

Academia Sinica

- ❖ Undertakes basic academic research in the sciences and humanities
- ❖ Over 2,500 staff and students
- ❖ Est. 1928 in China, 1949 in Taiwan
- ❖ Located in Taipei City
- ❖ 24 research institutes, 6 research centers
- ❖ In life sciences:
 - Institute of Plant and Microbial Biology
 - Institute of Cellular and Organismic Biology
 - Institute of Biological Chemistry
 - Institute of Molecular Biology
 - Institute of Biomedical Sciences
 - Agricultural Biotechnology Research Center
 - Genomics Research Center
 - Research Center for Biodiversity



Development Center for Biotechnology (DCB)

- ❖ Est. 1984, to establish internationally competitive biotech R&D capability, and to upgrade the domestic biotech industry.
- ❖ With Merck, set up biotech-focused services and training center in 2008
- ❖ Introduces and develops suitable biotechnologies from around the world, and transfers them to domestic industries.
- ❖ Facilities:
 - Contract biopharmaceutical manufacturing
 - Animal Center for toxicology studies
 - Research laboratories



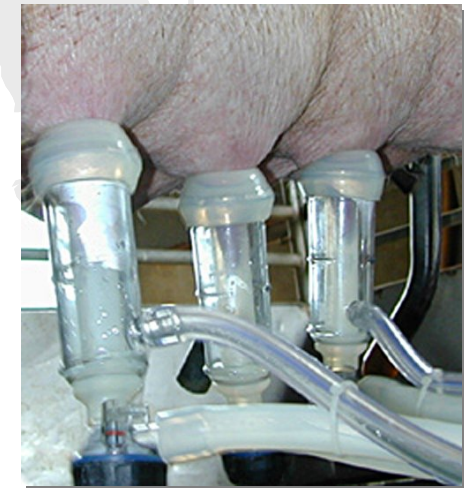


National Health Research Institutes (NHRI)

- ❖ Est. 1996, located in Miaoli (Central Taiwan)
- ❖ Division of Department of Health (DOH)
- ❖ Mission: The enhancement of medical research, and the improvement of healthcare in Taiwan
- ❖ 900 staff, budget of US\$90 million
- ❖ Features and highlights:
 - Houses the National Institute of Cancer Research
 - Additional strengths in CV diseases, immunology, stem cell research, vaccine research and development
 - Houses cell bank, bioinformatics center
 - Joined Human Genome Project, also sequenced chimp chromosome 22 (published in Nature, 2004)
 - Successfully synthesized generic version of Tamiflu in only 18 days

Animal Technology Institute, Taiwan (ATIT)

- ❖ Biotechnology research and development from animal husbandry
- ❖ Cutting-edge achievements in animal cloning and genetic modification
- ❖ Research fields include:
 - Development of new livestock breeds, cloning
 - Production of human biopharmaceuticals using GM animals
 - Waste water analysis
 - Diagnosis of livestock diseases
 - Artificial organ development
 - Biochips





Contents

- ❖ Taiwan's Quick Fact & Advantages
- ❖ Taiwan's Life Sciences: Definitions, Facts and Figures
- ❖ Strengths in Life Sciences
- ❖ Bioclusters
- ❖ Research Institutes
- ❖ Leading Companies; Examples
- ❖ Government Life Science Industry Development Policy
- ❖ Investment Incentives, Regulations
- ❖ Discussion & Summary

Example companies:

ScinoPharm Taiwan



- ❖ Leading Asian active pharmaceutical ingredient (API) manufacturer, supplies world's largest brand and generic pharmaceutical companies
- ❖ Positioning itself as integrated service provider with expertise across full spectrum of small, medium and large molecules
- ❖ Founded in 1997 by returning overseas-based Taiwanese bioscientists, Dr. Jo Shen and Dr. Hardy Chan (from Syntex, US)
- ❖ Early recipient of government investment support
- ❖ Initial on-site operations began in Nov. 1999
- ❖ Located in Southern Taiwan Science Park, Tainan County, with research facility in Kunshan, China
- ❖ 2007 revenues of US\$76 million (US\$45 million in 2006)

Example companies:

AbGenomics Corp.

