



ICGEB TRIESTE
ITALY



ICGEB NEW DELHI
INDIA



ICGEB CAPE TOWN
SOUTH AFRICA

ICGEB

International Centre for Genetic
Engineering and Biotechnology

Science for
Development

*An Intergovernmental Organisation for research, training and technology transfer in Life Sciences to
promote sustainable global developments*

ICGEB Cape Town Component



www.icgeb.org

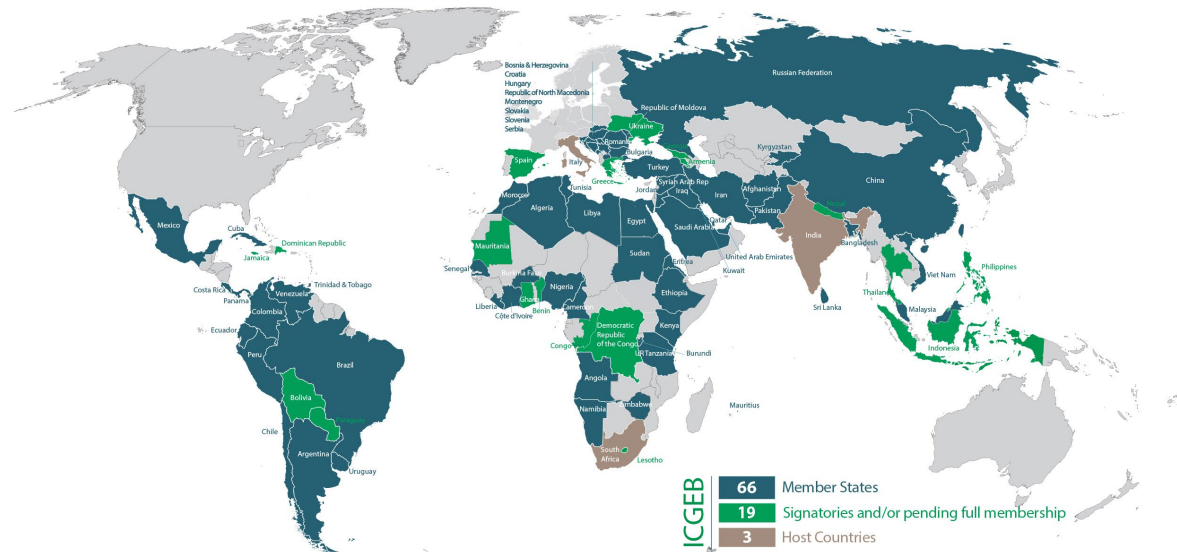
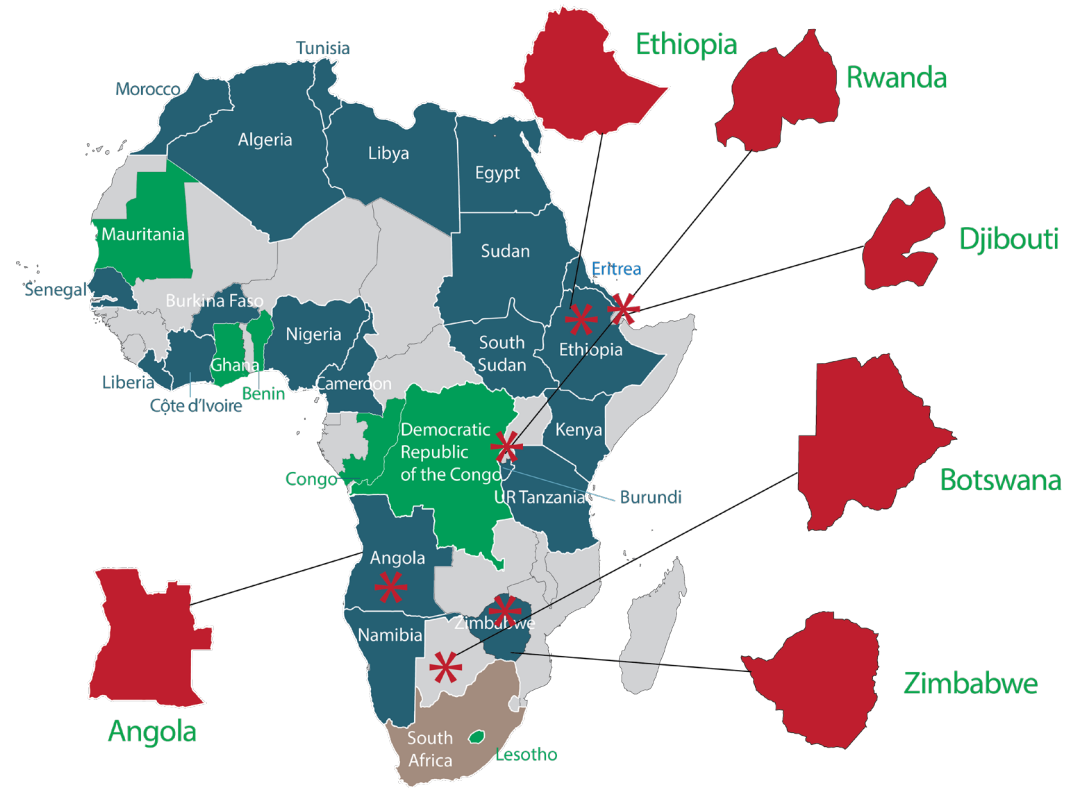
24 October 2022



