ACCESS BTO

DARPA's Biological Technologies Office

BTO Spotlight

Meet the Researchers
Helping DARPA Prevent Future Pandemics

DARPA's revolutionary nucleic-acid-based technologies help the body rapidly create protective antibodies against disease. Three organizations are helping us transform these tools into a platform that can be applied to any pandemic threat.

DARPA's 60th Anniversary Symposium

DARPA turned 60 on February 7, 2018. The capstone event of this anniversary year will take place in early September in Washington, DC. **"D60: Breakthrough Technology | Past, Present, Future"** will be a multifaceted symposium aimed at strengthening DARPA's innovation ecosystem (which includes academia, industry and government partners), informing stakeholders about DARPA's current vision and priorities, and learning from the Agency's record of achievements. Registration opens April 16, 2018.

Hear about BTO on the "Voices from DARPA" Podcast

Episode 6 – The Insectophile
Dr. Blake Bextine

Episode 12 – The Neobiologist
Dr. Justin Gallivan

Episode 18 – The Disease Slayer
COL Matthew Hepburn

So how can you help?

DARPA BTO makes significant investments in emerging biological technologies to de-risk them, but we depend on others to move our work from proofs of concept into fully realized capabilities.

Letter from the BTO Director

Friends of BTO,

In our inaugural issue of Access BTO, we call upon you to join in our all-hands-on-deck approach to developing and fielding breakthrough biological technologies and capabilities for the Department of Defense. Why now? We are currently at an inflection point where the fusion of biology with engineering is yielding powerful, and sometimes surprising, results. Every day, our news feeds contain stories about new biological technologies that promise to deliver seemingly magical solutions to previously intractable problems. Recently we have seen breakthroughs in therapeutics to protect the body against infectious diseases, as well as neural interfaces to open new communication channels with the brain. As our already deep knowledge base rapidly expands, even more powerful technologies for interfacing with biology are just over the horizon.

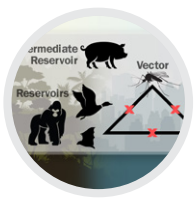
The mission of DARPA BTO is to be the first to identify, understand, and harness these advanced biological technologies so that they can be responsibly applied to bolster U.S. national security. DARPA remains a leader in that regard, but the democratization of biotech is introducing new risks, competition, and pressures. Consider, for instance, the dramatic decrease in the cost of sequencing a genome, paired with widely available tools for editing genes. Now, virtually any person anywhere might experiment with genetic modifications! Powerful new biotechnologies are beginning to open up a staggering array of applications but that will certainly yield new surprises that could impact security. DARPA's focused investments and drive to develop the most promising biological technologies are designed to keep the United States operating at a strategic advantage.

So how can you help? DARPA BTO makes significant investments in emerging biological technologies to de-risk them, but we depend on others to move our work from proofs of concept into fully realized capabilities. We need the help of government partners, venture capitalists, entrepreneurs, and advanced developers to speed innovations from the lab to service members, patients, and consumers. Our breakthroughs will not become real-world applications available for purchase and broad use unless we create new avenues for technology transition. We aim to engage with you at the earliest possible opportunities in the technology development cycle so that you can inform those pathways to commercialization. That is what this newsletter is all about.

We ask you to join us in this mission. The partnerships we forge and actions we take together will be key to creating opportunities in this exciting and transformative space!

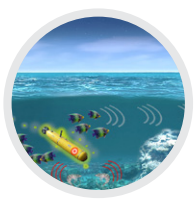
Thanks,
Justin C. Sanchez, Ph.D.
Director
Biological Technologies Office (BTO)
DARPA

New BTO Programs

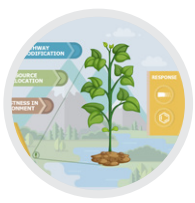


The **Preventing Emerging Pathogenic Threats (PREEMPT)** program, led by **Jim Gimlett**, seeks to support military readiness by going after new viral infectious diseases at their source—the animal reservoirs in which a pathogen lives, multiplies, and potentially evolves into a strain that can threaten humans.

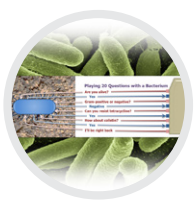
The **Epigenetic CHaracterization and Observation (ECHO) program**, led by **Eric Van Gieson**, aims to build a field-deployable platform technology that quickly reads someone's epigenome and identifies signatures that indicate whether that person has ever—in his or her lifetime—been exposed to materials that could be associated with weapons of mass destruction.



The **Persistent Aquatic Living Sensors (PALS)** program, led by **Lori Adornato**, will study natural and modified marine organisms to identify species that could contribute to discreet sensor systems that detect the movement of underwater vehicles. PALS will investigate these organisms' responses to the presence of such vehicles and characterize the resulting signals or behaviors so that they can be captured, interpreted, and relayed to end users by a network of hardware devices.



The **Advanced Plant Technologies** program, led by **Blake Bextine**, seeks to develop plants that can function as persistent, self-sustaining, ground-based sensors that protect troops and facilities by detecting and discreetly reporting on chemical, biological, radiological, nuclear, and explosive threats.



The **Friend or Foe program**, led by **Paul Sheehan**, proposes to develop a platform technology that rapidly screens unfamiliar bacteria to establish their pathogenicity and even discover unknown pathogenic traits, necessary first steps for designing effective biosurveillance and countermeasures.

The **Biostasis** program, led by **Tristan McClure-Begley**, aims to prevent death following traumatic injury by safely and reversibly slowing biochemical reactions inside cells. The program will leverage molecular biology—not temperature—to extend the window of time following a damaging event before a system collapses. Successful Biostasis technologies could also be applied to blood products and other biologics, reducing the complex logistical burden of standard cold-chain preservation.

The **Next-Generation Nonsurgical Neurotechnology (N3)** program, led by **Al Emondi**, seeks to achieve high levels of brain-system communications without surgery. The state of the art in brain-system communications has employed invasive techniques that allow precise, high-quality connections to specific neurons or groups of neurons. These techniques have helped patients with brain injury and other illnesses. However, these techniques are not appropriate for able-bodied people.