

# Paris R. Watson Ph.D.

Postdoctoral Fellow | Johns Hopkins University

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## EDUCATION AND TRAINING

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### Johns Hopkins University

Apr. 2024–Present

Postdoctoral Fellow

Baltimore, MD

- Supervised by Dr. Gira Bhabha and Dr. Damian Ekiert
- Structural cell biology of the harpoon-like invasion organelle in divergent Microsporidian parasites

### NYU Langone School of Medicine

Aug. 2023–Mar. 2024

Postdoctoral Fellow

New York, NY

- Supervised by Dr. Gira Bhabha and Dr. Damian Ekiert
- Structural cell biology of the harpoon-like invasion organelle in divergent Microsporidian parasites

### University of Pennsylvania

Aug. 2023

Ph.D., Chemistry

Philadelphia, PA

- Supervised by Dr. David W. Christianson
- Structural Studies of Histone Deacetylase Enzymes

### Victoria University of Wellington

Nov. 2017

Bachelor of Biomedical Science (Hons), Medicinal Chemistry and Molecular Pharmacology

Wellington, NZ

- Awarded with First Class Honours

## PUBLICATIONS

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1. **Watson, P.R.**, Goulart Stollmaier J., Christianson D.W., Crystal Structure of Histone Deacetylase 6 Complexed with (*R*)-Lipoic Acid, an Essential Cofactor in Central Carbon Metabolism (2023), *J. Biol. Chem.* 299, 10, 105228 <https://doi.org/10.1016/j.jbc.2023.105228>

2. Konig B.\*, **Watson, P.R.\***, Rebing N., Cragin A.D., Schaker-Hubner L., Hansken F.K., Christianson D.W., Difluoromethyl-1,3,4-oxadiazoles are Mechanism-Based, Essentially Irreversible Inhibitors of Histone Deacetylase 6 (2023), *J. Med. Chem.* 66, 19, 13821–13837, <https://doi.org/10.1021/acs.jmedchem.3c01345>,

3. **Watson, P.R.**, Christianson, D.W., Structure and Function of Kdac1, a Class II Deacetylase from the Multidrug-Resistant Pathogen *Acinetobacter baumannii*. (2023), 62, 18, 2689–2699, *Biochemistry*, <https://doi.org/10.1021/acs.biochem.3c00288>

4. **Watson, P.R.**, Gupta, S., Hosseinzadeh, P., Brown B.P., Baker, D., Christianson, D.W., Macrocyclic Octapeptide Binding and Inferences on Protein Substrate Binding to Histone Deacetylase 6. (2023), *ACS Chem. Bio.*, 18, 4, 959-968, <https://doi.org/10.1021/acschembio.3c00113>

5. Reßing, N., Schliehe-Diecks, J., **Watson, P.R.**, Sönnichsen, M., Cragin, A.D., Schöler, A., Yang, J., Borkhardt, A., Christianson, D.W., Bhatia, S., Hansen, F.K., Development of fluorinated peptoid-based histone deacetylase (HDAC) inhibitors for therapy-resistant acute leukemia. (2022), *J. Med. Chem.*, 65, 22, 15457–15472. <https://doi.org/10.1021/acs.jmedchem.2c01418>

6. **Watson, P.R.**, Bai, P., Wang, C., Cragin, A.D., Hooker, J., Christianson, D.W., Aromatic Ring Fluorination Patterns Modulate Inhibitory Potency of Fluorophenylhydroxamates Complexed with Histone Deacetylase 6. (2022), *Biochemistry*, 61, 18, 1945–1954. <https://doi.org/10.1021/acs.biochem.2c00332>

7. Hosseinzadeh, P., **Watson, P.R.**, Craven, T.W., Rettie, S., Li, X., Pardo-Avila, F., Bera, A.K., Khipple Mulligan, V., Lu, P., Ford, A.S., Weitzner, B., Moyer, A.P., Di Piazza, M., Whalen, J., Greisen, P., Christianson, D.W., Baker, D. Anchor extension – a structure-guided approach to design macrocycles targeting histone deacetylases. (2021) *Nat. Commun.*, 12, 3384. <https://doi.org/10.1038/s41467-021-23609-8>

8. Olaove O., **Watson, P.R.**, Nawar N., Geletu, M., Bukhari, S., Raouf, Y.S., Sedihji, A., Manaswiyoungkul, P., Erdogan, F., Abdeldayem, A., Cabraj, A.D., Kachiyapatel, N., Hassan, M.M., de Araujo, E.D., Christianson, D.W., Gunning, P.T. Unique Molecular Interaction with the Histone Deacetylase 6 Catalytic Tunnel: Crystallographic and Biological Characterization of a Model Chemotype, (2021), *J. Med. Chem.*, 64, 5, 2691-2704. <https://doi.org/10.1021/acs.jmedchem.0c01922>

