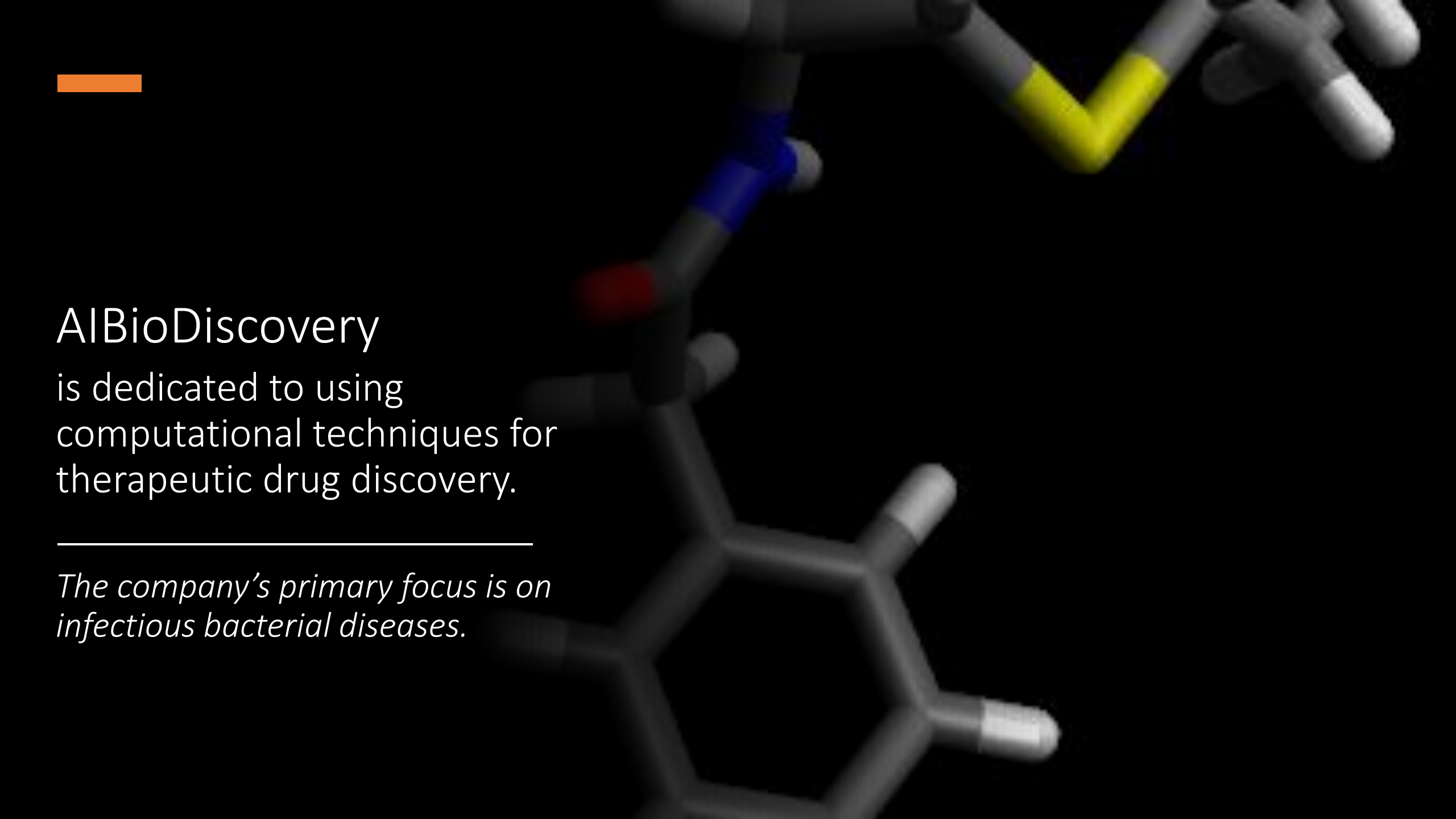
AIBioDiscovery LLC

is a Research-Based Startup



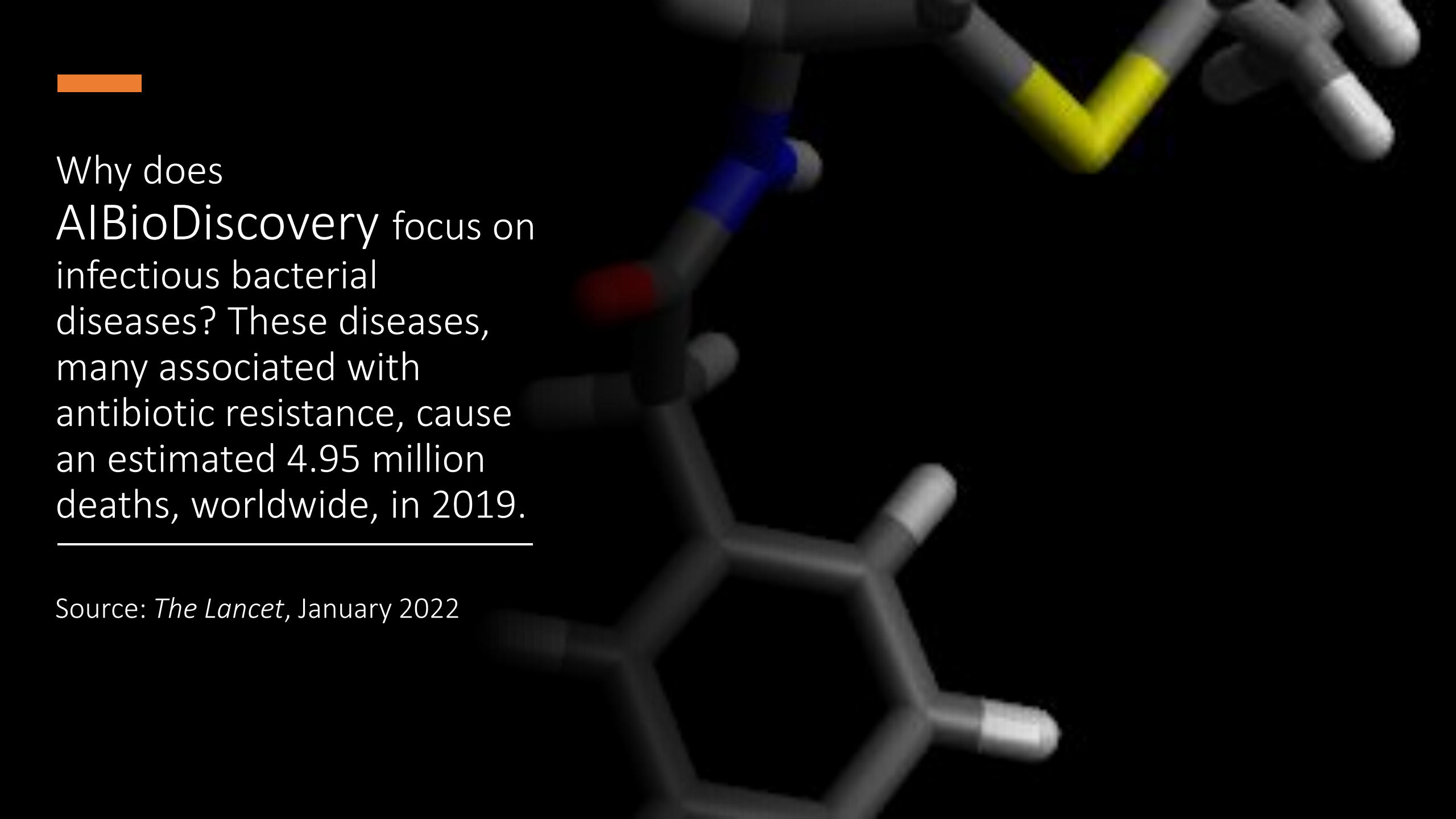
AIBioDiscovery

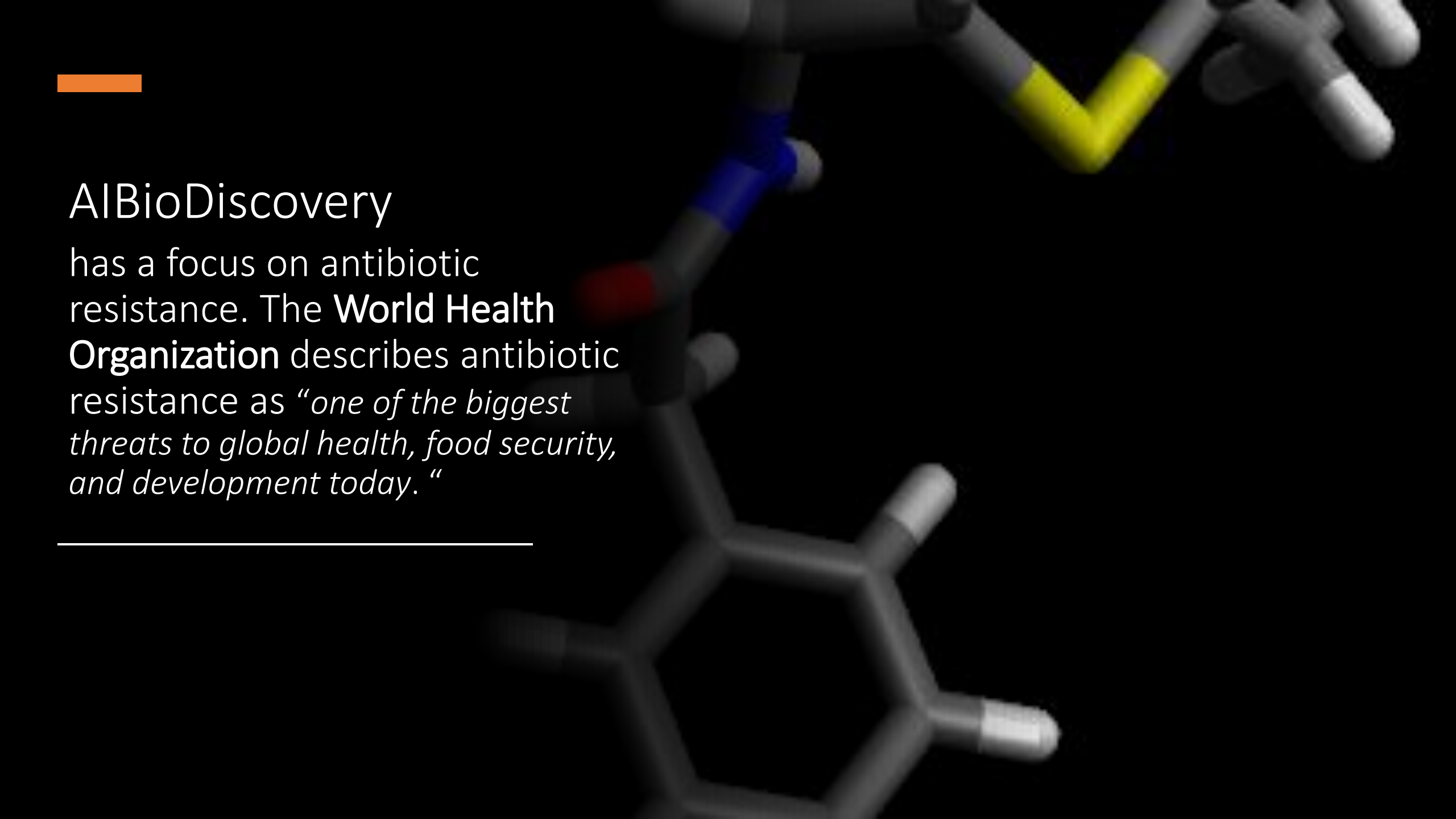
is dedicated to using computational techniques for therapeutic drug discovery.

The company's primary focus is on infectious bacterial diseases.

Why does AIBioDiscovery focus on infectious bacterial diseases? These diseases, many associated with antibiotic resistance, cause an estimated 4.95 million deaths, worldwide, in 2019.