- ❖ Located in Neihu Technology Park
- ❖ Drug discovery and development company, focusing on therapeutic monoclonal antibodies
- ❖ In 2005, licensed its antibody AB168 to Germany's Boehringer Ingelheim, potentially a treatment for MS, psoriasis, arthritis and autoimmune diseases



Example companies:

TaiMed Biologics

- ❖ Founded Sept. 2007, dedicated to the development of new drugs for diseases such as cancer, AIDS and influenza
- ❖ Located in Hsinchu Biomedical Park
- ❖ Through the Development Fund, the government has 40% stake
- ❖ Chairwoman is former Taiwan Vice Premier Tsai Ing-wen
- ❖ Other board members include AIDS research pioneer David Ho, Academia Sinica President Wong Chi-Huey
- ❖ Patent authorized by US-based Genentech for its lead clinical product, TNX-355, a potential treatment for HIV and AIDS patients. TNX-355 previously owned and developed by biotech company Tanox, founded by Taiwan bioscientists in the US, with company acquired by Genentech in 2007

Example companies:

TaiGen Biotechnology

- ❖ Drug development and discovery company, founded 2001, focusing on oncology, diabetic complications, infectious and inflammatory diseases
- ❖ Pipeline includes oral antibacterial Nemonoxacin, currently in US Phase II trials for community-acquired pneumonia and diabetes-related foot infections
- ❖ Located in Hsinchu Biomedical Park
- ❖ Investment from MPM, the world's largest life sciences venture capital firm, as well as government support through the Development Fund
- ❖ Founder, Chairman and President is Dr. Hsu Ming-chu, previously director of the Division of Biotechnology and Pharmaceutical Research, NHRI, and prior to that Research Director for Oncology and Virology at Hoffmann-La Roche USA



Example companies:

Vita Genomics

- ❖ Est. 2001 by Dr. Ellson Chen, previously Chief Scientist at US-based biotech giant Celera, and a renowned scientist in large-scale DNA sequencing and human genomics
- ❖ Vita is a genomics-based drug development and discovery company, focusing on therapies for Asian-specific diseases
- ❖ New Drug Rescue Program designed to resurrect drugs that have failed in the previous clinical trials owing to low efficacies. This program applies pharmacogenomics approaches using biomarkers to screen subsets of patients who may respond better or avoid adverse responses to the test drugs.
- ❖ Wholly-owned subsidiary GeneCore in Shanghai, China



Example companies:

Medigen Biotechnology

- ❖ Drug development and discovery company, focused on cancer treatment drugs
- ❖ Business model: Licensing-in early-stage drug candidates, conducting clinical trials I-IV with its in-house CRO and retaining subsequent product development/marketing rights
- ❖ Co-developed PI-88 with Australia's Progen Pharmaceutical. PI-88 is an anti-angiogenic agent shown to suppress growth and spread of cancers in pre-clinical animal studies. Phase I clinical trial on Asian advanced cancer patients successfully completed in 2004
- ❖ Similar development model announced March 2008 with Japan's Oncolys BioPharma, for Telomelysin (OBP-301), Oncolys' lead oncology clinical program. Medigen will develop and commercialize the drug for liver cancer and other cancer therapies

Example companies:

PharmaEssentia



- ❖ Founded by Dr. Lin Ko-chung, previously Discovery Chemistry head at US-based Biogen
- ❖ Has developed proprietary protein engineering techniques to create new drug candidates, modify existing drugs
- ❖ Pipeline:
 - New generation interferon-alpha for hepatitis B and C treatment
 - Growth hormone deficiency treatment
 - Multiple sclerosis treatment
 - Anemia treatment
 - Neutropenia treatment
- ❖ Manufacturer of PharmaQ10, pharmaceutical-quality CoQ10, used as a food and cosmetics supplement

