i>Listeria, Lactobacillus</i> ^g , <i>Pediococcus</i> ^{ad}
<i>lnu(B)</i>	7	<i>Enterococcus, Clostridium</i> ^a , <i>Erysipelothrix</i> ^{aq} , <i>Listeria</i> ^{cc} , <i>Staphylococcus, Streptococcus</i> ^h , <i>Virgibacillus</i>
<i>lnu(C)</i>	9	<i>Brachyspira</i> ^{bd,be} , <i>Campylobacter, Streptococcus, Haemophilus</i> ^L , <i>Bfidobacterium</i> ^{bf} , <i>Cloacibacillus</i> ^{a,bf} , <i>Enterococcus</i> ^{bf} , <i>Megaspaera</i> ^{bf} , <i>Veillonella</i> ^{bf}
<i>lnu(D)</i>	1	<i>Streptococcus</i>
<i>lnu(E)</i>	2	<i>Enterococcus, Streptococcus</i>
<i>lnu(F)</i>	9	<i>Aeromonas, Comamonas, Desulfobacterium, Escherichia, Leclercia, Morganella, Proteus,</i>

<i>lnu(G)</i> ^{ao}	2	<i>Providencia, Salmonella</i>
<i>lnu(H)</i> ^{ay}	1	<i>Enterococcus, Virgibacillus</i>
<i>lnu(P)</i> ^{ap}	1	<i>Riemerella</i>
<i>vat(A)</i>	1	<i>Clostridium</i>
<i>vat(B)</i>	1	<i>Staphylococcus</i>
<i>vat(C)</i>	2	<i>Enterococcus, Staphylococcus</i>
<i>vat(D)</i>	1	<i>Staphylococcus</i>
<i>vat(E)</i>	2	<i>Clostridium</i> ^a , <i>Enterococcus</i>
<i>vat(F)</i>	3	<i>Bacteroides</i> ^{aw} , <i>Enterococcus, Lactobacillus</i>
<i>vat(G)</i> ^f	1	<i>Yersinia</i>
		<i>Enterococcus</i>

PHOSPHORYLASES

<i>mph(A)</i>	11	<i>Aeromonas, Escherichia, Citrobacter, Enterobacter, Klebsiella, Pantoeae, Pseudomonas, Proteus Serratia, Shigella</i> ^{i, ag} , <i>Stenotrophomonas</i>
<i>mph(B)</i>	6	<i>Escherichia, Enterobacter, Klebsiella, Pseudomonas, Proteus, Salmonella</i>
<i>mph(C)</i>	3	<i>Listeria, Staphylococcus, Stenotrophomonas</i>
<i>mph(D)</i>	6	<i>Escherichia, Klebsiella, Pantoeae, Proteus, Pseudomonas, Stenotrophomonas</i>
<i>mph(E)</i> ^{s,bo}	10	<i>Acinetobacter, Citrobacter, Escherichia, Klebsiella, Morganella, Pasteurella, Providencia, Pseudomonas, Salmonella, Serratia</i>
<i>mph(F)</i> ^u	2	<i>Pseudomonas, Vibrio</i>
<i>mph(G)</i>	4	<i>Escherichia, Photobacterium, Salmonella, Vibrio</i>
<i>mph(H)</i> ^{bn}	1	<i>Brachybacterium</i>
<i>mph(I)</i> ^{bn}	1	<i>Paenibacillus</i>
<i>mph(J)</i> ^{bn}	3	<i>Brevibacillus, Paenibacillus, Scytonema</i>
<i>mph(K)</i> ^{bn}	1	<i>Bacillus</i>
<i>mph(L)</i> ^{bn}	1	<i>Bacillus</i>
<i>mph(M)</i> ^{bn}	1	<i>Bacillus</i>
<i>mph(N)</i> ^{bn}	1	<i>Exiguobacterium</i>
<i>mph(O)</i> ^{bn}	1	<i>Brachybacterium</i>

Blue indicates new since last update.

