Electronic Supplementary Material (ESI) for Environmental Science: Processes & Impacts.

Table S1. The antibiotics used for the disk diffusion assay and inhibition zone diameters of strain Jade-X in the presence/absence of BAC

Sensitivity	No.	Name	Concentration/ slice	Abbreviation	Plate 1 (cm)	Plate 2 (cm)	Plate 3 (cm)	Average (cm)	±
Increase	1	ciprofloxacin	5 μg	CIP(+)	2.4	2.2	2.0	2.20	0.16
				CIP	3	2.8	2.9	2.90	0.08
	2	levofloxacin	5 μg	LEV(+)	1.7	1.8	1.8	1.77	0.05
				LEV	2.3	2.5	1.9	2.23	0.25
	3	tetracycline	30 μg	TET(+)	0.7	0.9	0.8	0.80	0.08
				TET	0.9	1.1	1.3	1.10	0.16
	4	norfloxacin	10 μg	NOR(+)	1.6	1.6	1.7	1.63	0.05
				NOR	2.5	2.4	2.3	2.40	0.08
Decrease	5	ceftriaxone	30 μg	CTR(+)	1.7	1.8	2	1.83	0.12
				CTR	1.4	1.5	1.5	1.47	0.05
	6	polymyxin B	300 IU	PB(+)	2.1	2	1.8	1.97	0.12
				PB	1.6	1.5	1.4	1.50	0.08
No influence	7	imipenem	10 μg	IPM(+)	2.1	2	2.1	2.07	0.05
				IPM	2	2.1	2.0	2.03	0.05
	8	piperacillin	100 μg	PIP(+)	2.7	2.4	2.8	2.63	0.17
				PIP	2.8	2.5	2.4	2.57	0.17
	9	gentamicin	10 μg	GEN(+)	1.3	1.1	1.2	1.20	0.08
				GEN	1.1	1.2	1.2	1.17	0.05
	10	cefoperazone	75 μg	CPZ(+)	2.2	2.0	2.0	2.07	0.09
				CPZ	2	2	2.3	2.10	0.14
	11	doxycycline	30 μg	DO(+)	1.4	1.5	0.7	1.20	0.36
				DO	1.3	1	1.3	1.20	0.14
	12	ceftazidime	30 μg	CAZ(+)	2.5	2.6	2.7	2.60	0.08
				CAZ	2.4	2.6	2.5	2.50	0.08
	13	minocycline	30 μg	MI(+)	1.3	1.5	1.1	1.30	0.16
				MI	1.2	1.3	1.2	1.23	0.05
	14	amikacin	30 μg	AMK(+)	1.5	1.6	1.6	1.57	0.05
				AMK	1.5	1.7	1.4	1.53	0.12
No inhibitory zone diameter	15	oxacillin	1 μg	OX(+)	0	0	0	0	0
				OX	0	0	0	0	0
	16	florfenicol	30 μg	FFC(+)	0	0	0	0	0
				FFC	0	0	0	0	0
	17	azithromycin	15 μg	AZI(+)	0	0	0	0	0
				AZI	0	0	0	0	0
	18	sulfamethoxazole	25 μg	SXT(+)	0	0	0	0	0
				SXT	0	0	0	0	0
	19	clindamycin	2 μg	CC(+)	0	0	0	0	0

				CC	0	0	0	0	0
	20	chloramphenicol	30 μg	C(+)	0	0	0	0	0
				C	0	0	0	0	0
	21	cefazolin	30 μg	CZ(+)	0	0	0	0	0
				CCC	0	0	0	0	0
	22	ampicillin	10 μg	AMP(+)	0	0	0	0	0
				AMP	0	0	0	0	0
	23	kanamycin	30 μg	KAN(+)	0	0	0	0	0
				KAN	0	0	0	0	0
	24	penicillin	10 U	PEN(+)	0	0	0	0	0
				PEN	0	0	0	0	0
	25	streptomycin	10 μg	S(+)	0	0	0	0	0
				S	0	0	0	0	0
	26	erythrocin	15 μg	E(+)	0	0	0	0	0
				E	0	0	0	0	0
	27	cefuroxime sodium	30 μg	CXM(+)	0	0	0	0	0
				CXM	0	0	0	0	0
	28	lincomycin	2 μg	MY(+)	0	0	0	0	0
				MY	0	0	0	0	0
	29	cefalexin	30 μg	CN(+)	0	0	0	0	0
				CN	0	0	0	0	0