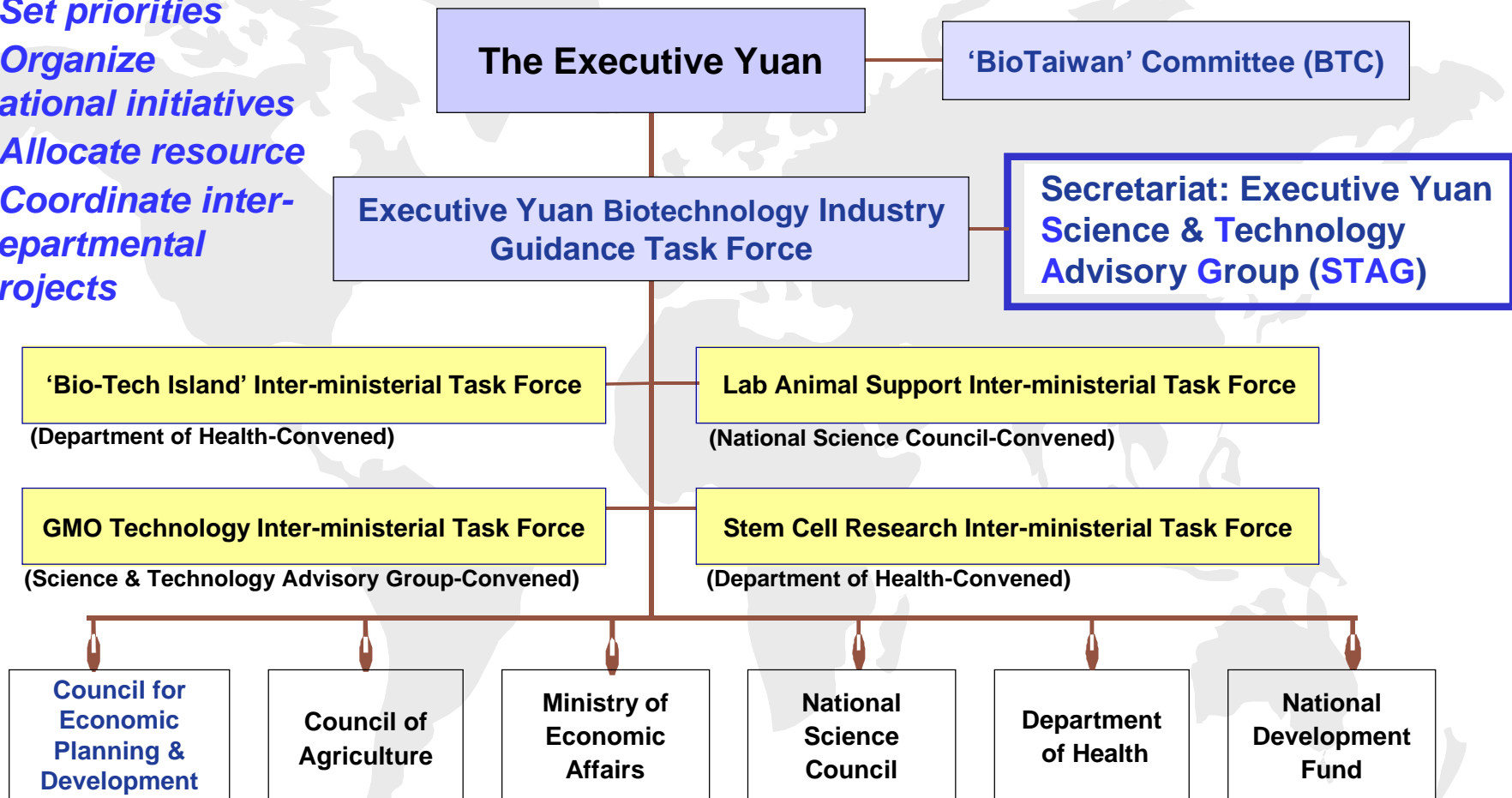


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Taiwan's Science Strategy & Policy: Setup and function of STAG

- Form policies
- Set priorities
- Organize national initiatives
- Allocate resource
- Coordinate inter-departmental projects