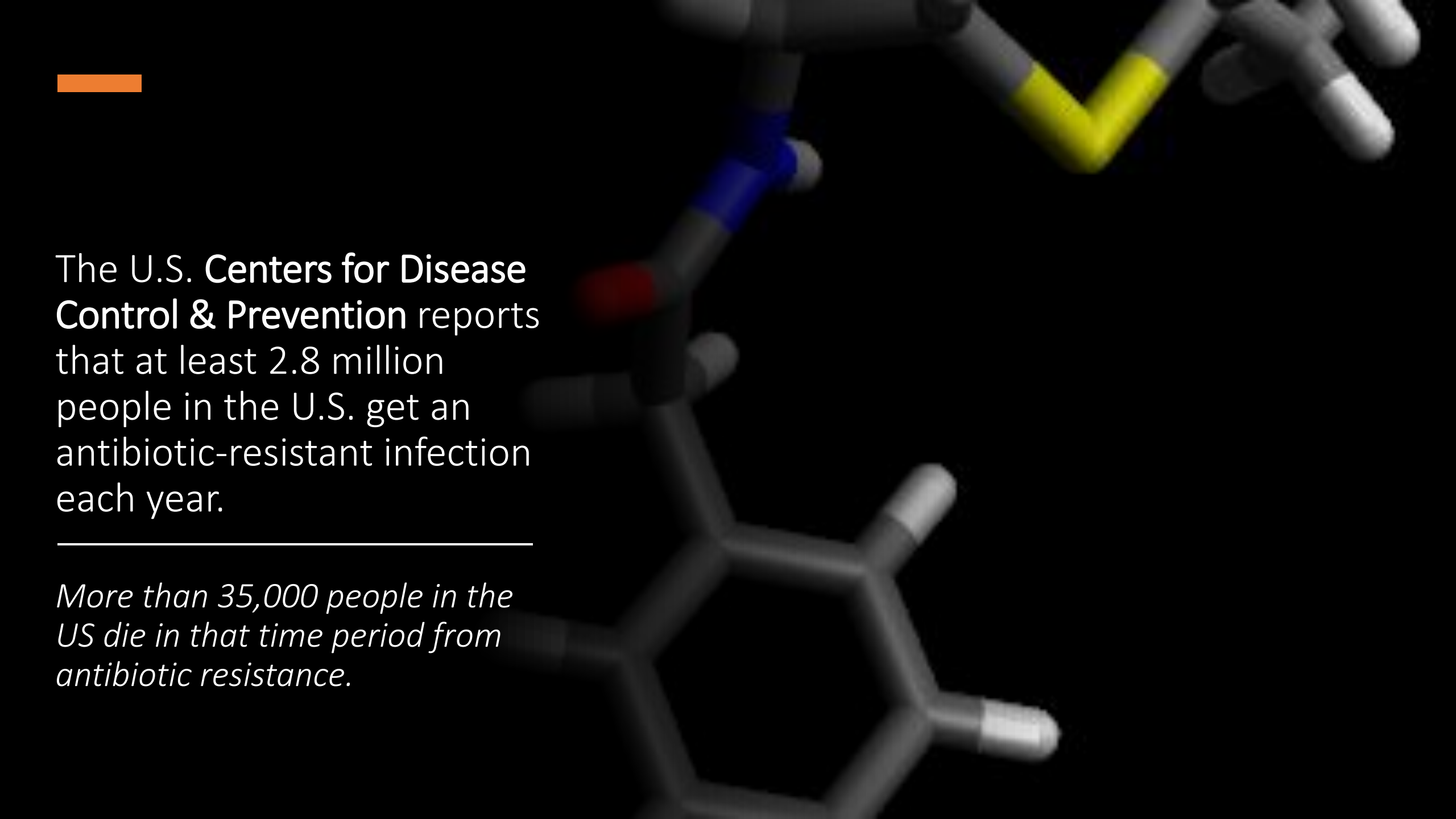
Source: *The Lancet*, January 2022





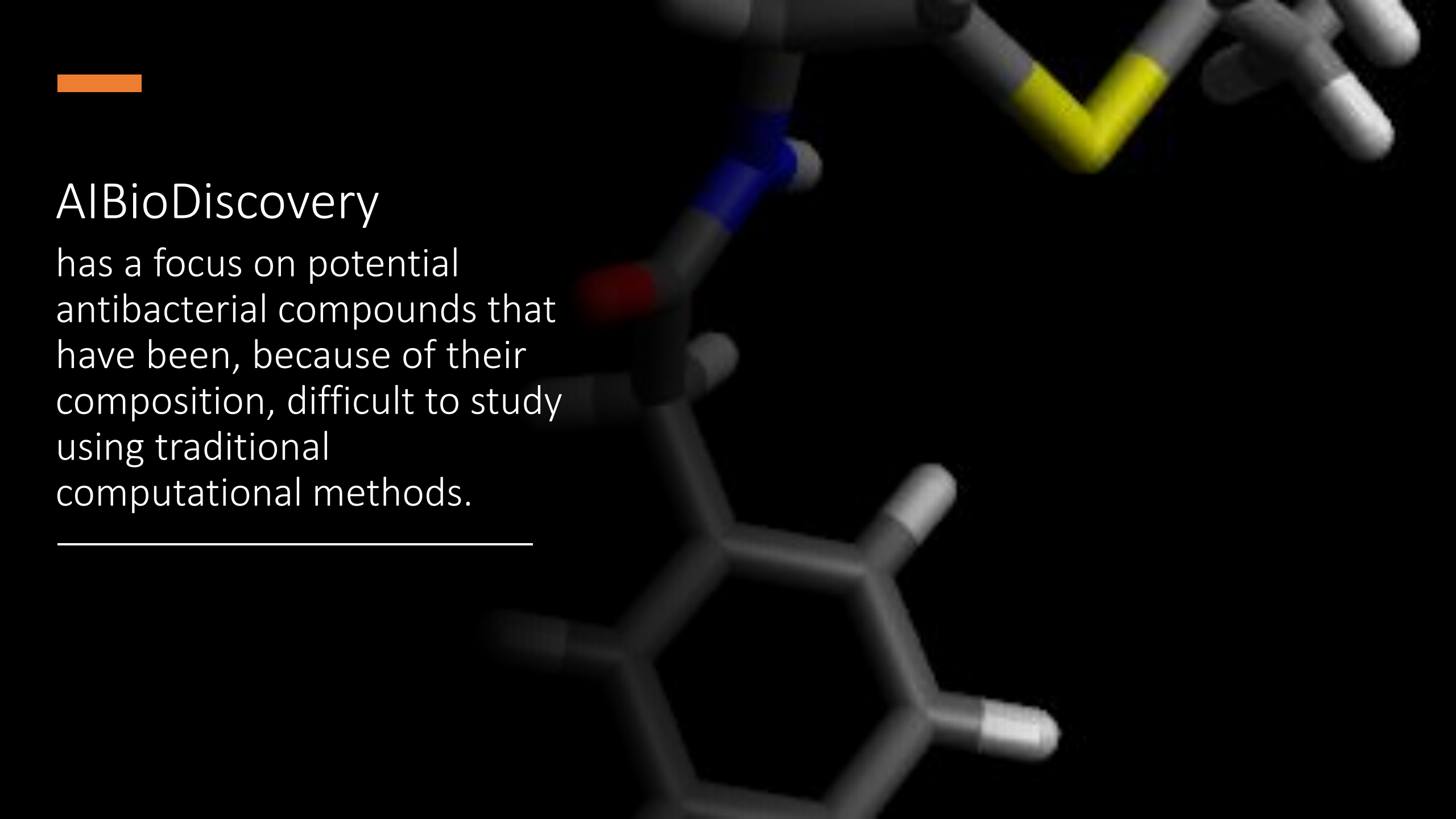
AIBioDiscovery

has a focus on antibiotic resistance. The **World Health Organization** describes antibiotic resistance as *“one of the biggest threats to global health, food security, and development today*. “



