**CROPBIOTECH UPDATE**

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A weekly summary of world developments in agri-biotech for developing countries, produced by the Global Knowledge Center on Crop Biotechnology, International Service for the Acquisition of Agri-biotech Applications SEAsiaCenter (ISAAA)

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**July 28, 2006**

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*** GLOBAL ***

**INTERNATIONAL EFFORT TO BOOST RICE PRODUCTION**

A major international scientific effort has been launched to develop a new approach to boost rice production and avoid rice shortages or famine. Scientists are looking at enhancing the rice plant's photosynthetic efficiency as alternative strategies are needed to increase rice production under global realities of less land, labor, and water. The International Rice Research Institute (IRRI) in the Philippines reports that new knowledge generated by the sequencing of the rice genome now allows more collaborative work to completely reconfigure the rice plant's photosynthetic system, the engine of rice production.

IRRI crop ecologist John Sheehy, convener at a workshop on "C4 Rice – Supercharging the Rice Engine" held at IRRI, explains that, "The photosynthetic process is the engine of growth for the rice plant, so, if we can improve that, then the whole plant benefits." This involves converting rice from a C3 plant to a C4 plant, where the "C" refers to the carbon captured by photosynthesis for growth. To do this, C4 plants—such as maize—use solar energy more effectively for growth.

For more information, email Duncan Macintosh of IRRI at d.macintosh@cgiar.org.

**CAST PAPER SAYS BIOTECH-DERIVED CROP AS SAFE AS CONVENTIONAL CROP**

Is the biotechnology-derived crop as safe as a conventional crop? There is evidence to support a strong affirmative response, says "Safety of Meat, Milk, and Eggs from Animals Fed Crops Derived from Modern Biotechnology", an issue paper released by the Council for Agricultural Science and Technology (CAST). It notes that "meat, milk, and eggs produced by farm animals fed biotechnology-derived crops are as wholesome, safe, and nutritious as similar products produced by animals fed conventional crops."

Written and evaluated by a Task Force of international scientists from the United Kingdom, Germany, the United States, and Brazil, the paper provides an overview of regulatory assessments of biotechnology-derived crops; and summarizes the empirical data generated for assessing the safety of meat, milk, and eggs from animals fed biotechnology-derived crops that express agronomic input traits.

Among CAST's recommendations to ensure continued safety and nutritive value of feeds in current and future crops derived from modern biotechnology are:

- Continue using a case-by-case safety assessment approach
- Assess risks, as opposed to hazards
- Provide adequate funding to regulatory groups
- Provide resources to increase public outreach and dialogue.

Read the full Issue Paper No. 34 at http://www.cast-science.org/cast/src/cast_publications.php?jump=83. Read the press release at http://www.cast-science.org/cast/news/feedsafety_nr.htm.

**BIOTECH APPLICATIONS FOR MANURE NUTRIENT MANAGEMENT**

Manipulating nutritional content, quality, and availability in plants has the potential to provide "designer feeds" for decreasing manure nutrient output. Enhancing the nutritional quality of feeds in diets in the light of industry efforts to lower the cost of animal production, while minimizing the extent of environmental impact, thus becomes a possibility for the biotechnological management of manure nutrients. This scenario is forwarded by "Biotechnological Approaches to Manure Nutrient Management", an Issue Paper published by the Council for Agricultural Science and Technology (CAST).

Dr. Xingen Lei, Department of Animal Science, Cornell University, and Task Force Chair, notes that "Because of population growth and the increasing demand for animal foods, global livestock production will continue to evolve from smaller family support systems to larger, more market-oriented, integrated production systems. Through this progression, issues involving environmental contamination, air quality, and animal welfare will be more commonplace, resulting in more complex relationships among the animal industry, society, and governmental agencies. Because biotechnology potentially can provide important solutions to these problems, it is critical that we understand and address the associated issues."

The paper explains that managing nutrients by controlling animal diets is easier than intervening after release of these potential pollutants into the environment.

Future research will target improved seed stock development and dietary enzyme use as economical and practical methods of treatment.

Read the full paper at http://www.cast-science.org/cast/src/cast_publications.php?jump=165. Access the press release at http://www.cast-science.org/cast/news/manuremanagement_nr.htm.

