Atomwise

Transitioning from academia to industry:
How the Merck research award guided me to my dream job

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CADD Scientist
Atomwise Inc.

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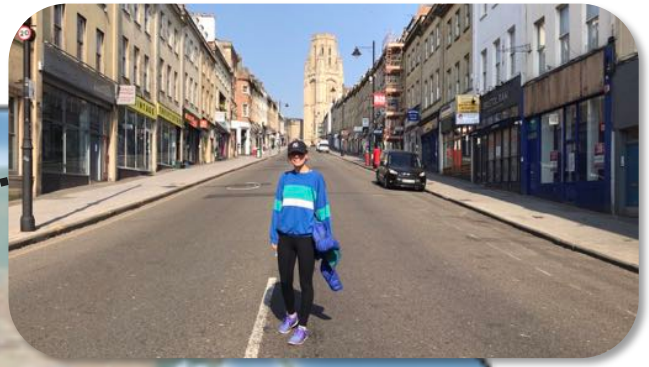
ACS Fall 2022
Chicago, IL

Disclaimer

This is my story and should not be taken as life advice.

Seattle, WA



Snohomish, WA

Davis, CA

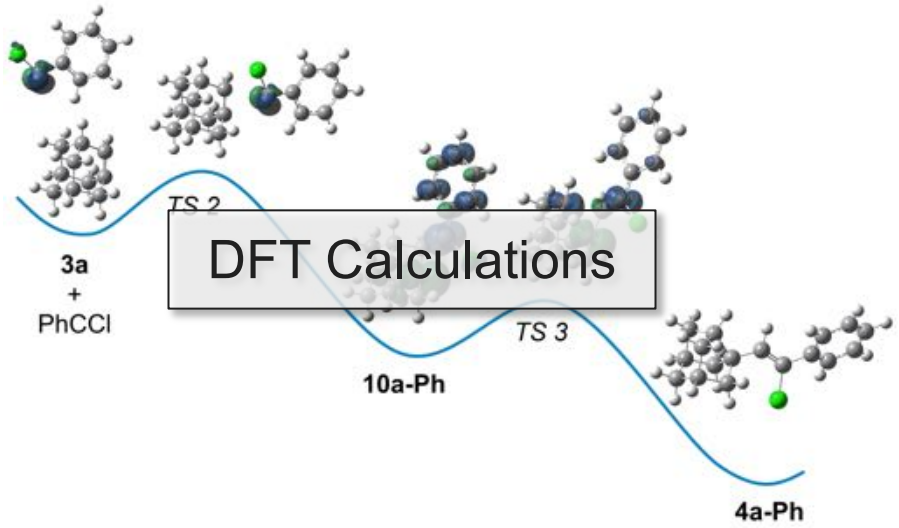
Bristol, England

Mülheim an der Ruhr, Germany

Taipei, Taiwan

Develop models to predict useful chemistry

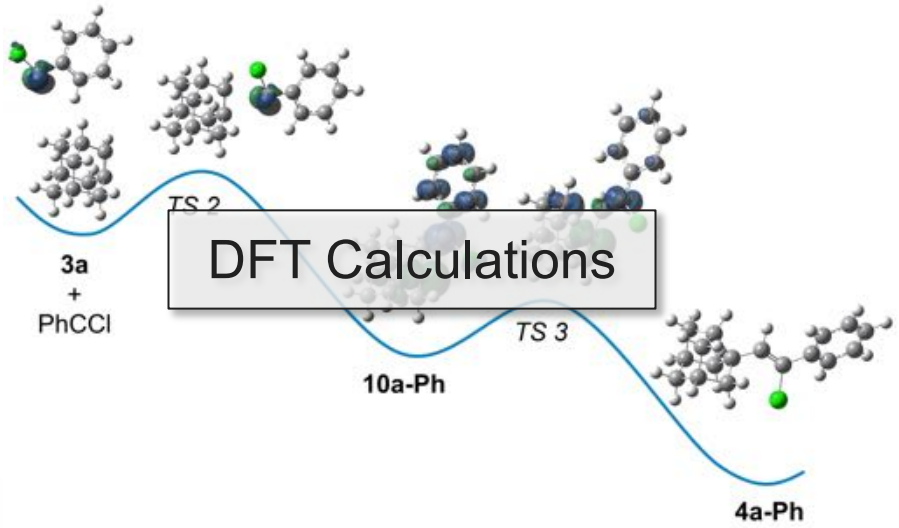
Overarching research goals



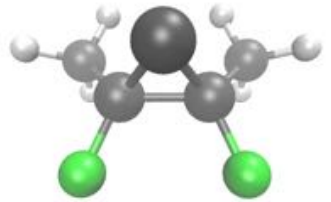
Hare, S. R., *et al.*; *J. Org. Chem.* **2015**, *80*, 5049-5065.

