

Supplementary Information File

First report on comprehensive genomic analysis of a multidrug-resistant *Enterobacter asburiae* isolated from diabetic foot infection from Bangladesh

Md. Rafiul Islam¹, Spencer Mark Mondol¹, Md. Azad Hossen¹, Mst. Poli Khatun¹, Shahjada Selim², Amiruzzaman³, Donald James Gomes¹, Md. Mizanur Rahaman^{1*}

¹Department of Microbiology, University of Dhaka, Dhaka-1000, Bangladesh

²Department of Endocrinology, Bangabandhu Sheikh Mujib Medical University, Dhaka-1000, Bangladesh

³Department of Medicine, Sir Salimullah Medical College, Dhaka-1000, Bangladesh

***Corresponding to:**

Md. Mizanur Rahaman, PhD

Associate Professor

Department of Microbiology,

University of Dhaka, Dhaka-1000, Bangladesh

Email: razu002@du.ac.bd

ORCID: 0000-0001-6939-0500

Contact Informations of Authors

1)Md. Rafiul Islam

Email: rafiul@du.ac.bd

2)Spencer Mark Mondol

Email: spencer.mark@du.ac.bd

3)Md. Azad Hossen

Email: mdazadmbg30.du@gmail.com

4) Mst. Poli Khatun

Email: mstpoli2018du@gmail.com

5)Shahjada Selim

Email: selimshahjada@gmail.com

6) Amiruzzaman

Email: suman24th.az@gmail.com

7)Donald James Gomes

Email: donalddjgomes@du.ac.bd

8)Md. Mizanur Rahaman (Corresponding Author)

Email: razu002@du.ac.bd

Supplementary table 1: List of virulence factor genes harbored by *E. asburiae* BDW1M3

Source	Genome Name	Gene	Product	E-value
Victors	Enterobacter asburiae BDW1M3	pcm	Protein-L-isoaspartate O-methyltransferase (EC 2.1.1.77)	6e-94
Victors	Enterobacter asburiae BDW1M3	fur	Ferric uptake regulation protein FUR	7e-59
Victors	Enterobacter asburiae BDW1M3	yjaG	Uncharacterized protein YjaG	1e-102
Victors	Enterobacter asburiae BDW1M3	ybaJ	Hha toxicity modulator TomB	3e-66
Victors	Enterobacter asburiae BDW1M3	yncB	Putative oxidoreductase YncB	1e-169
Victors	Enterobacter asburiae BDW1M3	sbmA	SbmA protein	1e-221
Victors	Enterobacter asburiae BDW1M3	Z2751	Putative outer membrane protein	1e-131
Victors	Enterobacter asburiae BDW1M3	focA	Formate efflux transporter FocA	1e-157
Victors	Enterobacter asburiae BDW1M3	msbB	Lipid A biosynthesis myristoyltransferase (EC 2.3.1.243)	1e-169
Victors	Enterobacter asburiae BDW1M3	dinP	DNA polymerase IV (EC 2.7.7.7)	1e-181
Victors	Enterobacter asburiae BDW1M3	manB	Phosphomannomutase (EC 5.4.2.8) => Colanic acid	1e-239
Victors	Enterobacter asburiae BDW1M3	nfnB	Oxygen-insensitive NAD(P)H nitroreductase (EC 1.-.-.-) / Dihydropteridine reductase (EC 1.5.1.34)	1e-109
Victors	Enterobacter asburiae BDW1M3	gmhA	D-sedoheptulose 7-phosphate isomerase (EC 5.3.1.28)	1e-104
Victors	Enterobacter asburiae BDW1M3	hfq	RNA-binding protein Hfq	3e-44

