KEPLEY BIOSYSTEMS, INC

Kepley Biosystems Inc. (KBI), with the support of the National Science Foundation (NSF) and the state of North Carolina, has invented synthetic bait with the potential to redefine crab and lobster baiting methodologies. Crustacean traps are typically baited using a vital link in the food chain; these fish are also called *forage fish*, small schooling fish routinely caught using gill nets. The global supply of forage fish is rapidly decreasing due to competition from several industries, including aquaculture, barnyard and domestic animal food, omega 3 supplements, and crustacean fishers; the latter of which are estimated to account for at least a third of commercial consumption. The declining supply and increased demand have driven up costs, affecting both commercial and recreational fishing viability. Beyond the impact on our prospective customers, pressures on the global forage fish supply are intensifying derivative risks for sea bird, pelagic fish and mammal populations, from whales to polar bears, to seals and walruses, all of which currently require at least half the supply to maintain sustainability. This has led to a crisis for our target customers now facing rising bait prices, erratic availability, new governmental regulations, and destruction to the ocean ecosystems on which their livelihoods depend.

In the crustacean fishing segment, alone, some $20 billion dollars are invested annually in the capture and utilization of forage fish for lobster and crab traps. This augurs a colossal market opportunity for KBI's bait fish alternative. Branded Organobait™, it is an entirely synthetic material that can effectively mimic the attractant properties of bait fish, yet has been developed using no fish or other animal by-products. KBI synthetic bait not only replicates bait fish chemistries (Figure 1, Left), but it also offers a controllable, sustainable, and ultra-concentrated formulation (Figure 1, Right).

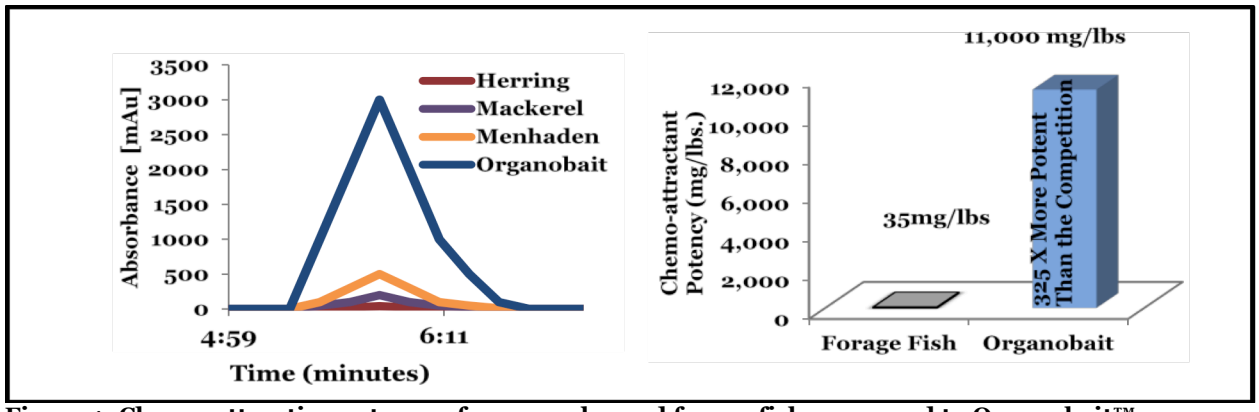

Figure 1: Chemo-attractive potency of commonly used forage fish compared to Organobait™
High Performance Liquid Chromatography (HPLC) evaluation of 3 commonly used baitfish species compared to Organobait. Organobait out performs forage fish (325X) as quick as 2 hours into fishing.

Organobait can also be profitably manufactured and sold at a lower end-user cost than with established forage fish baiting techniques. This technology therefore addresses customers' and environmental considerations, because it is sustainable, innocuous, cost-effective, and can be consistently available. Regulators and environmentalists will also have compelling reasons to support this product for its potential to help avert ocean ecosystem collapse from overfishing, especially using drift-net practices. In fact, KBI should achieve broad acceptance of this product once the most potent chemo-attractants are confirmed and delivery matrix solubility chemistries are finalized for use in widely different global crustacean ecosystems.

