

# A novel cold-adapted bacterium, *Arthrobacter* sp. ES1 from Fildes Peninsula, King George Island, Antarctica

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*Arthrobacter* strains are of special interest due to their ability to metabolized and resist to varieties environmental hazards and heavy metals. Recently, we have isolated an *Arthrobacter* sp. designated as ES1 from snow of Fildes Peninsula, King George Island, Antarctica. ES1 is an interesting strain due to its ability to thrive at cold temperature as low as 4°C. Strain ES1 was able to grow at temperature ranging from 4 to 28°C. It is a Gram-positive bacterium that formed creamy white colonies on agar media. We report here the genome of strain ES1 sequenced using the Illumina Mi-Seq sequencer. A total of 1.16 GB data with 3,248,048 reads were obtained. The genome size was 3.96 Mb which was assembled into 130 contigs. It has DNA G+C content of 65.74%. Gene annotation analysis shows that the genome has 3,673 CDS, 3 rRNA, 51 tRNA, 22 miscRNA, and 1 tm-RNA. Phylogenetic analysis based on the 16S rDNA and multiple genes markers suggests that *Arthrobacter* sp. U41 is the closest phylogenetic neighbor of strain ES1. ANIb and dDDH values showed that strain ES1 and its closest phylogenetic neighbor *Arthrobacter* sp. U41 are of two distinct species. Therefore, strain ES1 is likely to be a new species.

Table 1: Genome features

Feature	Value	Percentage (%) <sup>a</sup>
Genome size (bp)	3,962,783	100
Contigs No.	130	n/a
GC content (%)	2,604,737	65.73
Total number of genes	3,750	100
Protein coding sequences (CDS)	3,673	97.95
rRNA	3	0.08
tRNA	51	1.36
misc-RNA	22	0.59
tm-RNA	1	0.03

Table 2: ANIb and dDDH value of related *Arthrobacter* species as compare to strain ES1

No.	Species	Percentage			Accession no.
		ANIb	dDDH	Model CI	
1	<i>Arthrobacter</i> sp. U41	84.41	29.5	27.1 – 32.0	NZ CP015732.1
2	<i>Arthrobacter</i> sp. I3	80.78	24.7	22.4 - 27.2	NZ KI914902.1
3	<i>Arthrobacter</i> sp. Hiy06	78.90	24.6	22.3 – 27.0	BBUE01000001.1
4	<i>Arthrobacter</i> sp. 9MFC03	80.78	24.4	22.1 - 26.8	NZ KK211131.1
5	<i>Arthrobacter</i> sp. ov118	80.11	23.6	21.3 - 26.1	FPAY01000020.1
6	<i>Arthrobacter</i> sp. FB24	78.70	22.5	20.3 - 25.0	NC 008541.1
7	<i>Pseudarthrobacter sulfonivorans</i>	77.55	22.2	19.9 - 24.6	NZ CP013747.1
8	<i>Arthrobacter</i> sp. Soil762	77.50	22.1	19.8 - 24.5	NZ LMSG01000001.1
9	<i>Pseudarthrobacter siccitolerans</i>	76.91	21.7	19.5 - 24.2	NZ CAQI01000001.1
10	<i>Pseudarthrobacter phenanthrenivorans</i> Sphe3	76.71	21.6	19.3 – 24.0	NC 015145.1
11	<i>Pseudarthrobacter equi</i> strain IMMIB L-1606	76.61	21.5	19.2 - 23.9	LT629779.1
12	<i>Arthrobacter nitrophenolicus</i>	76.83	21.4	19.1 - 23.8	NZ AOFD01000001.1
13	<i>Pseudarthrobacter chlorophenolicus</i> A6	76.42	21.2	18.9 - 23.6	NC 011886.1

All related genomes retrieved from <https://ftp.ncbi.nih.gov/>