Victor s	Enterobact er asburiae BDW1M3	envZ	Osmolarity sensory histidine kinase EnvZ	1e- 249
Victor s	Enterobact er asburiae BDW1M3	purD	Phosphoribosylamine--glycine ligase (EC 6.3.4.13)	1e- 238
Victor s	Enterobact er asburiae BDW1M3	hrpA	ATP-dependent helicase HrpA	0.0
Victor s	Enterobact er asburiae BDW1M3	yafS	FIG005121: SAM-dependent methyltransferase (EC 2.1.1.-)	1e- 119
Victor s	Enterobact er asburiae BDW1M3	ppk	Polyphosphate kinase (EC 2.7.4.1)	0.0
Victor s	Enterobact er asburiae BDW1M3	argG	Argininosuccinate synthase (EC 6.3.4.5)	1e- 189
Victor s	Enterobact er asburiae BDW1M3	ydgF	Spermidine export protein MdtJ	3e- 50
Victor s	Enterobact er asburiae BDW1M3	celA	PTS system, N,N'-diacetylchitobiose-specific IIB component (EC 2.7.1.196)	3e- 48
Victor s	Enterobact er asburiae BDW1M3	yddX	Bdm protein	4e- 25
Victor s	Enterobact er asburiae BDW1M3	sbcD	Exonuclease SbcD	1e- 180
Victor s	Enterobact er asburiae BDW1M3	tufA	Translation elongation factor Tu	9e- 46
Victor s	Enterobact er asburiae BDW1M3	nqrE	Na(+)-translocating NADH-quinone reductase subunit E (EC 1.6.5.8)	9e- 93
Victor s	Enterobact er asburiae BDW1M3	hns	DNA-binding protein H-NS	7e- 69
Victor s	Enterobact er asburiae BDW1M3	trxA	Thioredoxin	3e- 57
Victor s	Enterobact er asburiae BDW1M3	trxB	Thioredoxin reductase (EC 1.8.1.9)	1e- 175

Victor s	Enterobact er asburiae BDW1M3	tufA	Translation elongation factor Tu	9e- 46
Victor s	Enterobact er asburiae BDW1M3	acnA	Aconitate hydratase (EC 4.2.1.3) @ 2-methylisocitrate dehydratase (EC 4.2.1.99)	0.0
Victor s	Enterobact er asburiae BDW1M3	smpB	tmRNA-binding protein SmpB	9e- 74
Victor s	Enterobact er asburiae BDW1M3	pstC	Phosphate ABC transporter, permease protein PstC (TC 3.A.1.7.1)	1e- 155
Victor s	Enterobact er asburiae BDW1M3	surA	Periplasmic chaperone and peptidyl-prolyl cis-trans isomerase of outer membrane proteins SurA (EC 5.2.1.8)	1e- 224
Victor s	Enterobact er asburiae BDW1M3	yeel	Protein MtfA	1e- 124
Victor s	Enterobact er asburiae BDW1M3	YPO117 9	Uncharacterized protein YajD	4e- 56
Victor s	Enterobact er asburiae BDW1M3	ydiK	UPF0118 inner membrane protein YdiK	1e- 186
Victor s	Enterobact er asburiae BDW1M3	malX	PTS system, maltose and glucose-specific IIC component / PTS system, maltose and glucose-specific IIB component (EC 2.7.1.208)	1e- 278
Victor s	Enterobact er asburiae BDW1M3	nlpC	Probable endopeptidase NlpC	1e- 75
Victor s	Enterobact er asburiae BDW1M3	map	Methionine aminopeptidase (EC 3.4.11.18)	1e- 139
Victor s	Enterobact er asburiae BDW1M3	yfhH	Uncharacterized HTH-type transcriptional regulator YfhH	1e- 123
Victor s	Enterobact er asburiae BDW1M3	speA	Biosynthetic arginine decarboxylase (EC 4.1.1.19)	0.0
Victor s	Enterobact er asburiae BDW1M3	yciH	Translation initiation factor SUI1-related protein	2e- 48
Victor s	Enterobact er asburiae BDW1M3	serA	D-3-phosphoglycerate dehydrogenase (EC 1.1.1.95)	1e- 219

Victor s	Enterobact er asburiae BDW1M3	galF	UTP--glucose-1-phosphate uridylyltransferase (EC 2.7.7.9)	1e- 158
Victor s	Enterobact er asburiae BDW1M3	sspA	Stringent starvation protein A	1e- 114
Victor s	Enterobact er asburiae BDW1M3	fliQ	Flagellar biosynthesis protein FliQ	6e- 39
Victor s	Enterobact er asburiae BDW1M3	carA	Carbamoyl-phosphate synthase small chain (EC 6.3.5.5)	1e- 213
Victor s	Enterobact er asburiae BDW1M3	wcaE	Colanic acid biosynthesis glycosyl transferase WcaE	1e- 121
Victor s	Enterobact er asburiae BDW1M3	kduI	4-deoxy-L-threo-5-hexosulose-uronate ketol-isomerase (EC 5.3.1.17)	1e- 151
Victor s	Enterobact er asburiae BDW1M3	lppA	Major outer membrane lipoprotein Lpp	1e- 35
Victor s	Enterobact er asburiae BDW1M3	aroA	3-phosphoshikimate 1-carboxyvinyltransferase (EC 2.5.1.19)	1e- 219
Victor s	Enterobact er asburiae BDW1M3	phoP	Transcriptional regulatory protein PhoP	1e- 118
Victor s	Enterobact er asburiae BDW1M3	carB	Carbamoyl-phosphate synthase large chain (EC 6.3.5.5)	0.0
Victor s	Enterobact er asburiae BDW1M3	cstA	Carbon starvation protein A	0.0
Victor s	Enterobact er asburiae BDW1M3	slyD	FKBP-type peptidyl-prolyl cis-trans isomerase SlyD (EC 5.2.1.8)	1e- 87
Victor s	Enterobact er asburiae BDW1M3	celF	N,N'-diacetylchitobiose-specific 6-phospho-beta-glucosidase (EC 3.2.1.86)	1e- 241
Victor s	Enterobact er asburiae BDW1M3	sodB	Superoxide dismutase [Fe] (EC 1.15.1.1)	1e- 103
Victor s	Enterobact er asburiae BDW1M3	yfhL	Uncharacterized ferredoxin-like protein YfhL	1e- 46