FOR IMMEDIATE RELEASE

NC Life Sciences Start-Up Awarded NSF Phase II Grant

Synthetic Alternative to Use of Wild Fish as Bait in a Multi-Billion Dollar Market

Greensboro, NC: Thursday, March 3, 2016

Kepley BioSystems, a North Carolina start-up, has been awarded a coveted National Science Foundation (NSF) Phase II SBIR grant for developing a synthetic, environmentally neutral alternative to help stem the continued depletion of wild fish; while at the same time, addressing a multi-billion dollar market. The grant has been awarded to the company after successfully competing for Phase I and IB NSF funding for research on a patent-pending, synthetic crustacean bait (#14/659,710 and #PCT/US2015/2086). This grant will enable optimization of this technology to replace the use of wild fish stocks as the primary bait in commercial lobster and crab traps. Crustacean fishing is a $66 billion global market that consumes over 18 million metric tons of bait fish for these traps at a cost of an estimated $20 billion per year.

This new product epitomizes the emerging trend of "Blue Ocean" innovations by merging ecology and enterprise within the currently $500 billion fishing industry. Companies like Kepley BioSystems are working toward significant, sustainable contributions to oceanic species conservation; in addition, these environmentally friendly enterprises are meeting the nutritional and food safety needs of the global seafood market while helping ensure political stability, worldwide.

Bait fish, also known as *forage fish*, typically include small species, such as menhaden, anchovies, and sardines. The industrial net-fishing industry catches and sells up to one-third of these wild forage fish for the sole purpose of catching *other* fish, crabs, and lobsters every year. In fact, mounting industrial demand, accelerated by a growing body of research extolling the virtues of these tiny nutritional dynamos, appears to be entirely unsustainable. The Kepley product promises to completely replace the use of fish to catch fish in this segment with a synthetic and environmentally neutral alternative.

In addition to lobster and crab fishing, industrial net fishing for 35 million metric tons of forage fish per annum supplies commercial production in numerous sectors, including: agricultural additives; pig and chicken feed; pet food; fish farming (aquaculture); and Omega 3 supplement oil (with well-documented, collateral loss of dolphin and other unintended by-catch). Second only to the importance and biomass of plankton, forage fish also provide the sole food source for many other fish, mammals, and birds in every region of the world.

"This innovation will help make a difference at the heart of the food chain," explained Professor Kepley. "What is crucial is that these dependent species require approximately half of the world's annual consumption of forage fish for survival."

"It's hardly a mystery to hear of depleted forage fish populations, with emaciated birds, seals, and whales featured in the news," said Dr. Dellinger, president of Kepley BioSystems. "This NSF Phase II grant will support continued laboratory activities. In addition, we are planning extensive field testing to ensure the success of this ecologically urgent innovation." The company is in an advanced stage of product development, and they will seek to further leverage this grant throughout scale up and commercialization by welcoming early investors in the coming months.

About Kepley BioSystems

Kepley BioSystems originated at the Joint School of Nanoscience and Nanoengineering (JSNN), North Carolina A&T State University and The University of North Carolina at Greensboro; the company is now located at the Gateway University Research Park proximal to JSNN. Kepley BioSystems is an academically-driven company led by Professor Christopher Kepley and Dr. Anthony Dellinger, a recent graduate, working in collaboration with lead inventor Terry E. Brady, located on the Caribbean island of Anguilla, British West Indies. For more information, visit: http://www.kepleybiosystems.com/

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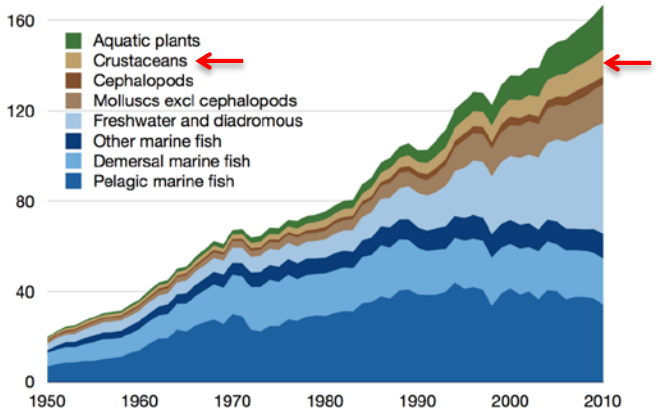
Attachments

Picture

Photo courtesy of Martin W. Kane, University of North Carolina at Greensboro

Anthony Dellinger, president of Kepley BioSystems, holding Maine lobster and synthetic crustacean bait



FAOSTAT group production in million tonnes for global fisheries, 1950–2010. (Source: FAO FishStat database.)