The U.S. **Centers for Disease Control & Prevention** reports that at least 2.8 million people in the U.S. get an antibiotic-resistant infection each year.

More than 35,000 people in the US die in that time period from antibiotic resistance.

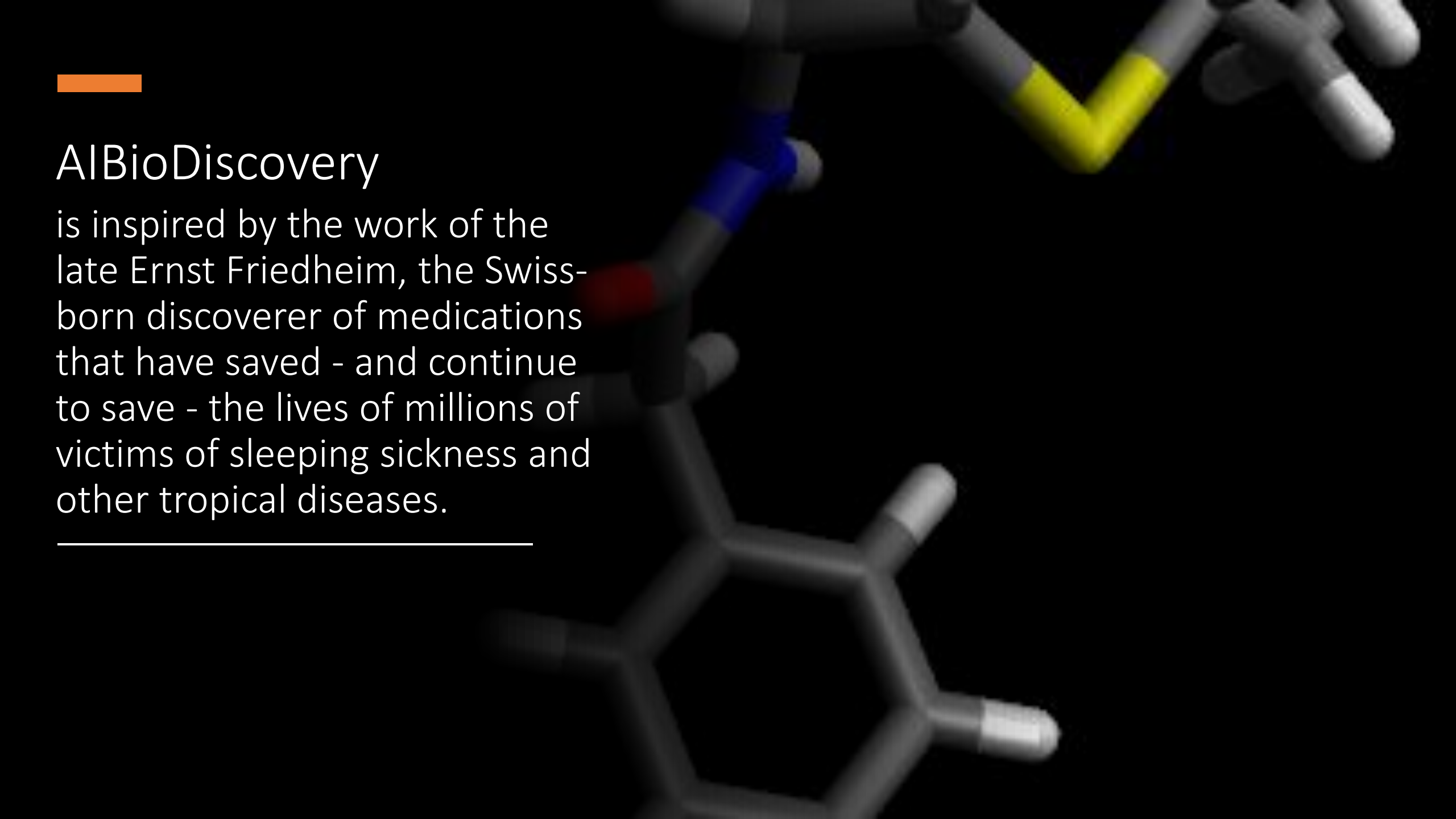


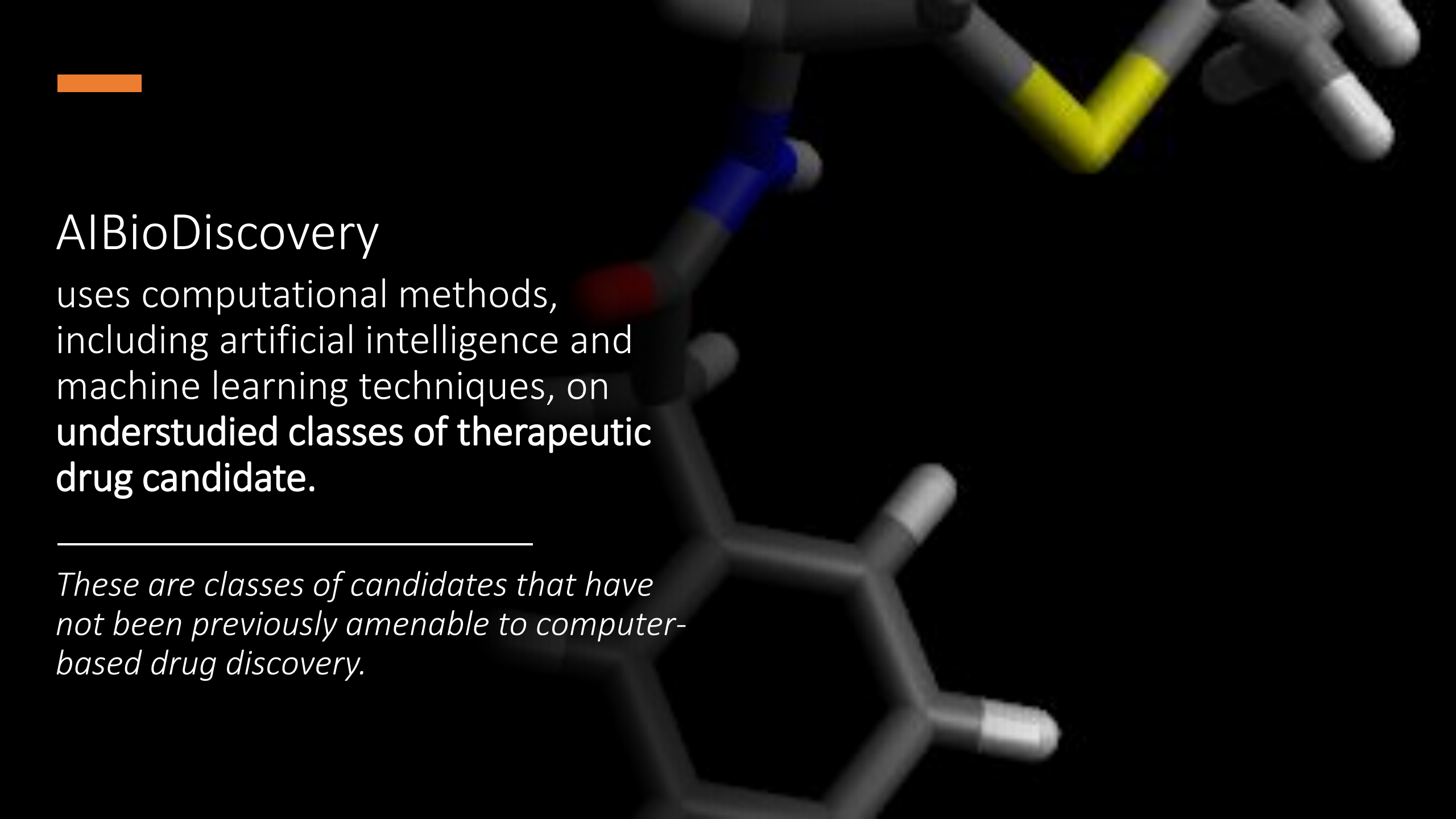
AIBioDiscovery

has a focus on potential antibacterial compounds that have been, because of their composition, difficult to study using traditional computational methods.

AIBioDiscovery

is inspired by the work of the late Ernst Friedheim, the Swiss-born discoverer of medications that have saved - and continue to save - the lives of millions of victims of sleeping sickness and other tropical diseases.





