

Strengthening capacity of Institute of Microbiology & Biotechnology (IMBT) for bioindustry development

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Tokyo. 23 Feb.2010



Content

- **Establishment of IMBT**
- **NITE,Japan & IMBT,VNU, Vietnam cooperation project is important factor for building up capacity of VTCC, IMBT.**
- **Current activities of IMBT**

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Priority policy for biotechnology

- **Policy**
- **Budget (equipment & abroad training)**
- **Fund for R-D**

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Some Government's directives

- **Directive No18/ND-CP**: National strategy for BT to 2010 (13/4/1993)
- Directive No. 50-CT/TW : Development and application of biotechnology to industrialization and modernization of the country (3/2005)
- **Directive No 115/CP-Ttg**: Management of organization for Science and Technology (6/2006)
- **Directive 80/ND-CP** : Supporting Spin off development (5/2008)

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Annual Budget

- **Before 1993: 200 000 USD**
- **1994-2003: around 2-4 Millions USD**
- **2004-up to Date: around 25-50 Millions USD**

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The need of NBRC for Bioindustry

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Establishment of IMBT

10/1996: Centre of Biotechnology Establishment .
5/2007 : Institute of Microbiology & Biotechnology
(Act 661/QĐ-TTg)

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Mission

- Conducting fundamental research , application, education and consultant in the fields of biotechnology and microbiology
- Development and technology tranfering for novel bioproducts
- International collaboration for conducting Msc and PhD courses in biotechnology

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MANPOWER & INFRASTRUCTURE

Facility & Equipment: 3 millions USD

Lab. Area:

1000 square meters

Research staff: 42

Professors: 04,

Dr. Biology: 08

MSc: 07

BSc: 17

Admin. staff: 06

PhD & MSc students: 6



Equipment:

For analytical work

- Conventional chromatography and FPLC, HPLC systems

- Multi-function UV-VIS spectrophotometers

For molecular biology work

- 1D & 2D electrophoresis apparatuses

- PCR machines

- Automatic sequencing machine (ABI 3.100 Avant)

- DNA gel apparatuses

- Freeze - centrifuges

For microbiology work

- Incubators, incubation shakers, fermentors

- Deep freezers, culture-boxes

- High-quality microscopes

- Freeze-dryers, Freezing room

-etc.

Fermentation pilot lab.

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**NITE, Japan & IMBT, VNU, Vietnam
cooperation project
is
an important factor
for
building up capacity of VTCC, IMBT**

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Starting points (2003)

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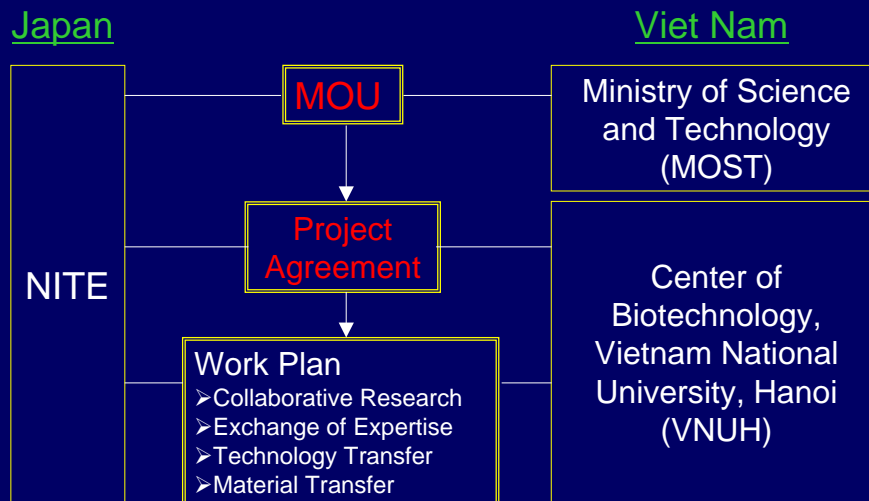
**Signing of Memorandum of Understanding (MOU)
between the Ministry of Science and Technology (MOST) of Viet Nam
and the National Institute of Technology and Evaluation of Japan
for the Joint Research Program on Conservation and Sustainable Use of
Biological Resources**

Signing for MOU between
Dr. Le Minh Sat, Vice
Director General of
Department of Science and
Technology, MOST, and
Mr. Masahiro Miyazaki,
Director General of
Department of
Biotechnology, NITE, on
15 March 2004, Kisarazu,
Chiba, Japan



The project : "Taxonomic and Ecological Studies of Microorganisms in Vietnam and the Utilization" was started in April 2004

Agreement on a collaborative work with Viet Nam



Objectives

Overall objective:

Buiding up capacity of VTCC in culture collection management

Specific objectives:

- *Technology transfer*
- *Manpower development*
- *VTCC image*
- *Benefit sharing (utilization and publication)*
- *Mutual understanding*

Technology transfer

- Sampling
- Isolating
- Identification
- Reservation
- Documentation
- Antibiotic screening

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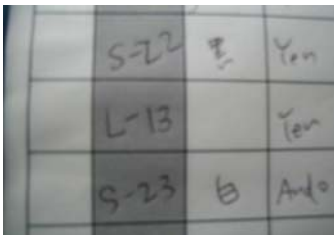
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Work flow of the project



Identification

Sampling



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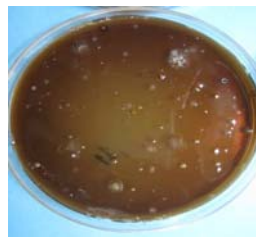
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Isolation

Microbes	Method
Filamenous fungi (8 methods)	Dilution met., UV radiation met., Aeration met., Surface sterile met., Moisture chamber met., Skeman'micromenipulator met., Diriec isolation met., Washing met.,
Actinomyces (3 methods)	SDS-YE method for general actinomycetes RC method for motile actinomycetes DH method for isolation of Streptomyces

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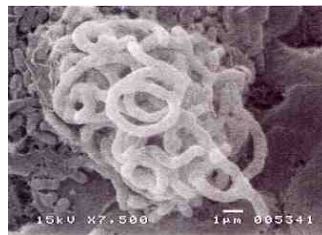
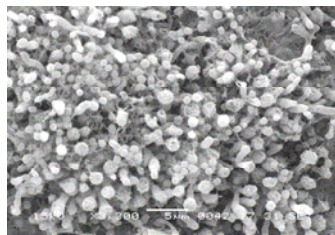
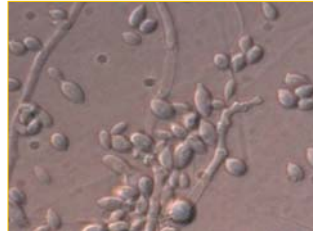
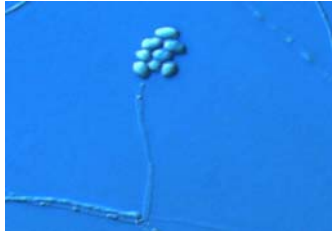
Identification

- **Observation**
 - Normal light microscopy
 - Scanning Electronic Microscope (SEM)
 - Fluorecent light microscopy
- **Molecular techniques**
 - DNA sequencing(18s,16s,ITS,D1D2 ,23s rDNA genes)
 - DNA hybridization
- **Chemotaxonomy techniques :**
 - Analysing menaquinone, ubiquinone, cell wall sugars, faty acids
- **Phylogenetic construction:**
 - Homologous search (BLAST)
 - Phylogenetic tree construction (Clustal ,Phylip,Treview)

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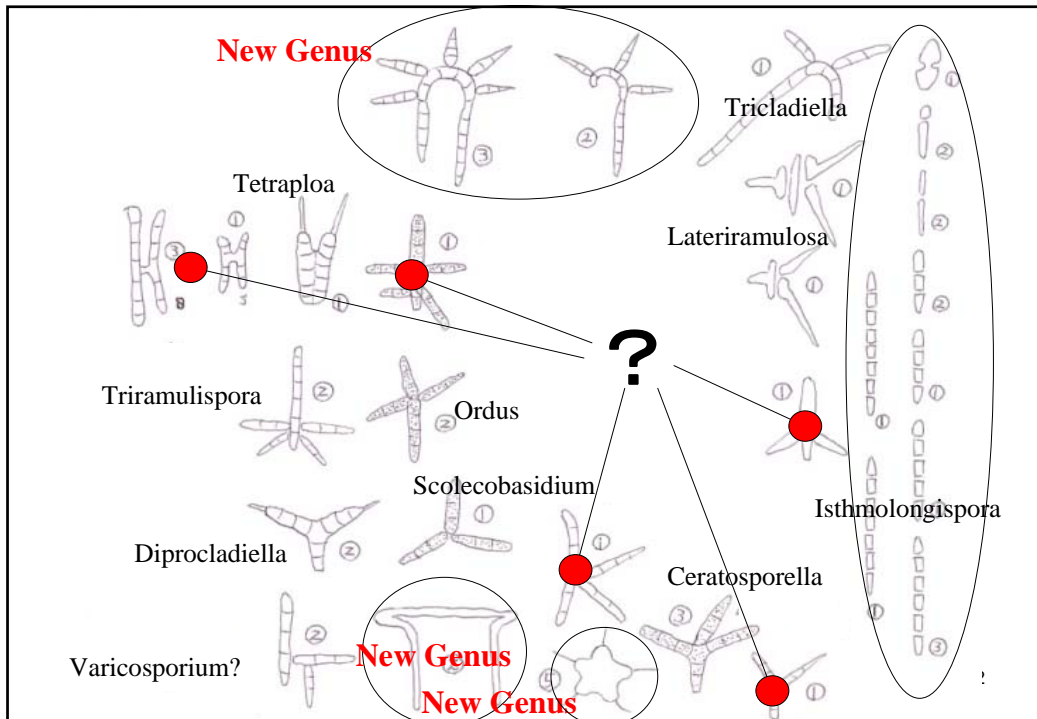
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Observation