Kepley BioSystems Related FAQ

Why is an alternative crustacean bait important?
The global supply of forage fish is rapidly decreasing due to competition from several industries, including aquaculture, barnyard and domestic animal food, Omega 3 supplements, and crustacean fishers; the latter of which are estimated to account for at least a third of commercial consumption. The declining supply and increased demand have driven up costs, affecting both commercial and recreational fishing viability. Beyond the impact on prospective customers, pressures on the global forage fish supply are intensifying derivative risks for sea bird, pelagic fish, and mammal populations, from whales to polar bears, to seals and walruses, all of which currently require at least half the annual global supply for survival.

What is the synthetic bait product called?
Organobait™ is the name of the Kepley BioSystems bait, which is an entirely synthetic material that can effectively mimic the attractant properties of "forage" fish for use as an environmentally neutral crustacean fishing bait.

How does Organobait™ work?
Organobait replicates the biochemistry of decaying fish that characterizes odorant-based attractant mechanism for crustaceans; this enables the product to attract lobsters and crabs as an alternative bait. Crustacean olfaction relies on groups of olfactory receptor neurons (ORN) arranged in clusters and housed in cuticular extensions called aesthetascs found on two, paired antennae. It has been previously shown that the magnitude of stimulation of these neurons in response to stimuli is indicative of the attractive or repulsive nature of the stimulus.

How is the synthetic bait used?
The product is being designed for compatibility with established fishing practices, with early test results promising success as a "drop-in" product. The final product will resemble and function much as current forage fish baiting while offering many advantages.

What is the source and supply chain of the materials used to manufacture this product?
All of the components used to manufacture Organobait are distinct inorganic chemistry materials available through well-defined supply chains worldwide. The global supply chains were a critical driver in the attractant selection process and the projected business case for Kepley BioSystems to develop this product.

If not forage fish, does the product contain any animal by-products?
Despite its development name, the Organobait dissolvable matrix or chemotactic molecules does not use any piscine, mammal, avian or other animal or plant by-products (e.g., decaying fish, land animals, or other organic protein sources).

Kepley BioSystems Overview

Professor Chris Kepley and Terry Brady met while working for a technology company that had been struggling to translate science and innovations into competitive commercial applications for many years. Mr. Brady served as an external strategic consultant for fifteen years acting mostly as an executive coach and as an early board member during the transition to becoming a publicly traded company. Dr. Kepley headed up a nano-biochemistry group focused on fullerenes, or Buckyballs. They both came away from that experience with new insights into the nexus of invention and business practicalities.

Professor Kepley was recruited and welcomed back into academia with the understanding that he had enterprise ambitions and became a tenured professor at the Joint School of Nanoscience and Nanoengineering (JSNN). Dr. Kepley, who earned both his PhD and MBA, was concerned about both business and academia as having structural and philosophical shortcomings.

Mr. Brady's early background was on the commercial side of science, which served as the foundation for his subsequent, patented inventions driven by unmet customer needs. Often frustrated by the shortcomings of business processes, he gravitated further into the discipline and scholarship of academia. With skills honed in his patent research, Mr. Brady ultimately concluded that enterprise requires dynamic business scholarship and falls short, or fails, without it.

This friendship evolved during a dinner in which the two shared a vision for an alternative approach to the *business of science*. The two postulated that graduate science programs needed to do more to orient and ground PhD candidates towards entrepreneurship, especially for those students so inclined. They believed that with the right ideas it would be easier to teach business skills than to teach scholarship, and they recognized the importance of the university's institutional framework for seeking grants to fund such endeavors.

In short, they envisioned having PhD candidates simultaneously matriculate toward earning their doctorate degrees, while developing world-class grant writing skills for preliminary funding and assuming leadership roles in startup companies with significant equity shares. At first, this particular aspect may not sound like a significant breakthrough, but it is. Young scientists are disillusioned far too often by the specter of operating within a corporate environment with limited, vague pathways for ideas to become products – compounded by the customary practice of signing away any rights (and prospective rewards) related to their creativity and scientific potential the day they are hired.