2008: ICGEB is one Centre, made of three Components and a network of Affiliated Centres



6 recent and new Incoming Member States



66	Member States
19	Signatories and/or pending full membership
3	Host Countries





Brazil



Cameroon



Colombia



Egypt



Eswatini



Germany



India



Italy



Kenya



Mauritius



Namibia



Nigeria



South Africa



Sudan



Switzerland



Togo



United Republic of
Tanzania



Zimbabwe

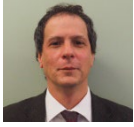
Nationalities at
ICGEB





ICGEB Cape Town Research Activities

ICGEB Cape Town Research Groups



Cancer Genomics – Dr. Luiz F Zerbini



Cytokines and Disease – Prof. Frank Brombacher



Biopesticides – Dr. Dennis O. Ndolo



Emerging Viruses – Dr. Georgia Schäfer



Plant Systems Biology – Dr. Lara Donaldson

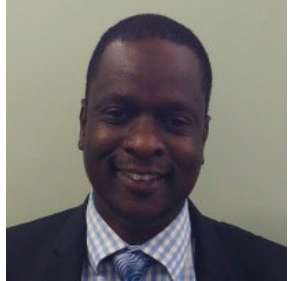


Bioinformatics – Dr. Stefano Cacciatore

Infectious Diseases – Advertising...



ICGEB Cape Town Research Groups



Biopesticides – Dr. Dennis O. Ndolo



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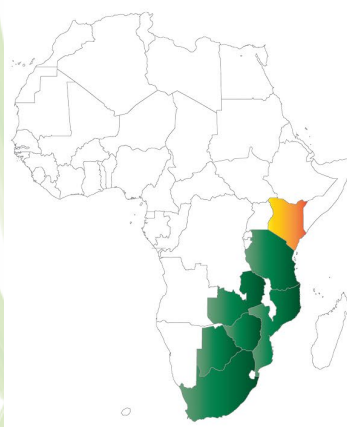


SDTF: Promote the use of biopesticides for late-season pests in key export crops to reduce reliance on synthetic chemical pesticides, enhance compliance with MRL limits, and facilitate trade



International Centre for Genetic Engineering and Biotechnology

STDF | STANDARDS and TRADE DEVELOPMENT FACILITY



Enhancing trade through regulatory harmonisation and pesticide-based residue mitigation in the SADC region



Overcoming barriers to trade through regulatory harmonization & related research with biopesticides for selected countries within the SADC Region



- ✓ Developing harmonised biopesticide guidelines for the SADC region
- ✓ Promoting the integration of biopesticides as Good Agricultural Practice
- ✓ Identifying biopesticides that can be used as alternatives to pesticides & so reduce chemical residue levels in export crops
- ✓ Project expected to address some of the trade challenges faced by SADC member countries caused by their inability to meet residue requirements in export markets.



