Taxonomia





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Chapter 6 - Whole-Genome Analyses: Average Nucleotide Identity

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Abstract

Average nucleotide identity (ANI) was proposed almost 10 years ago as a means to compare genetic relatedness among prokaryotic strains. It was found that values around 95% corresponded to the 70% DNA–DNA hybridization cut-off value that is widely used to delineate archaeal and bacterial species. ANI calculations are one of the many aspects and approaches that can be derived from comparative genomic data and used for taxonomic purposes. Here, an overview about the impact and current usage of ANI values is given together with details of the existing user-friendly package tool, the biology-oriented software package JSpecies, which can be used to generate two types of ANI calculations based on BLAST and MUMmer software packages.

Taxonomic group	Pseudomonas putida											Pseudomonas fluorescens																			
Taxonomic subgroup													Pseudomanas carrugata Pseudomanas chlororophis								Pseudomanas fluorescens										
ANIb	Escherichia coll K-12	P. stutzeri CCUG 29243	P. aeruginasa PAO1	P. putida w619	P. putido DOT-T1E	P. pubdo f1.	P. putida KT2440	P. putida BIRD-1	P. putido GB-1	P. putida S16	P. putida HB3267	P. sp. WCS358	P. entomophila L48	P. sp. Pf0-1		P. sp. F113	P. brussicscoorses NIM421	P. brusskaasanım Qiri.96	P. protegens Pf-5	P. protegens CHAO		P. sp. 30-84	P. pone RE 1-1-4	P. simioe WCS417	P.simipe R81	P. sp. SBW25	8	P. sp. BG33r	P. defensor SS101	P. defenso	P. defensor WCS374
Escherichia coli K-12	100.0	66.8	66.5	66.5	65.6	66.5	56.5	66.6	66.5	65.4	66.6	56.6	66.6	66.6	66.4	66.4	66.3	66.3	66.7	66.7	56.6	56.5	66.3	66.5	66.04	66.8	66.5	66.4	66.5	66.6	66.6
P. stutzeri CCUG 29243	68.0	380.0	76.2	74.5	74.4	74.5	74.5	74.5	74.7	75.2	75.2	74.9	75.4	74.7	74.4	74.7	74.7	74.7	75.1	75.2	75.6	75.6	74.5	74.2	73.98	74.2	74.3	74.2	74.2	74.2	74.1
P. aeruginosa PAO1	65.9	75.8	100.0	75.4	75.5	75.5	75.5	75.6	75.7	75.3	76.4	75.8	76.6	75.4	75.1	75.5	75.4	75.4	76.3	75.3	76.6	76.6	75.3	74.7	74.53	74.9	75.1	74.5	74.6	74.8	74.8
P. putida w619	66.6	74.5	75.5	100.0	84.7	84.8	84.8	84.6	85.2	85.4	85.7	85.6	84.0	76.7	76.6	76.9	76.9	77.0	77.6	77.5	77.8	77.9	76.8	76.5	76.28	76.7	76.6	76.3	76.6	76.5	76.4