Thus, Kepley BioSystems was established, PhD candidates were identified, and invention and grant writing ensued. The business model encompassed Kepley acting first as the innovation incubator, followed by an independent product company poised for organic growth, and led by the first doctoral graduate. The initial grant submitted to the NIH was not awarded funding. However, the second invention yielded early state funding and went on to be awarded an SBIR

(Small Business Innovation Research) Phase I grant from the National Science Foundation (NSF) early in 2015.

NSF SBIR grants require participation in a highly competitive program that encourages small US businesses to engage in Federal Research/Research and Development with significant potential for commercial success. In keeping with the NSF milestones, Phase I and IB funding coincide with the first two milestones intended to help recipients achieve proof-of-principle as a precursor to the more robust product development and business planning required to qualify for Phase II federal grant submission and consideration. Moving from the first to the second milestone in this process also affords an unparalleled synergy for the PhD candidates to apply and prove their research in defense of their theses and then graduating as company Presidents. The first test of the Kepley model is already accelerating toward market entry of the synthetic crustacean bait, leveraged by the US Government through the NSF program.

In fact, a small backlog of inventions has already been building for subsequent start-ups based on this model, while additional ambitious, promising graduate students willing to embark on new endeavors are identified and recruited. However, *this* NSF Phase II grant will be invested by one such capable, committed new doctoral graduate leading the effort, Anthony Dellinger. Dr Dellinger will be maintaining an adjunct relationship with JSNN and otherwise dedicated to full development of the first Kepley innovation. Additional grant efforts have been pursued for this technology to help secure any additional resources needed to achieve successful commercialization and provide a foundation for future organic growth.

Another significant benefit of this "science to business" model is in the development of grant writing skills that can be employed to obtain start-up and expansion capital. Grant funding provides non-dilutive resources in sharp contrast to the funding options typically available to start-ups; whereby, venture and even "angel" investors usually demand large equity transfers while pressuring the founders to discount the value of the enterprise in order to further leverage their shares.

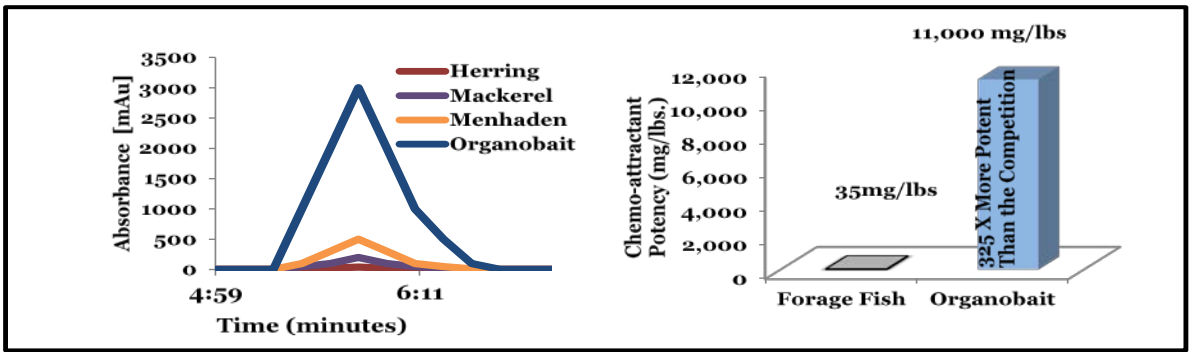
Before seeking external and secondary funding, this Kepley BioSystems business unit will also undergo the development of a new identity as a new corporation. In that case, early outside investors could become (new) company founders at a later stage, when the ultimate market potential and company value have been further established.

Ultimately, the synthetic crustacean bait product, initially positioned as "Organobait™" will address a $20 billion market – while building on a key component of the research and development phase. That is, the field work to validate the product is based largely on the pharmaceutical industry model for clinical trials. Specifically, the NSF Phase II development plan calls for hiring field trial monitors to oversee "in-the-water" testing of the bait. This will help to ensure the quality of the data necessary to optimize product formulation for an array of settings that characterize regional, environmental and species-specific customer needs. Upon product finalization, these "monitors"

would be uniquely qualified to become field representatives responsible for marketing and sales support.

