

# Loyola University Chicago

# Loyola eCommons

**Bioinformatics Faculty Publications** 

Faculty Publications and Other Works by Department

11-17-2016

# Draft Genome Sequence for a Urinary Isolate of Nosocomiicoccus ampullae

Evann Elizabeth Hilt Loyola University Chicago

Travis Kyle Price Loyola University Chicago

Katherine Diebel Loyola University Chicago

Catherine Putonti Loyola University Chicago, cputonti@luc.edu

Alan J. Wolfe Loyola University Chicago, awolfe@luc.edu

Follow this and additional works at: https://ecommons.luc.edu/bioinformatics\_facpub



Part of the Bacteriology Commons, and the Genomics Commons

## Recommended Citation

Hilt, Evann Elizabeth; Price, Travis Kyle; Diebel, Katherine; Putonti, Catherine; and Wolfe, Alan J.. Draft Genome Sequence for a Urinary Isolate of Nosocomiicoccus ampullae. Genome Announcements, 4, 6: e01248-16, 2016. Retrieved from Loyola eCommons, Bioinformatics Faculty Publications, http://dx.doi.org/10.1128/genomeA.01248-16

This Article is brought to you for free and open access by the Faculty Publications and Other Works by Department at Loyola eCommons. It has been accepted for inclusion in Bioinformatics Faculty Publications by an authorized administrator of Loyola eCommons. For more information, please contact ecommons@luc.edu.



This work is licensed under a Creative Commons Attribution 4.0 International License.

© 2016 Hilt et al. This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International license.







# Draft Genome Sequence for a Urinary Isolate of Nosocomiicoccus ampullae

#### Evann E. Hilt,<sup>a</sup> Travis K. Price,<sup>a</sup> Katherine Diebel,<sup>a</sup> Catherine Putonti,<sup>b,c,d</sup> Alan J. Wolfe<sup>a</sup>

Department of Microbiology and Immunology, Stritch School of Medicine, Health Sciences Division, Loyola University Chicago, Maywood, Illinois, USA<sup>a</sup>; Bioinformatics Program, Loyola University Chicago, Chicago, Chicago, Chicago, Illinois, USA<sup>b</sup>; Department of Biology, Loyola University Chicago, Chicago, Illinois, USA<sup>c</sup>; Department of Computer Science, Loyola University Chicago, Chicago, Illinois, USA<sup>d</sup>

A draft genome sequence for a urinary isolate of *Nosocomiicoccus ampullae* (UMB0853) was investigated. The size of the genome was 1,578,043 bp, with an observed G+C content of 36.1%. Annotation revealed 10 rRNA sequences, 40 tRNA genes, and 1,532 protein-coding sequences. Genome coverage was  $727 \times$  and consisted of 32 contigs, with an  $N_{50}$  of 109,831 bp.

Received 17 September 2016 Accepted 26 September 2016 Published 17 November 2016

Citation Hilt EE, Price TK, Diebel K, Putonti C, Wolfe AJ. 2016. Draft genome sequence for a urinary isolate of Nosocomiicoccus ampullae. Genome Announc 4(6):e01248-16. doi: 10.1128/genomeA.01248-16.

Copyright © 2016 Hilt et al. This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International license.

Address correspondence to Alan J. Wolfe, awolfe@luc.edu.

As part of an attempt to characterize the newly discovered female urinary microbiota (1–9), we report here the genome sequence and annotation of a strain of *Nosocomiicoccus ampullae* isolated from a female pursuing urogynecologic clinical care. This is the first report of a human isolate of *N. ampullae*, a species that has not been associated with pathogenesis.

N. ampullae strain UMB0853 was isolated from urine obtained by transurethral catheterization of an adult woman with urinary symptoms, using the described enhanced quantitative urine culture protocol (4). Strain UMB0853 was subcultured to purity and analyzed by matrix-assisted laser desorption ionization—time of flight mass spectrometry (10), which could not provide an assignment. In contrast, 16S rRNA gene sequence analysis identified the isolate as N. ampullae. A pure culture was stored at -80°C in a 2-ml CryoSaver brucella broth with 10% glycerol, and no beads (Hardy Diagnostics). For genome extraction and sequencing, the preserved pure culture isolate was grown on 5% sheep blood agar (BD BBL prepared plated medium) under 5% CO<sub>2</sub> at 35°C for 48 h.

