John J. Desmarais, Ph.D.

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Summary

Computational Postdoctoral Fellow at Cold Spring Harbor Laboratory working on RNA splicing with Justin Kinney and Adrian Krainer. I am effective working on teams or independently and in both wet and computational labs. Further, I am experienced with growth assays, protein purification, statistics, data analysis, and modeling.

Technical skills

- Python | Past experience in: R, Java, JavaScript, C++, Matlab, Mathematica
- Writing software for data analysis, statistics, and simulation
- High-throughput selections and creation of selection strains
    - Identification of essential and conditionally essential genes (RB-TnSeq)
    - Designing protein-selection strains, mutagenesis, and selection for activity
    - Preparation of Illumina libraries (amplicon sequencing or TnSeq)
    - Processing and analysis of next-generation sequencing results
- Medium-throughput assays
    - 96-well plate, growth assays or enzyme assays
- Molecular biology techniques (restriction, golden gate, and Gibson Cloning; PCR; etc.)
- Membrane-protein purification (Affinity or size-exclusion chromatography, ultracentrifugation, western blot, x-ray fluorescence, etc.)
- Model organism experience: *E. coli*, yeast, mice, *H. neapolitanus* (chemotrophic bacteria), *S. elongatus* PCC 7942 (cyanobacteria), *N. vectensis* (sea anemone)
- Works well on collaborative projects, comfortable presenting and communicating data

Work experience

1. 01/2023 - Present Computational postdoctoral fellow; Kinney Lab (CSHL)
   Project: Sequence determinants of mutual exclusivity in PKM splicing
2. 2016-08/12/2022 Graduate student researcher; Savage Lab (UC Berkeley)
   Projects: Deconvoluting multiple mutants in the context of random mutagenesis;
   Characterization of the DABs, C_i pumps in *H. neapolitanus;*
3. 2017 & 2019 Graduate student instructor (UC Berkeley)
   Biochemistry: Pathways, Mechanisms, and Regulation;
   Survey of the Principles of Biochemistry and Molecular Biology
4. September - May, 2014-2016 Undergraduate researcher, Ward Lab (Middlebury College)
   Projects: Towards a biosensor for Lyme borreliosis using toehold riboswitches;
   Co-localization of HEI10 and POLB in Mouse meiosis
5. Summer 2015 Amgen Scholar, Keasling Lab (UC Berkeley)
   Project: Engineering glucose uptake in nitrogen limited conditions in *E. coli*
6. Summer 2014 Stowers Summer Scholar, Gibson Lab (Stowers Institute for Medical Research)
   Project: Tentacle patterning and organismal size during Nematostella development
7. Summer 2013 Researcher, 2013 STEM Innovation Program (Middlebury College)
   Project: Building an automated BTEX sensing device
8. Summers 2011 & 2012 Intern, Neitz Lab (University of Washington School of Medicine)

Education

1. 2016-2022 University of California, Berkeley; GPA: 3.997
   Doctoral Program: Molecular and Cellular Biology; Chemical Biology (joint)
   Degree Earned: Ph.D.
2. 2012-2016 Middlebury College; GPA: 3.88
   Major: Molecular Biology and Biochemistry, High Honors. Minor: Computer Science.
   Degree Earned: BA, *summa cum laude*; *Phi Beta Kappa*

Publications

1. Flamholz, A. I., Dugan, E., Panich, J., **Desmarais, J. J.**, Oltrogge, L. M., Fischer, W. W., Singer, S. W. & Savage, D. F. Trajectories for the evolution of bacterial CO_2-concentrating mechanisms. *Proceedings of the National Academy of Sciences* **119,** e2210539119 (2022).
2. T. Y. Liu, G. J. Knott, D. C. J. Smock, **J. J. Desmarais**, S. Son, A. Bhuiya, S. Jakhanwal, N. Prywes, S. Agrawal, M. Díaz de León Derby, N. A. Switz, M. Armstrong, A. R. Harris, E. J. Charles, B. W. Thornton, P. Fozouni, J. Shu, S. I. Stephens, G. R. Kumar, C. Zhao, A. Mok, A. T. Iavarone, A. M. Escajeda, R. McIntosh, S. Kim, E. J. Dugan, K. S. Pollard, M. X. Tan, M. Ott, D. A. Fletcher, L. F. Lareau, P. D. Hsu, D. F. Savage, J. A. Doudna, Accelerated RNA detection using tandem CRISPR nucleases. *Nat. Chem. Biol.*, 1–7 (2021).
3. **J. J. Desmarais**, A. I. Flamholz, C. Blikstad, E. J. Dugan, T. G. Laughlin, L. M. Oltrogge, A. W. Chen, K. Wetmore, S. Diamond, J. Y. Wang, D. F. Savage, DABs are inorganic carbon pumps found throughout prokaryotic phyla. *Nat Microbiol*. **4**, 2204–2215 (2019).
4. J.-J. Liu, N. Orlova, B. L. Oakes, E. Ma, H. B. Spinner, K. L. M. Baney, J. Chuck, D. Tan, G. J. Knott, L. B. Harrington, B. Al-Shayeb, A. Wagner, J. Brötzmann, B. T. Staahl, K. L. Taylor, **J. Desmarais**, E. Nogales, J. A. Doudna, CasX enzymes comprise a distinct family of RNA-guided genome editors. *Nature*, 1 (2019).
5. V. Chubukov, **J. J. Desmarais**, G. Wang, L. J. G. Chan, E. E. K. Baidoo, C. J. Petzold, J. D. Keasling, A. Mukhopadhyay, Engineering glucose metabolism of Escherichia coli under nitrogen starvation. *NPJ Syst Biol Appl*. **3**, 16035 (2017).

Provisional patents

1. D. F. Savage, P. Hsu, N. Prywes, E. J. Charles, G. J. Knott, **J. J. Desmarais**, S. Kim, E. Dugan, M. Lukarska, S. S. Chandrasekaran, N. C. Lammers, T. Y. Liu, A. Mok. “Compositions and methods of a nuclease chain reaction for nucleic acid detection” (2020)
2. **J. J. Desmarais**, A. I. Flamholz, L. M. Oltrogge, D. F. Savage. “Computational method and system for compression of genetic information” (2020)
3. D. F. Savage, A. I. Flamholz, **J. J. Desmarais**. “Carbon transporters” (2018)

Presentations

1. 2019 Gordon Research Conference - Photosynthesis: “DABs Accumulate Bicarbonate” [poster]
2. 2018 Western Photosynthesis Conference: “The essential gene set for bacterial carbon concentration” [poster]