Victor s	Enterobact er asburiae BDW1M3	VC0243	GDP-mannose 4,6-dehydratase (EC 4.2.1.47)	1e- 178
Victor s	Enterobact er asburiae BDW1M3	znuB	Zinc ABC transporter, permease protein ZnuB	1e- 134
Victor s	Enterobact er asburiae BDW1M3	fadD	Long-chain-fatty-acid--CoA ligase (EC 6.2.1.3)	0.0
Victor s	Enterobact er asburiae BDW1M3	rfe	Undecaprenyl-phosphate alpha-N-acetylglucosaminyl 1-phosphate transferase (EC 2.7.8.33)	1e- 184
Victor s	Enterobact er asburiae BDW1M3	rpoS	RNA polymerase sigma factor RpoS	1e- 126
Victor s	Enterobact er asburiae BDW1M3	udg	UDP-glucose 6-dehydrogenase (EC 1.1.1.22)	1e- 162
Victor s	Enterobact er asburiae BDW1M3	fkpA	FKBP-type peptidyl-prolyl cis-trans isomerase FkpA precursor (EC 5.2.1.8)	1e- 133
Victor s	Enterobact er asburiae BDW1M3	pyrD	Dihydroorotate dehydrogenase (quinone) (EC 1.3.5.2)	1e- 181
Victor s	Enterobact er asburiae BDW1M3	ompA	Outer membrane protein A precursor	1e- 157
Victor s	Enterobact er asburiae BDW1M3	metA	Homoserine O-succinyltransferase (EC 2.3.1.46)	1e- 173
Victor s	Enterobact er asburiae BDW1M3	gyrA	DNA gyrase subunit A (EC 5.99.1.3)	0.0
Victor s	Enterobact er asburiae BDW1M3	ksgA	SSU rRNA (adenine(1518)-N(6)/adenine(1519)-N(6))-dimethyltransferase (EC 2.1.1.182)	1e- 120
Victor s	Enterobact er asburiae BDW1M3	vacB	3'-to-5' exoribonuclease RNase R	0.0
Victor s	Enterobact er asburiae BDW1M3	pgm	Phosphoglucomutase (EC 5.4.2.2)	1e- 274
Victor s	Enterobact er asburiae BDW1M3	arcA	Aerobic respiration control response regulator ArcA	1e- 126

Victor s	Enterobact er asburiae BDW1M3	trxC	Thioredoxin 2	7e- 71
Victor s	Enterobact er asburiae BDW1M3	dksA	RNA polymerase-binding transcription factor DksA	5e- 82
Victor s	Enterobact er asburiae BDW1M3	cpxA	Copper sensory histidine kinase CpxA	1e- 255
Victor s	Enterobact er asburiae BDW1M3	dsbA	Periplasmic thiol:disulfide interchange protein DsbA	1e- 100
Victor s	Enterobact er asburiae BDW1M3	ydjA	Putative NAD(P)H nitroreductase YdjA	2e- 83
Victor s	Enterobact er asburiae BDW1M3	cspC	Cold shock protein of CSP family => CspC (naming convention as in E.coli)	2e- 33
Victor s	Enterobact er asburiae BDW1M3	cls	Cardiolipin synthase, bacterial type ClsA	1e- 251
Victor s	Enterobact er asburiae BDW1M3	trpB	Tryptophan synthase beta chain (EC 4.2.1.20)	1e- 222
Victor s	Enterobact er asburiae BDW1M3	prfC	Peptide chain release factor 3	1e- 272
Victor s	Enterobact er asburiae BDW1M3	ilvG	Acetolactate synthase large subunit (EC 2.2.1.6)	1e- 301
Victor s	Enterobact er asburiae BDW1M3	pla	Protease VII (OmpT) precursor (EC 3.4.23.49) @ Outer membrane protease PgtE	1e- 146
Victor s	Enterobact er asburiae BDW1M3	barA	Signal transduction histidine-protein kinase BarA (EC 2.7.13.3)	0.0
Victor s	Enterobact er asburiae BDW1M3	tktA	Transketolase (EC 2.2.1.1)	0.0
Victor s	Enterobact er asburiae BDW1M3	cspE	Cold shock protein of CSP family => CspE (naming convention as in E.coli)	5e- 32
Victor s	Enterobact er asburiae BDW1M3	dgt	Deoxyguanosinetriphosphate triphosphohydrolase (EC 3.1.5.1), subgroup 1	1e- 252