9. Osko, J. D. Porter, N. J., Decroos, C., Lee, M. S., **Watson, P.R.**, Raible, S. E., Krantz, I. D., Deardorff, M. A., Christianson, D.W., Structural analysis of histone deacetylase 8 mutants associated with Cornelia de Lange Syndrome spectrum disorders. (2020) *J. Struct. Biol.*, 213, 107681. 10.1016/j.jsb.2020.107681

10. Correddu, D.; Montañó López, J. d. J.; Vadakkedath, P. G.; Lai, A.; Pernes, J. I.; **Watson, P. R.**; Leung, I. K. H. An Improved method for the heterologous production of soluble human ribosomal Proteins in *Escherichia coli*. (2019) *Sci. Rep.* 9., 8884. <https://doi.org/10.1038/s41598-019-45323-8>

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## FUNDING

### **Fulbright Science and Innovation Graduate Award**

*Fulbright New Zealand*

Aug. 2018 – Aug. 2019

*Undertaken at University of Pennsylvania*

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## HONORS AND AWARDS

**Excellence in Graduate Research Award**, University of Pennsylvania, 2021

**Chemistry Teaching Award**, University of Pennsylvania, 2020

**Chemistry Teaching Commendation**, University of Pennsylvania, 2019

**Fulbright Science and Innovation Graduate Award**, Fulbright NZ, 2018

**First Class Honours**, Victoria University of Wellington, 2017

**Graduate Award**, Victoria University of Wellington, 2017

**Top Biochemistry Student**, New Zealand Institute of Chemistry, 2017

**Summer Research Scholar**, Victoria University of Wellington, 2016, 2017

**Deans List**, Victoria University of Wellington, 2014, 2016

**Summer Research Scholar**, University of Auckland, 2015

**Finalist in the Sir Paul Callaghan Eureka! Science Communication Awards**, Eureka!, 2015

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## RESEARCH EXPERIENCE

### **Postdoctoral Research**

*Johns Hopkins University*

Apr. 2024 – Present

*Baltimore, MD*

- Working under Dr. Gira Bhabha and Dr. Damian Ekiert
- A continuation of my postdoctoral studies on the Microsporidian polar tube using cryo-ET

### **Postdoctoral Research**

*NYU Langone School of Medicine*

Aug. 2023 – Mar. 2024

*New York, NY*

- Working under Dr. Gira Bhabha and Dr. Damian Ekiert
- During my postdoctoral studies I will be investigating proteins involved in the formation and function of Microsporidian polar tube

### **Ph.D. Dissertation**

*University of Pennsylvania*

Aug. 2018 – Aug 2023

*Philadelphia, PA*

- Worked under Dr. David Christianson
- Investigating structural aspects of selective inhibition of histone deacetylase enzymes using x-ray crystallography. I looked at structural reasons for HDAC6 selectivity including linker fluorination, macrocyclic peptide binding, and discovered the first structures of a mechanism dependent irreversible HDAC inhibitor and the first example of second shell interaction in an inhibitor.
- Investigating structural trends in HDAC6 substrates substrate
- Biochemical and structural studies of a prokaryotic lysine deacetylase from *Acinetobacter baumannii*
- Worked on a number of collaborations undertaking the x-ray crystallography portion of the project with Dr. David Baker (University of Washington), Dr. Parisa Hosseinzadeh (University of Oregon), Dr. Finn Hansen (University of Bonn), Dr. Jacob Hooker (Harvard and Massachusetts General Hospital), Dr. Patrick Gunning (University of Toronto), Dr. Megan Matthews (University of Pennsylvania).

### **Research Assistant**

*Massey University*

Feb. 2018 – Aug. 2018

*Wellington, NZ*

- Worked under Dr. Penny Truman
- Undertook inhibition studies of monoamine oxidase by compounds in tobacco smoke
- Spearheaded communication between research groups at two different universities in the Wellington Area through a collaboration

- Standardized methods for long term continuation of the project

### Summer Research Assistant

*Victoria University of Wellington*

Summer 2017

*Wellington, NZ*

- Worked under Dr. Emily Parker
- Used *in silico* techniques for design of transition state inhibitors of Adenosine Triphosphate Phosphoribosyltransferase in the Schrodinger Suite

### Honors Thesis

*Victoria University of Wellington*

Feb. 2017 – Nov. 2017

*Wellington, NZ*

- Worked under Dr. Joanne Harvey
- Worked towards the synthesis of lactam analogues of the fungal compound (-)-TAN2483B
- Developing synthetic methods for synthesis of the target compound and structure elucidation using NMR

