



Supplementary materials to

Antibiotics act in concert with novel Fri1-like bacteriophage vB_AbaP_AGC01 against multidrug resistant *Acinetobacter baumannii* in human heat inhibited plasma blood and *Galleria mellonella* models

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Table S1. Host range of the vB_AbaP_AG01 phage. EOP – efficiency of plating; BI -Blood infection; RTI – Respiratory tract infection; STI – Skin and soft tissue infection, UTI – Urinary tract infection.

No.	Internal code	Species	Source of isolation	EOP
1	G60/1	<i>Acinetobacter baumannii</i>	BI	0.79
2	G49/1	<i>Acinetobacter baumannii</i>	BI	0
3	G64/1	<i>Acinetobacter baumannii</i>	BI	0
4	G61/1	<i>Acinetobacter baumannii</i>	BI	0.83
5	G43/2	<i>Acinetobacter baumannii</i>	BI	0.97
6	G48/2	<i>Acinetobacter baumannii</i>	BI	0.83
7	G56/2	<i>Acinetobacter baumannii</i>	BI	1.2
8	G38/1	<i>Acinetobacter baumannii</i>	BI	0
9	G76/2	<i>Acinetobacter baumannii</i>	BI	0
10	G6/2	<i>Acinetobacter baumannii</i>	BI	1.02
11	G45/2	<i>Acinetobacter baumannii</i>	BI	1
12	G56/1	<i>Acinetobacter baumannii</i>	BI	0.6
13	G32/1	<i>Acinetobacter baumannii</i>	BI	0
14	G54/2	<i>Acinetobacter baumannii</i>	BI	0
15	G39/1	<i>Acinetobacter baumannii</i>	BI	0
16	G63/1	<i>Acinetobacter baumannii</i>	BI	0.46
17	G4/2	<i>Acinetobacter baumannii</i>	BI	0.92
18	G80/1	<i>Acinetobacter baumannii</i>	BI	0
19	G9/3	<i>Acinetobacter baumannii</i>	BI	0
20	G5/3	<i>Acinetobacter baumannii</i>	BI	0
21	G15/2	<i>Acinetobacter baumannii</i>	RTI	0
22	G16/2	<i>Acinetobacter baumannii</i>	RTI	0
23	G41/1	<i>Acinetobacter baumannii</i>	RTI	0
24	G21/2	<i>Acinetobacter baumannii</i>	RTI	0
25	G24/1	<i>Acinetobacter baumannii</i>	RTI	0
26	G25/1	<i>Acinetobacter baumannii</i>	RTI	0.98
27	G59/1	<i>Acinetobacter baumannii</i>	RTI	0.74
28	G40/2	<i>Acinetobacter baumannii</i>	RTI	0
29	G37/2	<i>Acinetobacter baumannii</i>	RTI	0
30	G27/1	<i>Acinetobacter baumannii</i>	RTI	0
31	G42/1	<i>Acinetobacter baumannii</i>	RTI	0
32	G26/1	<i>Acinetobacter baumannii</i>	RTI	0.5
33	G2/2	<i>Acinetobacter baumannii</i>	RTI	0
34	G71/2	<i>Acinetobacter baumannii</i>	RTI	0.61
35	G1/1	<i>Acinetobacter baumannii</i>	RTI	0.73
36	G11/2	<i>Acinetobacter baumannii</i>	RTI	0
37	G22/2	<i>Acinetobacter baumannii</i>	RTI	0
38	G77/1	<i>Acinetobacter baumannii</i>	RTI	0
39	G74/1	<i>Acinetobacter baumannii</i>	RTI	1.2
40	G12/2	<i>Acinetobacter baumannii</i>	RTI	0
41	G57/1	<i>Acinetobacter baumannii</i>	RTI	0.23
42	G58/1	<i>Acinetobacter baumannii</i>	RTI	0.47
43	G35/2	<i>Acinetobacter baumannii</i>	RTI	0.84
44	G55/2	<i>Acinetobacter baumannii</i>	RTI	0.73
45	G64/2	<i>Acinetobacter baumannii</i>	RTI	0