To extract genomic DNA, cells were resuspended in 0.5 ml of DNA extraction buffer (20 mM Tris-HCl, 2 mM EDTA, 1.2% Triton X-100 [pH 8]), followed by the addition of 50  $\mu$ l of lysozyme (20 mg/ml), 30  $\mu$ l of mutanolysin, and 5  $\mu$ l of RNase (10 mg/ml). After a 1-h incubation at 37°C, 80  $\mu$ l of 10% SDS and 20  $\mu$ l proteinase K were added, followed by a 2-h incubation at 55°C. Two hundred ten microliters of 6 M NaCl and 700  $\mu$ l of phenol-chloroform were added. After a 30-min incubation with rotation, the solutions were centrifuged at 13,500 rpm for 10 min, and the aqueous phase was extracted. An equivalent volume of isopropanol was added, and the solution was centrifuged at 13,500 rpm for 10 min after a 10-min incubation. The supernatant was decanted and the DNA pellet precipitated using 600  $\mu$ l of 70% ethanol. Following ethanol evaporation, the DNA pellet was resuspended in Tris-EDTA (TE) and stored at -20°C.

Genomic DNA was diluted in water to a concentration of 0.2 ng/ $\mu$ l, as measured by a fluorometric-based method (Life Technologies); 5  $\mu$ l was used to obtain a total of 1 ng of input

DNA. Library preparation of the isolated DNA was performed using the Nextera XT DNA library preparation kit. Two libraries were prepared and sequenced during separate runs on the MiSeq sequencer (Illumina) using the MiSeq reagent kit version 2 (300 cycles). The two runs produced 11,221,884 reads in total. Assembly was performed using Velvet (11) (k=99), followed by SSPACE (12) for scaffolding, producing 32 contigs, which varied from 2,642 bp to 337,531 bp ( $N_{50}$ , 109,831 bp), with an average coverage of 727×. The NCBI Prokaryotic Genome Annotation Pipeline (13) detected 10 rRNA genes, 40 tRNA genes, 1,532 protein-coding sequences, and 35 pseudogenes. Six clustered regularly interspaced short palindromic repeat sequences (CRISPRs) were found (14). The genome size was 1,578,043 bp, with an observed G+C content of 36.1%.

**Accession number(s).** The draft whole-genome project for *N. ampullae* strain UMB0853 has been deposited at DDBJ/EMBL/GenBank under accession number MBFG00000000. Raw sequence reads are deposited at DDBJ/EMBL/GenBank under accession number SRR3828836.

## ACKNOWLEDGMENTS

We acknowledge Gina Kuffel and Michael Zilliox for sequencing this genome.

## **FUNDING INFORMATION**

This work, including the efforts of Alan J. Wolfe, was funded by HHS | National Institutes of Health (NIH) (RO1DK104718). This work, including the efforts of Catherine Putonti, was funded by National Science Foundation (NSF) (1149387). This work, including the efforts of Alan J. Wolfe and Catherine Putonti, was funded by Loyola University Chicago (LUC) (multidisciplinary research award).

## **REFERENCES**

1. Brubaker L, Nager CW, Richter HE, Visco A, Nygaard I, Barber MD, Schaffer J, Meikle S, Wallace D, Shibata N, Wolfe AJ. 2014. Urinary bacteria in adult women with urgency urinary incontinence. Int Urogynecol J 25:1179–1184. http://dx.doi.org/10.1007/s00192-013-2325-2.