Develop models to predict useful chemistry

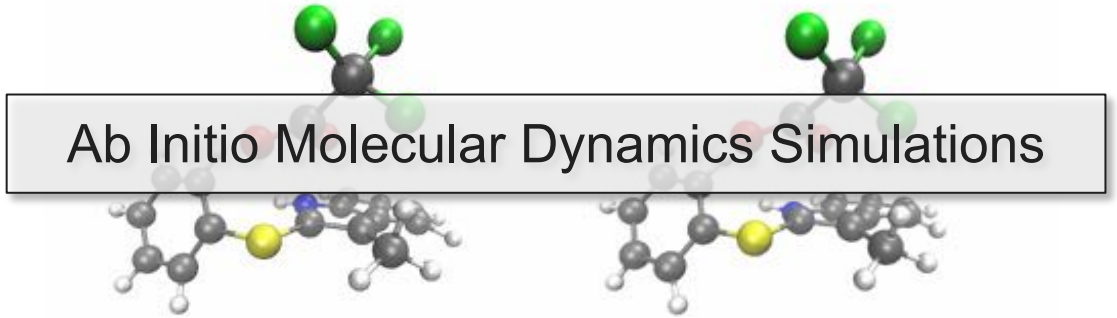
Overarching research goals



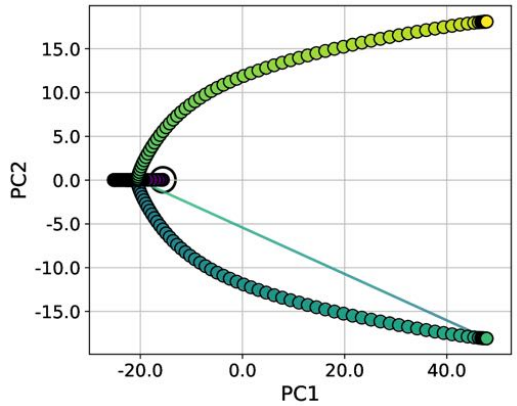
DFT Calculations

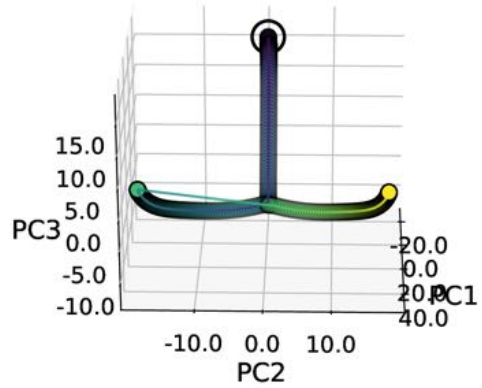


New Computational Analysis Tools



Ab Initio Molecular Dynamics Simulations





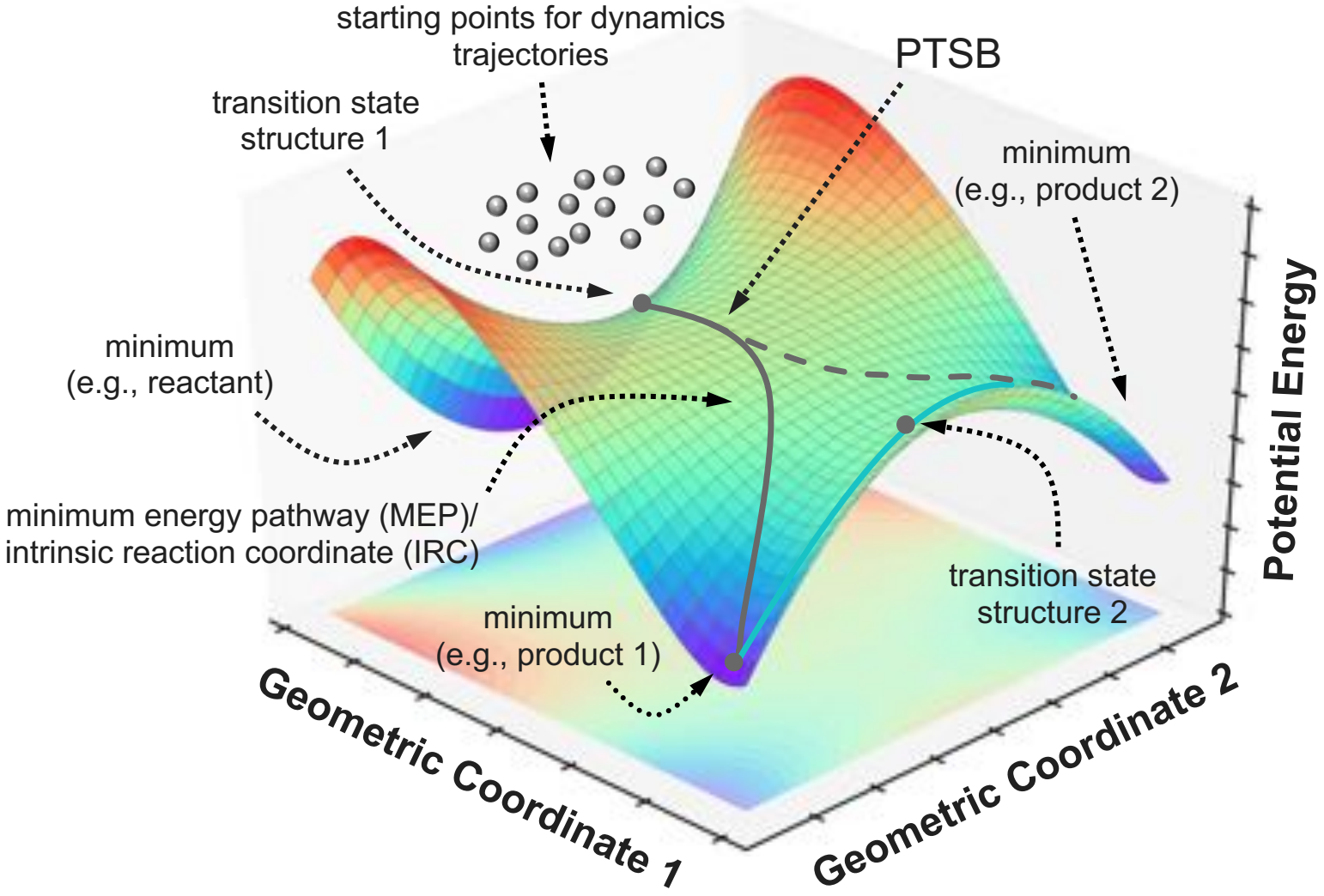
Hare, S. R., *et al.*; *J. Org. Chem.* **2015**, *80*, 5049-5065.
Hare, S. R.; Li, A.; Tantillo, D. J.; *Chem. Sci.* **2018**, *9*, 8937-8945.
Hare, S. R.; Bratholm, L. A.; Glowacki, D. R.; Carpenter, B. K.; *Chem. Sci.* **2019**, *10*, 9954-9968.

