

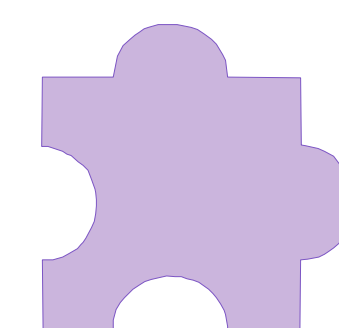
# New Drugs for Tuberculosis: Making them Faster and Cheaper

Undergraduate Researcher: Grace Bobo

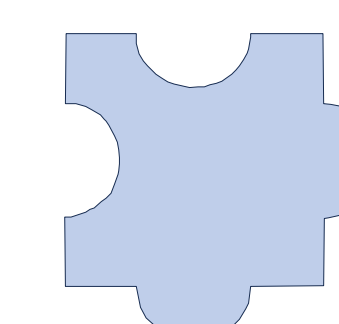
Graduate Student Mentor: Alex Menke

Faculty Advisor: Eric E. Simanek

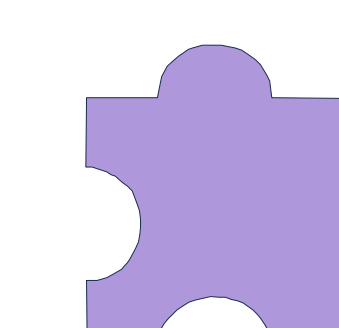
## Our Motivation: New drugs for TB are needed, and they need to be easy & cheap to make.



**Building from a lead:** Researchers at Cornell's Weill Medical School in New York City identified a lead molecule that could become the newest TB drug.

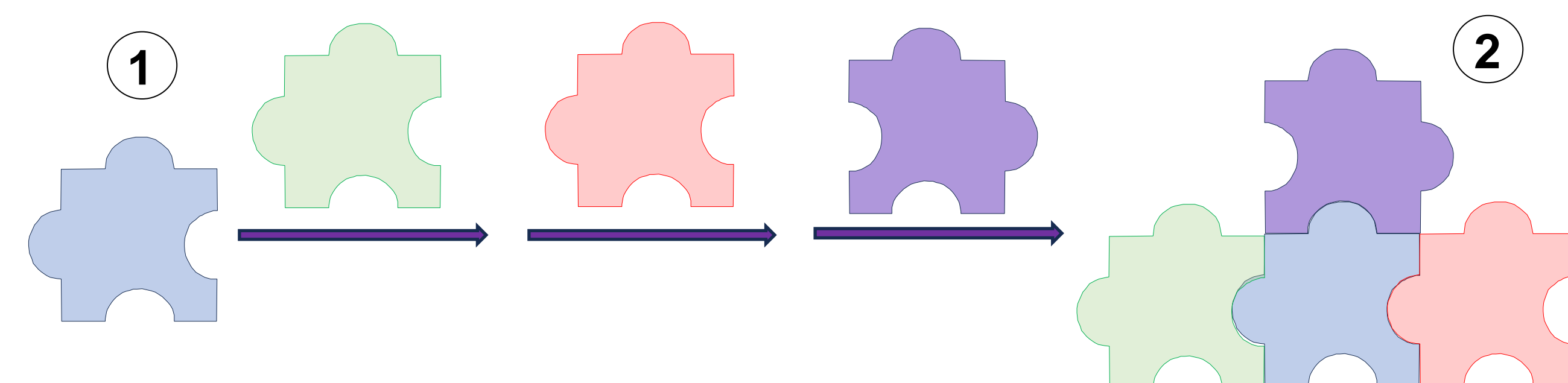


**Synthesis takes time and money.** The cost of drugs on the market reflect the effort required for their synthesis and the costs of the starting materials used.