- Project planning meeting held in October 2019
- Several local & international institutions supporting the Project: USDA; FAO; African Agricultural Technology Foundation; South African Bioproducts Organisation; CropLife Africa & Middle East
- Target SADC countries: Botswana, Mozambique, South Africa, Tanzania, Zambia & Mozambique; Collaborating country: Kenya
- Full grant proposal submitted to STDF in September 2020

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Plant Systems Biology – Dr. Lara Donaldson



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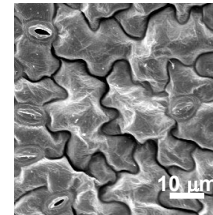


Salt-Specific Gene Expression Reveals Elevated Auxin Levels in *Arabidopsis thaliana* Plants Grown Under Saline Conditions

Lee Cackett^{1,2}, Carlo Vittorio Cannistraci^{3,4,5}, Stuart Meier², Paul Ferrandi^{2,6}, Aleš Pěničik⁷, Chris Gehring⁸, Ondřej Novák⁷, Robert A. Ingle² and Lara Donaldson^{2,6*}

Salt tolerance research:

- How does auxin biosynthesis gene, Nitrilase 2 improve salt tolerance?
- Hypothesis: auxin activates plasma membrane H⁺-ATPase to modify ion homeostasis and expansion growth
 - Plasma membrane proteomics
 - NIT2 overexpression → ↑↑expansin 11 expression. Overexpression of EXP11 improves growth in salt. Now looking at ion accumulation and cell size.



Sorghum microbiome research:

- Received South African samples (being processed for 16S seq)
- Samples collected in Kenya, more to be collected soon



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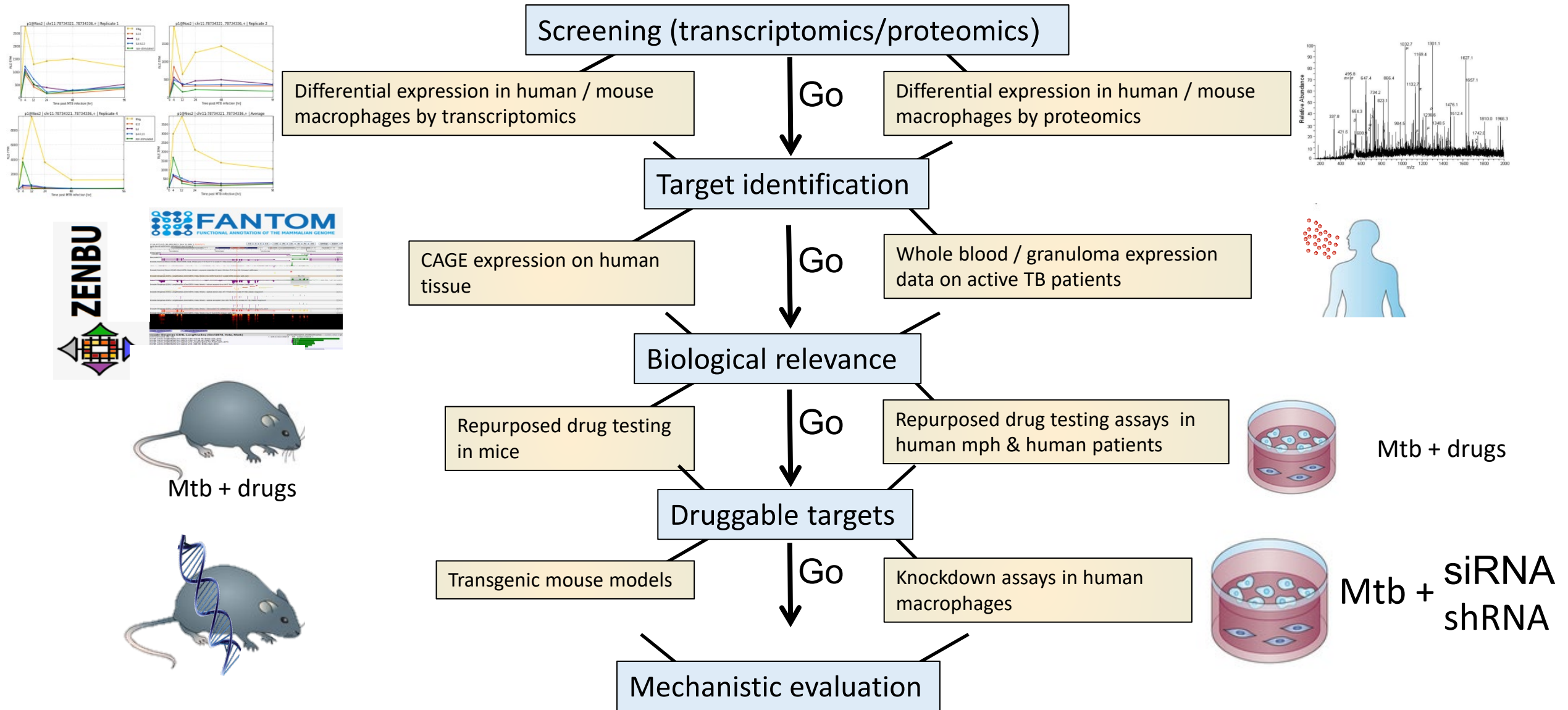
Cytokines and Disease – Prof. Frank Brombacher



