

# ICGEB

An International Organisation in  
the United Nations System



80+ Signatory States, 60+ Member States, 3 Components:  
Trieste (Italy) - New Delhi (India) - CapeTown (South Africa)  
and a network of 40+ Affiliated Centres

Developing knowledge



# The ICGEB mandate



1987-1995  
a special  
project of  
UNIDO



1995-today  
An independent  
international  
organisation

To provide a Centre of  
excellence for research  
and training in molecular  
biology and biotechnology  
addressed to the needs of  
our Member Countries

Science for Development



# ICGEB Board of Governors



## ICGEB-China Regional Research Center Construction Progress

Time	Main Progress
2017.3	RRCs Site Review
2017.5	Demonstration of Construction Plan in Trieste, Italy
2017.9	Signing of Strategic Agreements by Three Parties
2018.5	Approval of RRCs Implementation Plan on 24th ICGEB Session
2018.9	Completion of the Signing of RRCs MOU and the Selection of RRCs Site
2019.1	Preparation for Steering Committee and Scientific Committee
2019.4	Meeting of Steering Committee and Preparatory Meeting of Scientific Committee



# ICGEB Council of Scientific Advisors

- 15 eminent scientists including 1 Nobel Laureate.
- Meet annually to assess the scientific activities of the components.
- Advise the Board on future research priorities.





# The ICGEB 6 instruments of action

1. Cutting-edge scientific research in the laboratories in Trieste, New Delhi and Cape Town
2. Advanced education supported by long- and short-term fellowships for PhD students and post-docs
3. Organise Meetings, Courses and Workshops
4. Provide research grants for scientists in Member Countries
5. Technology transfer to industry for the production of biotherapeutics and diagnostics
6. Scientific Services and advice - Biosafety



# The ICGEB 6 instruments of action

1. Cutting-edge scientific research in the laboratories in Trieste, New Delhi and Cape Town





# The ICGEB 6 instruments of action

1. Cutting-edge scientific research in the laboratories in Trieste, New Delhi and Cape Town – scientists from our Member countries directly collaborate and work with ICGEB scientists.




# International Collaboration and Publication - recent examples:



ARTICLE

## Paracrine effect of regulatory T cells promotes cardiomyocyte proliferation during pregnancy and after myocardial infarction

Serena Zacchigna<sup>1,2</sup>, Valentina Martinelli<sup>3</sup>, Silvia Moimas 



## The PTPN14 Tumor Suppressor Is a Degradation Target of Human Papillomavirus E7

Anita Szalmás,<sup>a,b</sup> Vjekoslav Tomać,<sup>a,c</sup> Om Basukala,<sup>a</sup> Paola Massimi,<sup>a</sup> Suruchi Mittal,<sup>a</sup> József Kónya,<sup>b</sup> Lawrence Banks<sup>a</sup>




## Role of Capsid Anchor in the Morphogenesis of Zika Virus

Jyoti Rana,<sup>a</sup> José Luis Slon Campos,<sup>a\*</sup> Gabriella Leccese,<sup>a</sup> Maura Francolini,<sup>b</sup> Marco Bestagno,<sup>a\*</sup> Monica Poggianella,<sup>a</sup> Oscar R. Burrone<sup>a</sup>

ICGEB hosts scientists from more than 40 countries, collaborating and publishing in an international environment

## Posttranscriptional Regulation of HIV-1 Gene Expression during Replication and Reactivation from Latency by Nuclear Matrix Protein MATR3

Ambra Sarracino,<sup>a</sup> Lavina Gharu,<sup>a\*</sup> Anna Kula,<sup>b,c</sup> Alexander O. Pasternak,<sup>d</sup> Veronique Avettand-Fenoel,<sup>e</sup> Christine Rouzioux,<sup>e</sup> Maryana Bardina,<sup>a</sup> Stéphane De Wit,<sup>f</sup> Moncef Benkirane,<sup>g</sup> Ben Berkhout,<sup>d</sup> Carine Van Lint,<sup>b</sup> 





# Research: Macro-Areas and Groups

## 1. Infectious Diseases (12 Groups)

### PARASITIC DISEASES

Frank Brombacher (CT)  
Pawan Malhotra (ND)  
Asif Mohmmmed (ND)  
Renu Tuteja (ND)  
Dinkar Sahal (ND)  
Amit Sharma (ND)  
Neel Sarovar Bhavesh (ND)



### VIROLOGY

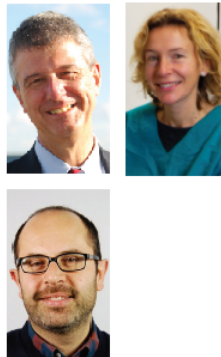
Alessandro Marcello (TS)  
Sujatha Sunil (ND)  
Anmole Chandele (ND)  
Arockiasamy Arulandu (ND)  
Oscar Burrone (TS)



## 2. Non-Communicable Diseases (15 Groups)

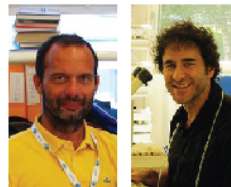
### CARDIOVASCULAR DISORDERS

Mauro Giacca (TS)  
Serena Zacchigna (TS)  
Francesco Loffredo (TS)



### NEUROBIOLOGY

Emanuele Buratti (TS)  
Fabian Feiguin (TS)



### IMMUNOLOGY

Dinakar Salunke (ND)  
Federica Benvenuti (TS)  
Dhiraj Kumar (ND)

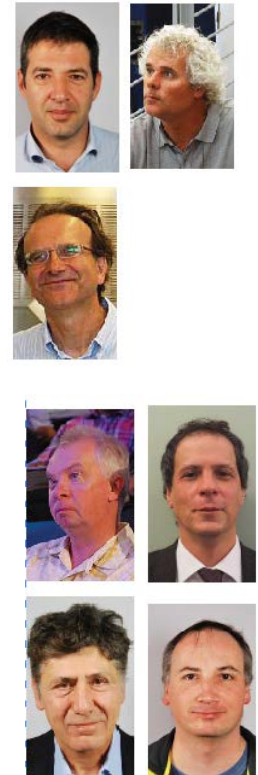


### CANCER

Lawrence Banks (TS)  
Luiz Zerbini (CT)  
Dimitar Efremov (TS)  
Mike Myers (TS)

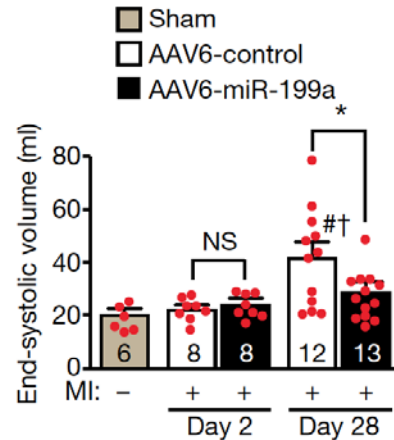
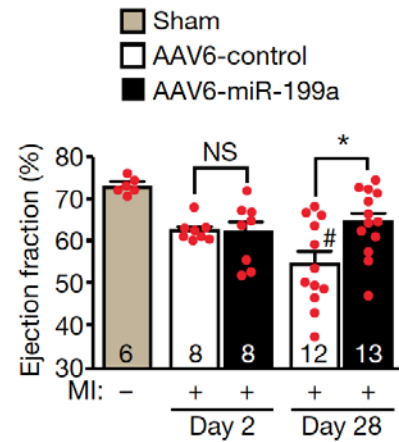
### MOLECULAR GENETICS

Francisco Baralle (TS)  
Andrés Muro (TS)  
Franco Pagani (TS)