¹*Actinobacillus actinomycetemcomitans* is now *Aggregatibacter actinomycetemcomitans*

^a Anaerobic genus; ^b *T. denticola* anaerobic but not all species in genus are anaerobes; ^c *msr(D)* normally linked to *mef(A)*; ^d the *msr(D)* may not be functional in the *Bacteroides* isolated described (Wang et al., App Env Microb. 2003); ^e Schwaiger, & Bauer, 2008, AAC 52:2994; ^g Rosander, Connolly & Roos AEM 74:6032, 2008; ^h Achard et al., AAC, 49:2716, 2005; ^l Boumghar-Bourtchai, Emg Infect Dis 14:1297, 2008; ^j Villedieu et al., AAC, 51:2195, 2007; ^k Kadlec, AAC 53:3589, 2009; ^L Chen et al, JAC 65:2256, 2010; ^m Kadlec & Schwarz. AAC 54:915, 2010; ⁿ Koike et al., Microbiol Ecol 3:487, 2009; ^o Lu et al., Curr Microbiol 61:44, 2010, The authors did not test for *mef(A)* but *msr(D)* has always been associated with *mef(A)* in a single element and thus the ureaplasma with *msr(D)* most likely carries the *mef(A)* gene; Malbruny et al. AAC 55:1470, 2011; ^q resistance to phenicols, lincosamides, oxazolidinones, pleuromutilins, and streptogramin A **but not macrolides**; Long et al., AAC 50:2500, 2006; ^r Roberts et al., J. Antimicrob. Chemother. 66:100-104, 2011; ^s *msr(E)* and *mph(E)* usually linked; ^t Jung et al., AAC 54:5359, 2010, please note the *vat* gene had been renamed *vat(H)*; ^u Szczepanowski et al., AAC 51:673, 2007 named *mph(E)* but this was not an officially approved name, and was changed to *mph(F)* because another set of unrelated genes were already labeled *mph(E)*; ^v Perreten, Switzerland; ^x Proteus JAC 66:2521, 2011; ^y Popwska et al, AAC 56:1434, 2012; ^z Wang et al, JAC 67:1824-1827, 2012; ^{aa} Si et al., AAC 59:7113, 2015 and Li et al., JAC 69:919, 2014, variant confers resistance to lincosamides, streptogramin A & pleuromutilins; ^{ab} Wang et al, JAC 67:1094-1098; ^{ad} Munoz-Atienza et al., BMC Microbiol. 13:15, 2013; ^{ac} Hays, Lienhard, Auzou et al, JAC 69:2056, 2014; ^{af} Qin et al., JAC 69:964, 2014; ^{ag} MMWR 63:132, Feb 14, 2014; ^{ai} Yang et al., JAC 68:1930-32, 2013; ^{aj} Xu et al, AAC 59:2462, 2015; ^{ak} Deshpande et al., AAC 2015, 59:6256-6261; Marín et al. 2015, AAC 59:586-589; ^{al} Vergen et al., Eur J Clin Micro Infec Dis, July 2015 doi 10.1007/s10096-015-2451-5; ^{am} Luo et al., Avian Pathology 2015, 44:162; ^{an} confers resistance to macrolides and lincosamides by not streptogramins V. Perreten ASM 2016; ^{ao} Zhu, Wang, Li et al., JAC doi:10.1093/jac/dkw549; ^{ap} Lyras et al., J Bacteriology 191:6345, 2009; ^{aq} Zhang et al., Vet Microb. 177:162, 2015; ^{ar} Hot et al., AAC58:3335, 2014; ^{as} Wilpf et al., July 2017, AAC e00066-17 1-6. <http://aac.asm.org/content/61/7/e00066-17.full.pdf+html>; ^{at} Candela et al., 2017 Intern J Antimicrob Agents 50:496; Tang et al., 2017, JAC, 72:1581, ^{av} Bojarska et al., Eur J. Clin Microbiol Infec Dis 35:917, 2016; ^{aw} Szekeley, Eitel, Molnar et al., Anaerobe 31:11, 2015; ^{ax} Wang et al., JAC 2015, 70:2182-90; Cavaco, Bernal, Zankari et al., JAC doi:10.1093/jac/dkw490, 2016, **Data shows it does not confer an efflux protein Schwarz & Yang personnel communication**; ^{ay} Luo et al., 2018, 51:136 International J Antimicrob Agents; ^{az} Wang et al., AAC 2013, 57:4061; ^{ba} Xing et al., PloSOne 2015 doi:10.1371/journal.pone.0131078; ^{bb} Li et al., submitted Erysipelothrix; ^{bc} Zhang, Schmidt, Plepersberg, Mol Microbiol 6:2147, 1992; ^{bd} Marinez et al., AEM 2018 e02888-17; ^{be} De Luca et al., Vet Microbiol 214:51, 2018; ^{bf} genera with the same *lnu(C)* transposon from WGS but unknown if it confers resistance to the isolates identified in De Luca et al., Vet Microbiol 214:51, 2018; ^{bh} **Guerin et al., JAC 2020 doi:10.1093/jac/dkaa125**; ^{bi} Christianson et al., PloS One 2016 9 erm(41), PMID:27490181; ^{bj} Sharkey, Edwards, O' Neill, MBio 2016; e01975-15 1-15; Sharkey, O'Neill, 2018 ACS Inf Dis 4:239-246 and Wilson MBio 2016; e00598-16. Demonstrated that *lsa(A)*, and *vga(A)* are ABC-F proteins that confer resistance by ribosomal **protection** rather than efflux has been shown in the first paper. Four genes have