**BBSRC, DFID LINK FOR RESEARCH ON SUSTAINABLE AGRI IN DEVELOPING COUNTRIES**

The Biotechnology and Biological Sciences Research Council (BBSRC) and the Department for International Development (DFID) have announced a new scheme to promote biotechnology and biological sciences research that addresses the challenges of agriculture in developing countries. This scheme will strengthen collaboration between both agencies to support research that will address problems in agricultural productivity and food security, and how these can be solved in Africa and Asia.

This scheme is one of the new initiatives being implemented under DFID's Strategy for Research on Sustainable Agriculture, and has a total budget of £6 million that will cover research grants in the next four years. The scheme's first research call will focus on crop sciences.

For more information, email Matt Goode of the BBSRC at matt.goode@bbsrc.ac.uk. Read about the new scheme at http://www.bbsrc.ac.uk/funding/news/welcome.html.

*** AFRICA ***

**LEADERS RESOLVE TO HARNESS BIOTECHNOLOGY TO DEVELOP AFRICA**

African governments have resolved to harness biotechnology in order to develop Africa's rich biodiversity, improve agricultural productivity, and develop pharmaceutical products within the framework of the New Partnership for Africa's Development (NEPAD). The African Union-appointed High-Level African Panel on Modern Biotechnology, headed by Prof. Calestous Juma of Cambridge University, USA, made this announcement during a recent series of consultative meetings with various stakeholders in Nairobi, Kenya.

The panelists unveiled a preliminary report on the role of modern biotechnology in the transformation of African economies, which examines how benefits of

biotechnology can be tapped by African countries. The report focuses on how best to build the capacity needed by the continent to harness and apply the technology to improve agricultural productivity, public health, industrial development, and economic competitiveness, among others.

The report concludes that regional cooperation is essential to address possibilities and issues associated with biotechnology and genetic modification. Regional economic integration bodies should play a key role in mobilizing, sharing, and using existing scientific and technological capacities, including human and financial resources, as well as physical infrastructure for biotechnology research and development, and innovation on the continent. They argue that international partnerships in biotechnology are critical to the realization of Africa's biotechnology strategies and should be actively pursued

For more information, contact Daniel Otunge at dotunge@absfafrica.org

**IITA TAKES ON BANANA VIRUS WITH UV, JUICE HELP**

Scientists from the International Institute of Tropical Agriculture (IITA) are using vegetable juice and near ultraviolet (UV) light to help them select the best banana plantlets in the laboratory. This is part of the IITA's rapid screening process for resistant banana plants; field evaluations for plant susceptibility to the Black Sigatoka fungus can be time consuming and expensive, so scientists use a combination of UV and juice to grow large amounts of fungal spores to transmit the disease and challenge culture plantlets in test tubes.

Once resistant plantlets are identified, they can be propagated in the laboratory, and subsequently distributed to banana farmers. IITA is now focusing on refining their screening methods and determining the relationship between early screening results and adult plant reaction.

Black Sigatoka is a common, widespread disease of bananas in sub-Saharan Africa. It can cause yield losses as high as 76%. Read the complete news article at http://www.iita.org/info/inew9/inew9.htm#3.

*** THE AMERICAS ***

## CITRUS TRISTEZA VIRUS SEQUENCED IN MEXICO

Scientists of the Instituto Politécnico Nacional (IPN) of Mexico have completed the sequencing of the Citrus Tristeza Virus (CTV), a pathogen responsible for huge losses to the Mexican agricultural sector, and the biggest threat to worldwide citrus production. CTV is transmitted by some species of aphids found on citrus plants, and symptoms of infected trees vary, from impaired tree growth to the rapid death of trees. CTV also affects the external and internal qualities of the fruit, and therefore reduces overall production of an orchard.

The project will pave the way for the development of vaccines to immunize citrus trees to the disease, said project leader Alberto Mendoza Herrera of the Center of Genomic Biotechnology. Mendoza Herrera explained that although the disease is of world wide concern, Mexican crops are particularly vulnerable, as 90% of commercial plantations are grafted onto sour orange (*Citrus aurantium*), which is highly susceptible to CTV.