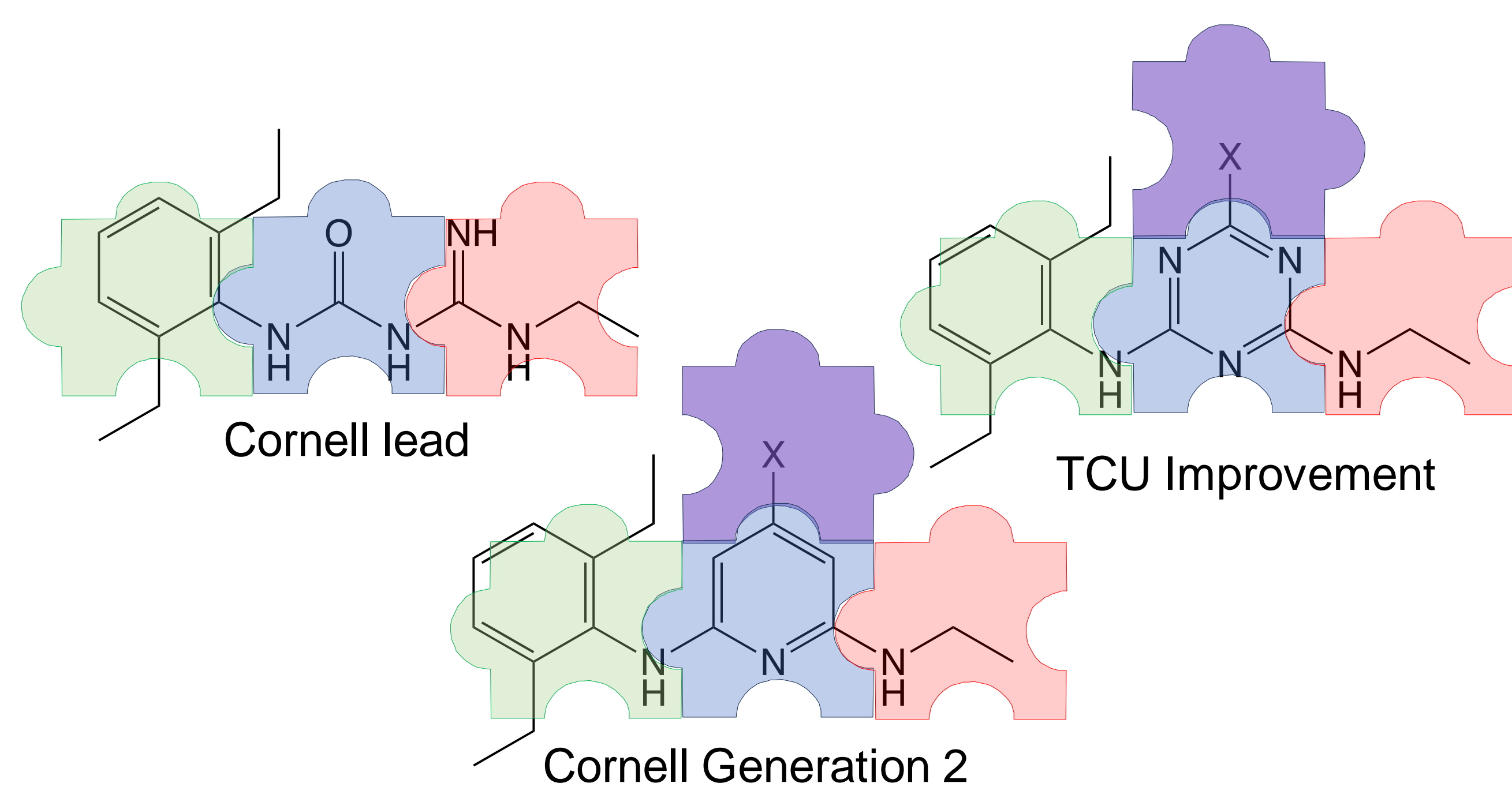


**The goal:** The new drug candidate is structurally similar to molecules made in the Simanek laboratory. We will make a series of molecules and collaborate to evaluate their efficacies.