been shown to be ribosomal protection from this group; ^{bk} These genes have been suggested to be ribosomal protection genes but no data to support the mechanism has been done and thus not clear of the mechanism of action [Sharkey, O'Neill, 2018 ACS Inf Dis 4:239-24]. ^{bl} Su, Kumar, Ding et al., 2018, PNAS, May 15, 2018. 115:5157-5162, www.pnas.org/cgi/doi/10.1073/pnas.1803313115 *msr(E)*; ^{b^m} Ero et al., 2019 Protein Science 28:684; ^{bn} Not named by the nomenclature center. Dr. Wright lab named these most come from WGS sequences from a variety of bacteria [Pawlowski et al. 2018 7:13803, Nature Communications]; ^{bo} multiple different genes labeled *mph(E)* in literature; ^{bp} *Cutibacterium* is the new genus name, Aoki et al., J Medical Microbio 2019 68:26; ^{bq} Ding et al., Communications Biol 2018, doi:10.1038/s42003-018-0064-0; ^{br} **Aoli, Nakase, Nakaminami et al, AAC2020 <https://aac.asm.org/content/aac/64/3/e01810-19.full.pdf>**; ^{bu} Stojkovic AAC2019 doi 10.1128/AAC.01074-19; ^{bv} **Shi, Yoshida, Fujlwara, Nishiki Microbial Drug Resist, 2020 <https://doi.org/10.1089/mdr.2020.0218>**; ^{bw} **Huber, Giguere, Slovis et al., Environ Microb 2020 doi:10.1111/1462-2920.15020**; ^{bx} **Schwendener, Dona, Perreten AAC 2020 DOI:1-.1128/AAC.00160; *mef(F)* and *msr(G)* linked plasmid, *mef(D)*-*msr(G)* linked on chromosome**;

^{by} *Clostridium difficile* is now known as *Clostridiodes difficile* other species are still the genus *Clostridium* ; ^{bz} GenBank# CP017962.1; ^{ca} **Ehrmann et al., JAC 201469:381-83 doi:10.1093/jac/dkt350**; ^{cb} **Alberto et al., JAC 2018 73:1763-69 doi:10.1093/jac/dky088**; ^{cc} **Yan et al., JAC 2020 75:868-872 doi:10:1093/jac/dkz545**; ^{cd} **Fernandez, Perrenten, Schwendener manuscript in press JAC DOI:10.1093/jac/dkaa405, low to moderate resistance *msr(F)*-*mef(D)* in *Staphylococcus***; ^{ce} **Chang Beijing, China**

2020: Some of the new genera came from U.S. National Library of Medicine National Center for Biotechnology Information;
<https://www.ncbi.nlm.nih.gov/pathogens/isolates#/search/>