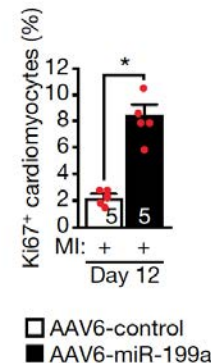
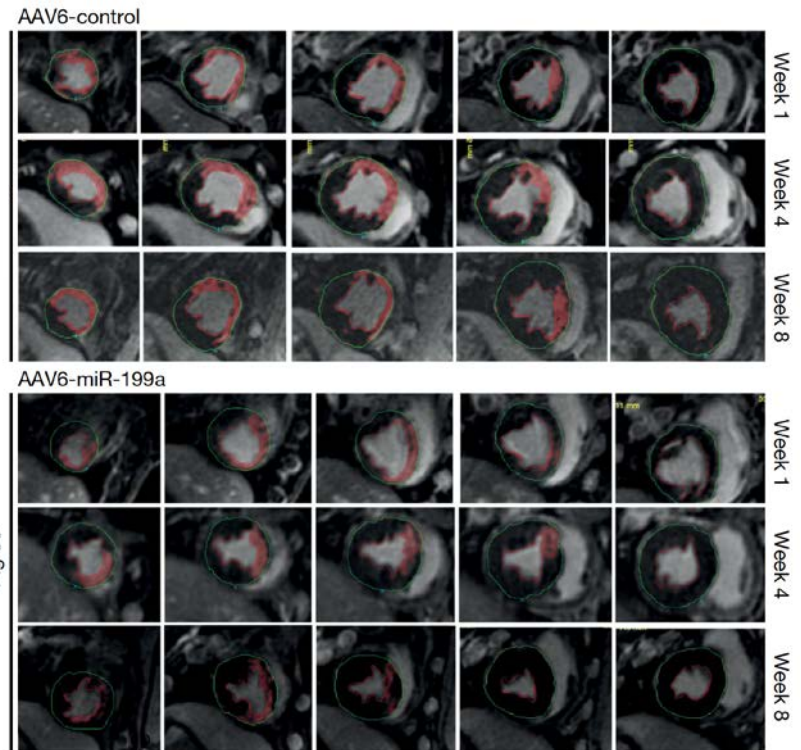
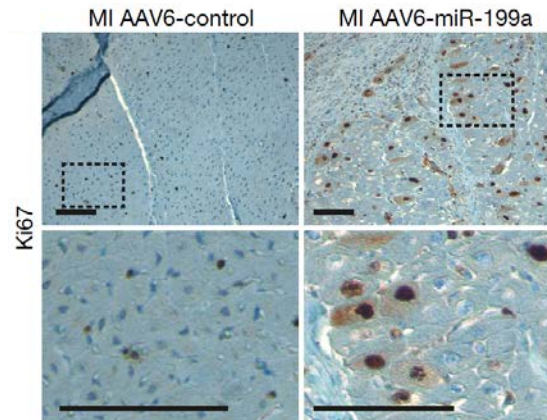
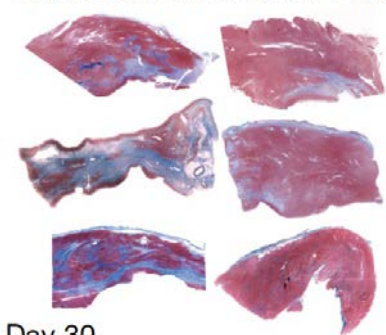


## MicroRNA therapy stimulates uncontrolled cardiac repair after myocardial infarction in pigs

Khatia Gabisonia<sup>1,8</sup>, Giulia Prosdocimo<sup>2,8</sup>, Giovanni Donato Aquaro<sup>3,8</sup>, Lucia Carlucci<sup>1</sup>, Lorena Zentilin<sup>2</sup>, Ilaria Secco<sup>2,4</sup>, Hashim Ali<sup>2,4</sup>, Luca Braga<sup>2,4</sup>, Nikoloz Gorgodze<sup>1</sup>, Fabio Bernini<sup>1</sup>, Silvia Burchielli<sup>3</sup>, Chiara Collesi<sup>2,5</sup>, Lorenzo Zandonà<sup>5</sup>, Gianfranco Sinagra<sup>5</sup>, Marcello Piacenti<sup>3</sup>, Serena Zacchigna<sup>5,6</sup>, Rossana Bussani<sup>5</sup>, Fabio A. Recchia<sup>1,3,7,9\*</sup> & Mauro Giacca<sup>2,4,5,9\*</sup>



AAV6-Control AAV6-miR-199a



- An AAV6 vector expressing the pro-proliferative miR-199a stimulates cardiac regeneration when administered after myocardial infarction in pigs
- In the long term, miR-199a expression needs to be controlled to avoid unwanted effects

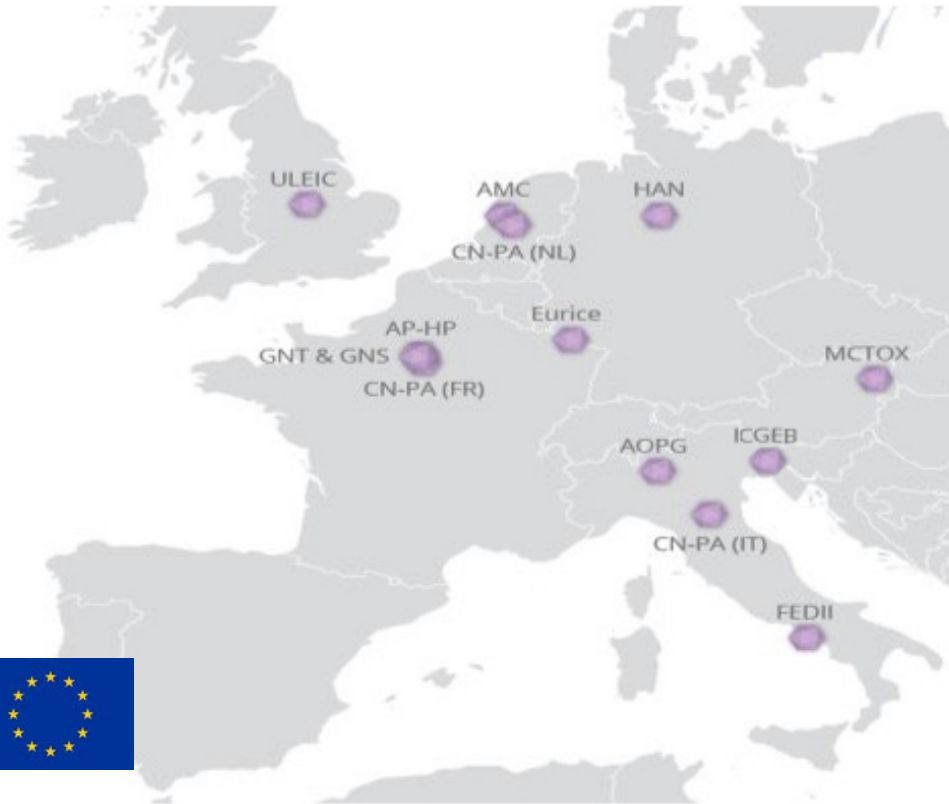


# Mouse Molecular Genetics Laboratory

## AAV8-mediated liver gene therapy for Crigler- Najjar Syndrome



**First patient in Europe treated with AAV-mediated gene-  
therapy for a genetic disease of the liver**



**F. Mingozzi - Genethon, Evry FRANCE**

Hopitaux de Paris, Paris FRANCE

Academisch Medisch Centrum, Amsterdam, THE  
NETHERLANDS

**ICGEB, Trieste ITALY**

Papa Giovanni XXIII Hospital, Bergamo ITALY

Università degli studi di Napoli Federico II, Naples ITALY

Medizinische Hochschule, Hannover GERMANY

Associazione Italiana Crigler-Najjar CIAMI, ITALY

Patients association of the Netherlands

Association Française de Crigle-Najjar, FRANCE

Selecta Bioscience, Watertown USA

University of Leicester, Leicester UK

MC Toxicology consulting GMBH, Wien AUSTRIA

EURICE, GERMANY

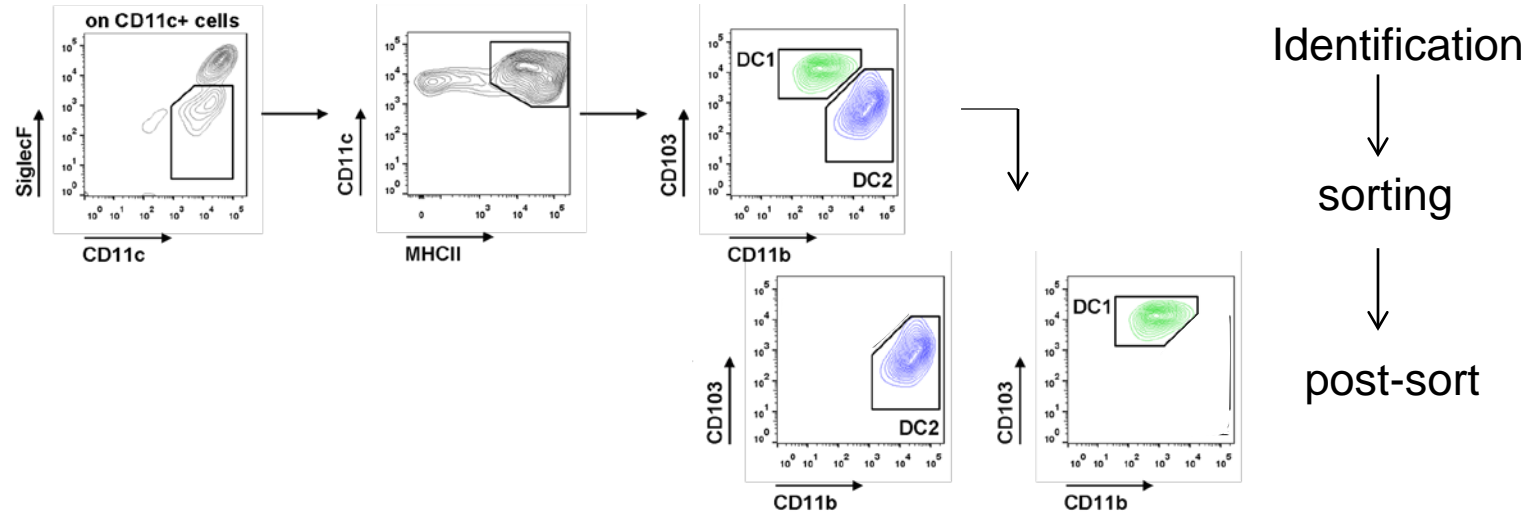
Genosafe, Evry FRANCE

and many others...