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Technology platform for host-directed drug therapy



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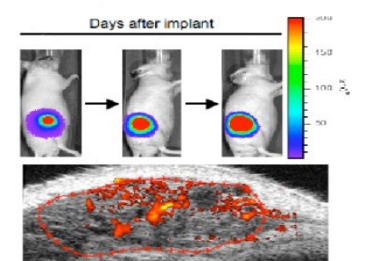
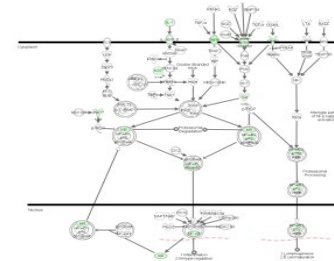
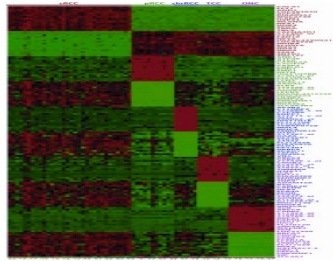
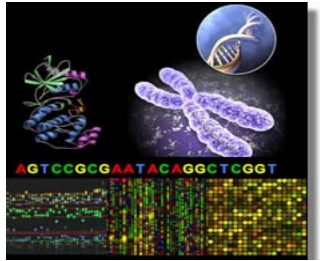
Cancer Genomics – Dr. Luiz F Zerbini



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Genomics, Proteomics, Metabolomics and Bioinformatics Approaches



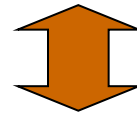
Functional Genomics

Microarray analysis

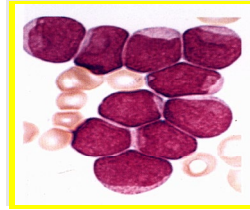
Proteomics Analysis

Signal Transduction Analysis

Drug Development



Benign X Malignant



Type of Cancer



Survival



Treatment

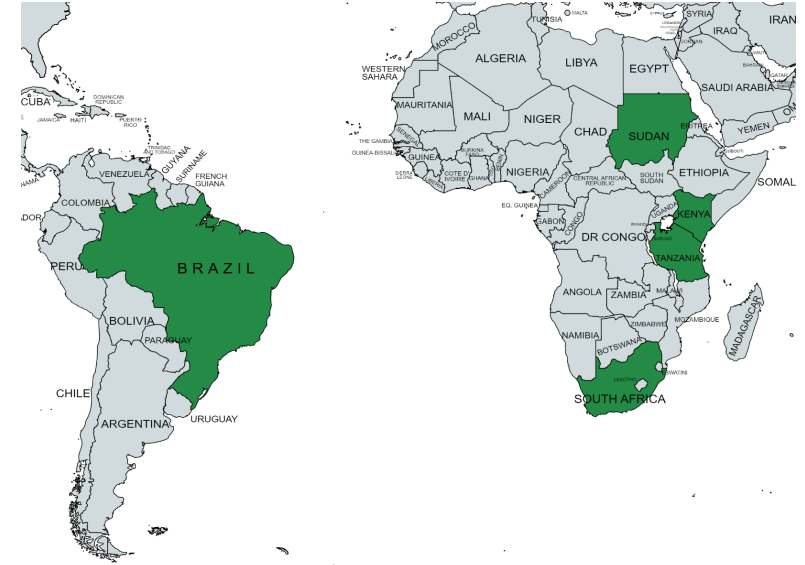


Precision Medicine

Prostate cancer

Hepatocellular Carcinoma

Wilms' tumour



Importance/Relevance:

- Globally is the second most common cancer and the sixth leading cause of death
- Among African men is ranked 1st in both incidence and mortality.
- African men suffer disproportionately from PCa compared to men from other parts of the world

Importance/Relevance:

- HCC accounts for about 90% of all liver malignancies
- 80% of all global cases are in low-income countries
- In Africa, is the most common and third most common fatal cancer in men and women.
- The age-standardised incidence of HCC in SSA is 41 per 100 000

Importance/Relevance:

- Wilms tumor (WT) is the most common renal malignancy in childhood
- Global disparities in WT: the highest incidence and lowest overall survival occurring in sub-Saharan African nations.
- Sub-Saharan African children consistently show the highest incidence of WT at 11 cases per million.
- Overall survival at 5-years for patients with WT in developed nations is now greater than 90%. However, in sub-Saharan African countries, overall survival at 5 years is as low as 25%.