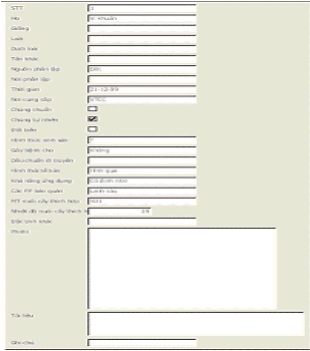


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Documentation



Culture data

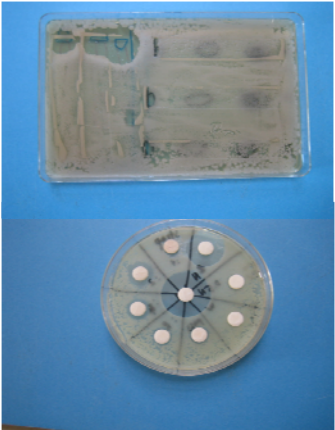
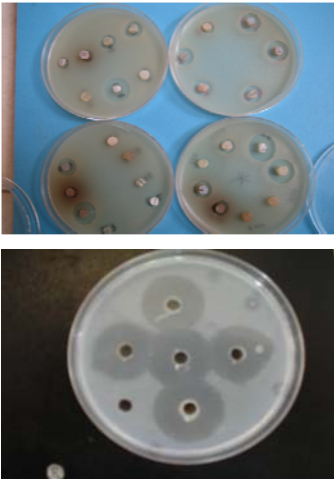


VTCC website

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Antibiotic screening



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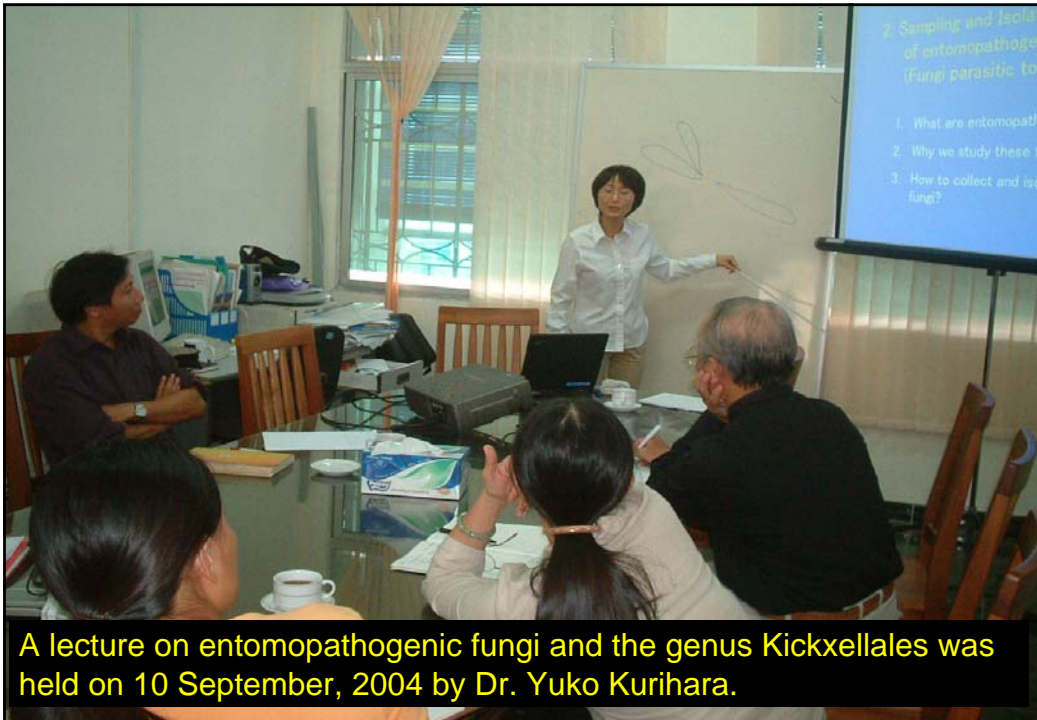


Manpower development

- 12 visits (Scientists and researchers) from VTCC to NITE (1-2 months)
- 6 visits of scientists to attended annual ACM meeting (I,II, III,IV,V)
- Conducting 14 Technical training workshops at IMBT for a number of 120 Vietnam participants
- Annual project workshops (2004-2009)