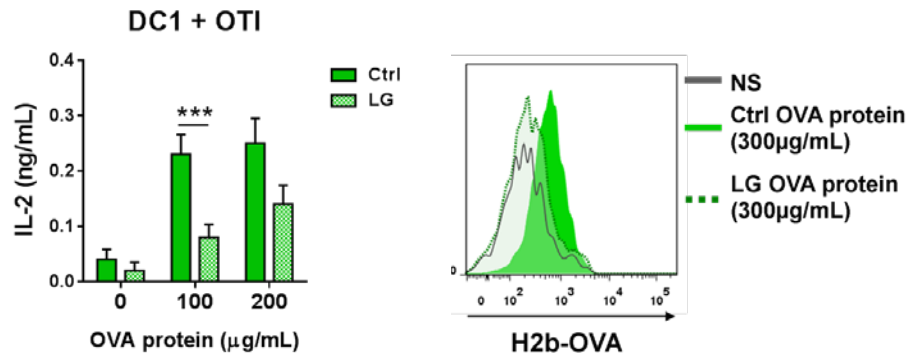


# Cellular Immunology: Identification of mechanisms of immune suppression in lung cancer

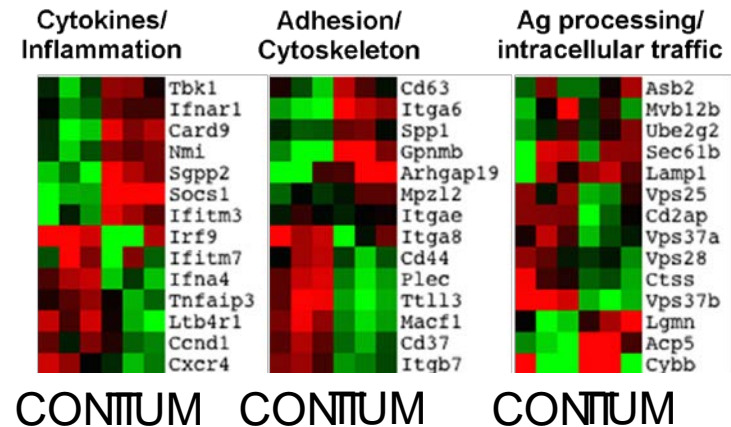
Isolation of rare subpopulation of immune cells in the tumor microenvironment by multicolor flow cytometry and cell sorting



## Functional testing



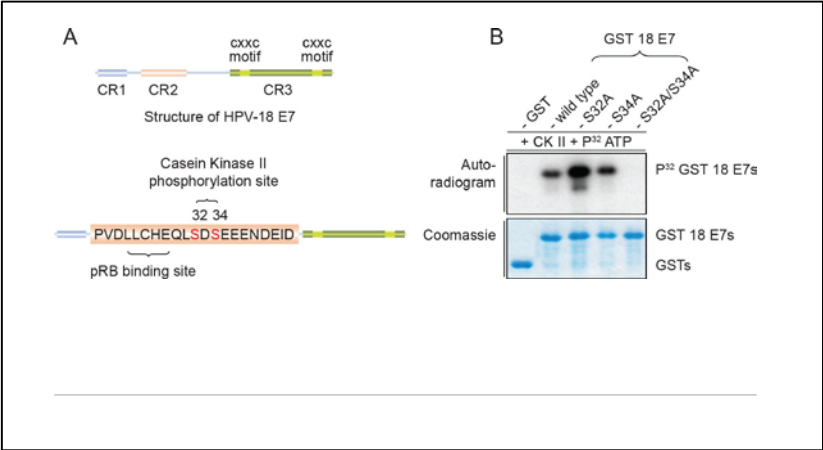
## Gene expression profiles



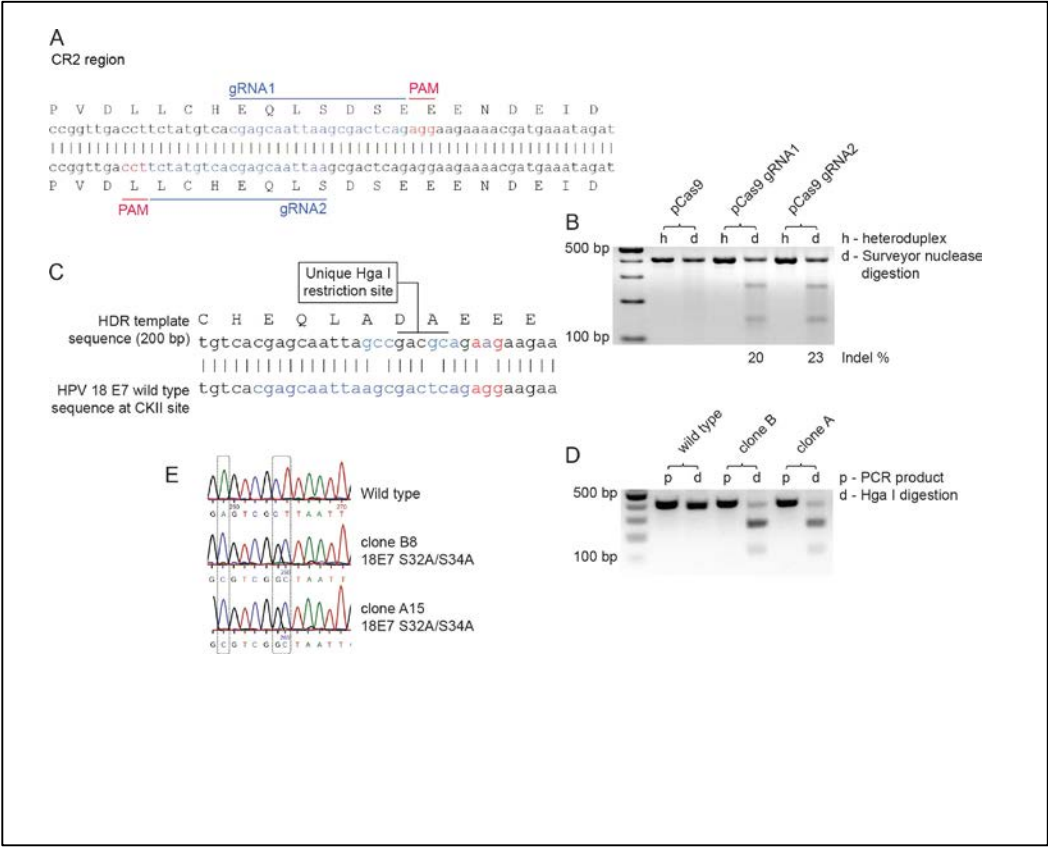


# The HPV-18 E7 CKII phospho acceptor site is required for maintaining the transformed phenotype of cervical tumour-derived cells

Om Basukala<sup>1</sup>



Demonstrates that blocking E7 CKII phosphorylation is a valid therapeutic approach for treatment of HPV-induced malignancy



# Research: Macro-Areas and Groups

## 3. Medical Biotechnology (3)

### BIOSIMILAR DRUGS

*Nataša Skoko (TS)*



### RECOMBINANT DIAGNOSTICS AND VACCINES

*Navin Khanna (ND)*

*Ranjan Nanda (ND)*



## 4. Industrial Biotechnology (7)

### BIOFUELS AND INDUSTRIAL BIOTECHNOLOGY

*Syed Shams Yazdani (ND)*

*Naseem Gaur (ND)*

*Pavan Jutur (ND)*

*Shireesh Srivastava (ND)*

*Shashi Kumar Rhode (ND)*

*Dinesh Gupta (ND)*

*Giuliano Degrassi (Buenos Aires)*



## 5. Plant Biology & Biotechnology (8)

### CROP IMPROVEMENT

*M.K. Reddy (ND)*

*Tanushri Kaul (ND)*

*S. Leelavathi (ND)*

*Vittorio Venturi (TS)*



### BIOTIC AND ABIOTIC STRESS

*Suresh Nair (ND)*

*Neeti Sanan-Mishra (ND)*

*Sneh Lata*

*Singla-Pareek (ND)*

*Denis Obonyo Ndolo (CT)*





# Fungal Enzyme Development at ICGEB, New Delhi



## Breakthrough

- Highly efficient enzyme cocktail for biomass hydrolysis in 2<sup>nd</sup> Gen Bioethanol

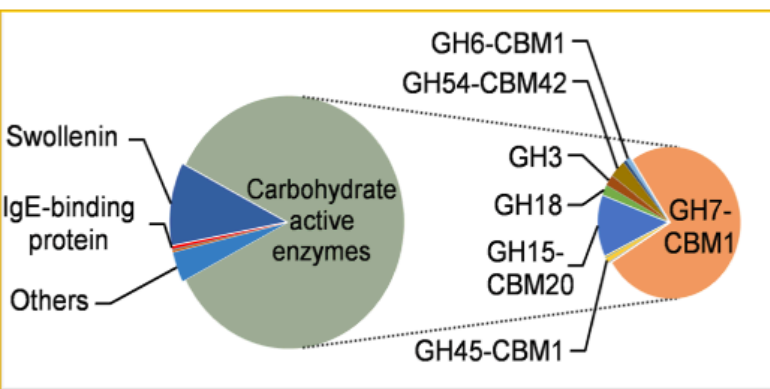
## Advantages

- Bioprospected a new fungal platform and engineered genome to produce high quantity of efficient enzyme
- Fungal enzyme D1Czyme-1 showed enzyme activity better than Novozyme CTec3 by 3<sup>rd</sup> party
- Active in a wide variety of agriculture residues, rice straw, wheat straw, sugarcane, cotton among others