Read more at
http://www.sagarpa.gob.mx/cgcs/sintesis/sintesis/2006/julio/ss_21.pdf

## NEW BARLEY HAS HIGHER YIELDS, AVAILABLE PHOSPHOROUS

Scientists from the Agricultural Research Service, of the United States Department of Agriculture (AR-USDA), have developed a new high-yielding barley that provides more bio-available phosphorous. That is, the phosphorous is present in a form more readily absorbed and used by animals that feed on the crop; this also means that the phosphorous is less likely to end up in animal manure and be carried away by rain runoff from pastures and fields into freshwater supplies.

Named “Herald,” the barley should save growers the cost of feeding phosphorus supplements to farm animals.

For more information, contact Marcia Wood of the ARS at marcia.wood@ars.usda.gov. Read the complete press release at http://www.ars.usda.gov/News/docs.htm?docid=1261.

## PINTO BEAN LINES DEVELOPED TO RESIST MOLD

Two new white mold-resistant, high-yielding pinto bean lines have recently been developed by scientists of the United States Department of Agriculture's Agricultural Research Service (USDA-ARS). Designated as USPT-WM-1 and USPT-WM-2, these lines were developed by cross-breeding the pinto bean Aztec, a semi-upright breed of pinto, with ND88-106-4, an upright navy bean breeding line.

White mold is an endemic disease affecting pinto and other dry edible bean crops throughout the United States. Crop losses can be minimized with fungicides, careful irrigation, or widely spaced rows, but the fungus that causes white mold can elude these measures and spread quickly through the air. Severe outbreaks of the disease can reduce bean yield and quality.

Read the complete article at http://www.ars.usda.gov/is/pr/2006/060724.htm. For more information, contact Jan Suszkiw of the ARS News Service at jan.suszkiw@ars.usda.gov.

## * ASIA *

## BANGLADESH APPROVES BIOTECH POLICY

Bangladesh has adopted its National Policy Guidelines on Biotechnology, which is aimed at increasing production and preservation capacities of various crops, fishes, and medicinal items, as well as protecting biodiversity and ensuring safety of public health and the environment. The approval was announced by the National Task Force on Biotechnology of Bangladesh in a recently concluded meeting chaired by Prime Minister Khaleda Zia.

The Prime Minister suggested the following steps to develop biotechnology in the country: provide assistance to institutions and scientists involved in biotechnology research work; build up the National Institute of Biotechnology (NIB) as a center of excellence; take proper steps for implementation of programs set in the Medical Biotechnology national guidelines; and quickly formulate and implement the programs of the Environment Ministry.

For more information, contact Professor Khondoker Nasiruddin of the Bangladesh Biotechnology Information Center at nasirbiotech@yahoo.com.

## INDIAN PARLIAMENT PASSES INTEGRATED FOOD BILL

The Food Safety and Standards Bill 2005 has recently been passed by the Indian Parliament. This integrated food law lays down science-based standards for the regulation of food manufacturing, storage, distribution, sale, and import; and aims at consolidating all food-related regulations. The law will also establish the Food Safety and Standards Authority of India, an independent food regulatory body.

With reports from the Business Standard, at http://www.business-standard.com/common/storypage.php?autono=99570&leftnm=3&subLeft=0&chkFlg= and the Financial Express, through http://www.financialexpress.com/fe_full_story.php?content_id=135351. More details on the Food Safety and Standards Bill 2005 can be found at http://164.100.24.208/ls/bills-ls-rs/2005/123_2005.pdf. For more information contact Bhagirath Choudhary of the ISAAA South Asia Office at b.choudhary@isaaa.org.

## INDIA EXEMPTS SOYBEAN OIL, EXTENDS TRADE REGULATION TO GM PRODUCTS

India has exempted importers of genetically modified (GM) soy oil from seeking clearance from the Genetically Engineering Approval Committee (GEAC), India's regulatory body. This exemption will extend until March 2007, according to a statement issued by the Directorate General of Foreign Trade (DGFT) of India's Ministry of Commerce.