STAG's Mission

To accelerate the development of science and technology in the R.O.C., the mission of STAG include:

- ❖ Providing recommendations of national science and technology development policy and important programs or projects for science and technology development
- ❖ Sponsoring and organizing STAG Board Meetings and various Strategic Review Board (SRB) meetings
- ❖ Steering the promotion of science and technology development programs or projects designated by the Cabinet
- ❖ Collecting important science and technology development information and providing consultations
- ❖ Other matters relevant to science and technology assigned by the Premier



STAG's Mission & goal

in the development of Life Science Industry

- Develop Taiwan's life science industry to be an critical & indispensable part of global industry.
- Biotech R&D, manufacture, & operation centers in Asian pacific region.

Goal

- ☞ 25% annual revenue growth 25%
- ☞ Reach 1500 billion (NT\$) investment
- ☞ Establish over 500 biotech companies
- ☞ Facilitate IPO of 18 companies in 2010

Approach

- ☞ Identify the needs & niches
- ☞ Drive the directions through national programs
- ☞ Improve infrastructures
- ☞ Provide incentives to facilitate transformation & stimulate investment

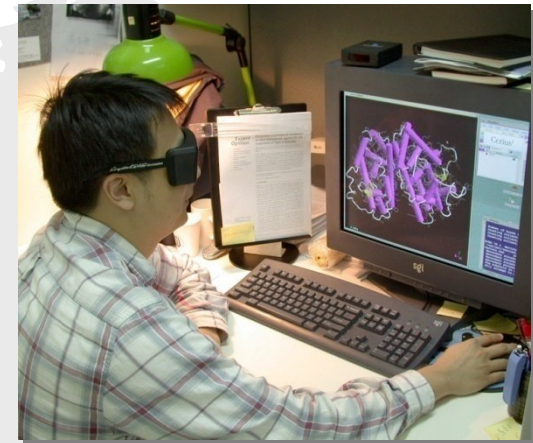
'Bio-Tech Island' project

- ❖ Initiated June 2005, a five-year, interdisciplinary technology integration program aimed at raising the standards of Taiwan's life sciences and clinical research sectors, integrating the healthcare industry, and creating an environment for companies to reach international standards
- ❖ Features:
 - **National Health Information Project (NHIP)**; digitizing of all medical treatment data, medical imaging, tests results, doctor's notes and patient histories (full custodial authority over the data given to patients). Patients can retrieve personal data online.
 - **Taiwan Biobank**; a genetic database
 - **Clinical trials and research system**; expanding already existing advantages as a regional clinical trails hub



'Two Trillion, Twin Stars' plan


- ❖ **Biotechnology industry part of the Two Trillion, Twin Stars plan, first initiated by the government in 2002:**
 - **Two Trillion** industries: The semiconductor and flat-panel display industries have revenue goals of NT\$1 trillion (~US\$30 billion) each
 - **Star** industries: The biotechnology and digital content industries; designation as a 'Star' industry leads to special developmental attention from the government
- ❖ **Part of a wider program, the government's "Challenge 2008 - National Development Plan"**





'Promotion Plan for the Biotechnology Industry'

- ❖ **Government-initiated developmental guideline for Taiwan's life sciences, a road map defining industry goals and action steps required**
- ❖ **First written 1995, revised biannually**
- ❖ **Five 'Areas of Attention':**
 - Life science-related laws and regulations
 - R&D and applications
 - Technology transfer and commercialization
 - Investment promotion and cooperation
 - Market information and marketing services
- ❖ **Growth goals**
 - Investment targets
 - Establishment of international-standard companies



Drive the development direction through National Program Project

- 
- **National drug discovery & development program**
Disease targets: cancer, cardiovascular, diabetes & neuronal diseases
 - **National genome program**
Research focus: liver/lung cancer, infectious disease, high prevalent genetic disorder
 - **National stem cell initiative program**
Research focus: adult and embryonic stem cells
 - **National agriculture biotechnology program**
Floral plants, herb & functional food, etc.