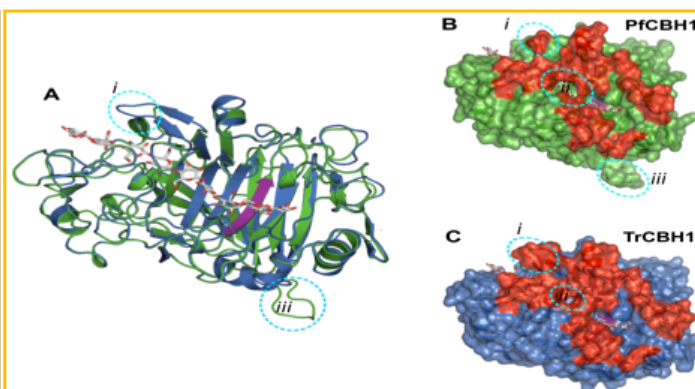
## Where we are

- Process optimized at 20L fermentor
- Further scale-up for commercial production under discussion

## Enzyme Composition



## Structure/Function Superiority



### References:

Yazdani et al.  
1714/DEL/2015 (Indian  
Patent Application)

Yazdani et al. US  
PatentUS2019032037A1  
(Notice for allowance)

Randhawa et al. 2018  
Biotech for Biofuels

Funso et al, 2018 J  
Proteomics; 2015 J  
Proteom Res



# Research: Macro-Areas and Groups

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*Neeti Sanan-Mishra (ND)*

*Sneh Lata*

*Singla-Pareek (ND)*

*Denis Obonyo Ndolo (CT)*



**Research Focus:** Understanding & improving plant tolerance towards stresses.

**Crops:** Rice, Tomato, Cotton

**Abiotic Stress:** Salinity, Drought, Temperature, Oxidative, Osmotic

**Biotic Stress:** Viruses, Insect (rice gall midge), Herbicide

### Objectives:

1. Understanding and improving abiotic stress tolerance in crop plants via genetic modification
2. Generation of superior plant types for durable stress tolerance via gene pyramiding
3. Enhancing yield of crop plants, especially rice, under normal and abiotic stress conditions.
4. Developing marker- and reporter-free transgenic rice and their assessment under contained field trials for salinity stress tolerance.
5. Translation research with ultimate goal of providing stress tolerant rice plants to farmers.
6. Understanding insect-plant interaction, especially rice-gall midge interaction.
7. Understanding the regulatory role of miRNAs in plant development and stress



DR. M.K. REDDY



DR. S. NAIR



DR. S. SINGLA-PAREEK



DR. N.S. MISHRA



DR. T. KAUL



S. Leelavathi

**DISEASED  
PLANTS**



**PATHOBIOME**

# Plant Microbiomes Studies

1. Pathogen-Cooperators
2. Beneficial Bacteria as Probiotics

**HEALTHY  
PLANTS**



**MICROBIOME**

**Identify** Pathogen Cooperators & Beneficial Bacteria

Rice bacterial endophytes: isolation of a collection,  
identification of beneficial strains and microbiome  
analysis

Iris Bertani,<sup>1</sup> Pamela Abbruscato,<sup>2</sup> Pietro Piffanelli,<sup>2</sup>  
Sujatha Subramoni<sup>1\*</sup> and Vittorio Venturi<sup>1\*</sup>  
<sup>1</sup>International Centre for Genetic Engineering and  
Biotechnology, Padriciano 85, 34149 Trieste, Italy  
<sup>2</sup>Plasco Tecnologico Padano (PTP) via A. Einstein  
Loc. Codazzo, 26900 Lodi, Italy

In a thorough microbiome study which highlights the  
enrichment taking place in the endosphere compartment  
(Lundberg et al., 2012). An important issue is how can  
endophytes colonize in high numbers plant tissues with-  
out eliciting a strong defense response or plant damage.  
It is likely that there are communication pathways in  
endospheres and in rhizosphere which are a harbinger of

**indigo**

**Interreg** 

  
Ministero degli Affari Esteri  
e della Cooperazione Internazionale  
FARNESINA





# Scientific Output

## ICGEB Publications from 2010-2018 include articles in:

Nature, Nature Medicine, Nature Cell Biology, Nature Rev. Cancer,  
Nature Comm., Cell Host & Microbe,  
PLoS Pathogens, EMBO J., Genes Dev., Trends Biochem. Sci.,  
Proc. Natl Acad. Sci. USA, J Exp. Med, Blood

	Trieste	New Delhi	Cape Town	Total ICGEB
Total publications 2017	91	97	17	205
Total IF	492	329	158	979
IF/Publication	5.4	3.4	9.3	4.8
Publication/year	87.1	115.0	19.6	221.7

**Citations Trieste: 2015 – 5858; 2016 – 5587; 2017 - 5952**

ICGEB Group Leaders are Editors or Editorial Board members  
on more than 60 international journals



# The ICGEB 6 instruments of action

1. Cutting-edge scientific research in the laboratories in Trieste, New Delhi and Cape Town
2. Advanced education supported by long- and short-term fellowships for PhD students and post-docs



# ICGEB Academic Programmes

PhD Fellowships

Postdoctoral  
Fellowships

Short-term PhD

Short-term Postdoc

SMART Fellowships

ICGEB-DIC-MOST  
International Fellowship  
Programme

 **ICGEB** International Centre for Genetic Engineering and Biotechnology | Developing Knowledge

The Arturo Falaschi Fellowship Programme

## PhD Fellowships



*Arora and Neeky, PhD Students - ICGEB New Delhi, INDIA*

Trieste ITALY	New Delhi INDIA	Cape Town SOUTH AFRICA
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**ICGEB** offers competitive **PhD Fellowships** in **Life Sciences** to highly motivated scientists wishing to pursue PhD research studies in a **world-class scientific environment**.

### Fellowships include:

- Participation in a top-class research programme
- Access to state-of-the-art facilities
- Participation in ICGEB Meetings, Seminars and Journal Clubs
- A competitive stipend, travel provision plus full coverage of tuition fees and health insurance

**Closing date for application:**  
**31 March 2020**

Nationals from **ICGEB Member States** are encouraged to apply

Afghanistan, Algeria, Argentina, Bangladesh, Bhutan, Bosnia and Herzegovina, Brazil, Bulgaria, Burkina Faso, Burundi, Cameroon, Chile, China, Colombia, Costa Rica, Côte D'Ivoire, Croatia, Cuba, Ecuador, Egypt, Eritrea, Ethiopia, Hungary, India, Iran, Iraq, Italy, Jordan, Kenya, Kuwait, Kyrgyzstan, Liberia, Libya, Malaysia, Mauritius, Mexico, Montenegro, Morocco, Namibia, Nigeria, North Macedonia, Pakistan, Panama, Peru, Qatar, Republic of Moldova, Romania, Russian Federation, Saudi Arabia, Senegal, Serbia, Slovakia, Slovenia, South Africa, Sri Lanka, Sudan, Syrian Arab Republic, Trinidad and Tobago, Tunisia, Turkey, United Arab Emirates, United Republic of Tanzania, Uruguay, Venezuela, Viet Nam, Zimbabwe

<https://www.icgeb.org/activities/fellowship/>

**ICGEB** Information and Applications:  
ICGEB CRP & Fellowships Unit  
Loc. Padriciano, 99 - 34149 Trieste, ITALY  
Tel: +39-040-3757382/7347  
Email: [Fellowships@icgeb.org](mailto:Fellowships@icgeb.org) | [www.icgeb.org](http://www.icgeb.org)



 **ICGEB** International Centre for Genetic Engineering and Biotechnology | Developing Knowledge

The Arturo Falaschi Fellowship Programme

## Postdoctoral Fellowships



*Manendra, Postdoc with Francesca and Luis, Phds - ICGEB Trieste, ITALY*

Trieste ITALY	New Delhi INDIA	Cape Town SOUTH AFRICA
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**ICGEB** offers competitive **Postdoctoral Fellowships** in **Life Sciences** to highly motivated scientists wishing to pursue post-doctoral research in a **world-class scientific environment**.

The Fellowships comprise a very **attractive package** including stipend, travel provision, health insurance and additional benefits.

The most successful fellows will also be eligible to apply for ICGEB **Early Career Research Grants** to support their **own research** programmes as young PIs upon return to an ICGEB Member State.