Table S2. List of functional genes and qRT-PCR primers used in this study

Number	Gene tag	Name	Forward Sequence (5′-3′)	Reverse Sequence (5′-3′)	Gene annotation
1	15670	*mexX*	AATCCGCATCG CGAATTGCT	CTGTGGGTTGA CCACCTTGA	multidrug efflux RND transporter periplasmic adaptor subunit MexX
2	15675	*mexY*	TCGCCGTGATGT ACCTGTTC	ACGTTGATCGA GAAGCCCAG	multidrug efflux RND transporter permease subunit MexY
3	6515	*mexJ*	GTGTCGGTCGA ACTCTGGTC	CAAGGGAACCG ATAACGGCA	multidrug efflux RND transporter periplasmic adaptor subunit MexJ
4	6520	*mexK*	CATCCTGGTGCT GGGTAAGG	AAGAAGCTCAC CAGCAGGAC	multidrug efflux RND transporter permease subunit MexK
5	7290	*mexP*	GCAACTGGATC TCGGCTTCA	ACGCCATTGGT GACGTAGTT	multidrug efflux RND transporter periplasmic adaptor subunit MexP
6	7295	*mexQ*	GCAGGTGACTA CCGCCTATC	GATGTGCTGGT CGAAGGTGA	multidrug efflux RND transporter permease subunit MexQ
7	7300	*opmE*	CGGCAATCTCG ATGCTTTGG	AGTACCGTCCG GTCGTAGAG	multidrug efflux transporter outer membrane subunit OpmE
8	19170	*mexN*	CGCAGGACATC AACCTCAGT	TTGGACACATC CATCAGCCC	multidrug efflux RND transporter permease subunit MexN
9	19175	*mexM*	GCTGACCATCG ACAACCAGA	CTTTGCTCGACA GCACCAAC	multidrug efflux RND transporter periplasmic adaptor subunit MexM
10	13140	*muxA*	AACCAGGCGCA ACTGAAGAA	GGTATCCAGGG TCTGCTTGG	multidrug efflux RND transporter periplasmic adaptor subunit MuxA
11	13145	*muxB*	CCTGATTTCCGG CTTCGTCT	TACTGTGCGATC AGGCCATC	multidrug efflux RND transporter permease subunit MuxB
12	13150	*muxC*	CTGCCCAACGTC GATTTTCC	CGATGTCCTTCT CCAGGTCG	multidrug efflux RND transporter permease subunit MuxC
13	13155	*opmB*	TATTTCCCCGAC CTCACCCT	GAACAGGGTCA TGGCGAACT	multidrug efflux RND transporter outer membrane subunit OpmB
14	24085	*mexV*	AAGGCCATCTC GAAAAGCGA	TGGAAAGGTCC TGCAAGGTG	multidrug efflux RND transporter periplasmic adaptor subunit MexV
15	24090	*mexW*	GAAGTGGTGAA GACCCTCGG	TCATCGACAGC GGAATGGTC	multidrug efflux RND transporter permease subunit MexW
16	815	*triA*	TCATTCCAAAG GTCGCTGGT	GAACTCGGCCA TCTTCACCG	triclosan efflux RND transporter adaptor protein TriA
17	820	*triB*	TCGTCGATGGG AAACAGTCC	CGAGTTTGATCT TCTGGCCG	triclosan efflux RND transporter adaptor protein TriB
18	825	*triC*	TCGTCCAGCACC AGTTCTTC	TCTCGTGGATGC TGCTGTTT	triclosan efflux RND transporter permease subunit TriC
19	27215	*motB*	CTGCAGCCGTAT TTCGAGGA	GATAGCTCCCA GTTGCCGAA	flagellar motor protein MotB
20	24865	*pilB*	AACAGCCTGGA TCGGGAAAG	GGTCGGAGAGA CCGATGAAC	type IV-A pilus assembly ATPase PilB
21	27655	*pilQ*	CAAGGACGGCA ATATCGGGA	ACAGTTGCAGG TCGAGGATG	type 4a pilus secretin PilQ
22	3800	*opmD*	TTCTTCGACGAT CCGCAACT	TCCAGCTGTTGT TCGATGCT	multidrug efflux transporter outer membrane subunit OpmD
23	3805	*mexI*	CGAGCCGATGT TCTCTTCCA	GTACTGCCCCTT CACCATCC	multidrug efflux RND transporter permease MexI
24	3810	*mexH*	CGGTCACCTATA CCGCCTAC	CTGGAGGATTT CCACGCGAC	multidrug efflux RND transporter periplasmic adaptor MexH
25	3815	*mexG*	GTCCACACCTTC TGGAGCAA	TCAGGCCTTCTG GTAGGTGG	multidrug efflux RND transporter inhibitory subunit MexG
26	2160	*mexA*	AGGAAGGCGTC AAGCAGAAG	TCGGTAACCAG CCACTTGTC	multidrug efflux RND transporter periplasmic adaptor subunit MexA
27	2165	*mexB*	CAGGAGCTTGC TGCTCTACC	ATTCCGTACCA GCATCCACG	multidrug efflux RND transporter permease subunit MexB
28	2170	*oprM*	CGCGAAGATCC AGAAGGACA	GAGCTGGTAGT ACTCGTCGC	multidrug efflux RND transporter outer membrane channel subunit OprM
29	25250	*oprJ*	CGACACGCTGG ATTGGAAGA	AGCGAGCGGTT GTTATCCAG	multidrug efflux transporter outer membrane subunit OprJ
30	25255	*mexD*	CAACGACTTCA CCAATGCGG	TCCCATTTCACG CTGACGAA	multidrug efflux RND transporter permease subunit MexD