Victor s	Enterobact er asburiae BDW1M3	leuO	LysR family transcriptional activator LeuO	1e- 152
Victor s	Enterobact er asburiae BDW1M3	cpxR	Copper-sensing two-component system response regulator CpxR	1e- 126
Victor s	Enterobact er asburiae BDW1M3	mglA	Galactose/methyl galactoside ABC transporter, ATP-binding protein MglA (EC 3.6.3.17)	1e- 282
Victor s	Enterobact er asburiae BDW1M3	pflA	Pyruvate formate-lyase activating enzyme (EC 1.97.1.4)	1e- 142
Victor s	Enterobact er asburiae BDW1M3	ilvD	Dihydroxy-acid dehydratase (EC 4.2.1.9)	1e- 285
Victor s	Enterobact er asburiae BDW1M3	hemE	Uroporphyrinogen III decarboxylase (EC 4.1.1.37)	1e- 169
Victor s	Enterobact er asburiae BDW1M3	tufA	Translation elongation factor Tu	1e- 145
Victor s	Enterobact er asburiae BDW1M3	znuC	Zinc ABC transporter, ATP-binding protein ZnuC	1e- 132
Victor s	Enterobact er asburiae BDW1M3	galU	UTP--glucose-1-phosphate uridylyltransferase (EC 2.7.7.9)	1e- 165
Victor s	Enterobact er asburiae BDW1M3	ppiC	Peptidyl-prolyl cis-trans isomerase PpiC (EC 5.2.1.8)	2e- 44
Victor s	Enterobact er asburiae BDW1M3	tdcE	Pyruvate formate-lyase (EC 2.3.1.54)	0.0
Victor s	Enterobact er asburiae BDW1M3	bglX	Periplasmic beta-glucosidase (EC 3.2.1.21)	0.0
Victor s	Enterobact er asburiae BDW1M3	csgD	Transcriptional regulator CsgD for 2nd curli operon	1e- 109
Victor s	Enterobact er asburiae BDW1M3	lon	ATP-dependent protease La (EC 3.4.21.53) Type I	0.0
Victor s	Enterobact er asburiae BDW1M3	narG	Respiratory nitrate reductase alpha chain (EC 1.7.99.4)	0.0

Victor s	Enterobact er asburiae BDW1M3	sodA	Superoxide dismutase [Mn] (EC 1.15.1.1)	1e- 102
Victor s	Enterobact er asburiae BDW1M3	uvrY	BarA-associated response regulator UvrY (= GacA = SirA)	1e- 113
Victor s	Enterobact er asburiae BDW1M3	ompR	Two-component system response regulator OmpR	1e- 133
Victor s	Enterobact er asburiae BDW1M3	sanA	SanA protein	1e- 128
Victor s	Enterobact er asburiae BDW1M3	dppA	Dipeptide ABC transporter, substrate-binding protein DppA (TC 3.A.1.5.2) @ Dipeptide chemoreceptor	1e- 303
Victor s	Enterobact er asburiae BDW1M3	aroC	Chorismate synthase (EC 4.2.3.5)	1e- 188
Victor s	Enterobact er asburiae BDW1M3	tdcA	Threonine catabolic operon transcriptional activator TdcA	1e- 141
Victor s	Enterobact er asburiae BDW1M3	asd	Aspartate-semialdehyde dehydrogenase (EC 1.2.1.11)	1e- 198
Victor s	Enterobact er asburiae BDW1M3	fabG	3-oxoacyl-[acyl-carrier protein] reductase (EC 1.1.1.100), FadG	1e- 108
Victor s	Enterobact er asburiae BDW1M3	yjeA	Translation elongation factor P Lys34--(R)-beta-lysine ligase	1e- 181
Victor s	Enterobact er asburiae BDW1M3	ycbG	Putative dehydrogenase	1e- 74
Victor s	Enterobact er asburiae BDW1M3	wecE	dTDP-4-amino-4,6-dideoxygalactose transaminase (EC 2.6.1.59)	1e- 201
Victor s	Enterobact er asburiae BDW1M3	ruvB	Holliday junction ATP-dependent DNA helicase RuvB (EC 3.6.4.12)	1e- 181
Victor s	Enterobact er asburiae BDW1M3	vacJ	Outer-membrane-phospholipid-binding lipoprotein MlaA	1e- 124
Victor s	Enterobact er asburiae BDW1M3	greA	Transcription elongation factor GreA	2e- 72