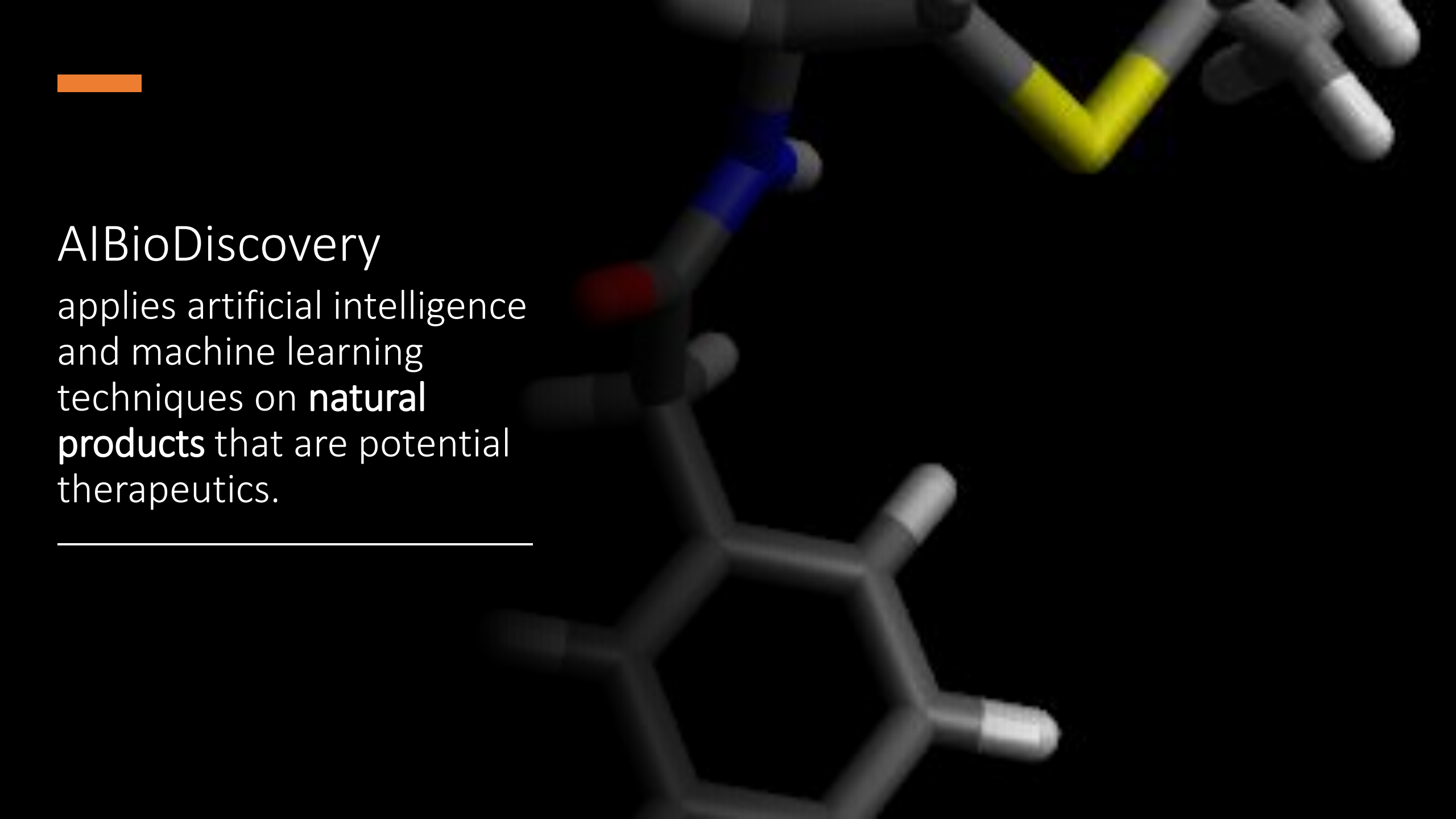
AIBioDiscovery

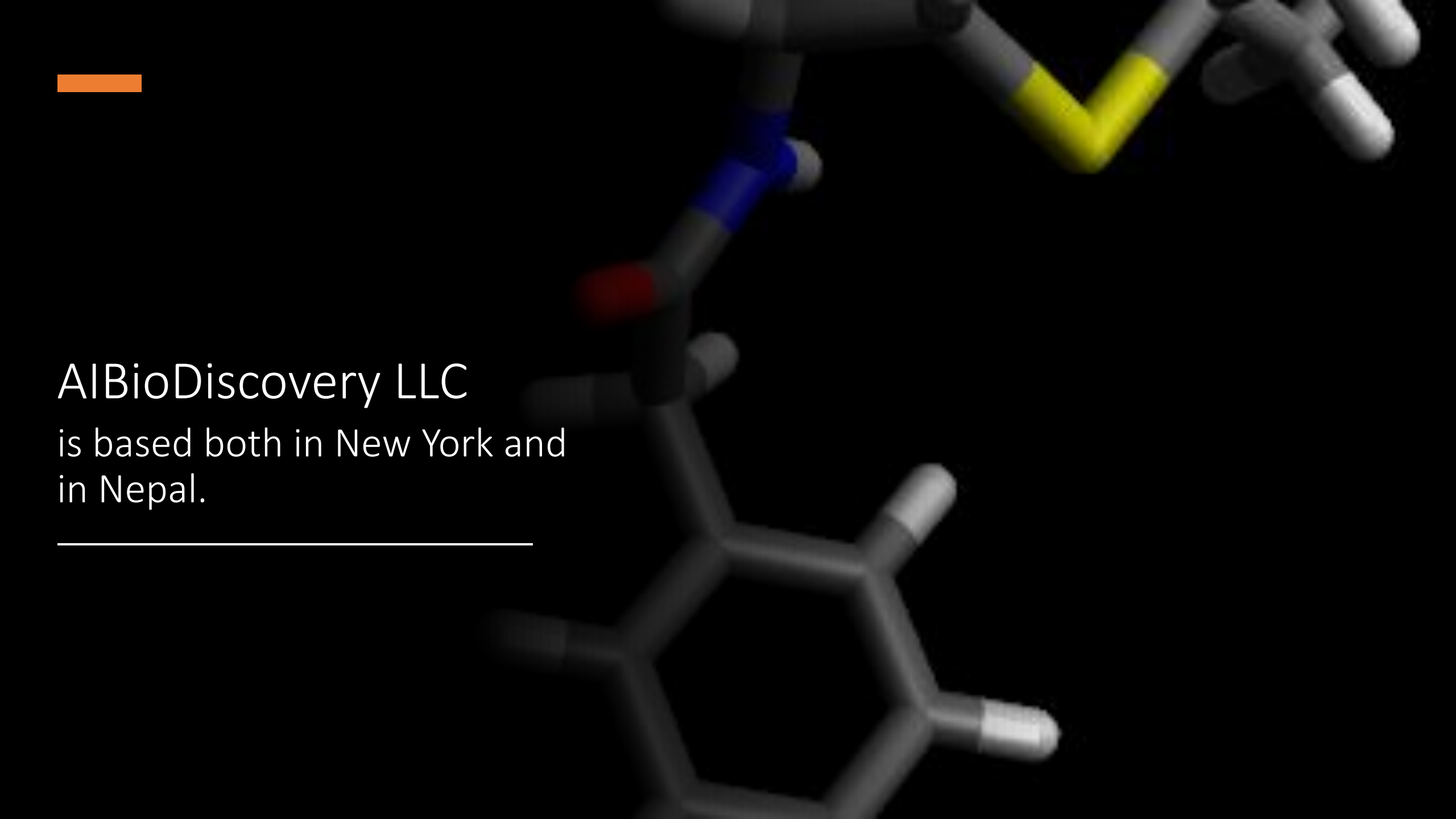
uses computational methods, including artificial intelligence and machine learning techniques, on **understudied classes of therapeutic drug candidate.**

These are classes of candidates that have not been previously amenable to computer-based drug discovery.

AIBioDiscovery

applies artificial intelligence and machine learning techniques on **natural products** that are potential therapeutics.