46	G10/2	<i>Acinetobacter baumannii</i>	RTI	0.54
47	G54/1	<i>Acinetobacter baumannii</i>	RTI	1.41
48	G36/2	<i>Acinetobacter baumannii</i>	RTI	1
49	G60/2	<i>Acinetobacter baumannii</i>	RTI	1.12
50	G59/2	<i>Acinetobacter baumannii</i>	RTI	0.92
51	G34/2	<i>Acinetobacter baumannii</i>	RTI	0
52	G70/2	<i>Acinetobacter baumannii</i>	RTI	0
53	G4/1	<i>Acinetobacter baumannii</i>	RTI	0
54	G23/2	<i>Acinetobacter baumannii</i>	RTI	0.96
55	G20/1	<i>Acinetobacter baumannii</i>	RTI	0.57
56	G20/2	<i>Acinetobacter baumannii</i>	RTI	0.29
57	G62/2	<i>Acinetobacter baumannii</i>	RTI	0.66
58	G32/2	<i>Acinetobacter baumannii</i>	RTI	0.39
59	G1/2	<i>Acinetobacter baumannii</i>	RTI	0
60	G63/2	<i>Acinetobacter baumannii</i>	RTI	0
61	G3/1	<i>Acinetobacter baumannii</i>	RTI	0
62	G36/1	<i>Acinetobacter baumannii</i>	RTI	0.78
63	G58/2	<i>Acinetobacter baumannii</i>	RTI	0
64	G9/1	<i>Acinetobacter baumannii</i>	RTI	0
65	G75/2	<i>Acinetobacter baumannii</i>	RTI	0
66	G5/2	<i>Acinetobacter baumannii</i>	RTI	0
67	G29/1	<i>Acinetobacter baumannii</i>	RTI	0
68	G78/2	<i>Acinetobacter baumannii</i>	RTI	0.49
69	G3/2	<i>Acinetobacter baumannii</i>	RTI	0.84
70	G74/2	<i>Acinetobacter baumannii</i>	RTI	0.76
71	G31/2	<i>Acinetobacter baumannii</i>	RTI	0
72	G46/2	<i>Acinetobacter baumannii</i>	RTI	0
73	G44/2	<i>Acinetobacter baumannii</i>	RTI	0
74	G51/2	<i>Acinetobacter baumannii</i>	RTI	0
75	G33/2	<i>Acinetobacter baumannii</i>	RTI	1.12
76	G2/1	<i>Acinetobacter baumannii</i>	RTI	0
77	G30/1	<i>Acinetobacter baumannii</i>	RTI	0
78	G73/2	<i>Acinetobacter baumannii</i>	RTI	0
79	G31/1	<i>Acinetobacter baumannii</i>	RTI	0
80	G5/1	<i>Acinetobacter baumannii</i>	RTI	0
81	G57/2	<i>Acinetobacter baumannii</i>	RTI	0.82
82	G62/1	<i>Acinetobacter baumannii</i>	RTI	0.46
83	G25/2	<i>Acinetobacter baumannii</i>	RTI	0
84	G61/2	<i>Acinetobacter baumannii</i>	RTI	0
85	G19/2	<i>Acinetobacter baumannii</i>	RTI	0
86	G16/1	<i>Acinetobacter baumannii</i>	RTI	0
87	G55/1	<i>Acinetobacter baumannii</i>	RTI	0.56
88	G79/1	<i>Acinetobacter baumannii</i>	RTI	0
89	G35/1	<i>Acinetobacter baumannii</i>	RTI	0.17
90	G17/1	<i>Acinetobacter baumannii</i>	RTI	0.93
91	G30/2	<i>Acinetobacter baumannii</i>	RTI	0
92	G50/1	<i>Acinetobacter baumannii</i>	RTI	0
93	G6/1	<i>Acinetobacter baumannii</i>	RTI	0.9
94	G81/1	<i>Acinetobacter baumannii</i>	RTI	0.83
95	G9/2	<i>Acinetobacter baumannii</i>	RTI	0.58

