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BIOTEC is turning Thai biotech dreams into reality

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Thailand was until recently not know to have made significant contributions to the life sciences industry. However, the landscape is changing rapidly in the 'Land of Free'. Much of the credit for this development goes to the National Center for Genetic Engineering and Biotechnology also known as BIOTEC.

BIOTEC was first set up under the Ministry for Science, Technology and Energy on September 20, 1983. After the establishment of National Science and Technology Development Agency (NSTDA) on December 30, 1991, BIOTEC became one of the NSTDA centers, operating outside the normal framework of civil service and state enterprises. Basic funding for the organization comes from the NSTDA.

As a premier research institute in Thailand, BIOTEC operates research units at Thailand Science Park and specialized laboratories hosted by various universities, covering a wide spectrum of research topics from agricultural science to biomedical science and environmental science. BIOTEC spends 75 percent of the revenue allotted to it on R&D. For the fiscal year 2011, its budget was approximately $24.5 million (753 million Baht) and the total expenditure was approximately $21 million (643.73 million Baht). "We have roles similar to NSTDA, that is to promote biotech industry in Thailand, get involved in the technology transfer process, and provide infrastructure to companies willing to carry out research in Thailand," said Dr Kanyawim Kirtikara, executive director, BIOTEC.

Apart from research and commercialization, BIOTEC activities also include policy research, outreach programs, human resource development and international relations. The organization has been at the forefront in attracting talent from biotechnology. Out of the 570 staff employed at BIOTEC, there are 36 percent MSc, 30 percent B Sc and 29 percent PhD degree holders, and 83 percent of the staff at the institution is involved in R&D.

The organization also collaborates with various companies and industries from Thailand and abroad, and the year 2012 has been fruitful for the organization. For instance, BIOTEC and Novartis, a leading multinational, decided to extend their 2005 partnership for another three years in April 2012. In 2005, Novartis and BIOTEC collaborated to decipher the potential use of microorganisms and natural compounds as sources of new medicines to treat diseases such as cancer, diabetes, heart diseases and tropical diseases.

"The partnership benefits from the BIOTEC's expertise in the knowledge of microorganisms, ranging from collection, identification, preservation to culturing conditions, and in the isolation and elucidation of pure natural compounds from such microorganisms," explains Dr Kirtikara. Novartis provides its expertise in the discovery, characterization, development and worldwide commercialization of compounds from both synthetic and natural product sources. As a result of this six-year-old partnership, over 7,200 microbe isolates and 115 pre-compounds have been evaluated against a battery of drug targets.

BIOTEC has been the prime organization that has brought new technologies to the country. For example, Dr Kirtikara said, "We realized that genomics field was new and was very important from biotechnology perspective, hence we established the Genome Institute. Our aim is to support Thai biotechnology industry. Normally companies from abroad have their own R&D arms. However, in Thailand, biotech companies are small and might not have enough capabilities. If they want to be competitive, they come to us to explore partnerships and we help them in the best possible way we can."

One of the many success stories for BIOTEC has been the launch of KEEEN in 2010 by Hi-Grimm Environmental and Research, a Thai company that has been supported by NSTDA and BIOTEC. KEEEN is an environmental-friendly bioremediation agent that uses microorganisms to eliminate hydrocarbons, fat, oil, grease and organic substances from contaminated areas. The product is a result of two-year collaborative research project between BIOTEC and Hi-Grimm on selecting oil-degrading bacteria for the commercial bioremediation products. "They had a very innovative idea. They wanted to replace products from abroad by using microbes found in Thailand. We did research with them as a joint research project. The research gave fruitful results. The company now has a consortium of microbes and is now quite successful. They have been winning various awards both local and regional. They themselves will be producers of the product and are now commercializing it."

The country is also on its way to get the first indigenously developed drug. A team led by Professor Yongyuth Yuthavong, who used to be the former minister of science and technology, has come up with a drug for combating malaria. The drug is against the dihydrofolate reductase target in the Plasmodium. The team synthesized a number of compounds out of which the most promising one was P218. The drug has been picked up by Medicine for Malaria Venture (MMV), and is in the process of moving into pre-clinical and clinical trials. "We are quite excited about the malaria drug. The preliminary results from the trials look very good and effective and have shown no toxicity in animals. Professor Yuthavong is probably the first science minister who is actually an active scientist and his team has done really well," said Dr Kiritikara. The NSTDA is talking to MMV for co-investment opportunities for the drug.

BIOTEC also worked with King Mongkut's University of Technology to establish National Biopharmaceutical Facility (NBF), which is the first cGMP pilot plant in Thailand, for producing therapeutic proteins. "We are in the process of equipping the plant. A lot of investment is required here as well. In collaborating with the university, new generations of scientists and engineers will be trained through this new facility and they will be ready for more demand from industry in the future," adds Dr Kiritikara.

BIOTEC Medical Biotechnology Research Unit, Chiang Mai University and Mahidol University jointly developed four serotypes of dengue vaccine candidate. The team successfully engineered the chimeric live attenuated vaccine for four serotypes of dengue virus. On February 21, 2011, the NSTDA, Chiang Mai university, Mahidol University and BioNet Asia announced a licensing agreement for this chimeric vaccine. The agreement enables BioNet Asia to further develop and produce the vaccine for testing in pre-clinical and clinical stages. This collaboration is expected to commercialize the dengue vaccine in Thailand and eventually expand to the ASEAN market and beyond.

The Thai government too is stepping up efforts to encourage the industry. The R&D spend, which has so far been 0.25 percent of the GDP, is expected to be increased to one percent in the next three years. Dr Kirtikara said the industry too needs to play a bigger role. "So far, majority of the funding for research has been coming from the government, but this can't be the case if we want to achieve the one percent target. The industry has a much bigger role to play and now the platform is in place for the industry to step in," she point out.

Agriculture and clean technology are two areas that have the potential to drive the Thailand industry. "Although work has started, we still need some time to catch up with the drug and biopharma industry. However, many big companies are now interested in using clean technology. They are looking at biotechnology to provide clean solutions and this is where the Thailand industry can step in to meet the government's aim," she said.