Outline

- Skills collected along academic path
- Decision to go into industry
- Atomwise and my current role
- Career tips

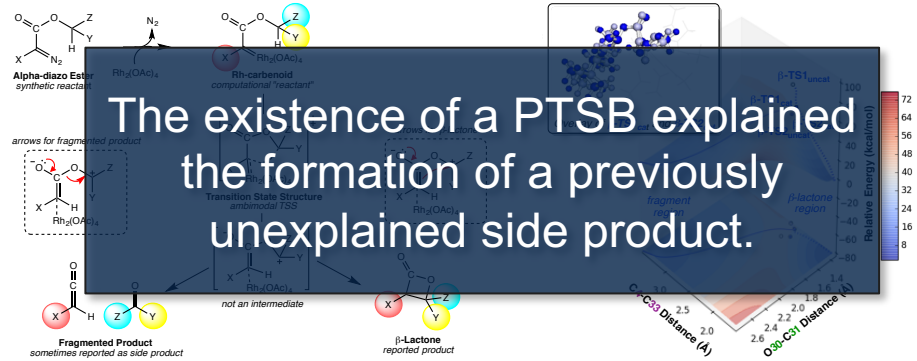
Doctoral Research

UC DAVIS
UNIVERSITY OF CALIFORNIA



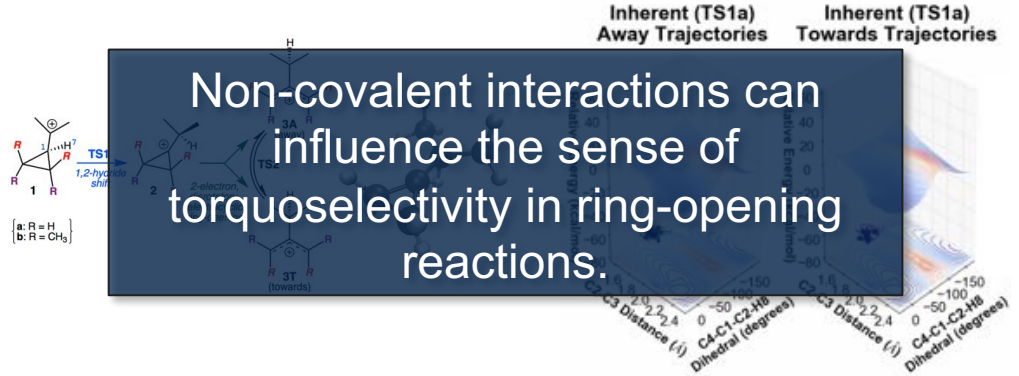
Studies on reactions containing PTSBs[1]

Rh-Catalyzed C-H Insertion[2]



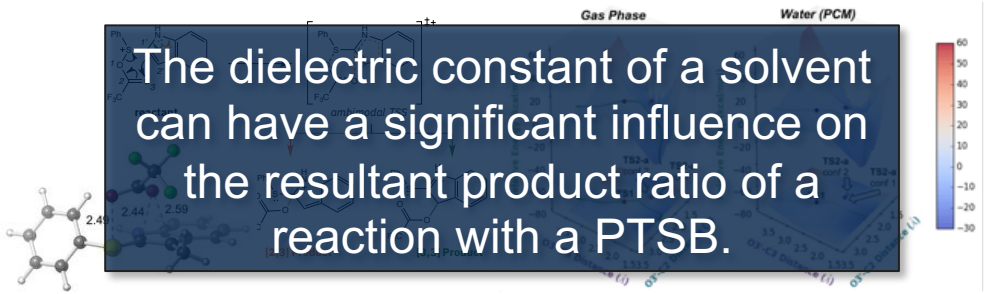
The existence of a PTSB explained the formation of a previously unexplained side product.

Hiscotropic Rearrangement[3]



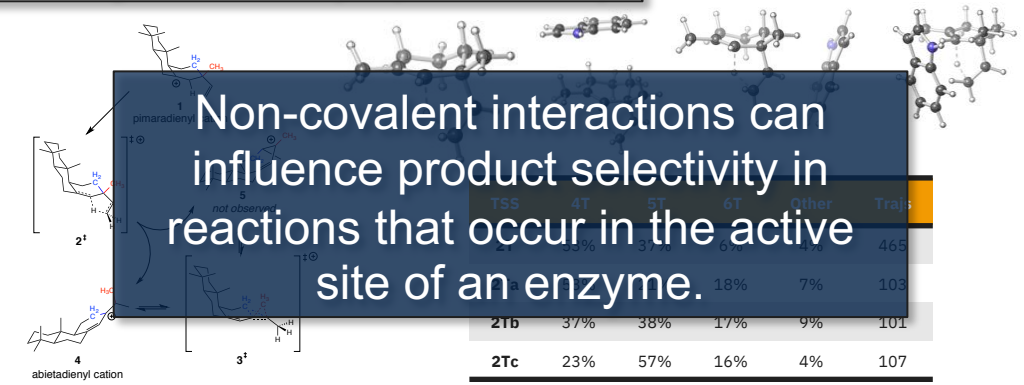
Non-covalent interactions can influence the sense of torquoselectivity in ring-opening reactions.

Pummerer-like Rearrangement[4]



The dielectric constant of a solvent can have a significant influence on the resultant product ratio of a reaction with a PTSB.

Abietadienyl Cation (*unpublished*)



	TSS	4T	5T	6T	Other	Trans
2T	35%	37%	6%	4%	465	
				18%	7%	103
2Tb	37%	38%	17%	9%	101	
2Tc	23%	57%	16%	4%	107	

Non-covalent interactions can influence product selectivity in reactions that occur in the active site of an enzyme.