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ACM-6. Hanoi 29-31 Nov.2009



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Image of VTCC



- *Up-grade quality:*
Number /isolates/documented
- Daily access visiting VTCC homepage:30-50
- *Domestic Recognised and requested for servicing,deposit,distribution*
- *International recognized:*
visit,deposit, distribution
- *Member of WFCC:*
<http://wdcn.nig.ac.jp/hpcc.htm>

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[VTCC/ WDCM933/](http://vtcc.wdcm933.com) Vietnam Type Culture Collection

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Benefit sharing (utilization and publication)

- Number of 1200/2000 sequences of isolates
- 2 paper published, 1 submitted and 3 manuscripts
- Starting biomass projects (2009-2011)

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Mutual understanding



- 12 visits of VTCC members to Japan (1-2 months periods)
- 70 visits of NITE to Vietnam (3-7days)
- 6 ACM visits to Asian countries (Thailand, Indonesia, China, Korea)

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- Briefly introduction to current activities of Institute of microbiology and biotechnology (IMBT)

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VIETNAM NATIONAL UNIVERSITY, HANOI
Institute of Microbiology & Biotechnology



Establishment :
May , 2007

Address:
E2, 144 Xuan Thuy
Cau Giay,
Hanoi, Vietnam
Tel: +84 43 768 0907
Fax: +84 43 768 0907

Website: <http://www.biotechvnu.edu.vn>

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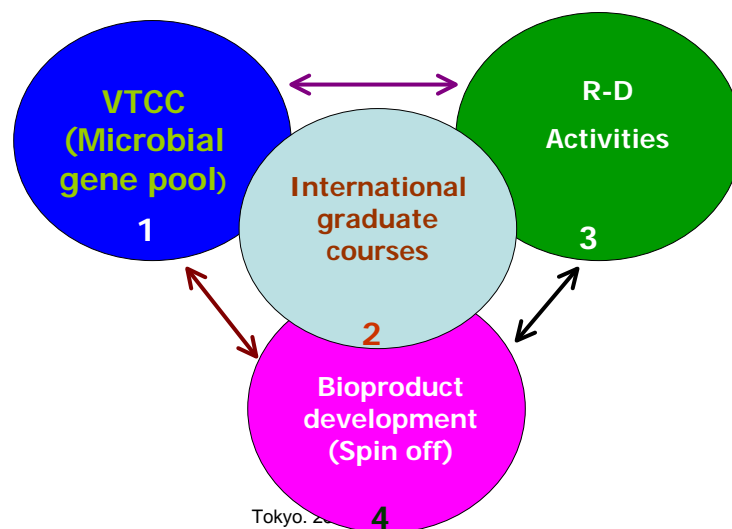
Main activities

- Microbial Diversity
- Enzyme & protein works
- Bioactive compounds from microbes
- Applications of Molecular biology
- Bio-product Development
- Graduate Training (M.sc, PhD)
- International Colaboration

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4 Main divisions



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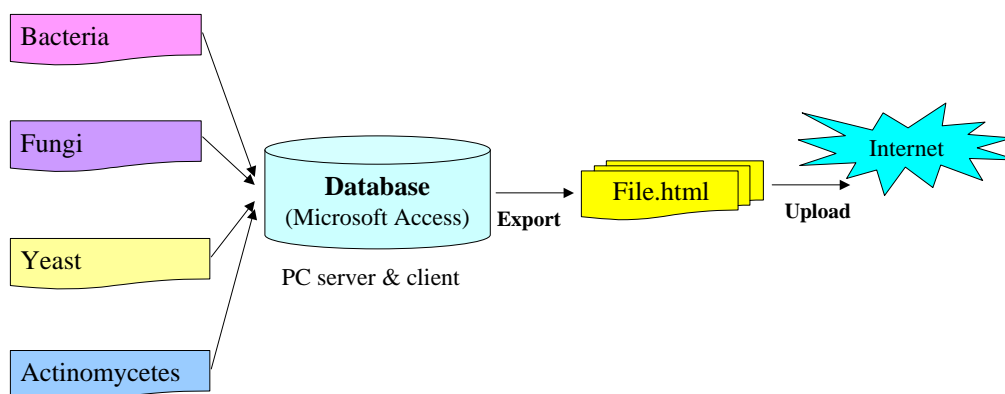
VTCC