## Research design: Test critical hypotheses with molecules that undergraduates can make in the laboratory



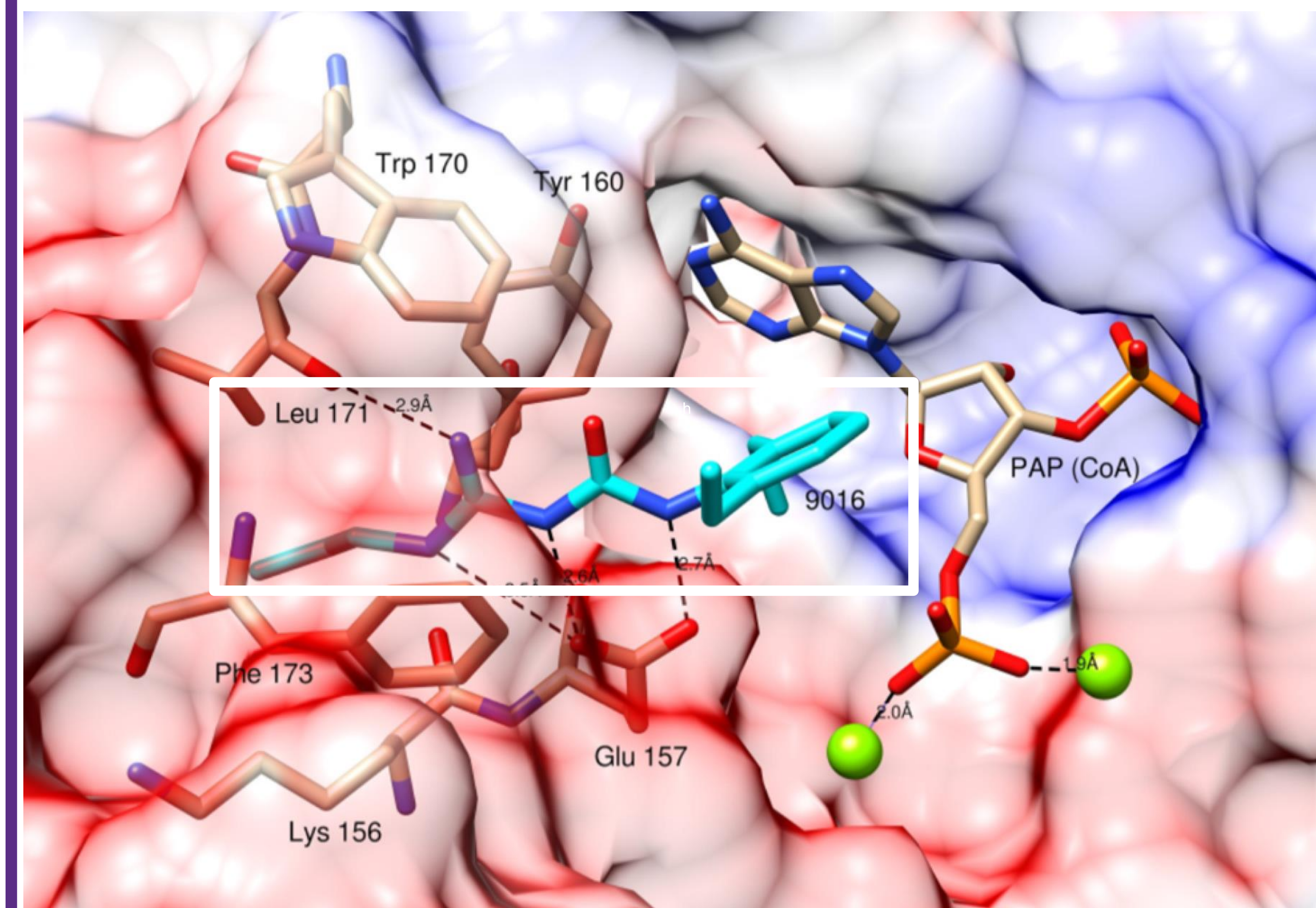
- Starting with a versatile inexpensive **building block**, groups that emulate the lead drug are installed in a single reaction flask over the course of a few hours.
- The reaction works in high yields and purification is accomplished by precipitation!



Tuberculosis is one of the deadliest infectious diseases on the planet.