[1]For a review on PTSBs, see: Hare, S. R. and Tantillo, D. J.; *Pure Appl. Chem.* **2017**, *89*, 679-698.
[2]Hare, S. R.; Tantillo, D. J.; *Chem. Sci.* **2017**, *8*, 1442-1449.
[3]Hare, S. R.; Pemberton, R. P.; Tantillo, D. J.; *J. Am. Chem. Soc.*, **2017**, *139*, 7485-7493.
[4]Hare, S. R.; Li, A.; Tantillo, D. J.; *Chem. Sci.* **2018**, *9*, 8937-8945.

Exposure to computational chemistry in industry

Result of a lot of luck, but required opening myself up to opportunity and failure

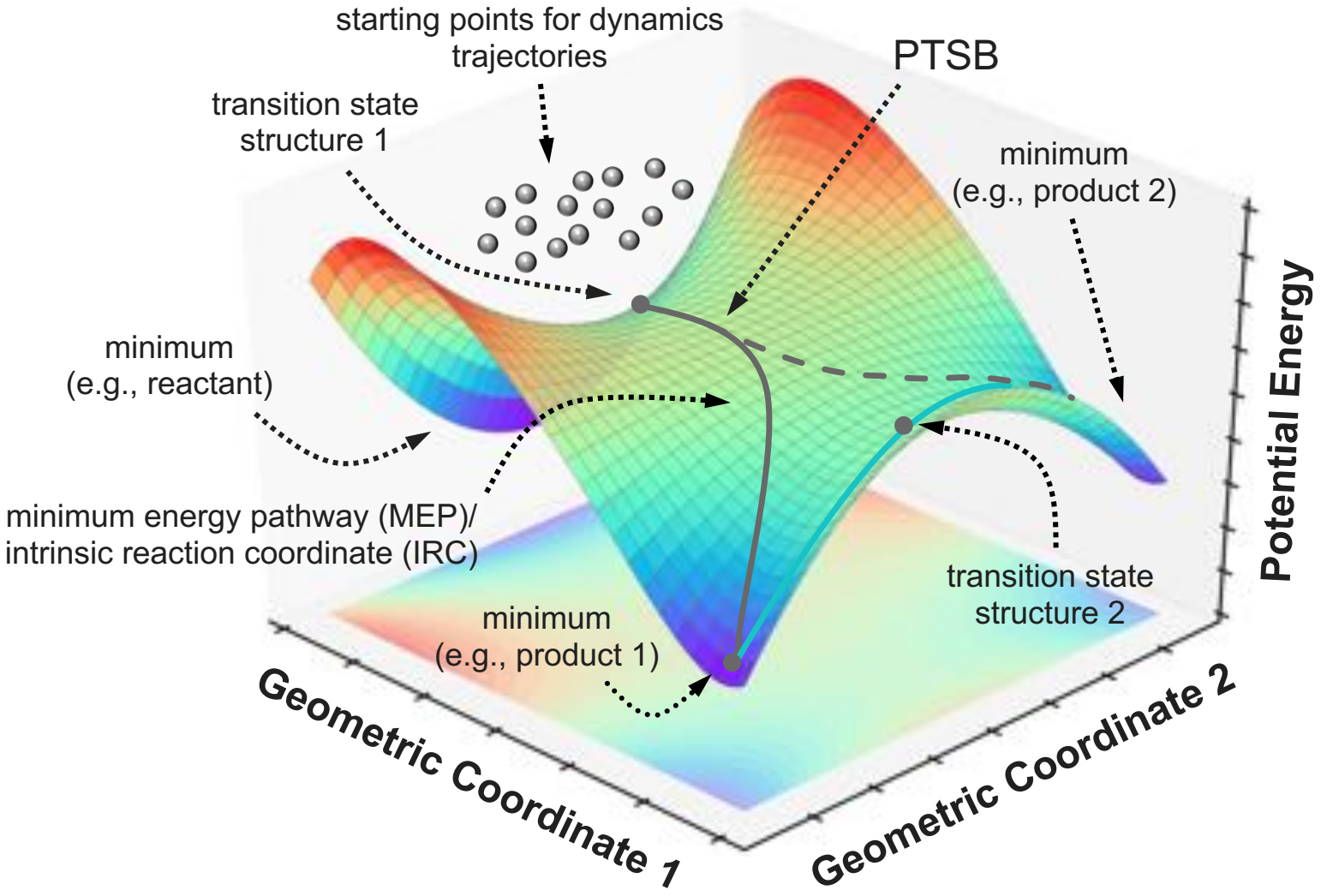
Women's Chemist Committee Merck Award winners at the 254th ACS Meeting in 2017

Computational pharmaceutical chemistry TA

D.E. Shaw Women's Forum for Graduate Students and Postdocs in 2018

Doctoral Research

UC DAVIS
UNIVERSITY OF CALIFORNIA

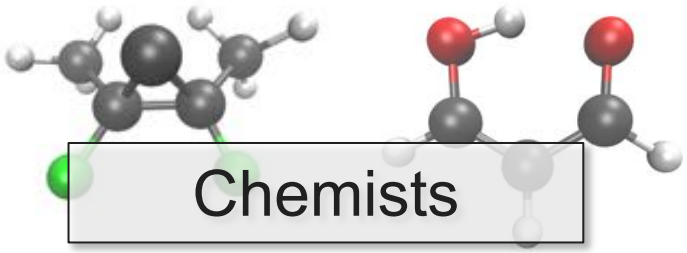


Skills Gained

- Execution of research projects
- Applying for awards
- Public speaking, networking, writing
- Advocating for myself and my research
- *Living abroad for extended periods*

