NMR
Core facility

DNA : Protein
Core facility

Molecular Interactions
Core facility

Mass Spectrometry
Core facility

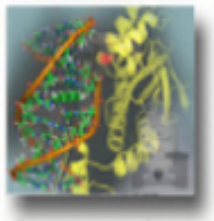
Combinatorial
Core facility

Advanced Biotechnology CORE Facilities

Fermentation
Core facility

Bioimaging
Core facility

Confocal
Core facility



Structural
Core facility

Welcome ! !

欢迎

Georgia State University | DEPARTMENT OF BIOLOGY

Biol 4905 (Summer '22)

Molecular Biotechnology Laboratory

Goals of the Course: The primary objective of this course is to introduce students to the relativel, sophisticated high technology that is / will be available in the ABCore Facilities at Georgia State University. To acheive this goal students will be given live instruction and directed VIDEO experience in performing "wet lab" experiments, purification of RNA and DNA as well as how to analyze and utilize these and other celular attributes using a variety of instruments. Informational lectures will be provided, where needed, to cover the scientific background behind the techniques as well as other more advanced techniques. Students will be expected to maintain a legible and well organized notebook of the activities carried outhroughout the course.

ATTENDENCE	**(70%)**
ON-LINE QUESTIONS / PPT	**(30%)**

Attendance: Students will be expected to attend ALL classes at the scheduled time. Owing to the nature of the course some web based activities may extend beyond the assigned time. On these occasions, students who need to leave early should email/tx the instructor **in advance** . Failure to attend two or more class days without this agreement will forfeit ALL points given for attendance.

Ethical considerations: Unless otherwise stated, all examination answers that are submitted for evaluation are considered to be the sole property and ideas of each individual student. Any student(s) caught copying or cheating will automatically receive **zero credit** for that particular submission, and possibly be subject to further disciplinary action.

Be aware of **Plagiarism**. **All students should be aware of the academic honesty policy (*http://deanofstudents.gsu.edu/faculty-staff-resources/academic-honesty/*).**

BIOL4905: Summer Semester '22 -ON LINE: -CRN 55906

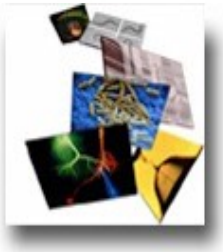
#	Date	Time	Lecture Description
	July 5th	8:30 am -10:00 pm	Welcome Reception
	July 6th	----	----
1	July 7th	8:30 am - 11:30 am	Introduction -ABCore -Training
2	July 8th	8:30 am - 11:30 am	Plasmid DNA Preparation
	July 9th	--	WEEKEND
	July 10th	--	WEEKEND
3	July 11th	8:30 am - 11:30 am	Proteomics I
4	July12th	8:30 am - 11:30 am	Proteomics II
5	July13th	8:30 am - 11:30 am	Proteomics III
6	July14th	8:30 am - 11:30 am	RNA Preparation
7	July15th	8:30 am - 11:30 am	---
	July 16th	--	WEEKEND
	July 17th	--	WEEKEND
8	July 18th	8:30 am - 11:30 am	qPCR & Robot
9	July 19th	8:30 am - 11:30 am	DNA Sequence Analysis
	July 20th	-	MINI BREAK
10	July 21st	8:30 am - 11:30 am	Automated Microscopy / AFM
11	July 22nd	8:30 am - 11:30 am	Next Gen. DNA Sequencing
	July 23rd	--	WEEKEND
	July 24th	--	WEEKEND
12	July 25th	8:30 am - 11:30 am	Microarray I
13	July 26th	8:30 am - 11:30 am	Microarray II
14	July 27th	8:30 am - 11:30 am	Nanostring
15	July 28th	8:30 am - 11:30 am	Flow Cytometry
-	July 29th	8:30 am - 11:30 am	- FINAL-
	July 30th - Aug 3rd	--	RECREATION

SUMMER INSTITUTE - ONLINE MODALITY CALENDAR 2022

SUN	MON	TUE	WED	THU	FRI	SAT
June 26	27	28	29	30	31	July 02
	9:00-10:00am Virtual Program Orientation for Summer Institute Online Modality					
July 03	04	05	06	07	08	09
	Holiday (Independence Day)	8:30-10:00am -Welcome Reception and Buddy Meet & Greet Event	Free Day	Classes begin! 8:30-11am: BIOL4905 INTRODUCTION 8-10:20pm: Afternoon course	8:30-11am: BIOL4905 DNA PREPARATION 8-10:20pm: Afternoon course	
10	11	12	13	14	15	16
	8:30-11am:BIOL4905 PROTEOMICS I 8-10:20pm: Afternoon course	8:30-11am:BIOL4905 PROTEOMICS II 8-10:20pm: Afternoon course	8:30-11am:BIOL4905 PROTEOMICS III 8-10:20pm: Afternoon course	8:30-11am: BIOL4905 RNA PREPARATION 8-10:20pm: Afternoon course	Virtual Independence Day Activity	
17	18	19	20	21	22	23
	8:30-11am:BIOL4905 qPCR / ROBOTS 8-10:20pm: Afternoon course	8:30-11am:BIOL4905 DNA Sequence Analysis 8-10:20pm: Afternoon course	Midterm Break	8:30-11am:BIOL4905 Next Gen. Sequencing 8-10:20pm: Afternoon course	8:30-11am:BIOL4905 Automated Microscopy /AFM	
24	25	26	27	28	29	30
	8:30-11am:BIOL4905 Microarray I 8-10:20pm: Afternoon course	8:30-11am:BIOL4905 Microarray II 8-10:20pm: Afternoon course	8:30-11am:BIOL4905 Nanostring 8-10:20pm: Afternoon course	8:30-11am:BIOL4905 Flow Cytometry 8-10:20pm: Afternoon course	FINALS	
31	August 01	02	03			
	9:00-10:00am: Closing Reception		Grades available in PAWS			