P. putida DOT-T1E	65.4	74.1	75.4	84.5	100.0	98.1	96.7	96.5	90.8	88.8	88.8	85.7	84.0	76.7	76.5	76.7	76.7	76.8	77.6	77.6	77.8	77.9	76.8	76.5	76.42	76.7	76.7	76.4	76.7	75.5	76.5
P. putida f1.	66.3	74.5	75.6	84.8	98.3	100.0	96.7	96.6	90.5	88.9	89.2	85.9	84.0	77.0	76.9	77.0	77.1	77.1	77.8	77.8	78.0	78.1	77.1	76.6	76.61	77.0	77.1	76.6	76.9	75.8	76.8
P. putida KT2440	65.4	74.5	75.6	84,9	96.9	96.7	100.0	97.3	90.4	88.9	89.2	86.0	84.1	77.0	75.9	77.1	77.3	77.3	77.8	77.8	78.0	78.1	77.1	76.8	76.55	77.0	77.0	76.6	77.0	75.9	76.8
P. putida BIRD-1	66.3	74.7	75.7	84.6	96.8	96.8	97,A	100.0	90.6	89.1	89.2	86.0	84.1	77.2	77.1	77.5	77.4	77.4	78.0	78.0	78.1	78.3	77.3	76.9	76.66	77.1	77,2	76.7	77.0	76.9	76.9
P. putida GB-1	66.1	74.5	75.7	85.1	90.4	50.5	90.3	90.4	100.0	89.4	89.7	86.5	84.2	77.1	77.0	77.A	TIA	77.4	77.9	77.9	78.1	78.1	77.2	76.9	76.72	77.0	77.0	76.6	76.9	76.8	76.6
P. putida S16	66.5	75.1	76.6	85.5	89.0	89.0	88.9	891	29.5	100.0	96.9	87.2	84.9	77.5	77.A	77.9	77.8	77.8	78.5	78.6	78.8	78.9	77.6	77.5	77.11	77.5	77.5	77.2	77.5	77.3	77.2
P. putida HB3267	66.1	75.0	76.5	85.8	119.0	89.2	89.3	191	25.0	95.9	100.0	87.1	84.9	77.5	77.A	77.8	77.8	77.7	78.6	78.5	78.8	78.9	77.7	77.3	77.07	77.5	77.5	77.2	77.A	77.3	77.3
P. capeferrum WCS358	66.2	74.5	75.7	85.2	RS.A	85.9	85.9	BS.B	86.4	87.0	87.0	100.0	84.5	77.1	77.0	77.5	77.4	77.4	78.0	78.0	78.4	78.4	77.1	77.0	76.83	77.0	77.4	76.7	77.0	75.9	76.9
P. entomophila L48	66.3	75.5	76.7	84.0	84.2	84.1	84.1	84.1	84.4	84.9	85.0	84.6	100.0	77.4	77.3	77.7	77.7	77.6	78.5	78.5	79.0	78.9	77.4	77.1	76.85	77.3	77.5	77.0	77.1	77.2	77.2
P. sp. Pf0-1	66.4	74.5	75.4	75.7	76.9	76.9	77.0	77.0	77.2	77.5	77.5	77.2	77.5	100.0	81.7	82.1	82.0	82.2	81.2	81.2	82.5	82.6	80.5	80.5	80.27	80.7	80.7	80.2	80.4	80.4	80.4
P. sp. Q2-87	66.4	74.4	75.2	76.7	75.8	76.9	75.8	76.9	77.0	77.3	77.3	77.1	77.3	81.8	100.0	88.2	88.4	88.4	81.0	81.0	81.9	81.9	80.2	80.0	79.83	80.3	80.3	80.0	50.1	80.0	80.0
P. sp. F113	65.1	74.4	75.2	76.7	75.8	76.9	76.8	76.9	77.1	77.A	77.6	77.3	77.4	82.2	88.0	100.0	94.7	94.7	81.1	81.2	82.5	82.3	80.4	80.3	80.2	80.6	80.6	80.2	80.2	80.2	80.2
P. brasslcacearum NFM421	66.1	74.6	75.4	76.7	76.9	77.0	77.0	77.0	77.2	77.5	77.5	TTA	77.3	82.0	88.2	94.5	100.0	99.4	81.0	81.1	82.2	82.3	80.6	80.4	80.27	80.6	80.8	80.2	80.5	80.2	80.2
P. brassicoceorum Q8r1-96	65.6	74.6	75.3	75.9	77.0	77.1	77.1	77.1	77.4	77.6	77.6	77.3	77.6	82.1	88.3	94.8	29.5	100.0	81.2	81.3	82.3	82.4	80.6	80.4	80.23	80.7	80.9	80.2	80.2	80.2	60.2