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Emerging Viruses – Dr. Georgia Schäfer

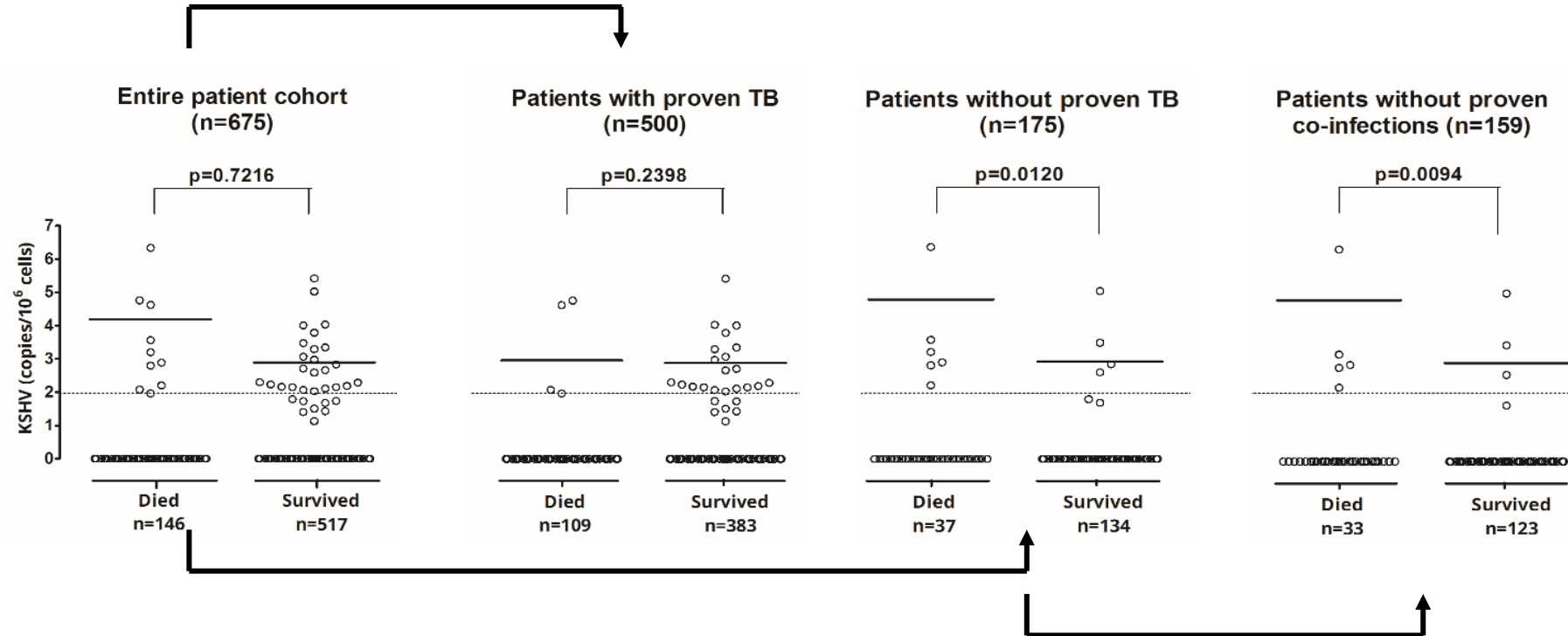


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Kaposi's Sarcoma Herpes Virus – Identification of risk factors

Elevated KSHV viral load is associated with mortality in critically ill patients with neither Mtb nor other microbiologically proven co-infection



Blumenthal *et al.*, 2019 (J Infect Dis)



Current EDCTP-funded project 2020-2024:
Characterisation of KSHV-driven pathologies and disease outcome in HIV-infected patients

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Bioinformatics – Dr. Stefano Cacciatore