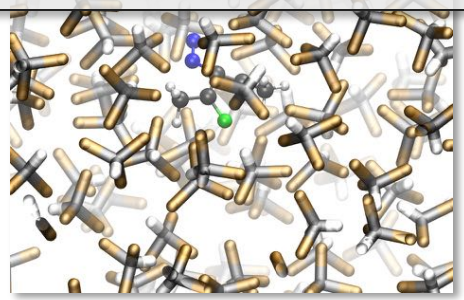
Postdoctoral Research

University of BRISTOL

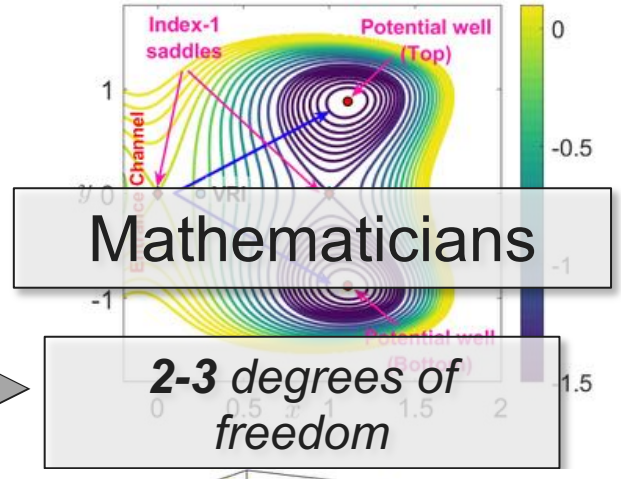


Chemists

many *degrees of freedom*

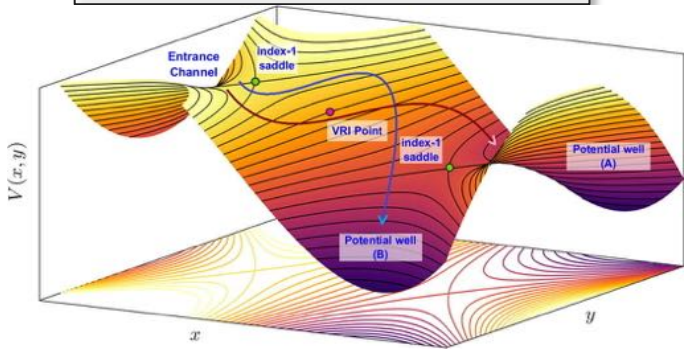


Dimensionality Reduction



Mathematicians

2-3 *degrees of freedom*



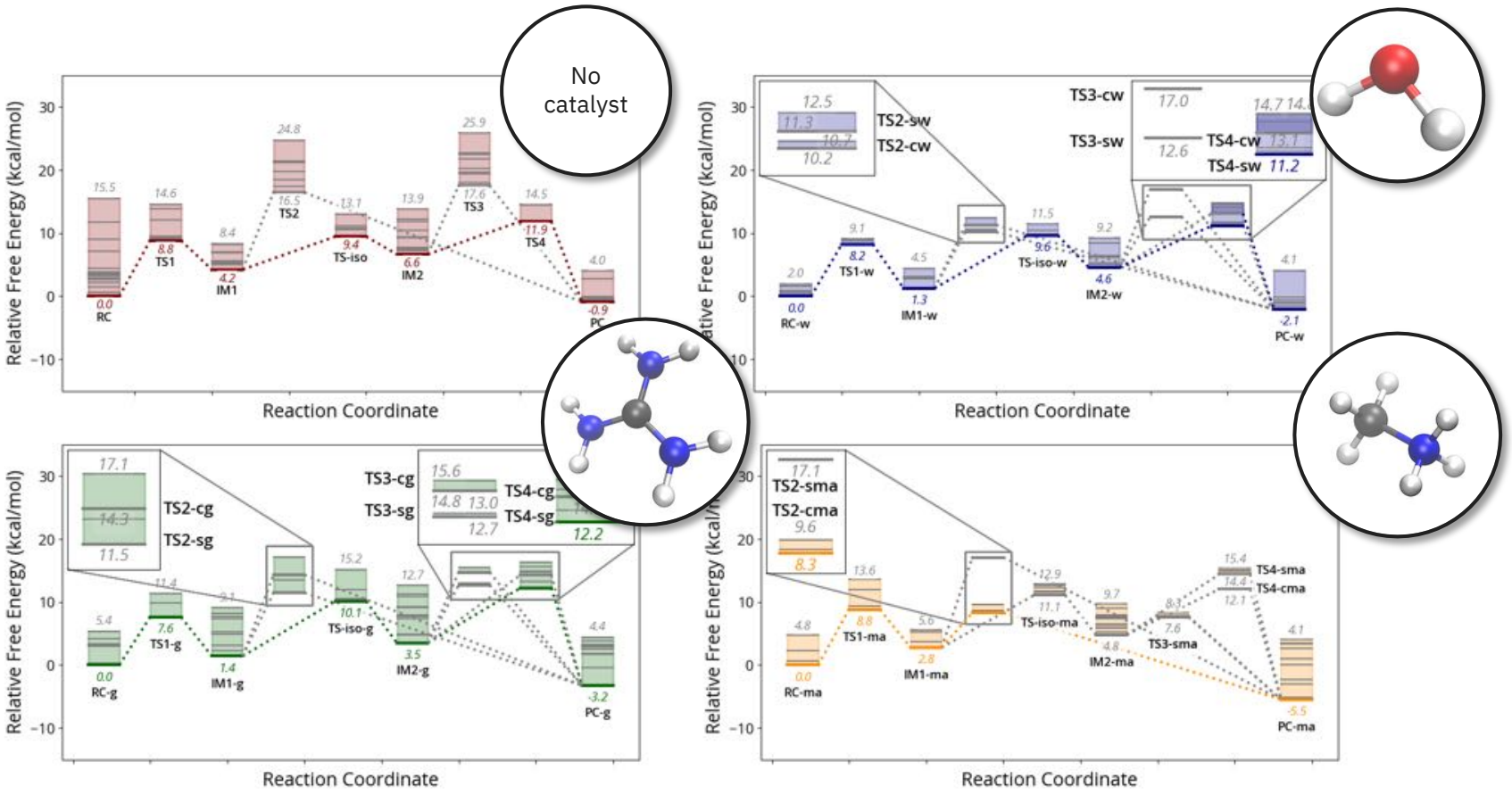
Skills Gained

- Python coding
- Version control with Git and GitHub
- Cross-disciplinary collaboration
- Independence in research
- *Living in and acclimating to a new country*

García-Garrido, V.J.; Katsanikas, M.; Agaoglou, M.; Wiggins, S.; *Chem. Phys. Lett.* **2020**, *754*, 137714.