### Summer Research Assistant

*Victoria University of Wellington/Callaghan Innovation*

Summer 2016

*Wellington, NZ*

- Worked under Dr. Ulrike Hubl
- Used HPLC to develop and optimise an assay to test the bifunctionality of L-Fucosekinase-GDP-L-fucose-pyrophosphorylase

### Summer Research Assistant

*University of Auckland*

Summer 2015

*Auckland, NZ*

- Worked under Dr. Ivanhoe Leung
- Optimisation, production and purification of two human proteins related to Parkinson's Disease
- Learnt foundational molecular biology techniques such as preparing DNA vectors, plasmid preparation and running protein expression trials

## POSTER PRESENTATIONS

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1. **Watson, P.R.**, Konig B., Rebing N., Cragin A.D., Schaker-Hubner L., Hansken F.K., Christianson D.W. , Difluoromethyl-1,3,4-oxadiazoles are Mechanism-Based, Essentially Irreversible Inhibitors of Histone Deacetylase 6 (2023), GSK-Penn Symposium.
2. **Watson, P.R.**, Konig B., Rebing N., Cragin A.D., Schaker-Hubner L., Hansken F.K., Christianson D.W. , Difluoromethyl-1,3,4-oxadiazoles are Mechanism-Based, Essentially Irreversible Inhibitors of Histone Deacetylase 6 (2023), Merck - You Belong in Chemistry Symposium.
3. **Watson, P.R.**, Hosseinzadeh, P., Baker, D., Christianson, D.W., Macrocyclic Peptide Binding in the Active Site of Histone Deacetylase 6 Mimics the Binding of Protein Substrate (2023), Enzymes, Coenzymes and Metabolic Pathways Gordon Research Seminar and Gordon Research Conference.
4. **Watson, P.R.**, Bai, P., Wang, C., Cragin, A.D., Hooker, J., Christianson, D.W., Aromatic C-F Interactions Influence Binding Mode of Inhibitors in HDAC6 (2022), GSK-Penn Symposium.
5. **Watson, P.R.**, Bai, P., Wang, C., Cragin, A.D., Hooker, J., Christianson, D.W., Aromatic C-F Interactions Influence Binding Mode of Inhibitors in HDAC6 (2022), Merck - You Belong in Chemistry Symposium.
6. **Watson, P.R.**, Bai, P., Wang, C., Cragin, A.D., Hooker, J., Christianson, D.W., Aromatic C-F Interactions Influence Binding Mode of Inhibitors in HDAC6 (2022), American Society for Biochemistry and Molecular Biology Annual Meeting

## ORAL PRESENTATIONS

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1. **Watson, P.R.**, Mechanism Dependent Irreversible HDAC6 Inhibitor, (2022), University of Pennsylvania Center for Translational Chemical Biology.
2. **Watson, P.R.**, Structural Determination of Peptide Macrocycles Bound to HDAC6, (2022), University of Pennsylvania Structure Talk.
3. **Watson, P.R.**, C-F Interactions in the Active Site of HDAC6, (2022), University of Pennsylvania Structure Talk.
4. **Watson, P.R.**, Structural Analysis of HDAC Enzymes (2022), Chemistry-Biology Interface Training Program Seminar.

## TEACHING EXPERIENCE

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### **Certificate in College and University Teaching**

Jan 2022 – Jan 2023

*University of Pennsylvania*

*Philadelphia, PA*

- Developed teaching skills through engaging in workshops and short courses on topics such as mentoring and accessible teaching
- Undergoing a teaching observation followed by a review to discuss what was successful during the class and possible ways to improve
- Developing a statement on teaching philosophy, followed by a workshop with fellow graduate students on developing our teaching philosophy for future faculty positions

### **Head Teaching Assistant for General Chemistry II**

Spring 2020 and 2021

*University of Pennsylvania*

*Philadelphia, PA*

- Supervised a group of 8 graduate and undergraduate students to meet grading deadlines and run recitations for over 200 first year chemistry students
- Lead TAs during the transition to online learning during Covid-19 to provide a cohesive transition to the online course
- Ran recitations both in person and online and assisted with preparation
- Organised cohesive grading of students work using both the online Canvas system and in person
- Routinely meet individually with students to provided tailored feedback

### **Teaching Assistant Principles of Biological Chemistry,**

Fall 2019, 2020 and 2022

*University of Pennsylvania*

*Philadelphia, PA*

- Planned and facilitated recitations using required worksheets, integrating required knowledge from lecture both in person and online during the pandemic
- Held office hours and worked individually with students to aid performance and understanding in the class
- Worked to weekly deadlines for grading problem sets, providing succinct feedback
- Collaborated with fellow teaching assistants to run exam review sessions

### **Laboratory Teaching Assistant**

Feb. 2016 – Aug. 2018

*Victoria University of Wellington*

*Wellington, NZ*

- Facilitated undergraduate lab for Principles of Chemistry course
- Worked to integrate concepts between laboratory and lecture

