

Draft Genome Sequence of *Cobetia* sp. UCD-24C, Isolated from Roots and Leaves of the Seagrass *Zostera marina*

Alexandra Alexiev,^a Megan L. Krusor,^b Guillaume Jospin,^a Jenna M. Lang,^a Jonathan A. Eisen,^{a,c} David A. Coil^a

Davis Genome Center, University of California Davis, Davis, California USA^a; Department of Earth and Planetary Sciences, University of California Davis, Davis, California, USA^b; Departments of Evolution and Ecology and Medical Microbiology and Immunology, University of California Davis, Davis, California, USA^c

Here, we present the 4,230,758-bp draft genome for *Cobetia* sp. UCD-24C. This strain was isolated from *Zostera marina* roots collected in Woods Hole, Massachusetts, USA.

Received 26 January 2016 Accepted 29 January 2016 Published 10 March 2016

Citation Alexiev A, Krusor ML, Jospin G, Lang JM, Eisen JA, Coil DA. 2016. Draft genome sequence of *Cobetia* sp. UCD-24C, isolated from roots and leaves of the seagrass *Zostera marina*. *Genome Announc* 4(2):e00116-16. doi:10.1128/genomeA.00116-16.

Copyright © 2016 Alexiev et al. This is an open-access article distributed under the terms of the [Creative Commons Attribution 4.0 International license](https://creativecommons.org/licenses/by/4.0/).

Address correspondence to Jonathan A. Eisen, jaeisen@ucdavis.edu.

The *Cobetia* genus was suggested by Arahall et al. and is most closely related to *Halomonas* and *Chromohalobacter*. The type strain was described as aerobic, Gram-negative, motile, and with rod-shaped cells that occur singly or in pairs. It is slightly halophilic and requires salt for growth (1). When grown in a mixed culture with two other marine bacteria, some *Cobetia* spp. can produce a biofloculant that removes turbidity and reduces chemical oxygen demand, resulting in its suggested use for wastewater treatment (2). *Cobetia* UCD-24C was isolated from seagrass (*Zostera marina*) roots collected from plants in Woods Hole, Massachusetts, USA (41°31'30.0"N 70°40'22.9"W). This sampling and culturing project was done as part of a collaboration between researchers at the University of California, Davis, and the University of Oregon called the Seagrass Microbiome Project (<http://www.seagrassmicrobiome.org>). The project seeks to characterize and analyze the microbial communities living in and on seagrasses.

Bacterial isolates were grown and double dilution struck on Luria broth agar (Difco), seawater agar, 10% diluted seawater agar, and *Azotobacter* isolation medium agar. Isolates were incubated at 25°C for 1 to 21 days. Scrapings were then frozen in 25% glycerol for long-term storage. The isolates were later thawed and grown in seawater nutrient agar medium (ATCC medium 2205, using InstantOcean instead of synthetic seawater). DNA was subsequently extracted using a Wizard Genomic DNA purification kit (Promega) from a fresh overnight culture.

A paired-end library was produced using a Nextera DNA sample prep kit (Illumina) and sequenced on an Illumina HiSeq platform. Sequencing resulted in 1,355,001 reads with a read length of 250 bp and approximately 160× coverage. The genome size is 4,230,758 bp, and the GC content was 62.5%. Sequences were processed by the A5-miseq assembly pipeline (3, 4), which automates error correction, data cleaning, contig assembly, and quality control. The completeness of the genome was assessed using PhyloSift (5), which utilizes a list of 37 highly conserved, single-copy marker genes (6). One copy of each marker gene was found in the assembly. Automated annotation was done using the RAST annotation server (7). A BLAST search and phylogenetic analysis using the assembled full-length 16S rRNA gene identified the iso-

late as a species of *Cobetia* (tree available at <https://dx.doi.org/10.6084/m9.figshare.2066541.v1>). This tree is ambiguous with respect to determination of species, and therefore we have only given a strain designation.

Nucleotide sequence accession numbers. This genome sequence has been deposited at DDBJ/EMBL/GenBank under the accession number [LJTD000000000](https://www.ncbi.nlm.nih.gov/nuclink/LJTD000000000). The version described in this paper is LJTD000000000.1.

ACKNOWLEDGMENTS

Bacterial strains were isolated as part of the 2014 Microbial Diversity Course at the Marine Biological Laboratory in Woods Hole, Massachusetts, USA. Illumina sequencing was performed at the DNA Technologies Core facility in the Genome Center at University of California, Davis, California, USA. This work was funded by a grant from the Gordon and Betty Moore Foundation (GBMF333) "Investigating the co-evolutionary relationships between seagrasses and their microbial symbionts."

We thank Colleen Cavanaugh for her assistance with seagrass sampling and John Zhang for help with library preparation.

FUNDING INFORMATION

This work, including the efforts of Jenna M Lang, was funded by Gordon and Betty Moore Foundation.

REFERENCES

1. Arahall DR, Castillo AM, Ludwig W, Schleifer KH, Ventosa A. 2002. Proposal of *Cobetia marina* gen. nov., comb. nov., within the family *Halomonadaceae*, to include the species *Halomonas marina*. *Syst Appl Microbiol* 25:207–211. [http://dx.doi.org/10.1078/0723-2020-00113](https://dx.doi.org/10.1078/0723-2020-00113).
2. Ugbenyen AM, Vine N, Simonis JJ, Basson AK, Okoh AI. 2015. Characterization of a biofloculant produced from the consortium of three marine bacteria of the genera *Cobetia* and *Bacillus* and its application for wastewater treatment. *J Water Sanit Hyg Dev* 5:81–88. [http://dx.doi.org/10.2166/washdev.2014.181](https://dx.doi.org/10.2166/washdev.2014.181).
3. Tritt A, Eisen JA, Facciotti MT, Darling AE. 2012. An integrated pipeline for de novo assembly of microbial genomes. *PLoS One* 7:e42304. [http://dx.doi.org/10.1371/journal.pone.0042304](https://dx.doi.org/10.1371/journal.pone.0042304).
4. Coil D, Jospin G, Darling AE. 2015. A5-miseq: an updated pipeline to assemble microbial genomes from Illumina MiSeq data. *Bioinformatics* 31:587–589. [http://dx.doi.org/10.1093/bioinformatics/btu661](https://dx.doi.org/10.1093/bioinformatics/btu661).
5. Darling AE, Jospin G, Lowe E, Matsen FA, Bik HM, Eisen JA. 2014.

- PhyloSift: phylogenetic analysis of genomes and metagenomes. *PeerJ* 2:e243. <http://dx.doi.org/10.7717/peerj.243>.
6. Wu D, Jospin G, Eisen JA. 2013. Systematic identification of gene families for use as “markers” for phylogenetic and phylogeny-driven ecological studies of bacteria and archaea and their major subgroups. *PLoS One* 8:e77033. <http://dx.doi.org/10.1371/journal.pone.0077033>.
 7. Aziz RK, Bartels D, Best AA, DeJongh M, Disz T, Edwards RA, Formsma K, Gerdes S, Glass EM, Kubal M, Meyer F, Olsen GJ, Olson R, Osterman AL, Overbeek RA, McNeil LK, Paarmann D, Paczian T, Parrello B, Pusch GD, Reich C, Stevens R, Vassieva O, Vonstein V, Wilke A, Zagnitko O. 2008. The RAST server: Rapid Annotations using Subsystems Technology. *BMC Genomics* 9:75. <http://dx.doi.org/10.1186/1471-2164-9-75>.