- Nienhouse V, Gao X, Dong Q, Nelson DE, Toh E, McKinley K, Schreckenberger P, Shibata N, Fok CS, Mueller ER, Brubaker L, Wolfe AJ, Radek KA. 2014. Interplay between bladder microbiota and urinary antimicrobial peptides: mechanisms for human urinary tract infection risk and symptom severity. PLoS One 9:e114185. http://dx.doi.org/ 10.1371/journal.pone.0114185.
- 3. Fouts DE, Pieper R, Szpakowski S, Pohl H, Knoblach S, Suh MJ, Huang ST, Ljungberg I, Sprague BM, Lucas SK, Torralba M, Nelson KE, Groah SL. 2012. Integrated next-generation sequencing of 16S rDNA and metaproteomics differentiate the healthy urine microbiome from asymptomatic bacteriuria in neuropathic bladder associated with spinal cord injury. J Transl Med 10:174. http://dx.doi.org/10.1186/1479-5876-10-174.
- 4. Hilt EE, McKinley K, Pearce MM, Rosenfeld AB, Zilliox MJ, Mueller ER, Brubaker L, Gai X, Wolfe AJ, Schreckenberger PC. 2014. Urine is not sterile: use of enhanced urine culture techniques to detect resident bacterial flora in the adult female bladder. J Clin Microbiol 52:871–876. http://dx.doi.org/10.1128/JCM.02876-13.
- Khasriya R, Sathiananthamoorthy S, Ismail S, Kelsey M, Wilson M, Rohn JL, Malone-Lee J. 2013. Spectrum of bacterial colonization associated with urothelial cells from patients with chronic lower urinary tract symptoms. J Clin Microbiol 51:2054–2062. http://dx.doi.org/10.1128/ JCM.03314-12.
- Lewis DA, Brown R, Williams J, White P, Jacobson SK, Marchesi JR, Drake MJ. 2013. The human urinary microbiome; bacterial DNA in voided urine of asymptomatic adults. Front Cell Infect Microbiol 3:41. http://dx.doi.org/10.3389/fcimb.2013.00041.
- Pearce MM, Hilt EE, Rosenfeld AB, Zilliox MJ, Thomas-White K, Fok C, Kliethermes S, Schreckenberger PC, Brubaker L, Gai X, Wolfe AJ. 2014. The female urinary microbiome: a comparison of women with and

- without urgency urinary incontinence. mBio 5:e01283-14. http://dx.doi.org/10.1128/mBio.01283-14.
- 8. Siddiqui H, Nederbragt AJ, Lagesen K, Jeansson SL, Jakobsen KS. 2011. Assessing diversity of the female urine microbiota by high throughput sequencing of 16S rDNA amplicons. BMC Microbiol 11:244. http://dx.doi.org/10.1186/1471-2180-11-244.
- 9. Wolfe AJ, Toh E, Shibata N, Rong R, Kenton K, Fitzgerald M, Mueller ER, Schreckenberger P, Dong Q, Nelson DE, Brubaker L. 2012. Evidence of uncultivated bacteria in the adult female bladder. J Clin Microbiol 50:1376–1383. http://dx.doi.org/10.1128/JCM.05852-11.
- Price TK, Dune T, Hilt EE, Thomas-White KJ, Kliethermes S, Brincat C, Brubaker L, Wolfe AJ, Mueller ER, Schreckenberger PC. 2016. The clinical urine culture: enhanced techniques improve detection of clinically relevant microorganisms. J Clin Microbiol 54:1216–1222. http://dx.doi.org/10.1128/JCM.00044-16.
- 11. Zerbino DR. 2010. Using the Velvet *de novo* assembler for short-read sequencing technologies. Curr Protoc Bioinformatics Chapter 11:Unit 11.5.
- 12. Boetzer M, Henkel CV, Jansen HJ, Butler D, Pirovano W. 2011. Scaffolding pre-assembled contigs using SSPACE. Bioinformatics 27: 578–579. http://dx.doi.org/10.1093/bioinformatics/btq683.
- 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.
- 14. **Grissa I, Vergnaud G, Pourcel C.** 2007. CRISPRFinder: a Web tool to identify clustered regularly interspaced short palindromic repeats. Nucleic Acids Res 35:W52–W57. http://dx.doi.org/10.1093/nar/gkm360.