In its annual supplement to the Foreign Trade Policy (2004-09) in April 2006, the government had notified that importers of all GM food products and ingredients would have to seek clearance from the GEAC.

With reports from the Financial Express through http://www.financialexpress.com/fe_full_story.php?content_id=134856. For more information contact Bhagirath Choudhary of the ISAAA South Asia Office at b.choudhary@isaaa.org.

## INDIA SIMPLIFIES CROP BIOTECH APPROVAL PROCEDURES

India's Genetic Engineering Approval Committee (GEAC), the country's regulatory body, has adopted an "event-based approval system" in place of existing case-by-case approval system of biotech products. This was done in an attempt to speed up the introduction of new and diverse products for local

farmers, stimulate competition, and offer wider choice without compromising biosafety and environmental safety.

The new simplified approval procedure will be applicable to cotton hybrids expressing the cry1Ac gene (Mon 531 event). Other products will also be evaluated under the liberalized system after their performance has been monitored post-release for a period of three years, and after the GEAC has renewed approval for commercial release. With the adoption of this system, the time period for commercial approval of new cotton hybrids containing the MON531 event will be reduced from around three years to one year.

Read the decisions at http://www.envfor.nic.in/divisions/csurv/geac/geac-69.pdf and http://www.envfor.nic.in/divisions/csurv/geac/mayee_report.pdf. For more information contact Bhagirath Choudhary of the ISAAA South Asia Office at b.choudhary@isaaa.org.

## MALAYSIA: PM TO LAUNCH BIOTECH HUB

BioNexus, a dedicated hub to bolster Malaysia's lucrative biotechnology sector, will be launched by the country's Prime Minister, Abdullah Ahmad Badawi, in mid-August 2007. BioNexus is a cluster of biotechnology firms that will bring together the best brains from local and foreign universities, research and development (R&D) organizations, government agencies, and private firms.

During the launch, the prime minister is expected to announce detailed tax incentives, R&D grants, and loan financing schemes to local and foreign biotech firms. He will also chair the National Biotechnology Implementation Council meeting and launch Malaysia's first full-fledged biotechnology firm, Inno Biologics Sdn Bhd.

For more information, contact Mahaletchumy Arujanan of the Malaysian Biotechnology Information Center (MABIC) at maha@bic.org.my. Find out more about MABIC at http://www.bic.org.my.

## CLONED OIL PALM MAKING ITS WAY IN MALAYSIA

Applied Agricultural Resources Sdn Bhd (AAR), an agricultural advisory firm based in Malaysia, has successfully developed cloned plantlets of oil palm through tissue culture clonal propagation, a technology the firm uses to clone high-yielding oil palms. These plantlets have 20 – 25% higher oil extraction rate, which translates to higher revenue for plantation companies. The clonal propagation technique, though developed in the 1970's, was commercialized

only by two firms in Malaysia, including AAR. Currently, seven firms have invested in the research and development of tissue culture clonal propagation.

For more information, contact Mahaletchumy Arujanan of the Malaysian Biotechnology Information Center (MABIC) at maha@bic.org.my. Find out more about MABIC at http://www.bic.org.my.

*** EUROPE ***

**Bt MAIZE IN SPAIN FOUND TO IMPROVE PRODUCTION BY 7.3%**

Scientists of the Institute and Agricultural Research and Technology (IRTA) of Catalonia report an average increase in Bt maize production of 7.3%, equivalent to 1,055 kilograms per hectare, when compared to non biotech varieties. In addition, the experts reported an increase in the quality of the grain, with an 83% decrease in the level of mycotoxins found in transgenic seeds, and increased grain moisture content during harvesting. The biotech varieties were also reported to have increase tolerance to fungal pathogens. More than 53,000 hectares of transgenic Bt maize were cultivated in Spain in 2005. The study also confirmed that a buffer zone of 15-20 m between Bt maize and conventional crop varieties is sufficient to insure coexistence and prevent the flow of the transgene.

The technical dossier is available at http://www.ruralcat.net. For more information visit: http://www.antama.net/imgNews/25-07-06.htm.