**Closing dates for applications:**  
**31 March and 30 September 2020**

Nationals from **ICGEB Member States** are encouraged to apply

Afghanistan, Algeria, Argentina, Bangladesh, Bhutan, Bosnia and Herzegovina, Brazil, Bulgaria, Burkina Faso, Burundi, Cameroon, Chile, China, Colombia, Costa Rica, Côte D'Ivoire, Croatia, Cuba, Ecuador, Egypt, Eritrea, Ethiopia, Hungary, India, Iran, Iraq, Italy, Jordan, Kenya, Kuwait, Kyrgyzstan, Liberia, Libya, Malaysia, Mauritius, Mexico, Montenegro, Morocco, Namibia, Nigeria, North Macedonia, Pakistan, Panama, Peru, Qatar, Republic of Moldova, Romania, Russian Federation, Saudi Arabia, Senegal, Serbia, Slovakia, Slovenia, South Africa, Sri Lanka, Sudan, Syrian Arab Republic, Trinidad and Tobago, Tunisia, Turkey, United Arab Emirates, United Republic of Tanzania, Uruguay, Venezuela, Viet Nam, Zimbabwe

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Email: [Fellowships@icgeb.org](mailto:Fellowships@icgeb.org) | [www.icgeb.org](http://www.icgeb.org)





# Fellows on Board 2018 (101+219 External Fund\*)

## Europe (33+24\*)

Bulgaria (1+1\*)  
Croatia (3+1\*)  
Germany (1\*)  
Hungary (1)  
Italy (18+20\*)  
Poland (2)  
Russia (1)  
Serbia (3+1\*)  
Slovenia (4)

## Africa (22+11\*)

Burkina Faso (1\*)  
Burundi (1)  
Cameroon (4)  
Egypt (4)  
Kenya (3)  
Morocco (1\*)  
Nigeria (8+1\*)  
South Africa (8\*)  
Tanzania (1)  
Tunisia (1)

## Asia (28+183\*)

Bangladesh (4)  
India (12+183\*)  
Iran (1)  
Malaysia (1)  
Nepal (1)  
Pakistan (3)  
Syria (4)  
Turkey (1)  
Viet Nam (1)

## Central & Latin America (18+1\*)

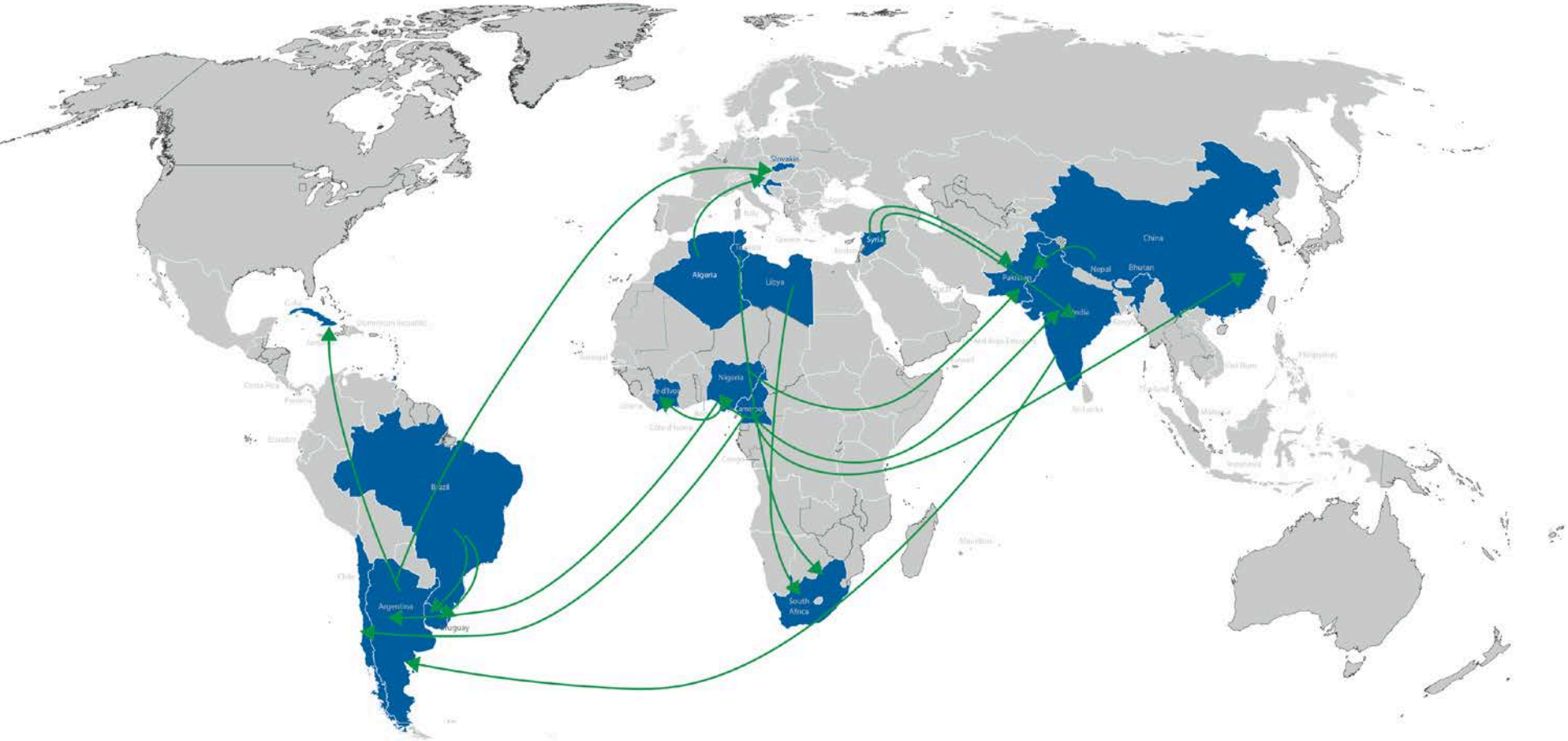
Argentina (5)  
Brazil (3)  
Cuba (3)  
Mexico (1)  
Peru (2)  
Trinidad & Tobago (1)  
Uruguay (1)  
Venezuela (2+1\*)

# The ICGEB 6 instruments of action

1. Cutting-edge scientific research in the laboratories in Trieste, New Delhi and Cape Town
2. Advanced education supported by long- and short-term fellowships for PhD students and post-docs
3. Short term mobility - SMART Fellowships: supports stays of 1-12 months in any other ICGEB Member Country aiding collaboration and tech transfer.



# Mobility SMART Fellowships 2018



South to South mobility of SMART Fellowships awarded and ongoing



# The ICGEB 6 instruments of action

1. Cutting-edge scientific research in the laboratories in Trieste, New Delhi and Cape Town
2. Advanced education supported by long- and short-term fellowships for PhD students and post-docs
3. Organise Meetings, Courses and Workshops



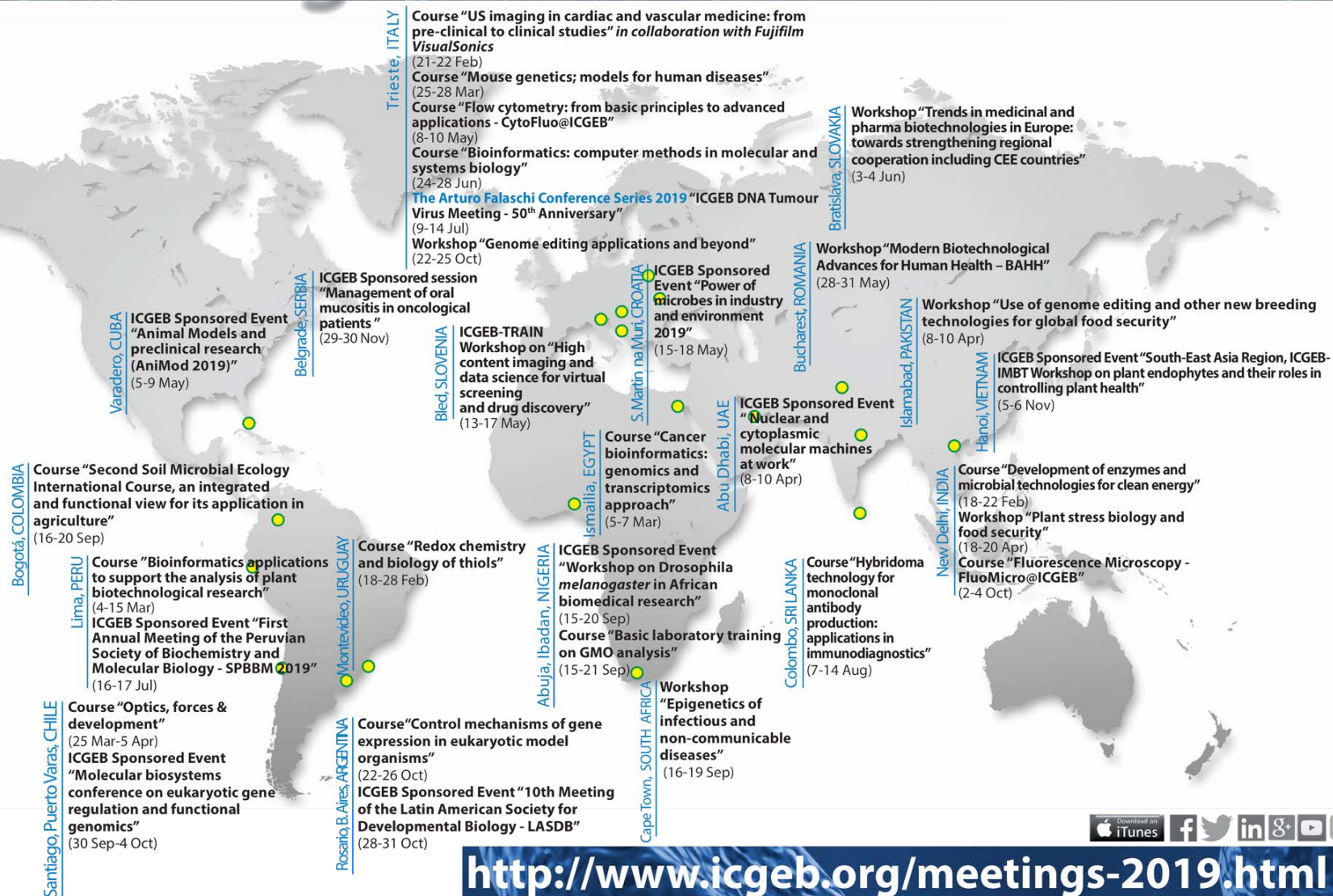


# ICGEB

International Centre for Genetic  
Engineering and Biotechnology

Developing  
Knowledge

# Meetings and Courses 2019



<http://www.icgeb.org/meetings-2019.html>





# ICGEB

International Centre for Genetic  
Engineering and Biotechnology

# Meetings and Courses 2020

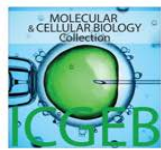


<https://www.icgeb.org/activities/meeting-and-courses/>

# High-quality, on-line Resources and Webinars

- Scientific Collections on iTunes & YouTube
  - 50 Collections and >550 movies; 100k downloads per year in >80 countries