- Enrichment (isolation, identification)
- Maintaining
- Distribution

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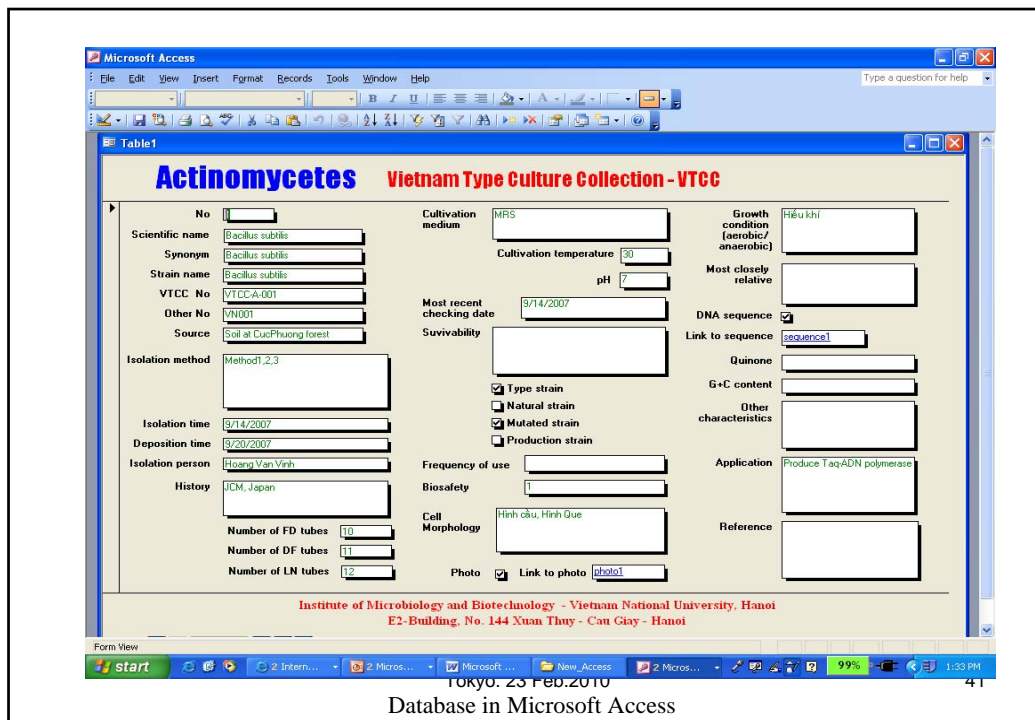
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Database management of VTCC



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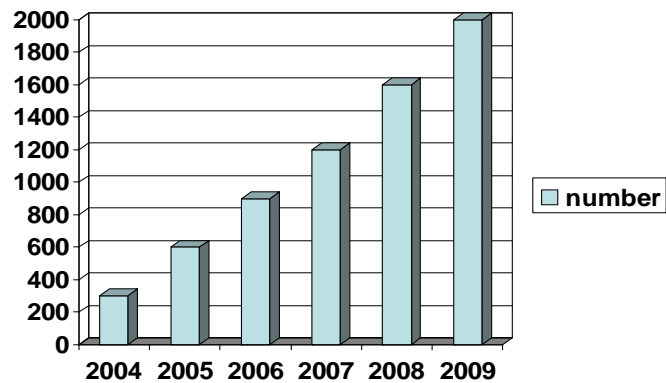
Enrichment of the cultures

Microbe	2004	2005	2006	2007	2008	2009
Aerobic bacteria	500	552	612	700	900	950
Anaerobic bacteria	-	-	-	-	-	50
Actinomyces	425	500	1023	1634	2108	3500
Yeast	381	470	523	643	780	850
Filamentous fungi	700	1314	1723	2123	2681	3000
Cell lines, plasmids	18	20	21	21	24	28
Total	2024	2856	3902	5121	6469	8378

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Documented cultures



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Some bioproduct and applications

Bioproduct	Application	Customer
Taq ADN Polymerase	for PCR and DNA finger printing	5 Molecular labs. In Hanoi, Ho Chi Minh cities
T4-ADN ligaza	for cloning and ADN modification	3 Molecular labs. In Hanoi, Ho Chi Minh cities
Digestive multi-enzymes	for animal feed	National Institute for animal husbandry
probiotic	For animal feed	National Institute for animal husbandry
Microbial preparation for environmental pollution treatment	composting and producing microbial fertilizers from urban celulosic waste	Hue and Ho Chi Minh Cities

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VTCC-Y- 0826

[Ask a question about this strain](#)

VTCC No.	VTCC-Y-0826
Scientific Name	<i>Rhodospiridium paludigenum</i>
Type Strain	
History	VTCC
Other No.	
Cultivation Medium	022
Cultivation Temp.	25 C
Source of Isolation	Decayed Leaves
Applications	
Sequences	26S rDNA
References	



Cells of strain No. VTCC-Y-0826



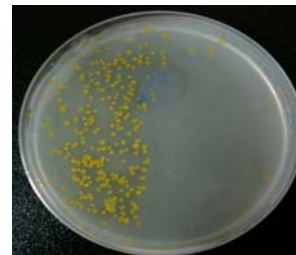
Colony of strain No. VTCC-Y-0826

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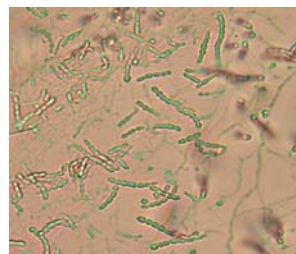
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VTCC-A- 1723 (VN07-A-0345)