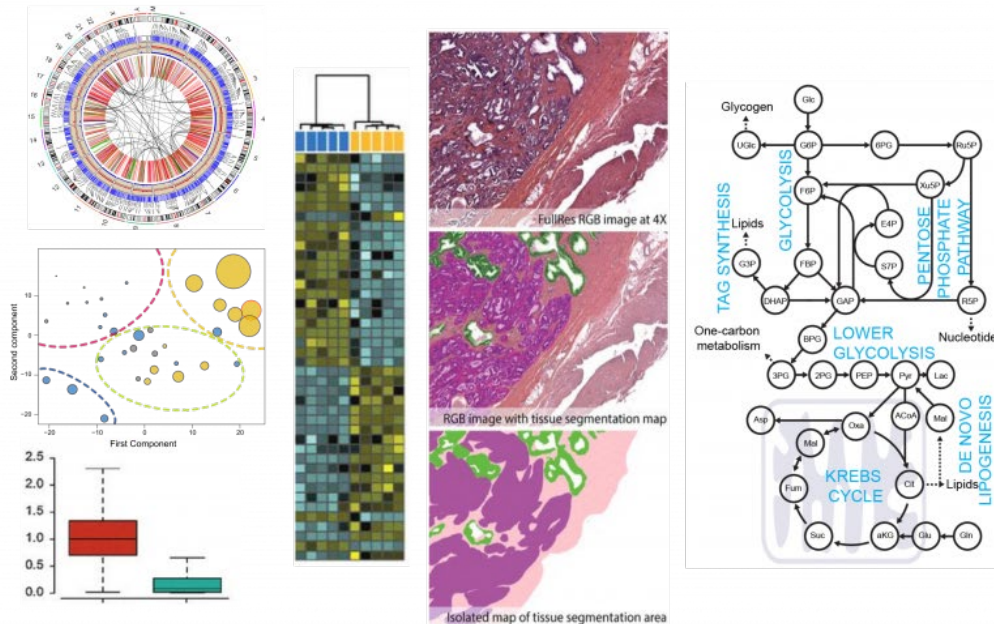
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Science for
Development

Bioinformatics Unit

The Bioinformatics Unit focuses on the development of bioinformatics tools and statistical approaches to facilitate the interpretation of data generated from high-throughput platforms, including metabolomics and genomics data.

Problem formulation
↓
Experimental design
↓
Sample collection
↓
Sample preparation
↓
Data acquisition
↓
Data visualization
↓
Statistical analysis
↓
Functional analysis



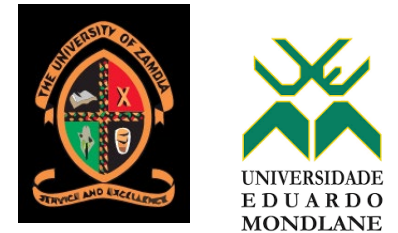
Lines of research

1. Exploratory approaches to data mining, especially those geared to ward the discovery of patterns in the data for exploratory tasks using clustering and feature extraction methods.
2. Developing the optimal standard operating procedures for data managing, sample collection, and processing.
3. Development of automatic procedures for the quantification of metabolites, lipoproteins, and signals from glycoprotein using Nuclear Magnetic Resonance Spectroscopy.
4. Application of mass spectrometry-based metabolomics to archival formalin-fixed, paraffin-embedded tissue specimens used in routine medical care for diagnostic purposes.



ICGEB Cape Town – International collaborations

**Imperial College
London**



Collaborations with African Institutes

<p>Burundi: Burundi University/ ISABU (Institut des Sciences Agronomiques du Burundi)</p>	  <p>UNIVERSITE DU BURUNDI Le grenier du savoir</p>
<p>Cameroon: Institute of Medical Research and Medicinal Plant Studies, Ministry of Scientific Research and Innovation, Yaoundé</p>	
<p>Egypt: Chemistry Department, Faculty of Science, Cairo University, Cairo</p>	 <p>CAIRO UNIVERSITY</p>
<p>Gabon: Centre de Recherches Médicales de Lambaréné (CERMEL), Libreville</p>	
<p>Kenya:</p> <ul style="list-style-type: none"> • Institute of Primate Research, National Museums of Kenya, Nairobi. • Biosciences eastern and central Africa - International Livestock Research Institute (BecA - ILRI) Hub • Centre for Agriculture and Bioscience International • Kenyatta University • Kenya Plant Health Inspectorate Services • Kenya Pest Control Products Board 	 <p>INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE</p> <p>biosciences eastern and central africa</p>   
<p>Ethiopia: Ethiopian Biotechnology Institute</p>	
<p>Mozambique: University Eduardo Mondlane, Maputo</p>	
<p>African Union: The Inter-African Phytosanitary Council of African Union (AU-IAPSC)</p>	 <p>INTER-AFRICAN PHYTOSANITARY COUNCIL</p>
<p>Tanzania: Plant Health and Pesticides Authority (TPHPA)</p>	
<p>Zambia: University of Zambia, Lusaka</p>	





ICGEB Cape Town Institutional Activities

GIRLS STEAM CAMP

A week long camping experience, designed to equip young girls to understand science and teach them Empowerment skills like Leadership and Self-management.