96	G7/3	<i>Acinetobacter baumannii</i>	RTI	0
97	G11/3	<i>Acinetobacter baumannii</i>	RTI	0
98	G93/01	<i>Acinetobacter baumannii</i>	RTI	0.93
99	G14/2	<i>Acinetobacter baumannii</i>	STI	0.34
100	G48/1	<i>Acinetobacter baumannii</i>	STI	0.29
101	G34/1	<i>Acinetobacter baumannii</i>	STI	0
102	G72/1	<i>Acinetobacter baumannii</i>	STI	0.92
103	G77/2	<i>Acinetobacter baumannii</i>	STI	0
104	G23/1	<i>Acinetobacter baumannii</i>	STI	0
105	G14/1	<i>Acinetobacter baumannii</i>	STI	0
106	G76/1	<i>Acinetobacter baumannii</i>	STI	0.62
107	G80/2	<i>Acinetobacter baumannii</i>	STI	0.21
108	G47/2	<i>Acinetobacter baumannii</i>	STI	0.81
109	G53/2	<i>Acinetobacter baumannii</i>	STI	0
110	G42/2	<i>Acinetobacter baumannii</i>	STI	1.13
111	G45/1	<i>Acinetobacter baumannii</i>	STI	1
112	G28/2	<i>Acinetobacter baumannii</i>	STI	0.67
113	G51/1	<i>Acinetobacter baumannii</i>	STI	0
114	G44/1	<i>Acinetobacter baumannii</i>	STI	0
115	G29/2	<i>Acinetobacter baumannii</i>	STI	0
116	G53/1	<i>Acinetobacter baumannii</i>	STI	0.64
117	G43/1	<i>Acinetobacter baumannii</i>	STI	0
118	G12/1	<i>Acinetobacter baumannii</i>	STI	0.76
119	G24/2	<i>Acinetobacter baumannii</i>	STI	0.39
120	G41/2	<i>Acinetobacter baumannii</i>	STI	0
121	G10/1	<i>Acinetobacter baumannii</i>	STI	0.59
122	G37/1	<i>Acinetobacter baumannii</i>	STI	0.34
123	G22/1	<i>Acinetobacter baumannii</i>	STI	0.22
124	G33/1	<i>Acinetobacter baumannii</i>	STI	0
125	G8/1	<i>Acinetobacter baumannii</i>	STI	1.34
126	G18/1	<i>Acinetobacter baumannii</i>	STI	0
127	G11/1	<i>Acinetobacter baumannii</i>	STI	0
128	G13/2	<i>Acinetobacter baumannii</i>	UTI	1
129	G67/2	<i>Acinetobacter baumannii</i>	UTI	0.59
130	G47/1	<i>Acinetobacter baumannii</i>	UTI	0.92
131	G65/1	<i>Acinetobacter baumannii</i>	UTI	0.64
132	G18/2	<i>Acinetobacter baumannii</i>	UTI	0
133	G75/1	<i>Acinetobacter baumannii</i>	UTI	0.53
134	G46/1	<i>Acinetobacter baumannii</i>	UTI	0
135	G17/2	<i>Acinetobacter baumannii</i>	UTI	0.48
136	G13/1	<i>Acinetobacter baumannii</i>	UTI	0
137	G15/1	<i>Acinetobacter baumannii</i>	UTI	0.85
138	G78/1	<i>Acinetobacter baumannii</i>	UTI	0
139	G73/1	<i>Acinetobacter baumannii</i>	UTI	0.79
140	G65/2	<i>Acinetobacter baumannii</i>	UTI	0.93
141	G38/2	<i>Acinetobacter baumannii</i>	UTI	1.2
142	G79/2	<i>Acinetobacter baumannii</i>	UTI	0.21
143	G71/1	<i>Acinetobacter baumannii</i>	UTI	0
144	G7/2	<i>Acinetobacter baumannii</i>	UTI	0
145	G70/1	<i>Acinetobacter baumannii</i>	UTI	0

