evolutionary genomics

NEWS RELEASE

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EVOLUTIONARY GENOMICS AWARDED AIDS GRANT

Aurora, Colo. (June 5, 2003) – The National Science Foundation (NSF) has awarded a Phase I Small Business Innovative Research (SBIR) grant to Evolutionary Genomics, a biotechnology company whose "Adapted Traits" method allows it to cost-effectively screen genomic data for rare genes responsible for commercially valuable adaptations. The SBIR grant will support a project whose goal is to enable AIDS drug development based on the genetic factors underlying the successful adaptations by our closest primate relatives to HIV-type viruses.

"Drugs do not cure AIDS and more effective therapies to treat and prevent this illness is one of the greatest needs, if not the greatest need, of this century," said Professor Frances Gotch, D.Phil. of the Department of Immunology, Imperial College London. "The strategies outlined by Evolutionary Genomics offer the greatest possibility of elucidating naturally protective factors that counteract the devastating effects of this virus." Her colleague, Justin Stebbing, MD, of the same department added, "Their proposal is well constructed, balanced, financially sound and will undoubtedly lead to significant results in this field. We support their work wholeheartedly and regard it as a privilege to have the opportunity in the future to collaborate with them from our institution in the UK and our sister institute in Entebbe, Uganda".

Genetically, chimpanzees are over 99% identical to humans and are generally susceptible to the same microbes that infect humans. Moreover, infections in humans and chimpanzees elicit a similar coordinated counterattack by a battery of specialized cells and proteins that attempt to contain the infection and eliminate the infectious agent. That said, chimpanzees do not share human susceptibility to the Human Immunodeficiency Virus (HIV). The NSF grant to Evolutionary Genomics will support research to find out what allows chimpanzees to escape the ravages of AIDS. Evolutionary Genomics will compare genes that respond to HIV infection in human and chimpanzee cells, and find the rare chimpanzee genes that show evidence of adaptation to thwart progression to AIDS. The changes encoded in such adapted genes will help jump-start the development of drugs that can exploit the same resistance mechanism.

Typically, drugs to treat infectious diseases target some component unique to the infectious agent. In the case of HIV, several drugs have been developed that inhibit critical viral proteins. However, as HIV replicates in the course of infection, it does such a sloppy job of copying its DNA that each new generation of virus incorporates numerous random mutations. Thus, each HIV-infected patient soon has a population of widely varying mutant HIV. When a patient is treated with one of the current drugs alone, most of the HIV is inhibited at first, but rare, mutant viruses are not affected by the drug. In the continued presence of the drug, resistant viruses thrive, and the drug loses efficacy for that patient. Because of this, current AIDS treatment involves multiple drug combinations (cocktails), which are expensive and require demanding treatment schedules. A critical barrier to the development of more effective and cheaper AIDS treatments is the extreme mutability of HIV.

"HIV's most potent weapon is essentially an evolutionary process in fast-forward, thus it makes sense to combat this weapon with the tools of evolutionary biology." said Walter Messier, Ph.D., the study's Principal Investigator and Chief Technology Officer of Evolutionary Genomics. In the wild, chimpanzees are found to carry HIV-type virus in their

bloodstream, yet they do not succumb to AIDS. Moreover, laboratory chimpanzees injected with HIV become infected, but resist developing AIDS. This resistance stems from the same process of natural selection responsible for the outgrowth of mutant HIV in a treated patient, only over a far longer time frame. Chimpanzees have harbored HIV-like viruses for as long as two million years. Over that time, random mutations have occurred in chimpanzees that provided protection against HIV. The continued exposure of chimpanzees in the wild to HIV-type viruses has selected for HIV resistance in today's chimpanzees.

Evolutionary Genomics is a small biotechnology company located in the premier U.S. bioscience "incubator", Fitzsimons Bioscience Park Center, in Aurora, outside of Denver, CO. The company's "Adapted Traits Platform" is a patented method of comparing genes of closely related species and identifying those responsible for adaptations based on rare evolutionary sequence patterns. Evolutionary Genomics applies the method in both human healthcare and agriculture. To tackle intractable human diseases for which there are clear-cut solutions in chimpanzees or other closely related non-human primates, such as AIDS, hepatitis C, hormone-sensitive cancers, and sepsis, we compare equivalent genes of humans and disease-resistant primates. To discover natural control points for yield in key agricultural crops we compare equivalent genes of domesticated crops and their wild ancestors.

The National Science Foundation Small Business Innovative Research program is a congressionally mandated grant program that selects proposals demonstrating "unique, ingenious" approaches to problems with important commercial applicability. Successful completion of Phase I grants (which provide up to $100,000) makes a small business eligible to apply for a Phase II grant of up to $500,000.