New government's vision in life science industry

President Ma's new proposal

Double the funding of national drug development program in 4 year

Establish efficient drug evaluation process

Develop protein drug

Establish medical engineering research and production center

Establish herbal medicine research center

Industrialization of Agriculture

Establish clinical trial center for Asian prevalent disease

Food safety

Develop agriculture industry

Center of Excellence

Medical research on Asian prevalent diseases

Class II/III medical device ODM center

Reduce consumption of chemicals

Biopharmaceutical

- Become a high impact biomedical research & biomanufacture center
- Establish center of excellence for study & treating Asian prevalent diseases
- Establish center of excellence in research & development of gene drug

Medical device

- Short term: prepare Taiwan to become the ODM center for manufacturing class II/III medical device 中心
- Mid/long term: foster & promote at least 3 companies successfully founded to facilitate the development of the industry

Agriculture biotechnology

- Goal in year 2015
- Double the revenue
 - Reduce to half of consumption on chemicals
 - Facilitate transformation of traditional agriculture



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Investment incentives

- ❖ Entry point for investment inquires for life science companies: Biotechnology & Pharmaceutical Industries Program Office (BPIPO), Ministry of Economic Affairs (MOEA)
- ❖ BPIPO services:
 - Promote government biotech-related policies
 - Act as a window for international exchanges
 - Provide information related to investment incentives
 - Provide relevant legal information
 - Provide relevant document for the setting up of companies and factories
 - Assist in business operational planning and the raising of capital
 - Operate the Executive Yuan's One-Stop-Service Office for the Biotechnology Industry
 - <http://www.biopharm.org.tw>



Other incentive programs

- ❖ What incentives does Taiwan offer to those foreign companies coming to Taiwan to invest in technology research and development?
 - Foreign companies may apply, according to the regulations, to the MOEA with proposals for R&D funding.
 - The MOEA's Industrial Technology Task Force is set up to encourage businesses to conduct business innovation, applied research, strengthening business R&D capabilities and mechanisms as well as promoting the development of the knowledge service sector. The MOEA also, from time to time, updates its various funding plans based on the changes among domestic companies.



Other incentive programs

Continue!

- ❖ For foreign companies setting up regional operational headquarters in Taiwan
- ❖ For foreign companies coming to Taiwan to invest in technology research and development
- ❖ The Executive Yuan has several low-interest loan programs, which foreign firms can participate in:
 - Loans for the Purchase of Automatic Machinery
 - Loans to Help Upgrade Small-and-Medium-Sized Enterprises
 - Loans to Help Anti-Pollution Machinery for Local Businesses
 - Loans to Help Promote Traditional Sectors
- ❖ All companies interested in these loans should consult local or private banks. Loan interest rates will remain within the Chunghwa Post Office's public rates for two-year fixed deposits of 2.175-2.45%.



Other incentive programs

Continue!

- ❖ In order to encourage companies to upgrade technology service capabilities or engage in R&D, and to raise the added value of products or services, the Executive Yuan Development Fund is providing low-interest loans for manufacturing, Internet, and technology service companies engaging in R&D or investment projects
- ❖ Loans rates are range between 1.5-2.5% (which includes yearly loan interest paid to the Development Fund and bank guarantor fees at 0.5-1.5%); if a Small-to-Medium Sized Enterprise is needed as a guarantor, then an additional processing fee is charged at 0.75% of the loan amount.
- ❖ For more information, please refer to the website of the Executive Yuan Development Fund:

<http://www.df.gov.tw/english/index.html>



Government regulations

- ❖ Since the first application of the government's Promotion Plan for the Biotechnology Industry, amendment of laws and regulations relating to Taiwan's life science industries have been ongoing.
- ❖ Areas covered to date:
 - Drug approval laws and procedures
 - Manufacturing facility approval standardization
 - Health food product approval and regulation
 - Medical device categorization standardization
 - Ethical issues: stem cells, cloning, GM foods and animals, etc.
 - Easing of requirements for public listing on stock trading boards of life science companies
 - Technology transfer and intellectual property rights issues