**INRA, CIRAD LINK FOR AGRI STUDY**

France's National Institute for Agricultural Research (INRA) and Centre De Cooperation Internationale En Recherche Agronomique Pour Le Développement (CIRAD) have united for a prospective study on agriculture and food worldwide in 2035. Dubbed "Agrimonde," the study will be conducted over the next two years and will serve to: 1) foresee the role of French and European agriculture in the different global change scenarios and 2) pinpoint the fundamental issues with which agricultural research will be faced.

INRA and CIRAD will assemble a committee of experts to provide scientific and methodological advice. The results of the work will be published in 2008. Both agencies conduct research on issues linked to agriculture, biosafety, and environment and territorial management, with emphasis on sustainable development.

Fore more information, contact Rémi Barré (remi.barre@cnam.fr) or Sandrine Paillard (sandrine.paillard@paris.inra.fr) of INRA; or Bruno Dorin (dorin@cirad.fr) of CIRAD. Read the complete press release at http://www.cirad.fr/en/presse/communique.php?id=196.

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## RESEARCH

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### BIOFUELS COST, BENEFITS EXAMINED

With rising costs and depleting supplies of fuel, as well as the negative environmental consequences associated with the use of fossil fuels, scientists are studying the viability of biofuels, which are sourced from agricultural products. Two main types of biofuels are currently in use: bioethanol, sourced mainly from corn and sugarcane; and biodiesel, sourced mainly from soybean and oilseed rape.

To be viable alternatives, biofuels should provide a high net energy gain, have high environmental benefits, be economically competitive, and be producible in large quantities without reducing food supplies. In line with this, Jason Hill and colleagues of St. Olaf College, Minnesota, USA, examine the “Environmental, economic, and energetic costs and benefits of biodiesel and ethanol biofuels.” Their work appears in the latest issue of the Proceedings of the National Academy of Sciences.

By using current data on farm yields, commodity and fuel prices, farm energy and agrichemical inputs, production plant efficiencies, co-product production, greenhouse gas (GHG) emissions, and other environmental effects brought about by the use of corn grain ethanol and soybean biodiesel, researchers concluded that biodiesel is the more viable fuel alternative, at least in the US. In particular, they found that: 1) Bioethanol yields 25% more energy than the energy invested in its production, whereas biodiesel yields 93% more; 2) GHG emissions are reduced 12% by the production and combustion of ethanol and 41% by biodiesel; 3) Biodiesel releases less air pollutants per net energy gain than ethanol; 4) Biodiesel has minimal impact on human and environmental health through nitrogen, phosphorous, and pesticide release; and 5) Transportation biofuels such as synfuel hydrocarbons or cellulosic ethanol, if produced from low-input biomass grown on agriculturally marginal land or from waste biomass, could provide much greater supplies and environmental benefits than food-based biofuels.

Read the complete article at http://www.pnas.org/cgi/content/full/103/30/11206.

**STUDY EXPLORES GENE CHANGES BROUGHT BY VIRUS IN POTATO**

Plants respond to attack by invading pathogens through a complex network of signals that activate defense mechanisms. Scientists are interested in plant-pathogen interactions, as they can provide a glimpse into how the plant immune system works, which, in turn, can contribute to further studies on engineering pathogen resistance into plants.

One such pathogen, potato virus Y, causes potato tuber necrotic disease in sensitive cultivars. Studies have hitherto been unable to track the overall changes arising from the interaction between potato plants and the virus. Scientists from research institutions in Slovenia and the Netherlands, however, have been able to determine the "Potato virus Y induced changes in the gene expression of potato (*Solanum tuberosum* L.)." Their work is published in the latest issue of Physiological and Molecular Plant Pathology.

Scientists used the highly sensitive potato cultivar Igor, which they infected with Potato Virus Y. Through subjective hybridization, cDNA microarrays, and real-time PCR, they monitored gene expression in both infected and uninfected plants. After analyzing their results, they found that 175 genes were expressed in high amounts due to pathogen stress. These genes coded for heat shock proteins, catalase 1, ?-1,3-glucanase, wound inducing gene, and genes involved in photosynthesis, suggesting that these genes may play a role in the susceptible potato–potato Virus Y interaction. The scientists, however, were not able to assign function to about 33% of the isolated genes; and, when they compared the expression profile to existing plant-virus interaction data, found that different sets of genes were activated not only in different plant hosts, but in different development stages. Only studies on a wide range of host–virus combinations can lead to identification of general features in plant–virus interactions, the authors wrote.