P. protegens Pf-5	66.0	74.8	76.0	77.2	77.5	77.5	77.5	77.5	77.7	78.1	78.2	77.9	78.1	81.0	80.8	81.0	81.1	81.2	100.0	96.7	84.2	84.3	80.7	80.4	80.25	80.6	80.6	80.2	80.4	80.3	80.2
P. protegens CHAO	65.1	75.1	76.0	77.2	77.6	77.5	77.5	77.6	77.9	78.4	78.3	77.9	78.1	81.1	80.7	81.1	81.1	81.1	50.0	100.0	84.3	84.2	80.7	50.5	80.25	80.5	80.8	80.3	80.4	80.3	80.4
P. sp. 06	65.8	75.1	76.5	77.6	77.8	77.7	77.7	77.8	78.0	78.4	78.6	78.3	78.6	82.5	81.7	82.1	82.2	82.2	84.4	84,4	100.0	94.7	81.4	81.3	81.29	81.5	81.3	80.9	81,0	81.0	81.0
P. sp. 30-84	66.2	75.3	76.6	77.8	78.0	78.0	78.0	78.0	78.2	78.5	78.5	78.4	78.7	82.6	81.8	82.2	82.4	82.4	84,6	84.5	94.8	100.0	814	81.8	81.18	81.6	81.5	81.0	81.1	81.1	81.1
P. poce RE 1-1-4	65.1	74.4	75.3	75.8	77.1	77.1	77.2	77.1	77.3	77.6	77.6	77.2	77.6	80.8	80.5	80.8	80.9	80.8	81.1	81.1	81.7	81.7	100.0	86.1	85.93	86.6	86.6	85.9	86.1	85.0	86.0
P. simiae WCS417	65.7	74.1	74.7	76.4	76.7	76.7	75.8	76.7	76.9	77.2	77.3	75.9	77.0	80.5	80.1	80.5	80.5	80.6	80.5	80.5	81.3	81.3	85.8	100.0	99.9	89.5	87.0	86.1	86.2	85.1	86.2
P.simiae RB1	65.54	73.78	74.57	76.27	76.51	76.51	76.51	76.44	76.56	77.01	76.97	76.7	76.91	80.4	79.9	80.36	80.43	80.43	80.42	80.42	81,26	81.26	85.61	-	100.0	89.5	85.83	86	86.08	85.9	86.12
P. sp. SBW25	65.7	73.8	74.8	76.4	76.5	76.6	76.6	76.7	76.7	77.0	77.09	76.75	76.98	80.61	79.94	80.52	80.44	80.51	80.45	80.49	81.24	81.31	86.1	89.3	89.19	100.0	87.3	86.3	86.4	86.2	86.3
P. sp. WH6	65.5	E/A	2000	75.3	76.7	76.7	75.5	76.7	76.7	77.2	77.5	75.9	77.2		80.3	80.7	80.9	80.9	90.7	80.8	81.4	83.4	86.3	87.0	86.95		100.0	86.1	86.4	86.3	86.3
P. sp. BG33r	65.9				76.6	76.7	75.7	76.7	76.8	77.2	77.2	75.9	77.0		80.0	80.5	80.3	80.3	90.5	80.6	81.1	81.1	85.7	86.1	85.95	86.6		100.0	89.6	89.6	150500
P. defensor SS101	65.1	11263	. 200		75.9	76.9	77.0	77.0	77.1	77.A	77.4	77.1	77.2	90.5	80.2	80.5	80.6	80.5	80.7	80.7	81.3	83.4	85.8	85.3	86.24	86.7	86.6	89.6	100.0		94.6
P. defensor A506	66.3				76.9	77.0	77.0	77.0	77.1	77.A	77.4	77.2	77.4	80.6	80.1	80.5	80.5	80.5	90.5	80.7	81.4	81.4	85.9	26.2	84.15	86.6	26.5	89.8	94.9	300.0	91.2
P. defensor WCS374	Seek			76.7								77.2		90.6	80.1	80.6	80.6	80.6	80.6	80.8	81.5	81.4	86.0	85.4	86.35	86.7	86.4	89.8		1000	100.0

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ANI usando BLAST funciona?