146	G66/2	<i>Acinetobacter baumannii</i>	UTI	0.89
147	G7/1	<i>Acinetobacter baumannii</i>	UTI	0.71
148	G68/1	<i>Acinetobacter baumannii</i>	UTI	1.32
149	G66/1	<i>Acinetobacter baumannii</i>	UTI	0
150	G50/2	<i>Acinetobacter baumannii</i>	UTI	0.49
151	G52/1	<i>Acinetobacter baumannii</i>	UTI	0
152	G8/2	<i>Acinetobacter baumannii</i>	UTI	0
153	G49/2	<i>Acinetobacter baumannii</i>	UTI	0.83
154	G68/2	<i>Acinetobacter baumannii</i>	UTI	0.24
155	G69/2	<i>Acinetobacter baumannii</i>	UTI	00
156	G40/1	<i>Acinetobacter baumannii</i>	UTI	0
157	G72/2	<i>Acinetobacter baumannii</i>	UTI	0
158	G27/2	<i>Acinetobacter baumannii</i>	UTI	0.9
159	G19/1	<i>Acinetobacter baumannii</i>	UTI	0.34
160	G69/1	<i>Acinetobacter baumannii</i>	UTI	0
161	G21/1	<i>Acinetobacter baumannii</i>	UTI	0
162	G52/2	<i>Acinetobacter baumannii</i>	UTI	0
163	Ab1/113	<i>Acinetobacter baumannii</i>	UTI	1.2
164	Ab1/119	<i>Acinetobacter baumannii</i>	UTI	1.1
165	Ab1/123	<i>Acinetobacter baumannii</i>	UTI	0.46
166	Ab2/01	<i>Acinetobacter baumannii</i>	UTI	0.32
167	Ab2/02	<i>Acinetobacter baumannii</i>	UTI	0
168	Ab2/19	<i>Acinetobacter baumannii</i>	UTI	0.93
169	Ab2/87	<i>Acinetobacter baumannii</i>	UTI	0
170	Ab3/1	<i>Acinetobacter baumannii</i>	UTI	0
171	Ab4/12	<i>Acinetobacter baumannii</i>	UTI	0
172	Ab5/02	<i>Acinetobacter baumannii</i>	UTI	0
173	Ab5/16	<i>Acinetobacter baumannii</i>	UTI	0.12
174	Ab5/19	<i>Acinetobacter baumannii</i>	UTI	1.32
175	Ab5/23	<i>Acinetobacter baumannii</i>	UTI	0
176	Ab5/19	<i>Acinetobacter baumannii</i>	UTI	0.39
177	Ab5/22	<i>Acinetobacter baumannii</i>	UTI	0.66
178	Ab6/11	<i>Acinetobacter baumannii</i>	UTI	0
179	Ab6/12	<i>Acinetobacter baumannii</i>	UTI	0
180	Ab6/13	<i>Acinetobacter baumannii</i>	UTI	0.79
181	Ab6/14	<i>Acinetobacter baumannii</i>	UTI	0.39
182	Ab6/15	<i>Acinetobacter baumannii</i>	UTI	0.63
183	Ab6/16	<i>Acinetobacter baumannii</i>	UTI	0
184	ATCC®19606™	<i>Acinetobacter baumannii</i>	UTI	1
185	ATCC®17978™	<i>Acinetobacter baumannii</i>	UTI	0.43

Table S2. Predicted function of the open reading frames defined within the functional module.

Functional module	Predicted function (ORF)
DNA replication	DNA binding protein (ORFs: 14, 16, 22, 51)
	DNA primase/helicase (ORFs: 17, 19)
	DNA/RNA binding protein (ORF20)
	DNA helicase (ORF21)
	ATP-dependent DNA ligase (ORF23)
	DNA polymerase I (ORF24),
	deoxynucleoside monophosphate kinase (ORF27)
	5'-3' exonuclease (ORF28)
	tRNA nucleotidyltransferase (ORF29)
	DNA endonuclease VII (ORF30)
	phosphoesterase with HTH domain (ORF31)
dNMP kinase (ORF32)	
RNA polymerase (RNAP)	DNA-directed RNA polymerase (ORF33)
Virus structure and assembly	head-to-tail connector protein (ORF36)
	scaffolding protein (ORF37)
	major capsid protein (ORF38)
	tail tubular protein A (ORF39)
	tail needle protein (ORF40)
	tail tubular protein B (ORF41)
	tail tubular protein C (ORF42)
	internal virion protein A (ORF43)
	internal virion protein A (ORF44)
	DNA ejectosome component (ORF45)
	tail fiber protein (ORF46)
DNA maturase A (ORF49)	
DNA maturase B (ORF50)	
Host cell lysis	holin (ORF47)
	endolysin (ORF48)