Victor s	Enterobact er asburiae BDW1M3	clpP	ATP-dependent Clp protease proteolytic subunit ClpP (EC 3.4.21.92)	1e- 112
Victor s	Enterobact er asburiae BDW1M3	phoU	Phosphate transport system regulatory protein PhoU	1e- 128
Victor s	Enterobact er asburiae BDW1M3	atpA	ATP synthase alpha chain (EC 3.6.3.14)	1e- 281
Victor s	Enterobact er asburiae BDW1M3	dctA	Na ⁺ /H ⁺ -dicarboxylate symporter	1e- 224
Victor s	Enterobact er asburiae BDW1M3	cstA	Pyruvate:H ⁺ symporter BtsT	0.0
Victor s	Enterobact er asburiae BDW1M3	rpoB	DNA-directed RNA polymerase beta subunit (EC 2.7.7.6)	0.0
Victor s	Enterobact er asburiae BDW1M3	yegQ	Uncharacterized protease YegQ	1e- 252
Victor s	Enterobact er asburiae BDW1M3	mdfA	Multidrug efflux pump MdfA/Cmr (of MFS type), broad spectrum	1e- 206
Victor s	Enterobact er asburiae BDW1M3	crp	Cyclic AMP receptor protein	1e- 117
Victor s	Enterobact er asburiae BDW1M3	yihE	YihE protein, a ser/thr kinase implicated in LPS synthesis and Cpx signalling	1e- 160
Victor s	Enterobact er asburiae BDW1M3	cyoB	Cytochrome O ubiquinol oxidase subunit I (EC 1.10.3.-)	0.0
Victor s	Enterobact er asburiae BDW1M3	mppA	Murein peptide ABC transporter, substrate-binding protein (requires DppBCDF)	1e- 290
Victor s	Enterobact er asburiae BDW1M3	slyA	Transcriptional regulator SlyA	5e- 64
Victor s	Enterobact er asburiae BDW1M3	clpB	Chaperone protein ClpB (ATP-dependent unfoldase)	0.0
Victor s	Enterobact er asburiae BDW1M3	guaB	Inosine-5'-monophosphate dehydrogenase (EC 1.1.1.205) / CBS domain	1e- 270

Victor s	Enterobact er asburiae BDW1M3	purH	IMP cyclohydrolase (EC 3.5.4.10) / Phosphoribosylaminoimidazolecarboxamide formyltransferase (EC 2.1.2.3)	1e- 274
Victor s	Enterobact er asburiae BDW1M3	miaA	tRNA dimethylallyltransferase (EC 2.5.1.75)	1e- 167
Victor s	Enterobact er asburiae BDW1M3	guaA	GMP synthase [glutamine-hydrolyzing], amidotransferase subunit (EC 6.3.5.2) / GMP synthase [glutamine-hydrolyzing], ATP pyrophosphatase subunit (EC 6.3.5.2)	1e- 304
Victor s	Enterobact er asburiae BDW1M3	nrdD	Ribonucleotide reductase of class III (anaerobic), large subunit (EC 1.17.4.2)	0.0
Victor s	Enterobact er asburiae BDW1M3	yciF	Stress response diiron-containing protein YciF	4e- 72
Victor s	Enterobact er asburiae BDW1M3	hcpA	Type IV pilin Pila	6e- 66
Victor s	Enterobact er asburiae BDW1M3	yqaE	UPF0057 membrane protein YqaE	4e- 21
Victor s	Enterobact er asburiae BDW1M3	trkA	Trk potassium uptake system protein TrkA	1e- 253
Victor s	Enterobact er asburiae BDW1M3	rfbB	dTDP-glucose 4,6-dehydratase (EC 4.2.1.46)	1e- 181