Postdoctoral Research

UNIVERSITY of WASHINGTON



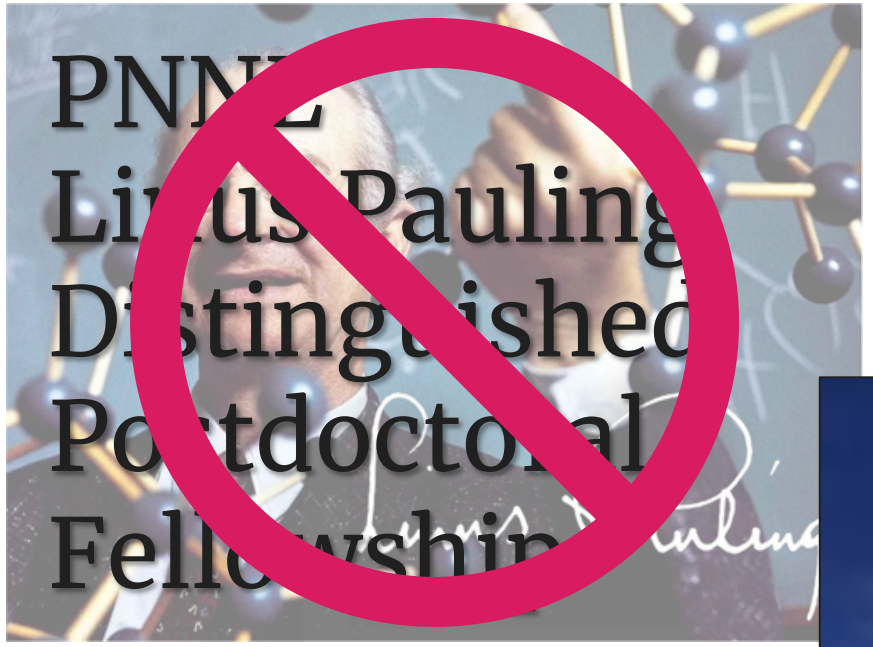
Skills Gained

- Project management
- Leadership in a research group
- Grant writing
- Understanding the “big picture” of my work
- *Learning to work completely remotely*
- *Evaluating professional values*

CAM-B3LYP/6-311++G(2d,2p)
IEFPCM water solvent

Hare, S.; Pfaendtner, J.; *Phys. Chem. Chem. Phys.*, **2022**, *24*, 3664-3674.

Interviewing and decision to go into industry



Current Position

Atomwise

Artificial Intelligence for Drug Discovery

We use our AI engine to transform drug discovery. Our discoveries help create **better medicines faster.**

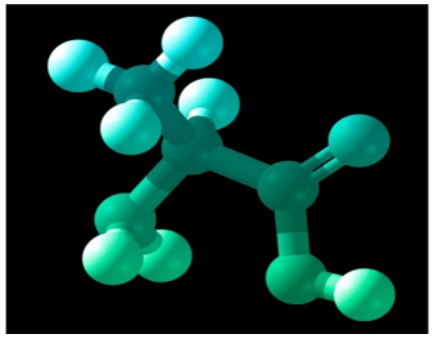
Stephanie Hare, PhD

SCIENTIST, CADD

Deep Learning for Drug Design

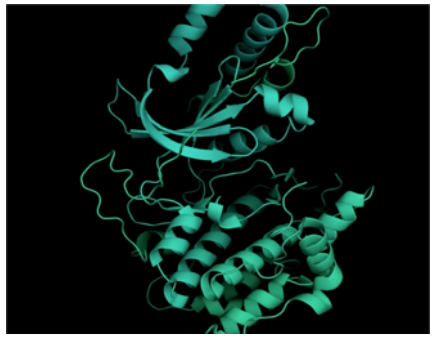
1st to use Convolutional Neural Nets (CNNs) for structure-based drug discovery

1



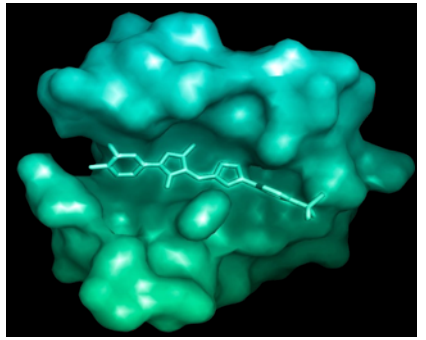
Map Atoms in 3D Space, use Voxels and Poses

2



Screen 16+B chemicals for predicted interaction with the target

3



Send hits with the most potential to client for lab testing (75% success)