## Podcasts



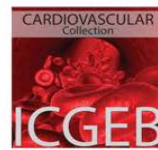
Molecular and Cellular Biology  
ICGEB - Trieste, Italy



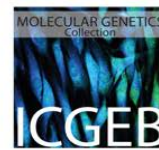
Immunology  
ICGEB - Trieste, Italy



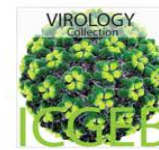
Biotechnology  
ICGEB - Trieste, Italy



Cardiovascular  
ICGEB - Trieste, Italy



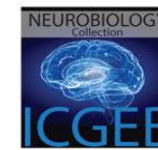
Molecular Genetics  
ICGEB - Trieste, Italy



Virology  
ICGEB - Trieste, Italy



Cancer  
ICGEB - Trieste, Italy



Neurobiology  
ICGEB - Trieste, Italy



Bioinformatics  
ICGEB - Trieste, Italy



Lezioni di Cellule Staminali 2014  
ICGEB, Trieste



Plant Biology  
ICGEB - Trieste, Italy



Lezioni di Terapia Genica 2014  
ICGEB, Trieste



Regenerative Medicine and Gen...  
ICGEB - Trieste, Italy



Rna Processing  
ICGEB - Trieste, Italy



Microbiology  
ICGEB - Trieste, Italy



FluoMicro@ICGEB  
ICGEB, Trieste - Italy





# The ICGEB 6 instruments of action

1. Cutting-edge scientific research in the laboratories in Trieste, New Delhi and Cape Town
2. Advanced education supported by long- and short-term fellowships for PhD students and post-docs
3. Organise Meetings, Courses and Workshops
4. Provide research grants for scientists in Member Countries





# ICGEB

International Centre for Genetic  
Engineering and Biotechnology

Developing  
Knowledge

## ICGEB Research Grants 2019

### CRP - Collaborative Research Programme

ICGEB offers a dedicated source of **funding for outstanding projects** in ICGEB Member States, with the goal of promoting collaboration, training of young scientists and the development of research facilities.

The programme provides support for research activities in **basic life sciences, human healthcare, industrial and agricultural biotechnology and bioenergy**.

Applicants should hold positions at **Universities or Research Institutes** in any of the **ICGEB Member States\***

A new special category, Early Career **Return Grants**, funds young researchers, who have spent a minimum of 2 years abroad and who have recently returned to an ICGEB Member State to establish an independent laboratory.

**Closing date for submission:**

**30 April 2019**

#### ICGEB Member States

Afghanistan, Algeria, Argentina, Bangladesh, Bhutan, Bosnia and Herzegovina, Brazil, Bulgaria, Burkina Faso, Burundi, Cameroon, Chile, China, Colombia, Costa Rica, Côte D'Ivoire, Croatia, Cuba, Ecuador, Egypt, Eritrea, FYR Macedonia, Hungary, India, Iran, Iraq, Italy\*, Jordan, Kenya, Kuwait, Kyrgyzstan, Liberia, Libya, Malaysia, Mauritius, Mexico, Montenegro, Morocco, Namibia, Nigeria, Pakistan, Panama, Peru, Qatar, Romania, Russian Federation, Saudi Arabia, Senegal, Serbia, Slovakia, Slovenia, South Africa, Sri Lanka, Sudan, Syrian Arab Republic, Trinidad and Tobago, Tunisia, Turkey, United Arab Emirates, United Republic of Tanzania, Uruguay, Venezuela, Vietnam, Zimbabwe.

\* Laboratories in Italy are excluded from the call



#### Information and Submission:

ICGEB Research Grants - CRP & Fellowships Unit  
Loc. Padriciano, 99 - 34149 Trieste, ITALY  
Tel.: +39-040-3757382  
Email: [crp@icgeb.org](mailto:crp@icgeb.org)

<http://www.icgeb.org/research-grants.html>



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# ICGEB Supports:

- Collaborative Research Grant Program
- Supports research in laboratories in ICGEB Member Countries. Includes provision for additional training anywhere in the world.
- Early Career Return Grants aimed at supporting young scientists establishing their own research programmes with an ICGEB member Country.
- Funds consumables, equipment, personnel and travel.

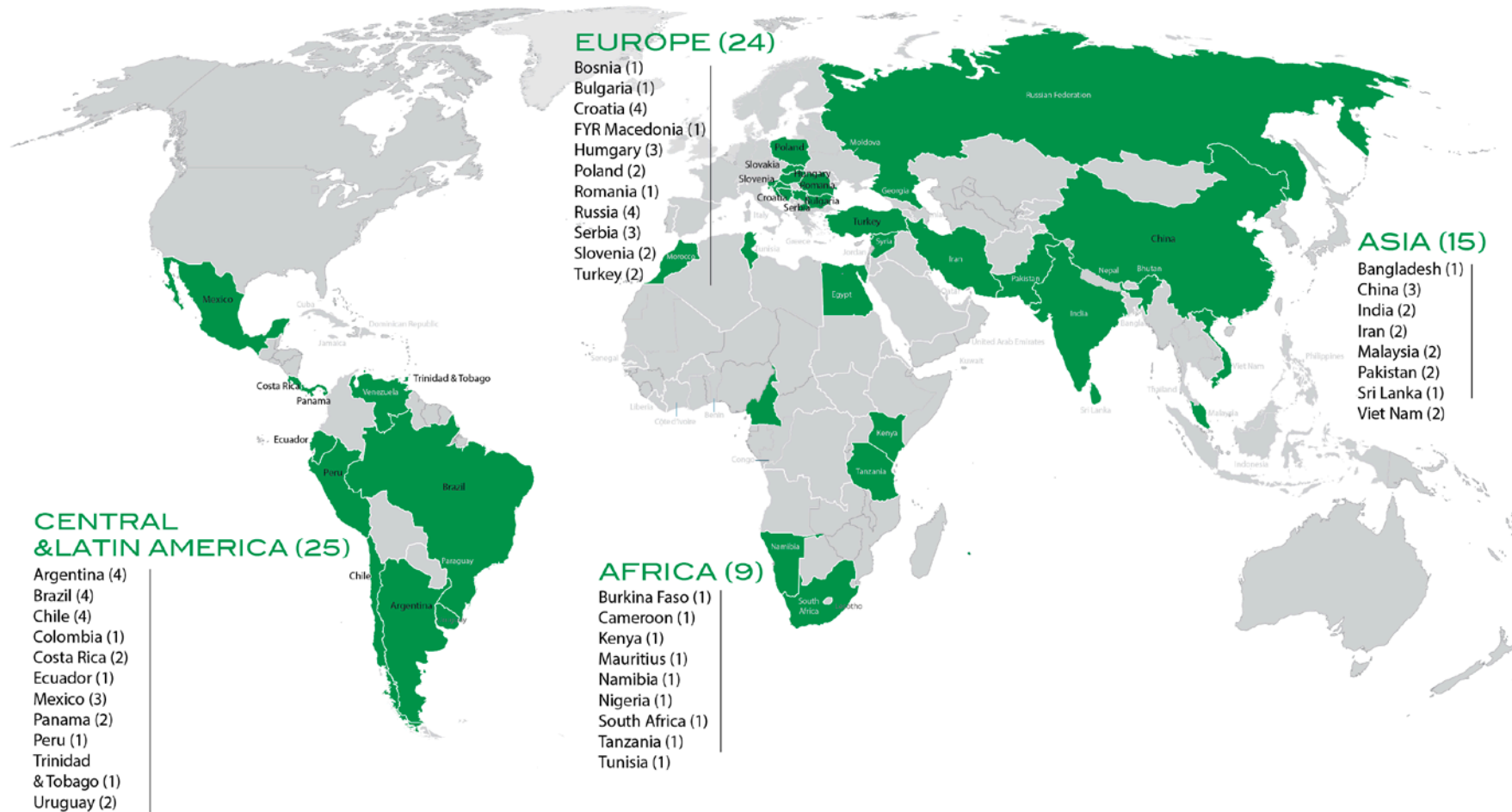




# Collaborative Research Proposals: 2018 Selection Process



# CRP on Board 2018 (73)



Countries with ongoing projects funded by the CRP-Research Grant Programme

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5. Technology transfer to industry for the production of biotherapeutics and diagnostics