Also in keeping with the pharmaceutical industry framework, highly influential distributors and globally respected members of the culinary sector (whose businesses depend on reliable crustacean supplies) could be more readily identified and engaged in the refinement of the final product design. Indeed, there is a body of "crustacean thought-leaders" from fishermen to regulators shaping the practices and standards with regard to the industry and the environment, many of whom have already been consulted – and all of whom have been readily disposed toward the Kepley BioSystems product and keen to assist in its progress.

Organobait™ is a product that replicates the biochemistry of decaying fish that mimics odorant-based attractants for crustaceans. Crustacean olfaction relies on groups of olfactory receptor neurons (ORN) arranged in clusters and housed in cuticular extensions called aesthetascs found on two, paired antennae. It has been previously shown that the magnitude of stimulation of these neurons in response to stimuli is indicative of the attractive or repulsive nature of the stimulus. The Kepley BioSystems product is an entirely synthetic material that can effectively mimic the attractant properties of bait fish, yet has been developed using no fish or other animal by-products. This synthetic bait not only replicates bait fish chemistries (Figure 1, Left), but it also offers a controllable, sustainable, and ultra-concentrated formulation (Figure 1, Right).



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Kepley BioSystems Leadership

The Kepley BioSystems founders possess experience as inventors, scientists and entrepreneurs/business professionals. The leadership includes Drs. Christopher Kepley and Anthony Dellinger, and Mr. Terry Brady.

Professor Kepley has a comprehensive biology research background and is recognized internationally for his work, much of which he has shared in 80 peer-reviewed publications. In business, Dr. Kepley was the Group Leader of NanoBiology at Luna Innovations, where he increased revenue by $2 million during his three years as a full-time executive. His inventions have resulted in 11 issued patents for products in active commerce, notably, the first basophil-specific antibody (2D7) currently sold through several biotech companies. Dr. Kepley holds a tenured professorship at JSNN. He has a BS in Biology, a PhD from Medical College of Virginia, and an MBA from the College of William and Mary.

Terry Brady's 35 years of leadership experience includes global sales, marketing, invention/entrepreneurship, and executive management. Seasoned by early positions in multi-nationals, including Johnson & Johnson, Richardson Vicks (purchased by Proctor and Gamble) and Union Carbide, Mr. Brady ultimately served as president of International Technidyne Corporation (ITC), Edison, NJ (now Accriva Diagnostics, San Diego, CA) and as founder, president and CEO of Array Medical, Inc., Somerville, NJ. In both roles, he led the growth and ultimate divestiture of the two companies: ITC to a Fortune 500 leader, ThermoElectron (394 in 1999); and Array to Helena Laboratories. In addressing customer needs, Mr. Brady was the lead inventor of four US patented products and numerous others with FDA-approval that remain in active commerce – many of which still enjoy segment dominance. During the first year of Array Medical operation, he conceived, developed, and conducted clinical trials for FDA approval of a major cardiovascular product. Successfully manufacturing and marketing this product through 50 worldwide dealers epitomized Mr. Brady's mastery of traditional manufacturing operations, direction of an in-house marketing agency, and of establishing hundreds of relationships in a global dealership distribution business model. Most recently, he has qualified for a commercial fishing license in relation to this bait invention and hands-on validation of the technology with spiny lobster and stone crab.

Dr. Anthony Dellinger serves as President and Scientist. He has a biology background, including marine sciences. Dr. Dellinger's expertise includes attractant molecular matter and chemistry, facilitating the invention and engineering of synthetic agents. He holds a BS in Forensic Molecular Biology with a Minor in Chemistry and a PhD in Nanoscience. He has authored or co-authored numerous peer-reviewed publications and has collaborated with Dr. Kepley for a decade in academia and industry. Dr. Dellinger's PhD project was the stimulus for this technology, and he continues with these scientific refinements. He was recently named the inaugural Entrepreneur of the Year for 2015 at his alma mater, the University of North Carolina. He is one of three crustacean panelists selected for the 2015 International BioMarine© conference.