Proven Success with the Most Challenging Targets

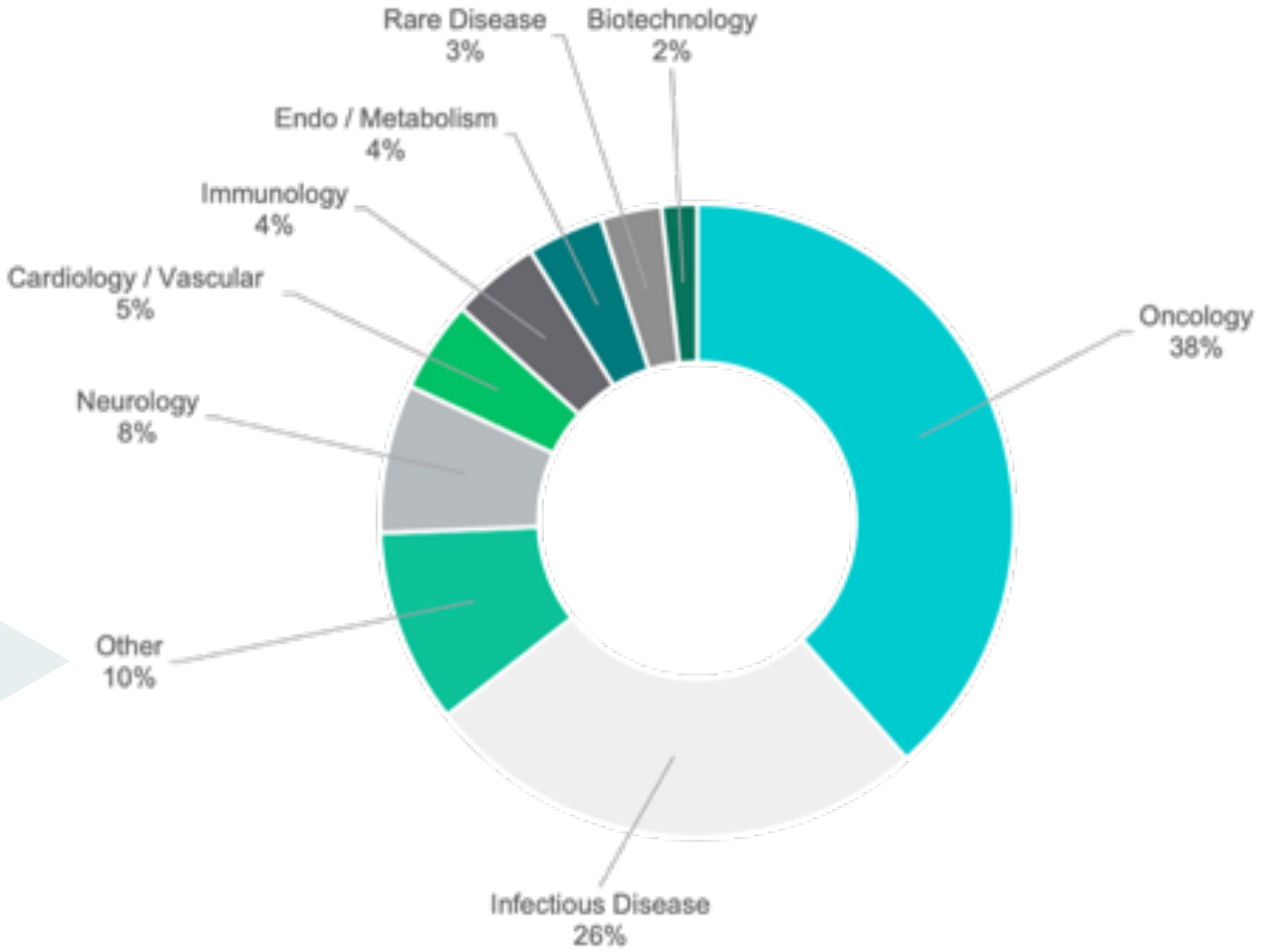
AI delivers at least one hit validated in laboratory experiments 74% of the time

Overall Success	No Training Data	Homology Model	X-ray Structure	Protein-Protein Interactions	Cryo-EM Data
120 Projects	55 Projects	20 Projects	84 Projects	23 Projects	1 Projects
74% Success	71% Success	71% Success	75% Success	83% Success	100% Success

Pipeline with enormous breadth

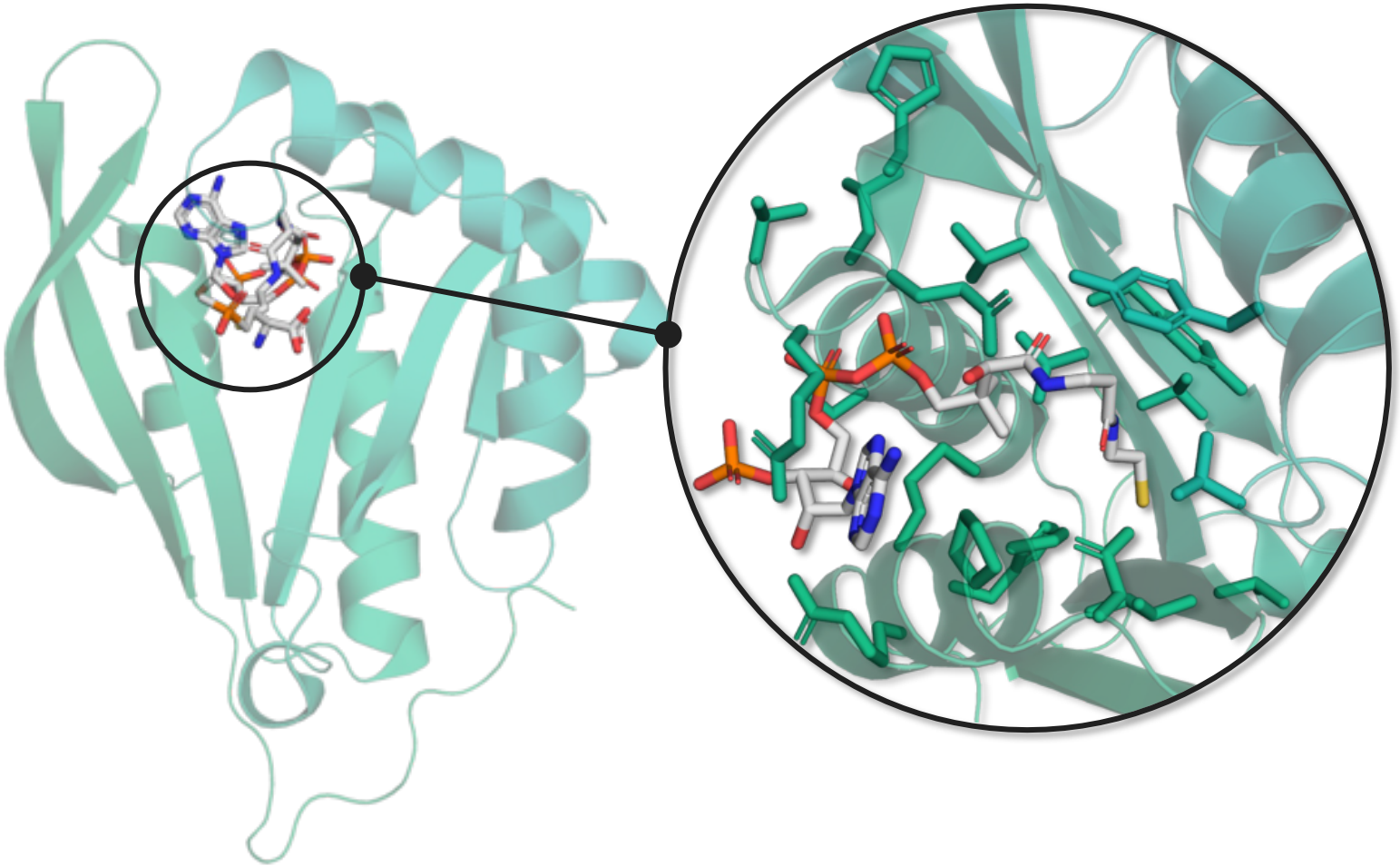
Over 775 accepted projects to date across diverse disease and application areas