Because this study has provided important insights into the susceptible potato–virus interaction at the level of gene expression, scientists are better equipped to find more means by which to engineer Potato Virus Y resistance in potatoes. Subscribers to the journal can access the complete article at http://dx.doi.org/10.1016/j.pmpp.2006.02.005

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## ANNOUNCEMENTS
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### INDIA HOSTS GFAR 2006

The Department of Agricultural Research and Education (DARE) and the Indian Council of Agricultural Research (ICAR) will host the GFAR 2006 "Reorienting Agricultural Research to meet the Millennium Development Goals" from November 9-11, 2006 in New Delhi, India. About 400 participants representing national agricultural research systems, advanced agricultural research institutes and universities, the Consultative Group on International Agricultural Research (CGIAR), non-government organizations, farmers' organizations, and the private sector are expected to attend the conference.

For more information, visit http://www.egfar.org/gfar2006/index.jsp.

### PLANT MOL BREEDING CONFERENCE TO BE HELD IN CHINA

The 2nd International Conference on Plant Molecular Breeding (ICPMB) will be held in Sanya City, Hainan province, P. R. China on March 23-27, 2007. This event will focus on applied plant genomics and molecular plant breeding, in view of the increasing need to use new molecular approaches and mine novel gene resources. Important aspects of plant molecular breeding and related transgenic ecological risk and intellectual property rights (IPR) will be covered in several sessions and satellite workshops. Deadline of full paper and extended abstract submission is on December 31, 2006. For more information, visit http://www.icpmb.org/142.html.

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## DOCUMENT REMINDERS
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### NEW POCKET K ON PLANT DIAGNOSTICS RELEASED

Pocket K No. 22, Plant Disease Diagnostics, is the newest Pocket K in the popular series, and is currently available online at the ISAAA KC Website. This Pocket K details the processes involved in plant diagnostic kits, whether they detect proteins or nucleic acids.

Pocket Ks are Pockets of Knowledge, packages of information on crop biotechnology products and related issues. They are available in 12 languages. Pocket Ks are produced by the Global Knowledge Center on Crop Biotechnology

(KC) of the International Service for the Acquisition of Agri-biotech Applications (ISAAA). Twenty-one other topics are available at http://www.isaaa.org/kc

## FARM-SCALE EVALUATION OF BT COTTON

A farm-scale evaluation demonstrates positive results in favor of transgenic cotton. Read the article “Farm-scale evaluation of the impacts of transgenic cotton on biodiversity, pesticide use, and yield” in the Proceedings of the National Academy of Sciences of the United States of America. Subscribers may read the full paper online at http://www.pnas.org/cgi/reprint/103/20/7571.

## NEW IFPRI BRIEFS PUBLISHED

The International Food Policy Research Institute (IFPRI) has released “Promising Crop Biotechnologies for Smallholder Farmers in East Africa: Bananas and Maize.” The research brief presents synopses of two case studies about the potential for pro-poor crop biotechnologies, and available for download at http://www.ifpri.org/pubs/rag/br1004.asp.

## ARGENBIO RELEASES SPANISH BIOTECH GLOSSARY

ArgenBio, the Argentine Council for Biotechnology Information and Development, has released a glossary of biotechnology terms in Spanish. The glossary is available at http://www.argenbio.com/h/glosario/index.php

## FAO FORUM AVAILABLE IN MANDARIN

The Food and Agriculture Organization (FAO) of the United Nations has released the report of the first six e-mail conferences of the FAO Electronic Forum on Biotechnology in Food and Agriculture in Mandarin Chinese. Visit http://www.fao.org/docrep/009/y2729c/y2729c00.htm to access the document.

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Please visit CropBiotech Net web pages (http://www.isaaa.org/kc) to view previous issues of this newsletter and see other available resources for download.

While we are still developing this site, feel free to e-mail (knowledge.center@isaaa.org) us for your views and comments on any crop biotechnology product and related issues.

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