31	25260	*mexC*	AATAGGAAGGA TCGGGGCGT	CTCCACCGGCA ACACCATTT	multidrug efflux RND transporter periplasmic adaptor subunit MexC
32	13310	*oprN*	GGGTCTGTTCAG TCTGCTGG	TTCGACCAACT GGTTCAGGG	multidrug efflux RND transporter outer membrane subunit OprN
33	13315	*mexF*	AGATCGGCCAG TTGAAGGTG	TTGAGTTCGGC GGTGATGAA	multidrug efflux RND transporter permease subunit MexF
34	13320	*mexE*	TGATCAAGGAC GAAGCGGTC	TGCGGTAGACG GTCTTGTTG	multidrug efflux RND transporter periplasmic adaptor subunit MexE
35	19190	*lasI*	GTGTTCAAGGA GCGCAAAGG	ATTCGCCAGCA ACCGAAAAC	acyl-homoserine-lactone synthase LasI
36	19200	*lasR*	ATCCTGCAGAA GATGGCGAG	GGGTAGTTGCC GACGATGAA	transcriptional regulator LasR
37	7420	*rhlR*	GTTTGCGTAGCG AGATGCAG	GGCGTAGTAAT CGAAGCCCA	transcriptional regulator RhlR
38	7425	*rhlI*	TTCGACCAGTTC GACCATCC	TAACGCGAAAG CTCCCAGAC	acyl-homoserine-lactone synthase
39	21495	*pqsB*	GAAGATTGGCC ATCCGTTGC	GACTCGCTGTCC ACTTCCAA	2-heptyl-4(1H)-quinolone synthase subunit PqsB
40	21500	*pqsA*	GCAATACACCT CGGGTTCCA	CCCATGCCATA GCCGAAGAA	anthranilate--CoA ligase
41	13850	*pvdQ*	GGCCATTTCGG GGTCTACAA	CTGGACTGGGA GAAAGCCAG	acyl-homoserine lactone acylase PvdQ
42	6660	*bamA*	CGAAGAAGACC TGACCGACC	CCAGGTAATAG GAGCGCAGG	outer membrane protein assembly factor BamA
43	5880	*bamB*	ATGGTTCCAGC ATCTACGCC	TCCACTTCTTCT TGCCGGTG	outer membrane protein assembly factor BamB
44	3790	*phzA*	GGGCTATTGCG AGAACCACT	GCTATTCCCAAT GCACGCAG	phenazine biosynthesis protein PhzA
45	3785	*phzB*	TGGCAAAGACA AACTTGCGG	ATGATTGGGGT CGTCGGTTC	phenazine biosynthesis protein PhzB
46	19235	*bdlA*	CATACCCTGTCC ACCGAGAC	ATCTGTTGCGA GTGCTGTGA	biofilm dispersion protein BdlA
47	21055	*flgE*	ACAACTCGTCCT CTTCGCTG	GTCCGGCTCGTT CTTGATGA	flagellar hook protein FlgE
48	21060	*flgD*	TCGCTGAACAA GAGCATGGA	ACGTTGACCCA TACGTTGCT	flagellar hook assembly protein FlgD
49		16S rRNA	TGCCTGGTAGTG GGGGATAA	TCTGATAGCGT GAGGTCCGA	reference gene