# ICGEB Trieste

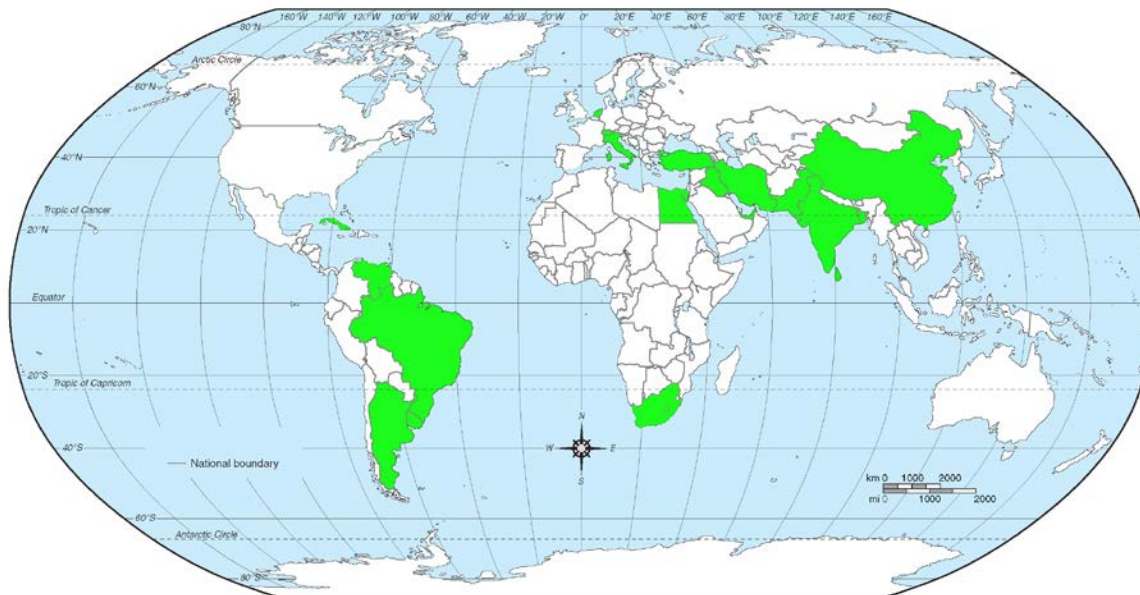
## Biotechnology Development Group (BDG)



- **The BDG supports local biopharmaceutical manufacturing in member countries, improving the drug availability at a more affordable price**
- **Develops simple and innovative technologies for production of biosimilars.**
- **The BDG has developed and transferred know-how for the production of the following products:**
  - EPO
  - IFN alpha 2A/B
  - GCSF
  - IFN beta
  - Insulin
- **Most of the companies involved in tech transfers are now producing biosimilars using ICGEB technologies.**

# Technology Transfers at ICGEB Trieste

- 80 Tech transfer agreements
  - > 100 scientists trained
  - 20 different countries



# Steps in Technology Transfer and Training

- Signature of a **Technology Transfer Agreement**



## PHASE 1

- Scientists from the Company spend **4-6 weeks** in the ICGEB Laboratories gaining hands-on experience in the production of selected technologies
- Supply of **Protocols** for describing creation of **strains** and cell lines and complete down and upstream procedures & supply of genetically modified strains and cell lines

## PHASE 2

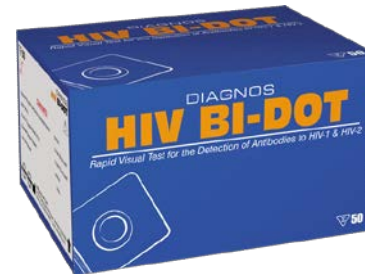
- Post training **assistance** to the industrial partner in establishing the process at its own facility.





# ICGEB New Delhi

## *Diagnostic kits*



Not only biologics, R&D a few examples...



# **Strains** 4 **Plants**

What do we do?

1. Provision of newly identified and characterized plant beneficial bacterial strains
2. Isolation, characterization and phenotypization of your 'local' plant beneficial bacterial strains
3. Screening of our culture collection of plant beneficial strains against your pathogen in order to identify a potential biocontrol agent

**Vittorio Venturi**, Bacteriology Group  
ICGEB, Padriciano 99, 34149 Trieste Italy  
Tel: +39-040-375-7319  
email: [strains4plants@icgeb.org](mailto:strains4plants@icgeb.org) or  
[venturi@icgeb.org](mailto:venturi@icgeb.org)







# Technology Transfer: Vaccines & Infectious Disease

## Sun Pharma and ICGB to develop novel dengue vaccine

Sun Pharma and ICGB signed an agreement to develop a vaccine targeted against all four serotypes of dengue virus



Arijit Paladhi



Sun Pharma and ICGB had, in May, announced another partnership for development of a

### Patents

- Dengue subunit vaccine quadrivalent candidate DSV against all four DENV serotypes (PCT/IB2015/056352 – Khanna N. et al.)
- Anti dengue activity of *Cissampelos pariera* extracts (PCT/IB2010/050299 - Bhatnager, P.K. et al.)

Home BioTech Novavax, CPL Biologicals, ICGB join hands for malaria research

India 20 July 2012 News By BioSpectrum Bureau

## Novavax, CPL Biologicals, ICGB join hands for malaria research

BILL & MELINDA  
GATES foundation

The  
Economist

World politics

Business & finance

Economics

Science & technology

Culture

Do you yield?

## Growing anti-malaria drugs in tobacco plants

How to increase the supply of artemisinin

Oct 22nd 2016

Timekeeper

Like

462

Tweet



ONE of the most valuable weapons in the war on malaria is artemisinin, a drug c from the leaves of sweet wormwood. Its discovery, inspired by wormwood's use



Working Group  
on Zika Virus

# The ICGEB 6 instruments of action

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5. Technology transfer to industry for the production of biotherapeutics and diagnostics
6. Scientific Services and advice - Biosafety







# ICGEB Capacity Building Project for sub-Saharan Africa



*Assisting the development of effective safety and regulatory systems for the products of modern biotechnology in selected countries of sub-Saharan Africa (SSA)*

A 4-year project focussing on enhancing the ability of regulatory authorities in SSA to regulate the development &/or commercialisation of the products of modern agro-biotechnology, by the formation of a solid bedrock of African expertise through which regulatory systems can be manned effectively and sustainably.

Project dedicated URL:

[www.icgeb.org/biosafety/projectforSSA/abouttheproject.html](http://www.icgeb.org/biosafety/projectforSSA/abouttheproject.html)



[www.facebook.com/pages/ICGEB-Biosafety-Capacity-Building/166333846846436](https://www.facebook.com/pages/ICGEB-Biosafety-Capacity-Building/166333846846436)



BILL & MELINDA  
GATES foundation



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## BIOTECH-NET PROJECT

An example of Scientific Diplomacy to  
Enhance Biotechnology Know-how  
in the Horn of Africa:  
focus on  
**Eritrea and Ethiopia**



*Ministero degli Affari Esteri  
e della Cooperazione Internazionale*

# ICGEB for the lay public



#Scienza a #Trieste per il pubblico  
[icgeb.org/divulgazione-s...](http://icgeb.org/divulgazione-s...)  
[pic.twitter.com/3MUC2ZR4vc](https://pic.twitter.com/3MUC2ZR4vc)

View translation

Reply Delete Favorite More







# SA National Science Week Launch, 27 July 2019





# ICGEB Regional Research Centres (RRCs)



## PURPOSE

- Strengthens **research skills, knowledge** and **capacities** of the local scientific community while pursuing specific objectives for research, training and technology transfer to industry, which would benefit both the hosting country and the region where the RRC is located
- Fosters **attractiveness** for international scientists and ensure adherence to standards of excellence
- Serves the **needs** and **specificity** of individual regional areas

## OBJECTIVES

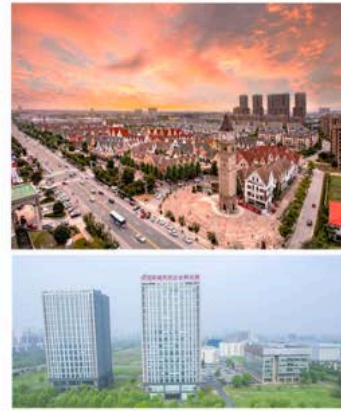
- Conducts **scientific research** at the highest international standards
- Provides a centre for short- and long-term research **training activities** at international level
- Enhances the capacity of the scientific community in the geographical region in the field of biotechnology, with special regard to interaction with the **biotech industry**

# ICGEB RRCs –

Research  
projects and  
institutions that  
we have played  
a role in  
creating in  
Member States

## ICGEB Regional Research Centres:

China Medical City science park, Taizhou, comprises more than 800 companies working in the biomedical sector, including the subsidiaries of several large multinational pharmaceutical companies, and ICGEB will be the catalyst for research in the field of innovative pharmaceutical therapies for cancer and degenerative diseases.