VTCC No.	VTCC-A-1723
Scientific Name	<i>Catellatospora</i> sp.
Type Strain	
History	VTCC
Other No.	
Cultivation Medium	023
Cultivation Temp.	30 C
Source of Isolation	Soil
Applications	
Sequences	16S rDNA
References	



Strain No. VN07-A-0345



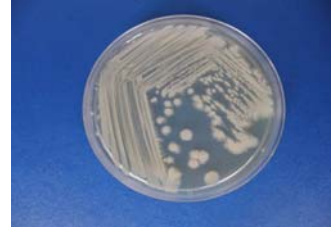
Conidiophore and spores of strain No. VN07-A-0345

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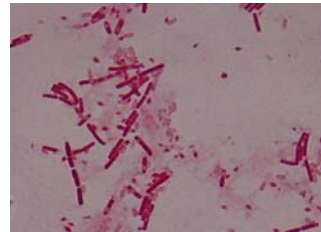
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VTCC-B-557

VTCC No.	VTCC-B-557
Scientific Name	<i>Bacillus</i> sp.
Type Strain	
History	VTCC
Other No.	
Cultivation Medium	014
Cultivation Temp.	30 C
Source of Isolation	Soil
Applications	Kills insect
Sequences	16S rDNA
Reference	



Colony of strain No. VTCC-B-557

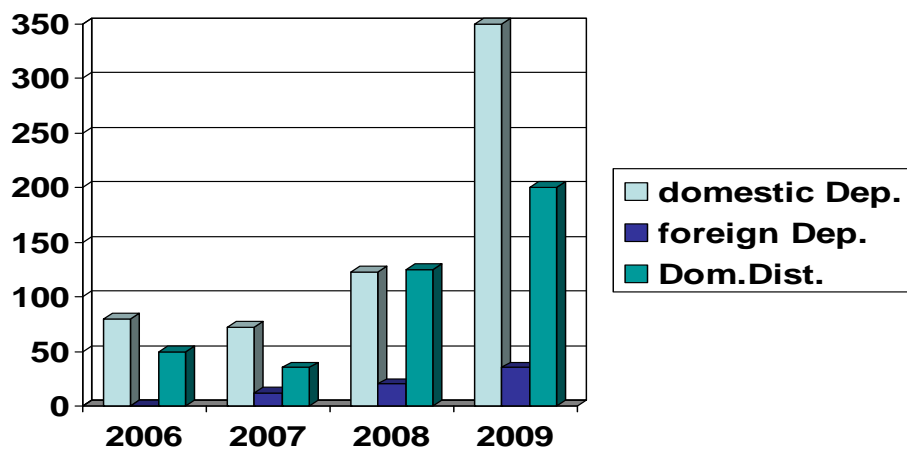


Cells, endospores and parasporal crystals of Strain No. VTCC-B-557

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Deposit and distribution



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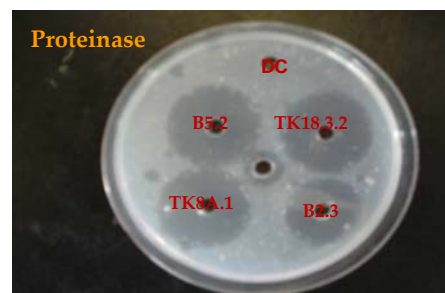
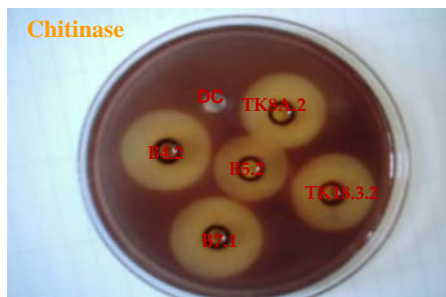
R-D activities

- Screening bioactive compounds from microbes (enzymes, antifungi, antibacteria and protease inhibitor)
- Improvement of industrial microbes (enzymes, antimicrobes :phytase, protease, nisingnamycin, natamycin)
- Valuable recombinant proteins (T4 ligase, Taq polymerase, RT) for diagnostics