Table S3. The antibiotic resistance genes of strain Jade-X analyzed using the comprehensive antibiotic resistance database

ORF_ID	Resistance Mechanism	AMR Gene Family
1_orf01260	antibiotic efflux	major facilitator superfamily (MFS) antibiotic efflux pump
1_orf01762	antibiotic efflux	major facilitator superfamily (MFS) antibiotic efflux pump
1_orf05870	antibiotic efflux	multidrug and toxic compound extrusion (MATE) transporter
1_orf01913	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf00675	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf00676	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf07533	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf07530	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf03951	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf03949	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf01149	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf01146	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf01145	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf01974	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf01975	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf01973	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf05747	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf05744	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf02211	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf02212	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf03953	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf03952	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf07192	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf07195	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf04719	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf04716	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf03892	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf03894	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf03897	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf01911	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf02127	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf03898	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf01144	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf02214	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf08139	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf07529	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf00678	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf03946	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf02683	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf00253	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump

1_orf00255	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf00257	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf07534	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump
1_orf08166	antibiotic efflux	small multidrug resistance (SMR) antibiotic efflux pump
1_orf01287	antibiotic inactivation	APH(3')
1_orf06970	antibiotic inactivation	chloramphenicol acetyltransferase (CAT)
1_orf06247	antibiotic inactivation	fosfomycin thiol transferase
1_orf09017	antibiotic inactivation	OXA beta-lactamase
1_orf01304	antibiotic inactivation	PDC beta-lactamase
1_orf02165	antibiotic target alteration	pmr phosphoethanolamine transferase
1_orf07816	antibiotic target alteration	pmr phosphoethanolamine transferase
1_orf07818	antibiotic target alteration	pmr phosphoethanolamine transferase
1_orf04316	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump; ATP-binding cassette (ABC) antibiotic efflux pump; major facilitator superfamily (MFS) antibiotic efflux pump;
1_orf00674	antibiotic efflux	resistance-nodulation-cell division (RND) antibiotic efflux pump