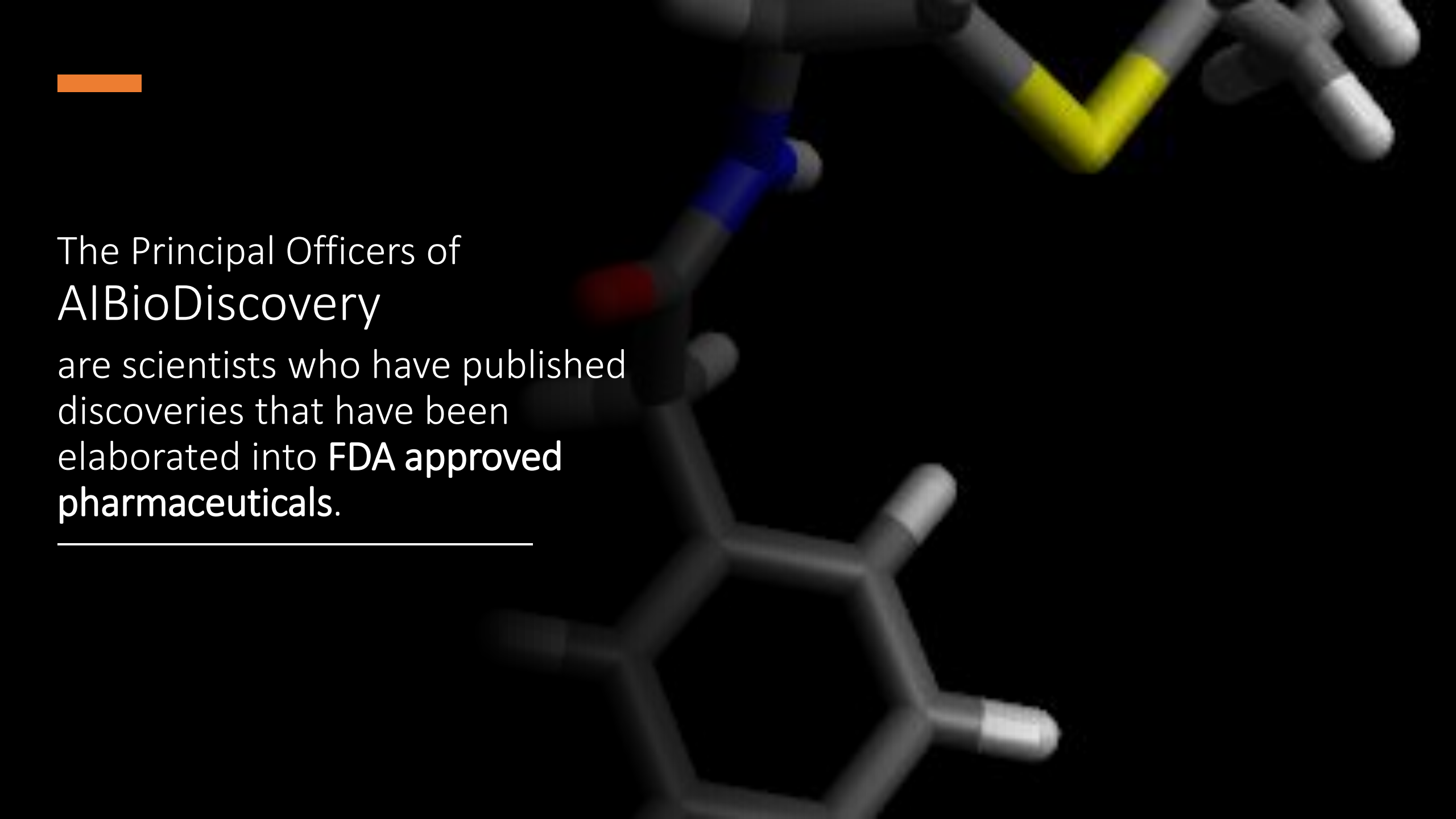
AIBioDiscovery LLC

is based both in New York and in Nepal.

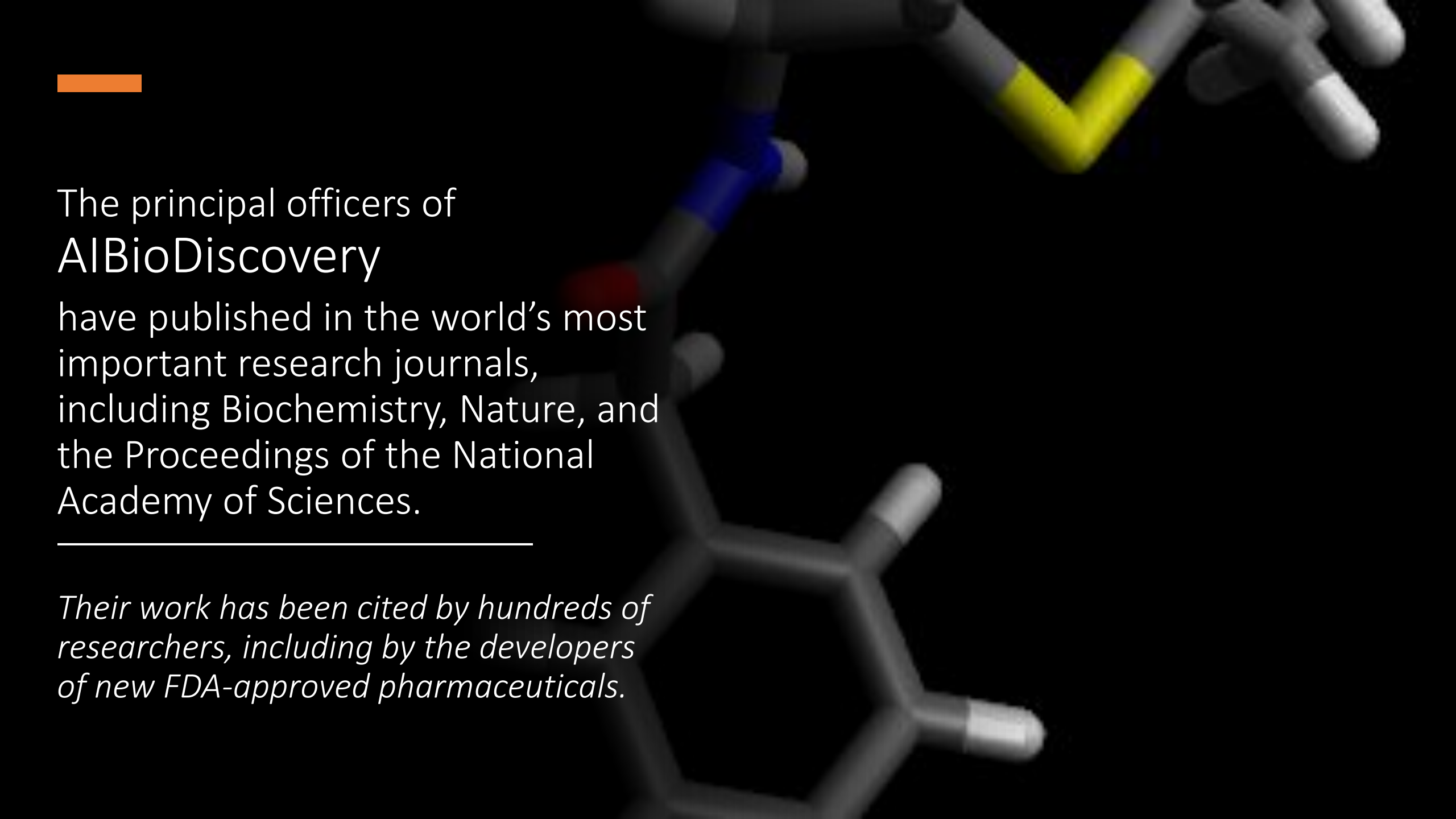
AIBioDiscovery

has identified hundreds of candidate antibacterials, including one of the most promising candidates for reversing antibiotic resistance.

We experimentally confirm our best computational results with laboratory-based tests.



The Principal Officers of
AIBioDiscovery
are scientists who have published discoveries that have been elaborated into **FDA approved pharmaceuticals**.