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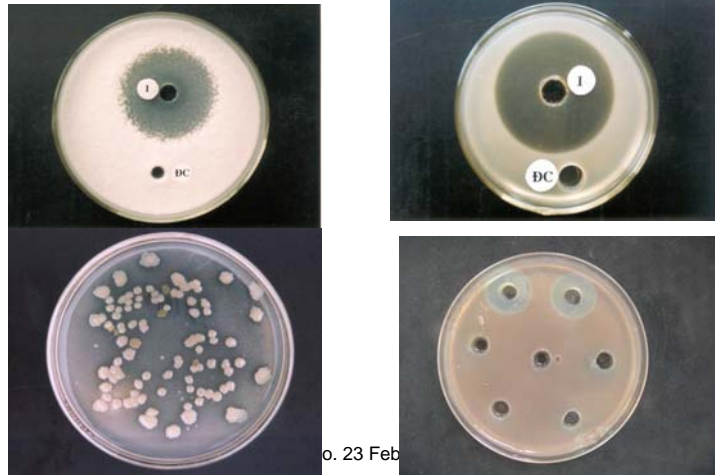
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Screening for enzyme producers



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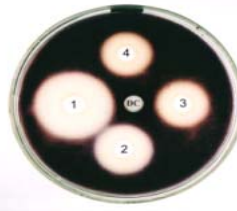
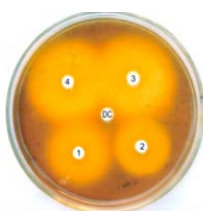
Screening bioactive compound against fungi and bacteria



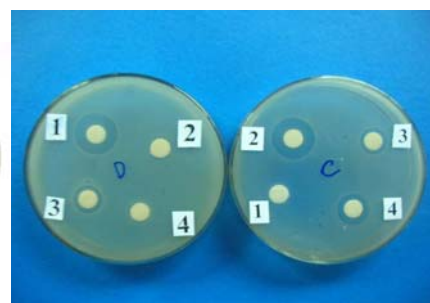
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Screening for probiotic bacteria



Enzyme activity



Anti harmful bacteria
(*Salmonella*, *Shigella*, *E.coli*)

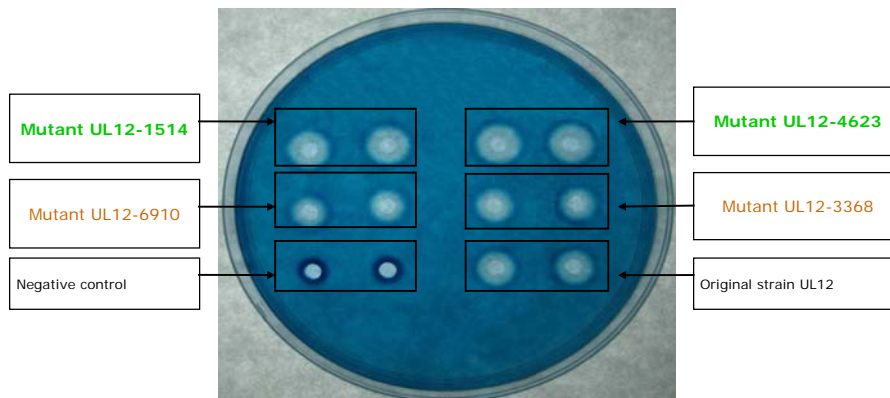
Screening criteria:

- Tolerant to intestinal condition (Low pH, bile salt, temperature)
- Anti harmful bacteria (lactic bacteria)
- Enzyme producers
- Co-existing

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IMPROVING ACTIVITIES OF ENZYME



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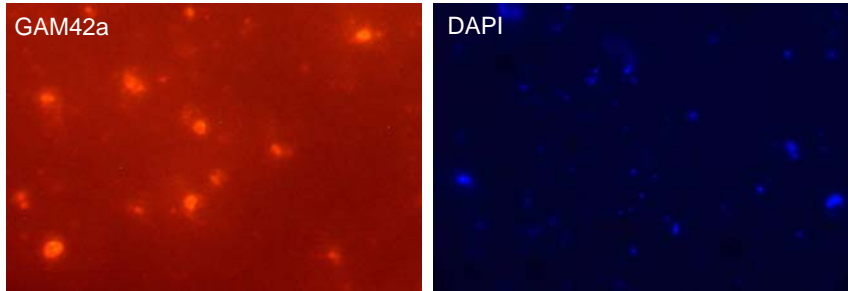
Some projects on going

- Development process for enzymatic production for animal feed.
- Enzymatic process for producing chitosan oligomers
- Development of animal probiotic
- Production of L-lactic from cassava
- Bioremediation of dioxin contaminated soils

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FISH for studying diversity of bacteria from dioxin contaminated soil in Danang Airport



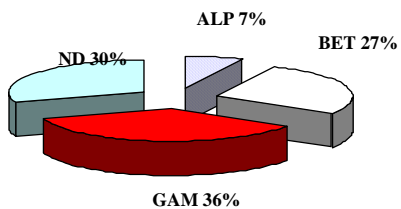
FISH probes:

- | | |
|--------|----------------------------------|
| ALP968 | α - <i>Proteobacteria</i> |
| BET42a | β - <i>Proteobacteria</i> |
| GAM42a | γ - <i>Proteobacteria</i> |

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Diversity of bacteria from dioxin contaminated soil



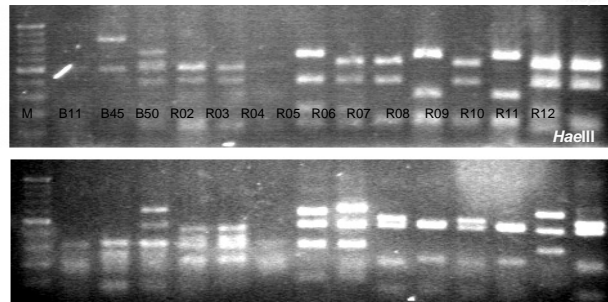
FISH probes:

- ALP968 α - *Proteobacteria*
- BET42a β - *Proteobacteria*
- GAM42a γ - *Proteobacteria*

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Diversity of 14 isolates obtained from dioxin contaminated soils by ARDRA analysing

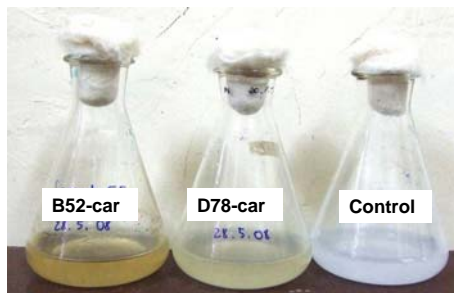


Using MspI and HaellI RE for ARDRA analysing

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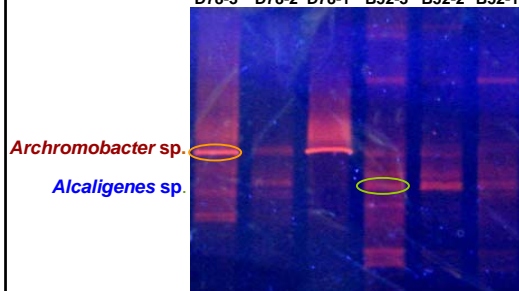
DGGE analysis of carbazol-degrading bacteria



Enrichment of carbazol-degrading bacteria from sample B52-Car and D78-car

D78-3 D78-2 D78-1 B52-3 B52-2 B52-1

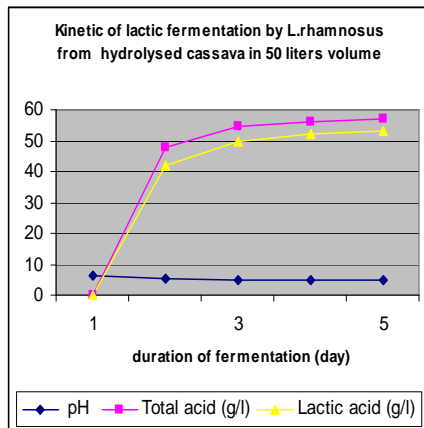
PCR-DGGE analysing of rADN 16s



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L-lactic fermentation from cassava



The result showed that when using strain *L.rhamnosus* for L-fermentation from the hydrolysed cassava powder (equally to 80 g/l reducing sugars in 50 liter fermenter), the amount of L-lactic acid obtained is about 53 g/l equally to the yield of 66.3 %.

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Some results from field test

- On piglets
- On chicken

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On piglets

Indicators	Negative *	Positive*	Exp	Compare to Negative
Growth rate (gam/pc/day)	396	454	462	Increase by 16.7%
Yield (gam feed/gam of weight)	1.53	1.39	1.42	Reduced by 7.2%
Diarrhea rate (case)	254	135	175	Reduced by 31%

Piglets: 21 days age/weight: 7-8 kg. 24 pcs/case;Exp.Duration: 50 days

- Negative: feed without probiotic or antibiotic
- Positive :feed with antibiotic

• [Source: Dr. Viet. Natl.Inst.Hus.Man.](#)

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On chicken

Indicators	Negative *	Positive*	Exp	Compare to Negative
Growth rate (gam/pc/49 days)	2318	2509	2500	Increased by 7.9%
Yield (gam feed/gam of weight)	2.10	1.92	1.96	Reduced by 6.6%

Chicken:from 1 day age; 25 pcs/case;Exp.Duration: 49 days

- Negative: feed without probiotic or antibiotic
- Positive :feed with antibiotic

• [Source: Dr. Viet. Natl.Inst.Hus.Man.](#)

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Spin off

- Probiotic in production
- Microbial preparation for composting
- Bioproduct for biocontrol

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Post graduate training



Opening ceremony international Master course in biotechnology
The cooperation between VNU, Hanoi and Liege Univ.Belgium

(Feb.2008)

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