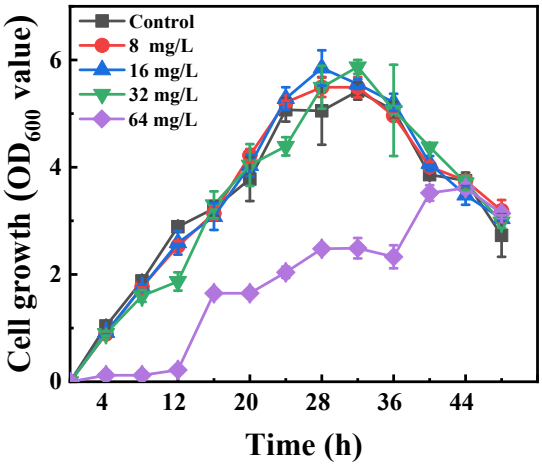

Fig. S1 The growth curves of strain Jade-X cultured in flasks (100 mL medium in 250 mL flask) at 30°C and 150 rpm

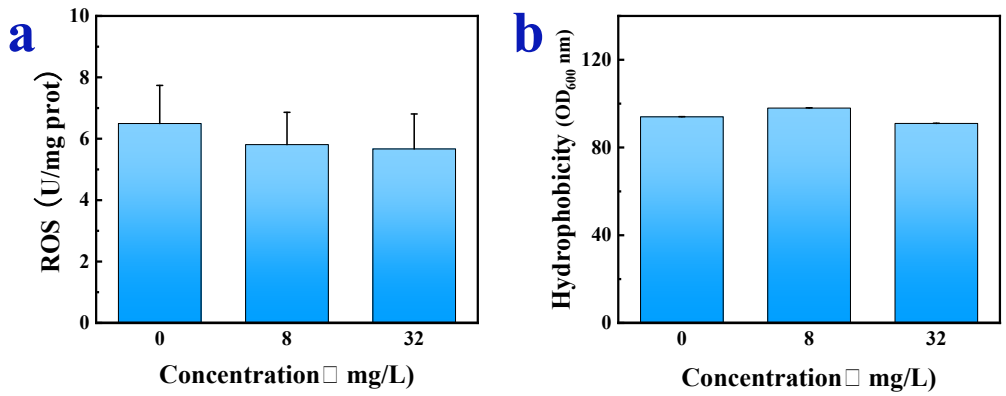

Fig. S2 Effects of BAC on ROS production (a) and hydrophobicity (b)