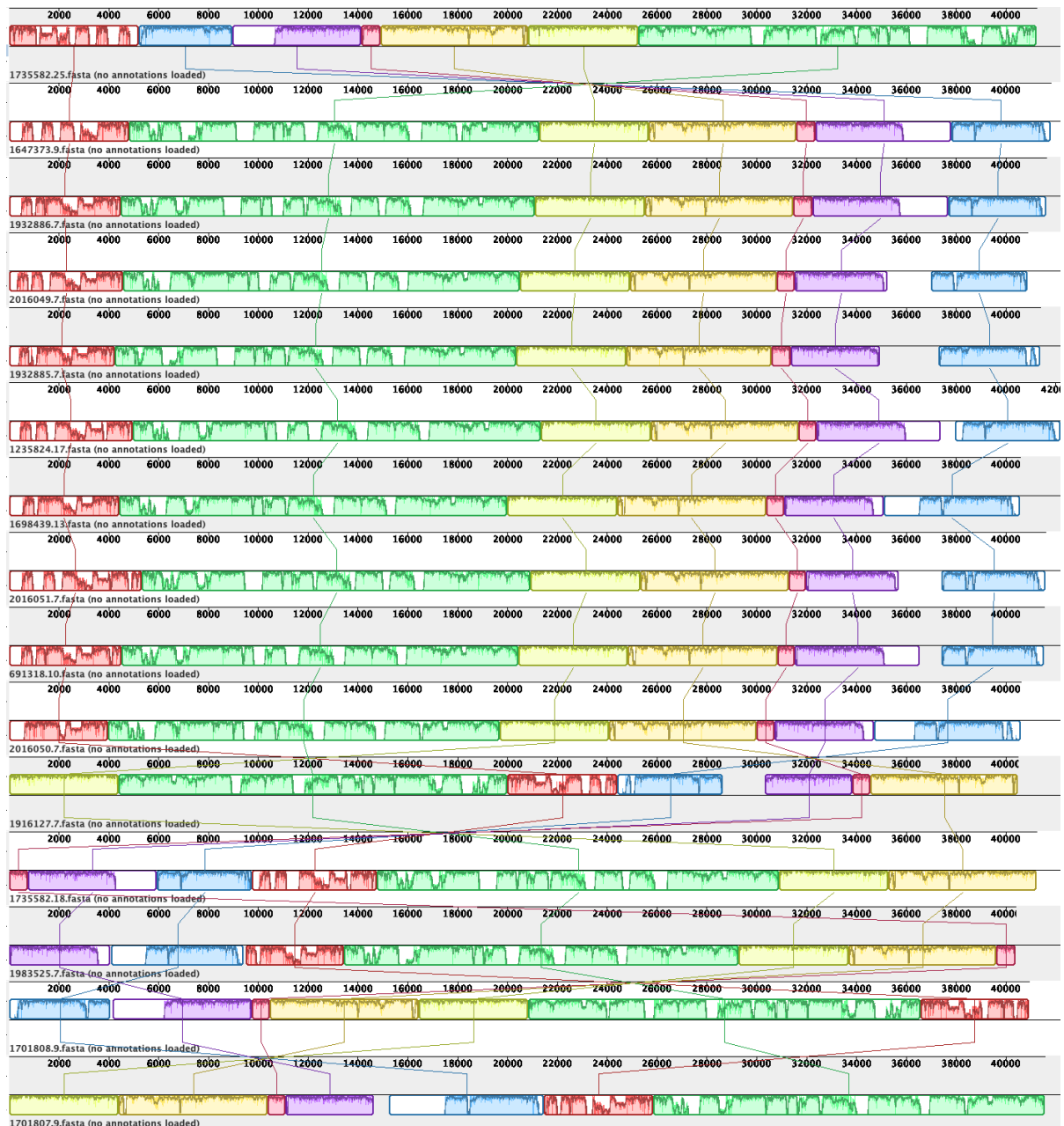


Figure S1. Mauve Colored boxes indicate homologous DNA regions between genomes without genomic rearrangements. Genomic similarity is represented by the height of the bars, which corresponds to the average level of conservation in that region of the genome sequence. Completely white regions represent fragments that were not aligned or contained sequence elements specific to a particular genome. Data were analyzed with PATRIC 3.6.3. [1] (1735582.25 – *Acinetobacter* phage vB_AbaP_AGC01; 1235824.17 - *Acinetobacter* phage Abp1; 1647373.9 - *Acinetobacter* phage Fri1; 1698439.13 - *Acinetobacter* phage phiAB6; 1701807.9 - *Acinetobacter* phage vB_AbaP_PD-6A3; 1701808.9 - *Acinetobacter* phage vB_AbaP_PD-AB9; 1735582.18 - *Acinetobacter* phage vB_AbaP_IME200; 1916127.7 - *Acinetobacter* phage SH-Ab 15519; 1932885.7 - *Acinetobacter* phage vB_AbaP_AS12; 1932886.7 - *Acinetobacter* phage vB_AbaP_AS11; 1983525.7 - *Acinetobacter* phage WCHABP5; 2016049.7 - *Acinetobacter* phage vB_AbaP_B1; 2016050.7 - *Acinetobacter* phage vB_AbaP_B3; 2016051.7 - *Acinetobacter* phage vB_AbaP_B5; 691318.10 - *Acinetobacter* phage phiAB1).