CMC  
中国医药  
高新技术开发区



16 labs



4 clean labs



12 offices

Building Premises



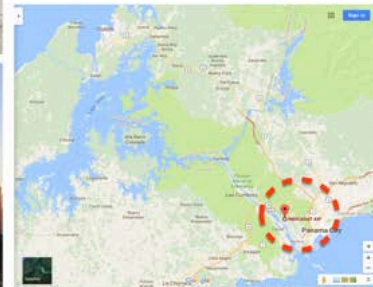
INDICASAT AIP, Panama City: research of the ICGEB RRC will focus on the use of molecules deriving from natural resources of the country to develop new pharmaceuticals against infectious and degenerative diseases.



February 2017



INDICASAT - City  
of Knowledge  
Panama City,  
Panama



# ICGEB's infrastructure capabilities

Facilities and expertise available at the ICGEB

Research Institutes and Companies in our Member States can access our laboratories and equipment and get support of our highly qualified international staff.

We can provide on-the-job specialised training in specific processes and techniques available at ICGEB, and can collaborate on developing and adapting these for the specific requirements of our partners.

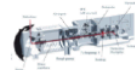
[www.icgeb.org/icgeb-facilities](http://www.icgeb.org/icgeb-facilities)

## General-use equipment and specialised services at ICGEB

### Proteomics Facility

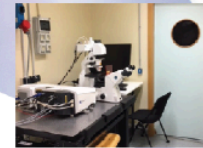
#### Key Services:

- Protein identification
- Mapping of post translational modifications
- Quantitation of proteins, peptides and small molecules



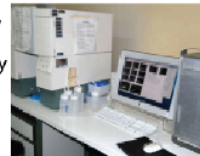
### Fluorescence Microscopy Facility

Offers a collection of state-of-the-art fluorescence microscopy equipment and accessory services to support in-house scientists and visitors in the use of fluorescence microscopy methods for their research.



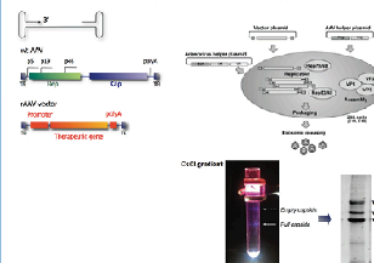
### Flow-Cytometry Facility

3 different instruments, for a wide range of possible flow cytometry applications:  
**BD FACSCalibur** cell analyser equipped with a single blue light excitation laser, and three fluorescence reading channels.  
**BD FACSCelesta** equipped with three lasers (violet, 405 nm, blue, 488 nm and red, 633 nm)  
**BD FACSAria II** cell sorter, with three lasers and 13 fluorescence reading channels.



### AAV Vector Unit Facility

#### From AAV to recombinant AAV vectors



### Facility for Pathogenic Virus Manipulation

#### The Biosafety Level 3 (BL3) Laboratory

was designed in accordance with guidelines of the Italian Ministry of Health. This facility has special engineering and containment features that allow investigators to work safely with known or possible human pathogens classified at level 3 such as the human immunodeficiency virus.



### High Throughput Screening Facility



- Human/Mouse whole Genome siRNA library
- Human synthetic microRNA mimic (2,042 mature sequences, miRBase v.19.0)
- Human miRCURY LNA inhibitors (1972 molecules)
- FDA approved small molecule compounds (1280 compounds)
- Custom cherry-picked human and mouse siRNA libraries





# Fluorescence Microscopy Core Facility (FMCF) - [www.icgeb.trieste.it/fluorescence-microscopy.html](http://www.icgeb.trieste.it/fluorescence-microscopy.html)

## INSTRUMENTS

- Leica DMLB upright microscope;
- Leica Laser Microdissector LMD;
- Leica DMIRE2 inverted microscope;
- Zeiss LSM510 confocal microscope with lasers 488, 514, 543 nm and 2 PMT + microinjector (Eppendorf); **(Purchased 1998 – end of support)**
- Zeiss LSM510 META equipped with lasers 458, 477, 488, 514, 543, 633 nm, 2 PMT + META detection module for emission spectra analysis; **(Purchased 2004, end of support)**

## NEW PURCHASES

- Nikon Eclipse Ti-E inverted for live imaging + CMS (Andor) + stage incubator (Okolab) **(Purchased 2014)**
- Zeiss LSM880 with lasers 405, 458, 488, 514, 543, 633 nm, 3 PMT + Airyscan with 32 GaAsP channels for fast high-resolution fast acquisition **(bid finalized 2017)**

## USERS (no charge)

- ICGEB groups
- External users from neighboring institutions
- FluoMicro@ICGEB Course 2016-2017
- Training of ICGEB short-term research fellows

## MANAGEMENT

- Alessandro Marcello GL Molecular Virology
- Paola Massimi – staff Tumour Virology
- Online booking system
- Maintenance and training of users



# ICGEB Trieste Core Facilities

BL3 containment laboratory

Proteomics and mass spectrometry

Peptide synthesis and chemical modification

Advanced optical microscopy

Flow cytometry and cell sorting

Animal house

AAV Vector Unit (AVU)

Bioinformatics

High throughput, whole genome siRNA screening

Technical services and mechanics workshop

## Proteomics Facility

The Proteomics Facility uses state-of-the-art techniques in mass spectrometry for protein identification, protein quantification, and the mapping of post translational modifications. The facility is equipped with modern electrophoresis and HPLC equipment for sample preparation and separation. The facility is currently equipped with two mass spectrometers: a Thermo Finnigan LCQdeca ion trap mass spectrometer, and an Applied Biosystems 4800 MALDI TOF/TOF.

What we do:

- Protein identification using LC-MS/MS
- Post translational modification mapping (ETD & CID)
- Protein and peptide characterization
- Protein:Protein Interaction profiling
- Complex Mixture profiling (typically from cell lines, tissues, and biofluids)
- Last steps of sample prep. Including digestion and clean up
- Anything that we think is interesting

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BL3 containment laboratory

Proteomics and mass  
spectrometry

Peptide synthesis and chemical  
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Advanced optical microscopy

Flow cytometry and cell sorting

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Bioinformatics

High throughput, whole genome  
siRNA screening

Technical services and mechanics  
workshop

## HTS Facility



### MAIN GOAL:

Perform genome-wide RNA interference screens in human/mouse cells  
(upgradable for screening of small molecules in the future)

### EQUIPMENT:

- liquid handling station
- automated high-content-microscope
- multimode microplate reader
- cell washers, liquid dispensers, microplate sealer



### LIBRARIES:

- human whole-genome siRNA library (approx. 20 000 genes)
- mouse whole-genome siRNA library (approx. 18 000 genes)
- small siRNA sublibraries targeting specific intracellular pathways





# ICGEB Services available to Member States

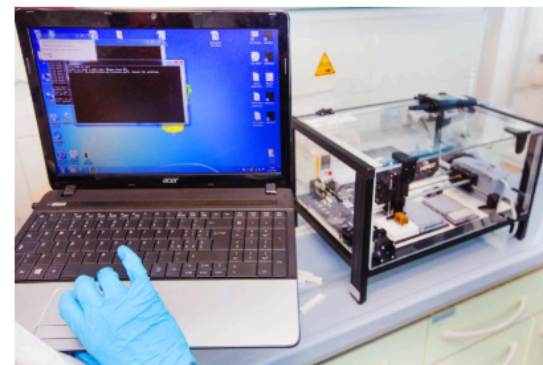
All supported  
through the  
Fellowship and  
CRP  
programmes

[www.icgeb.org/icgeb-facilities](http://www.icgeb.org/icgeb-facilities)



## TRIESTE

- HighThroughput Screening, including high-content microscopy (assistance with design and implementation of high throughput screens)
- Cell-sorting (assistance and training in the use of FACS and cell sorting)
- Bioinformatics assistance  
Proteomic analyses
- Microscopy (assistance and training in the use of a range of microscopy techniques and sample preparation)
- Peptidesynthesis  
NMR (assistance with all aspects of structural projects)
- Biosafety (assistance in identification, regulation, management and monitoring of GMO products)
- Biosimilars (production and development processes)
- Biofertilisers I (identification of appropriate organisms)
- Biofertilisers II (development of strains and field trials)  
Advocacyfor regulators and policy-makers
- Bioremediation (assistance with specific projects, including protocol development)
- Scientific and editorial advice on manuscripts and grants



## NEW DELHI

- TACF Facility (Tuberculosis Aerosol Challenge Facility (TACF))
- NMRFacility (500 MHz Bruker AVANCE III 4-channel NMR spectrometer)
- TEMFacility (High precision microtome with an advanced anti-vibration system)
- CrystallographyFacility  
LiquidHandling & Robotic Colony Picker Instruments  
LC-MS/MSand GC-MS Facility
- Fermentation Facility
- Microscopy Facility (Advanced optical microscopy, including confocal and SIM microscopes outfitted for live cell imaging)
- MassSpectrometer Facility (A high resolution hybrid Orbitrap LC-MS/MS instrument)
- Animal Facility
- Cell Culture Facility (cell microinjection and flow cytometry)
- Flow Cytometer with three lasers (BD FACS Verse cytometer)
- High Content Microscopy Imaging System (Image X press Nano System)
- [Bioinformatic Tools](#)





Thank you

Lawrence Banks: [banks@icgeb.org](mailto:banks@icgeb.org)