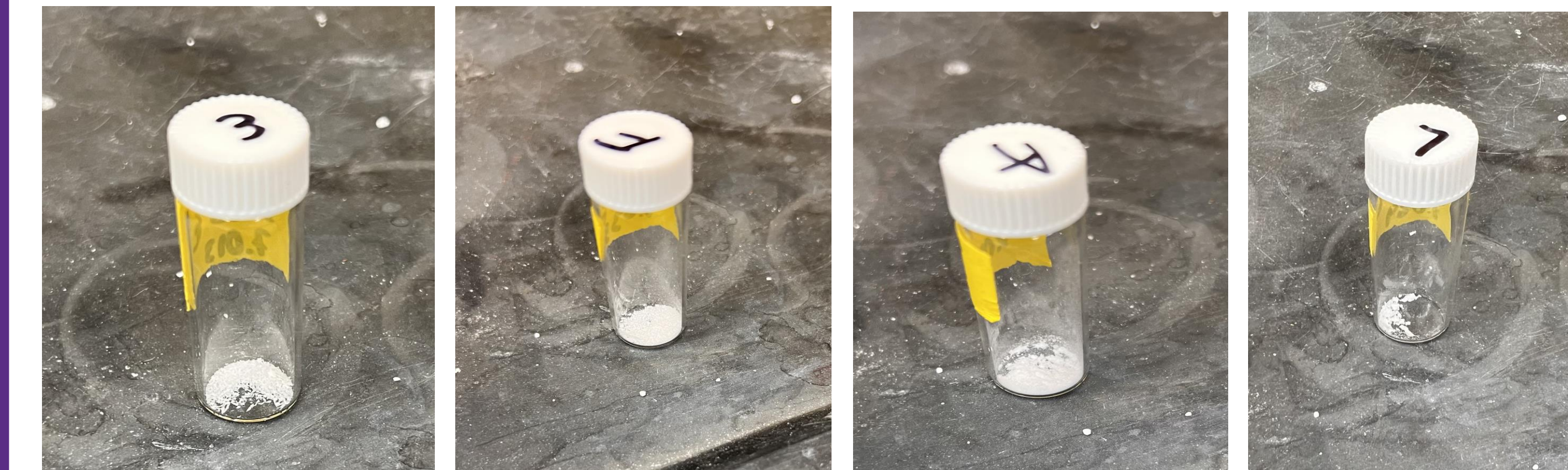
In 2018, 1.5 million people died including 251,000 with HIV.

## The Weill Drug Binds a TB-specific Target



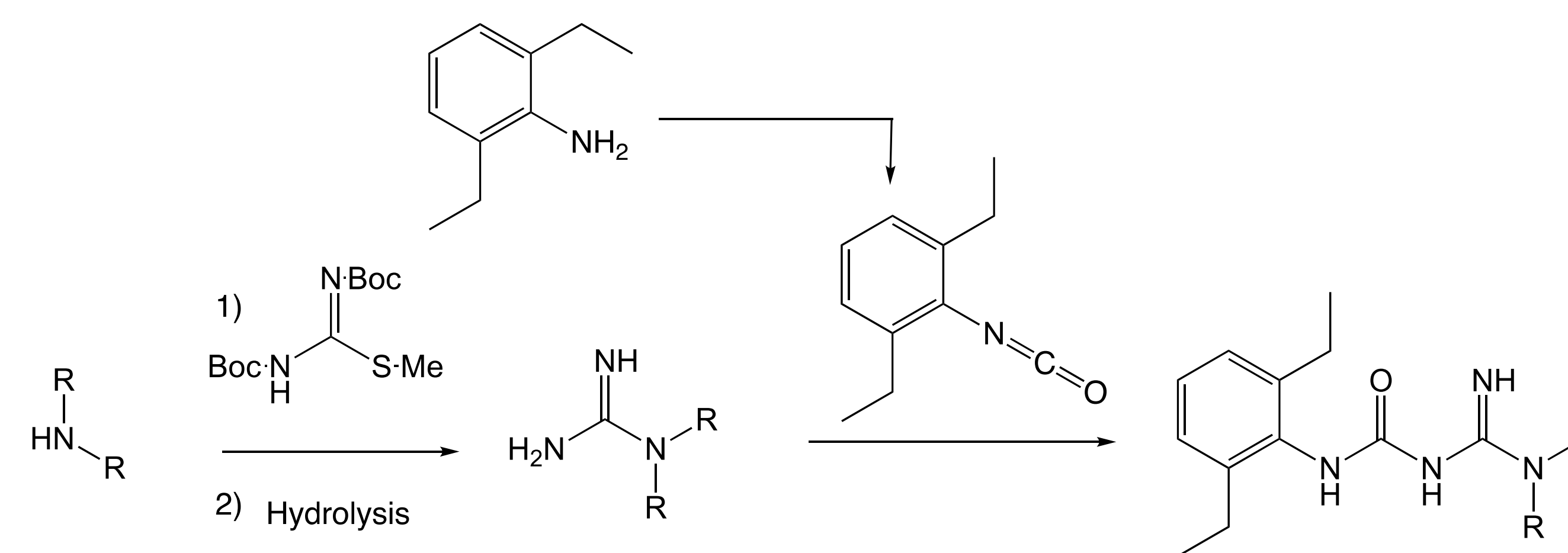
## What pharmaceutical companies want:

	TCU	Cornell
Few steps	✓	✓
Short reaction times	✓	
Inexpensive building blocks	✓	✓
Safe chemistry	✓	
Low temperatures	✓	
Nontoxic intermediates	✓	
Green (water) reaction conditions	✓	
No chromatography	✓	
Easy purification	✓	
High Yields	✓	

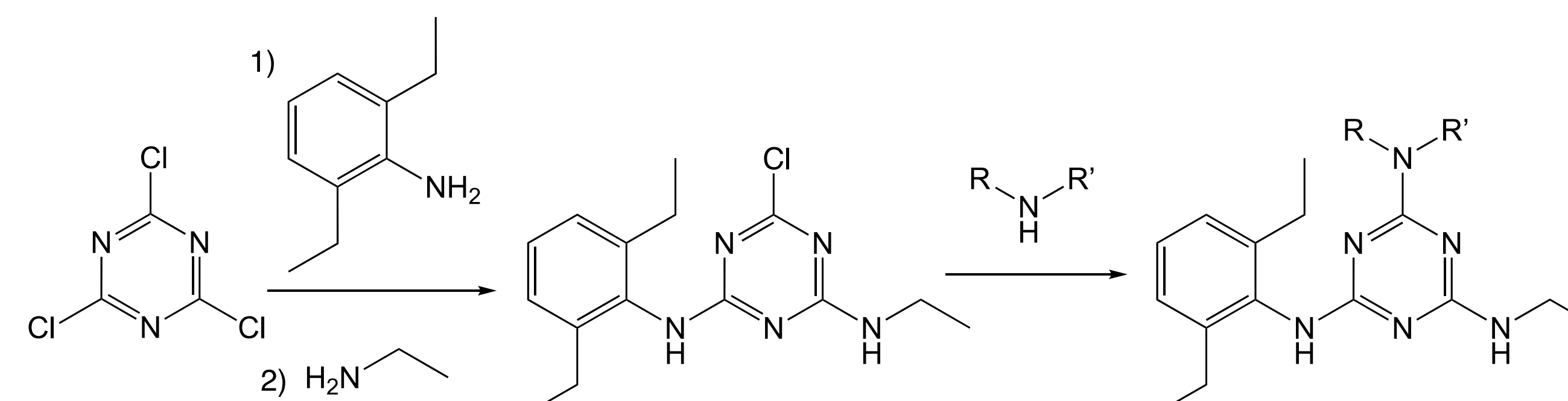


The reaction product is filtered off as a white (pure) solid in many cases (as shown above).

## The Cornell Route to New Drug Leads – Longer, costly and multiple purifications



## The TCU Route to New Drug Leads – Two steps, high yields and easy purification



## What's next for the undergraduates?

**Grace** – Grace is a 2nd year student who has been working in the laboratory since she was in high school. She plans on working towards a PhD when she graduates.

**And Alex** — Alex, a former TCU undergraduate, is on track to defend his PhD thesis in December 2024. He was awarded a fellowship to work at the FDA for three months last summer.

Professor Simanek is the Robert A. Welch Chair in Chemistry. After spending 12 years on the faculty at Texas A&M University, he moved to TCU in 2010.

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