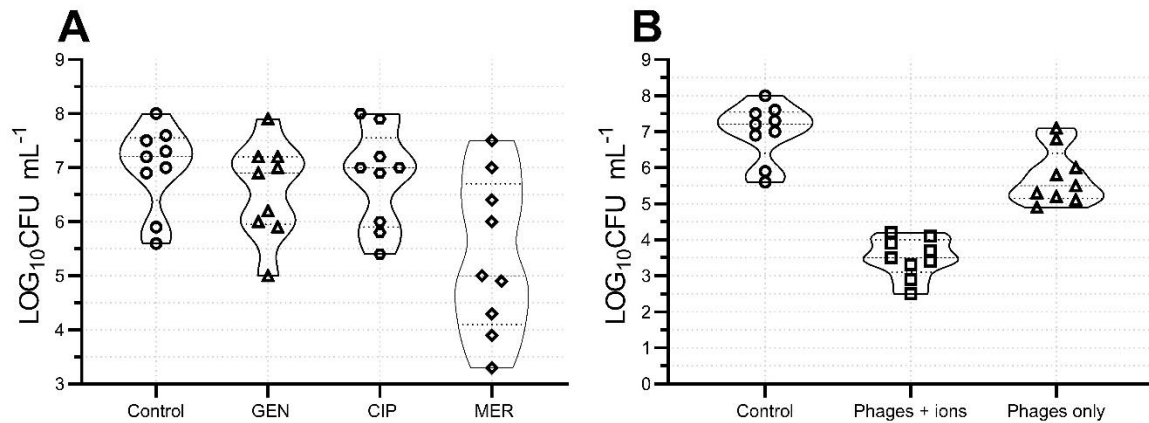


Figure S2. Antibiotic and Phage activity in the human heat inhibited plasma blood model. (A) Effectiveness of the *A. baumannii* treatment with antibiotics in the human heat inhibited plasma blood model. Control – without antibiotic addition; GEN - gentamicin, CIP – ciprofloxacin, MER – meropenem. (B) Influence of the ions reconstruction (CaCl_2 , FeSO_4 , or MgCl_2 ions were reconstructed at a final concentration of 5 mM) on the bacteriophage activity in the human heat inhibited plasma blood model

1. Wattam AR, Davis JJ, Assaf R, Boisvert S, Brettin T, Bun C, Conrad N, Dietrich EM, Disz T, Gabbard JL, Gerdes S, Henry CS, Kenyon RW, Machi D, Mao C, Nordberg EK, Olsen GJ, Murphy-Olson DE, Olson R, Overbeek R, Parrello B, Pusch GD, Shukla M, Vonstein V, Warren A, Xia F, Yoo H, Stevens RL. Improvements to PATRIC, the all-bacterial Bioinformatics Database and Analysis Resource Center. *Nucleic Acids Res.* 2017 Jan 4;45(D1):D535-D542. doi: 10.1093/nar/gkw1017. PMID: 27899627. PMCID: PMC5210524.