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Taiwan's strength in life science development

- ❖ Government support, with development incentives and benefits
- ❖ Access to innovation, with an emphasis on technological achievements, research institutes, number of bioscientists, etc.
- ❖ Speed of innovation, new technology development, speed of business in Taiwan
- ❖ Strong regulatory structure and enforcement (IP laws, etc)
- ❖ Unique cultural or location conditions (Chinese herbal medicine, achievements and involvement in Asian-prevalent diseases, orchid biotech, etc.)
- ❖ Access to finance, VC industry
- ❖ Access to markets (specifically, proximity to China)
- ❖ Access to patients (clinical trials advantages)
- ❖ Impressive industry achievements to date, join us for more!!



Taiwan's experience in the development of Life Science Industry

- Create a task force “STAG” to facilitate the cooperation & integration between different government departments
- Empower STAG to coordinate different parties within the government
- Empower STAG to initiate new program and allocate resources

- Approach**
- ☞ Identify the needs & niches at the national level
 - ☞ Drive the directions through national programs
 - ☞ Improve infrastructures & provide germinating bed
 - ☞ Provide incentives to facilitate transformation & stimulate investment



Alliance & collaboration in Asian Pacific region

❖ Frequent interaction through Bioindustry events

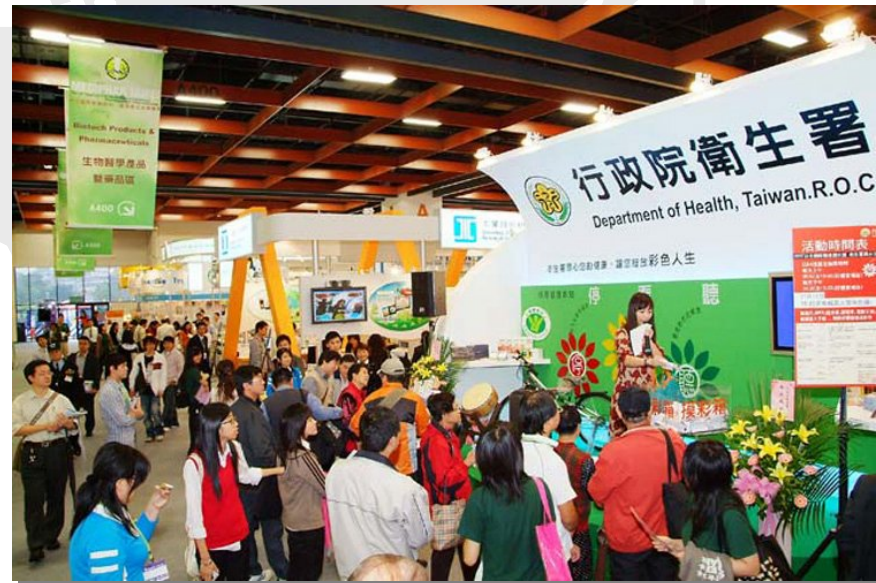
- Work together as a regional team
- Learn from each other through successful & failure experiences
- Identify together the growing hurdles and unmet needs
- Establish the universal goals in the development of life science

❖ Get started with the following actions:

- Co-develop bio-agriculture to produce food crop and next generation biofuel
- Make alliance in medical device to create a value chain within Asia
- Screening, diagnosis and treatment for Asian prevalent diseases
- Joint efforts on high impact bio-medical R&D projects
- Harmonization of drug and other regulatory guidelines
- Exchange of academic researchers and graduate students among Asian countries

2008 Bioindustry events in Taiwan

- ❖ APEC Biotechnology Conference 2008
Taipei, 21 July, 2008
- ❖ BioBusiness Asia 2008 Taipei, 22-23 July, 2008
- ❖ BioTaiwan 2008 Conferences & Exhibition
Taipei, 24-27 July, 2008
- ❖ MediPhar Taipei 2008
Taipei, 6-9 November, 2008



Thank you for your attention!



*“Taipei 101”
Landmark in Asia and in the World*

Life Science: the Next Economic Engine for Taiwan

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