- Ophthalmology
- Rheumatology
- Gastroenterology
- Hepatology
- Musculoskeletal
- Psychiatric
- Dermatology
- Hematology
- Veterinary Disease
- Agriculture/Antifungals
- CRISPR/Biodefense



My role as a CADD scientist

On the Production team



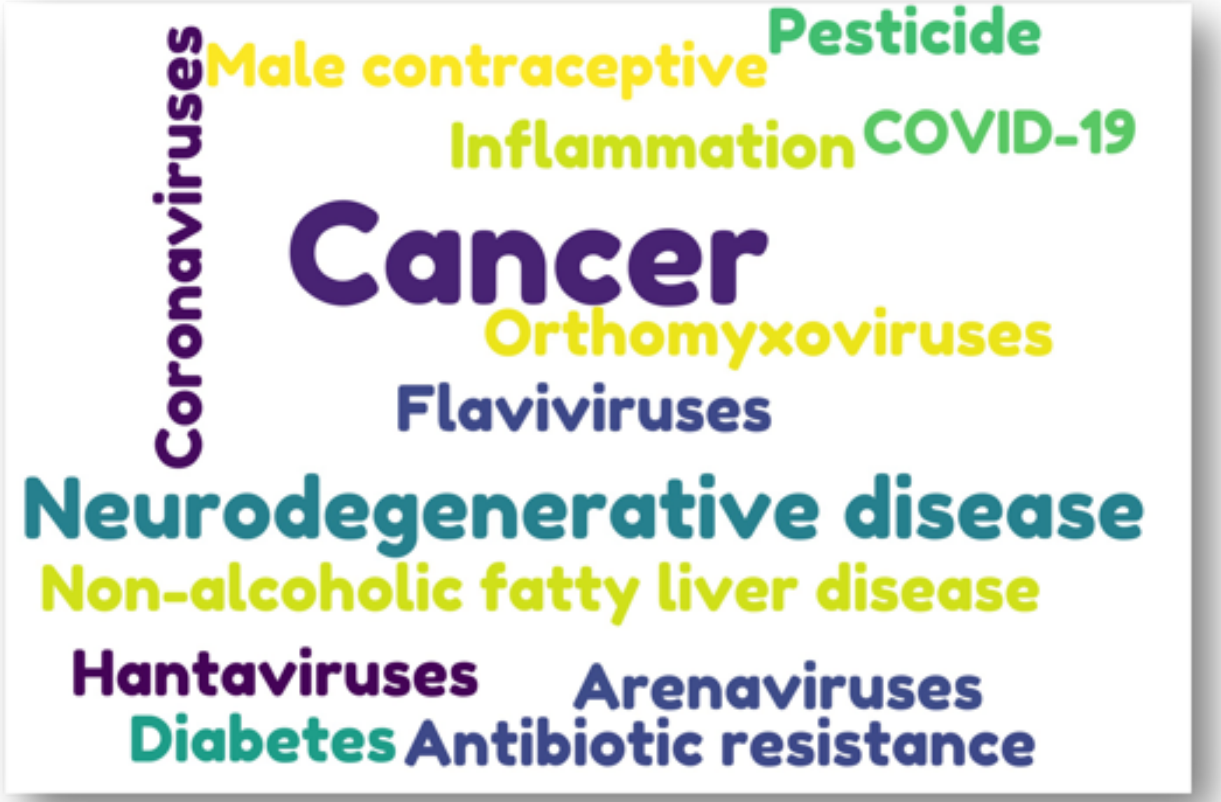
(Some) questions I answer:

- What is the mechanism of action?
- How does this protein relate to a disease indication?
- What part of the protein is involved in the pathway we want to alter?
- What structure do we use?
- Are there any common motifs in the predicted binders?

Stecula, A.; Hussain, M. S.; Viola, R. E.; *J. Med. Chem.* **2020**, *63*, 8867–8875

My role as a CADD scientist

Production team



- Academic collaborations (AIMS program)
- Joint ventures (JVs) with Big Pharma
- Internal Projects

The transition from academia to industry

Has it been difficult?

No.

Career tips

From my own experience (your mileage may vary)

- View interviews as (serious) **practice**
  - Push yourself, but in the framework of **training** rather than **outcome.**
- Apply for **everything** you can as a graduate student and postdoc
  - You never know which experiences will serve you in the future. Open yourself up to being involved in projects/experiences outside of your forte.
- Keep (or get back) in touch with **people** you like
  - Focus on networking with people whose values align with yours.
- Never lose sight of the **high-level** impact of the work you do
  - This is necessary for success in any field.

Atomwise

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Add me on LinkedIn!

Questions?

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