### **Peer Assisted Study Support**

Feb. 2015 – Nov. 2015

*Victoria University of Wellington*

*Wellington, NZ*

- As a second year student taught weekly active learning tutorials for first year chemistry courses
- Taught key concepts, helped solidify understanding and guide problem solving

## MENTORING EXPERIENCE

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### **Undergraduate Student Mentoring**

Fall 2021 – Spring 2022

*University of Pennsylvania*

*Philadelphia, PA*

- Primary supervisor to an undergraduate student, whose work resulted in two conference presentations at The American Society for Biochemistry and Molecular Biology Annual Meeting and 3 co-authored publications
- Primary supervisor to a visiting professor and visiting research scholar, training them in biochemical and x-ray crystallography techniques

### **Research Scholar Mentoring**

Fall 2022 – Spring 2023

*University of Pennsylvania*

*Philadelphia, PA*

- Primary supervisor to a visiting professor and visiting research scholar, training them in biochemical techniques such as protein purification and assay development and x-ray crystallography techniques

## LEADERSHIP EXPERIENCE

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- Organiser of Merck-You Belong in Chemistry Symposium** August. 2021 – April 2023  
*University of Pennsylvania Philadelphia, PA*
- Worked as one of 3-4 representatives from Women+ in Chemistry, to host an annual conference at Penn Chemistry in collaboration with Merck celebrating diverse people in the Chemical Sciences
  - Helped facilitate the event organisation and logistics working with scientists at Merck and fellow graduate students
  - Fostered an ongoing relationship with Women+ in Chemistry and Merck scientists for ongoing continuation of the annual symposium
- President of Women+ in Chemistry** Jun. 2020 – Jun. 2022  
*University of Pennsylvania Philadelphia, PA*
- Managed a board of gender minority students to organise events for the department and gender minorities
  - Oversaw a yearly budget in collaboration with the Treasurer
  - Liaised with faculty members and administrative leaders to promote issues that gender minority students are facing to help facilitate a positive environment
  - Assisted in running the first Women in STEM conferences for members of the Penn Community
- Women in STEM Conference Chair** Jun. 2021 – June 2022  
*University of Pennsylvania Philadelphia, PA*
- Chaired a committee of 10 people from 5 different graduate groups on campus, to organise a Women in STEM conference in 2022 that just under 100 people registered to attend
  - Served as an administrative coordinator to organise the event, organising logistics and the schedule
  - Managed grant applications to raise \$6000 in funds for the conference
- Professional Advancement Committee** Aug. 2019 – Present  
*University of Pennsylvania Philadelphia, PA*
- Board Member
  - Help to organise and run events around professional advancement for Masters, PhD and Postdocs in the department
- Wavelength - LGBT+ Chemistry Group** Fall 2019  
*University of Pennsylvania Philadelphia, PA*
- Board Member
  - Help to organise events centered around LGBT+ issues, especially barriers faced in science

## DEPARTMENTAL SERVICE

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- Chemistry Department Diversity and Inclusion Committee** Aug. 2020 – Jun. 2023  
*University of Pennsylvania Philadelphia, PA*
- Graduate Student Representative
  - Engaged in discussion and provide ideas for departmental improvement on diversity related issues
  - Interpreting survey results for the promotion of issues women face to the committee
- Graduate Student Advisory Committees** Fall 2019 and 2022  
*University of Pennsylvania Philadelphia, PA*
- Served on two advisory committees run by the Graduate Student Chair and the Executive Director
  - Helped to provide perspective on the graduate student experience and student issues
  - Engaged in discussion and provide ideas for increased student satisfaction

## OUTREACH

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- Activities for Community Education in Science** Spring and Fall 2019  
*Philadelphia, PA*
- Facilitated experiments for 3rd-8th grade students from the Philadelphia area
- Philadelphia Area Girls Enjoying Science** Spring 2019  
*Philadelphia, PA*
- Organised and ran two experiments designed for 6th grade girls
- Victoria University of Wellington Chemistry Outreach** June 2017  
*Wellington, NZ*
- Oversaw experiments for students from high schools in the Wellington Region

## OTHER ACTIVITIES

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### **Graduate Associate at Perry World House**

Aug. 2020 – May 2021

*University of Pennsylvania*

*Philadelphia, PA*

- Collaborate and engage in discussion with fellow associates, visiting scholars and experts about global policy
- Developed writing skills by writing an op-ed on international scientific collaborations

### **PBG Healthcare Consulting**

Aug. 2020 – Dec. 2020

*University of Pennsylvania*

*Philadelphia, PA*

- Investigated potential areas of expansion for a biotech startup through literature reviews and business analysis
- Improved communication skills through weekly presentations to my group and a final presentation to the company founders