The principal officers of

AIBioDiscovery

have published in the world's most important research journals, including Biochemistry, Nature, and the Proceedings of the National Academy of Sciences.

Their work has been cited by hundreds of researchers, including by the developers of new FDA-approved pharmaceuticals.

Past work on organoboron compounds done by principals of

AIBioDiscovery

Synthetic aromatic organoboron compounds were first published as enzyme inhibitors in America's most important research journal, the *Proceedings of the National Academy of Sciences,* in 1971. Their use in purifying enzymes was patented in 1975. Their elaboration into peptide analogs and their use as enzyme inhibitors and antithrombic agents was published first in 1991 and again in 1993. These compounds were the subject of four patents beginning in 1999.

These compounds were first published as inhibitors of bacterial resistance factors to penicillin antibiotics in 1983, again in 1986.

These compounds were created using classical scientific methods, without the aid of computers or AI.

Relevant Work Done by Others

Peptide organoboronic acid inhibitors of proteasomes, based on the original work mentioned on the left, were approved for the treatment of multiple myeloma by the FDA in 2003. A currently used compound is Velcade.

The use of peptide and cyclic boronic acids as inhibitors of bacterial resistance factors to penicillin antibiotics began to be studied by others in 1998 and has resulted in a large number of papers and patents. A currently used FDA approved compound is Vaborbactam.

Past work on natural products done by principals of AIBioDiscovery uses the world's most comprehensive library of natural products in order to discover those compounds that bind to proteins of interest, including the bacterial resistance factors to penicillin antibiotics. AIBioDiscoveries has found natural products that are predicted to bind to various classes of bacterial resistance factors to penicillin antibiotics.

These compounds were studied using classical computational methods, without the aid of AI.

Relevant Work Done by Others

Natural products as potential medications have been studied since antiquity. Plants and plant extracts were among the only sources of medications in that period.

The current era of antibiotic use also relies heavily on natural products. The first penicillins, the antibiotic streptomycin, and others were extracted from living cultures. That work continues and cannot realistically be summarized here.

Phase I – Isolation and testing of natural product compounds using computational methods

Underway ←→ *Further funding required*

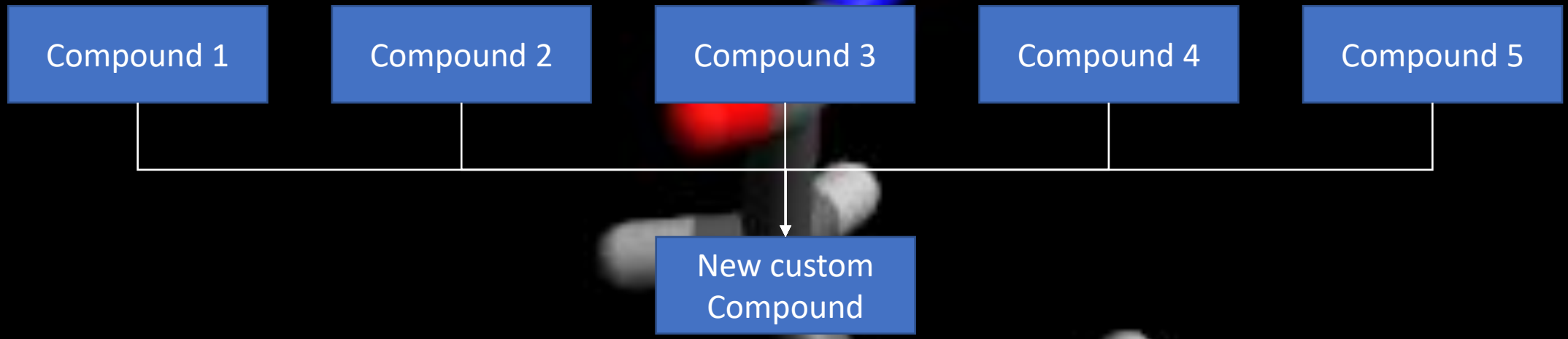
Phase	In Silico Evaluation	Initial Evaluation	Live Bactria Evaluation	Compound Optimization
Description	Used computational models to isolate which compounds are best at stopping resistance factors from working	Tested compounds to determine if it inhibits certain bacterial factors	Test if compounds can inhibit growth in live bacteria	Test which set of natural and synthetic compounds work best to inhibit bacterial growth
Result	Tested 229357 compounds, 110 compounds are successful in *silico*	Have acquired additional data on 16 compounds	Two compounds overcome bacterial resistance to antibiotics. This work continues	This work is underway.

Test which set of natural and synthetic compounds work best to inhibit bacterial growth → Animal & Clinical Trials

As successful compounds are isolated, AI will be taught what to look for to increase speed of evaluation

Phase II – Development of Synthetic compounds

As multiple compounds are isolated, computational techniques can be used to determine why each is successful - creasing a custom compound with unique properties that is more effective than its precursors



Millions of compounds will be tested *in silico*, with thousands having some success. This propriety knowledge will allow for continues custom development of new compounds that are designed to target specific properties – allowing for fast development of therapeutics targeted to specific antibiotic resistant bacteria

AIBioDiscovery has filed a preliminary patent application for two compounds that restore the action of certain penicillin and cephalosporin antibiotics that are no longer active due to bacterial resistance. These compounds reactivate antibiotics that no longer are active. This has been demonstrated on both gram-positive and gram-negative bacterial pathogens.

These compounds, by themselves, show no antibacterial activity, which makes it possible that bacteria will not develop resistance to them.

Learn more about

AIBioDiscovery

and its plans for future work by contacting one our principal officers at AIBioDiscovery@gmail.com

Citations:

The U.S. Centers for Disease Control and Prevention (CDC) reports that at least 2.8 million people in the U.S. get an antibiotic-resistant infection every year. More than 35,000 people die in that time period from antibiotic resistance. https://www.foxnews.com/health/trump-surgeon-general-us-fight-antimicrobial-resistance-prevent-next-pandemic

https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)02724-0/fulltext

https://www.npr.org/sections/goatsandsoda/2022/01/20/1074373834/why-humans-are-losing-the-race-against-superbugs

https://www.kplctv.com/2022/01/20/study-drug-resistant-bacteria-kill-12-million-globally/

https://www.cnbc.com/2021/11/17/antibiotic-resistance-could-be-the-next-hidden-pandemic-uk-experts.html