KWAMAPHUMULO APRIL 2021

BIO Africa

Building Foldscopes

The International Centre for Genetic Engineering and Biotechnology (ICGEB) generously donated foldscopes for the girls to construct and observe objects on a microscopic level. A foldscope is an optical microscope that is built using simple components like paper and a lens.



ICGEB International SEMINAR PROGRAMME

2021

International Seminar and Podcast Programme

 **ICGEB** International Centre for Genetic Engineering and Biotechnology

ICGEB International SEMINAR PROGRAMME 2021

Tuesday
27 JUL
12:00 noon
(South Africa
Time)

(3:30 pm)

**Tamlyn SHAW**
Business Development Manager, co-founder, Cape Biotech
Technologies South Africa, Cape Town, SOUTH AFRICA

**"Producing SARS-CoV-2 diagnostics
proteins in plants- An African Story"**

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ICGEB International SEMINAR PROGRAMME 2021

Tuesday
6 JUL
2:00 pm
(South Africa
Time)

(5:30 am)

**Ana Carolina ZERI**
Researcher at Sirius, Coordinator - Materials beamline
CNPEM - National Center for Research in Energy and Materials
Campinas, BRAZIL

**"Structural Biology at Sirius - the Manacá
beam line"**

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ICGEB International SEMINAR PROGRAMME 2021

Tuesday
15 JUN
2:00 pm
(South Africa
Time)

**Towia Libermann**
Director, BIRAC, Genomics, Proteomics, Bioinformatics, and Systems
Biology Centre, and CP-ACC Cancer Proteomics Core, Div. of
Interdisciplinary Medicine and Biotechnology, Boston, USA

**"Next Generation Proteomics Driving
Precision Medicine"**

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ICGEB International SEMINAR PROGRAMME 2021

Tuesday
25 MAY
12:00 noon
(South Africa
Time)

**Steven RUNO**
Department of Biochemistry, Microbiology and Biotechnology
Kenya University, KENYA

**"Genetic basis of Striga (witchweed)
resistance in sorghum"**

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ICGEB International SEMINAR PROGRAMME 2021

Tuesday
17 AUG
12:00 noon
(South Africa
Time)

**Jaco MARAIS**
Product manager: Row Crops, Bioreational Products PHILAGRO
SABO representative, SOUTH AFRICA

"A South African biocontrol perspective"

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ICGEB International SEMINAR PROGRAMME 2021

Tuesday
5 OCT
3:00 pm
(South Africa
Time)

**Pawan MALHOTRA**
Malaria Group, International Centre for Genetic Engineering and
Biotechnology, New Delhi, INDIA


**"Unravelling the mode of actions of two current
antimalarial: Chloroquine & Artemisinin"**

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ICGEB International SEMINAR PROGRAMME 2021

Friday
29 OCT
12:00 noon
(South Africa
Time)

(3:30 am)


**Hasan H. OTU**
Professor of Electrical and Computer Engineering
University of Nebraska-Lincoln, USA

**"Utilization of Bayesian Networks in
Systems Biology"**

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ICGEB International SEMINAR PROGRAMME 2021

Tuesday
7 SEP
12:00 noon
(South Africa
Time)

**Catherine H. KASCHULA**
Senior Lecturer, Department of Chemistry and Polymer Science,
Stellenbosch University, Cape Town, SOUTH AFRICA

**"The chemistry of garlic and its ability to
kill cancer cells"**



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International Centre for Genetic Engineering and Biotechnology

ICGEB Science & the City

SOUTH AFRICA



Science in the city centre brought to you by
International Centre for Genetic Engineering and Biotechnology
#ScienceforSociety - #WomeninScience - #Food&Health



1st international edition of ICGEB Science & the City
March 2022

Myth busters: Discrediting misinformation in Science