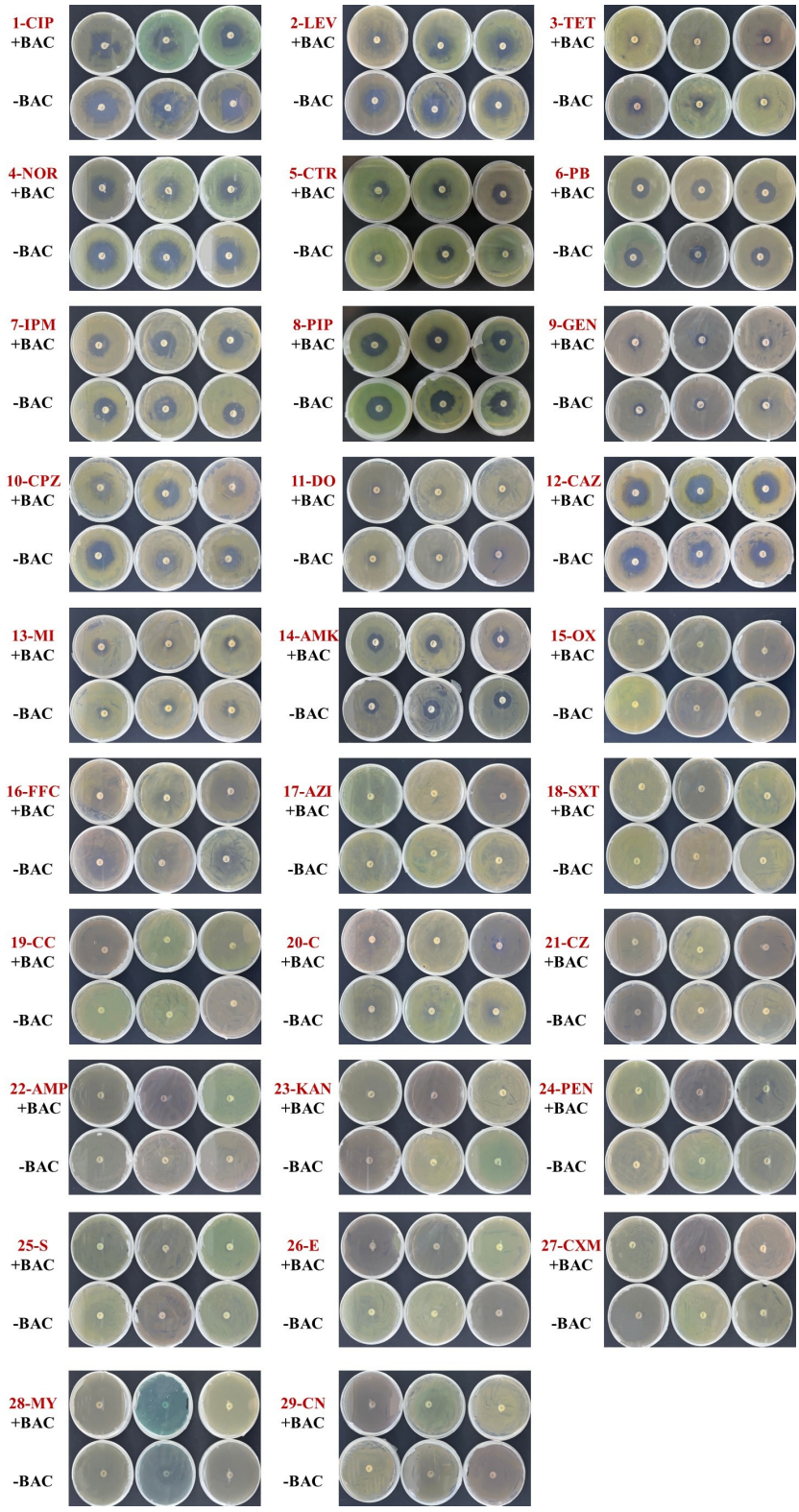

Fig. S3 Antibiotics sensitivity assay of strain Jade-X. BAC concentration was 8 mg/L, and strain was incubated at 30°C for 48 h

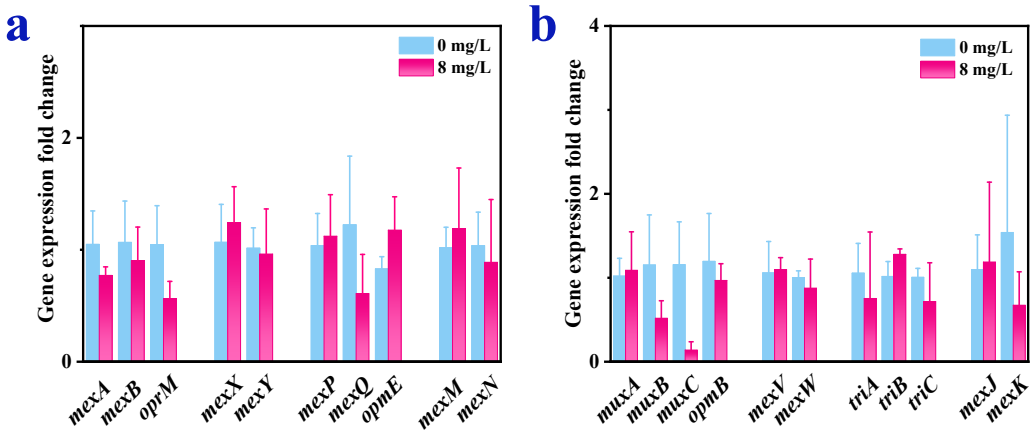

Fig. S4 The expression patterns of RND efflux-related genes of strain Jade-X in response to 8 mg/L BAC