Legend:
Orange: Courses Blue: Activities

NMR
Core facility



DNA : Protein
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Director: Houghton

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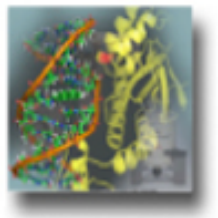
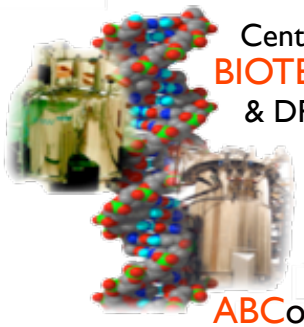


Structural
Core facility

Petit Life Science Center

Natural Science Center



Center for
BIOTECHNOLOGY
& DRUG DESIGN

ABCore Facilitie

Genomics Core Facility

Georgia State University

WORKFLOW
MICROARRAY GENE EXPRESSION
TARGET PREPARATION
TARGET HYBRIDIZATION
FLUIDICS
PROBE ARRAY WASH
AND STAIN
PROBE ARRAY SCAN
DATA ANALYSIS

3. Fluidics station 450: wash & stain chip

4. Affymetrix GeneChip Scanner 7G

Report

1. Quality check by Bioanalizer and RT

DNA Sequencing Core Facility

Ping L Jiang (pjiang@gsu.edu) /4044135370

Principle of DNA sequencing

What happens to Your DNA

Ideal Results

Results that are not so great

Troubleshooting 1: Template problems

Troubleshooting 3: Cleaning problems

Atomic Force Microscopy Core Facility

What is AFM and How does it work?

Applications in biology

Applications in protein structure analysis

Flow Cytometry

Debby Walthall(dwalthall@gsu.edu)

Instrument/Services

Analysis Softwa

BD FACSCanto + HTS

Diva Software
FACSCanto and FACSAria

BD FACSAria II Cell Sorter

Beckman Cell LabQuanta

Saturday, November 28, 2009

Welcome
Cell, Protein and DNA Core Facilities

About
Welcome to GSU Cell - Protein - DNA Core Facilities

Resources
Find answers to your questions here

Contacts
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Director of Core Facilities
Tel: 404-413-5390 | Email: jhoughton@gsu.edu

Debby Walthall
Research Scientist
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Services
Learn about some of the services that the core facility offers

Instrumentation
Find out what equipment and facilities are available for your use

What's New?
Find out what's new in the Cell - Protein - DNA Core Facilities

NEW

ore Facility

Georgia State University

3. Image Quantitation

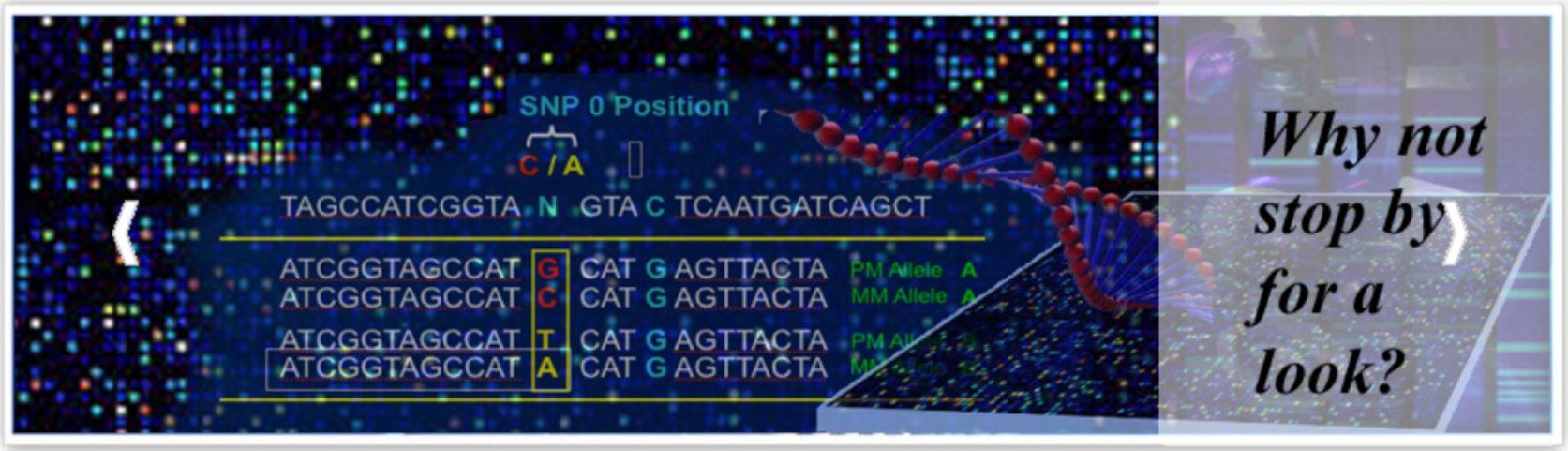
4. Spot picker and Protein and Peptide digestion

Automated Protein Digestio

Automated or Manual Protein Digestio

5. TOF/TOF MALDI Mass Spectrometer and Data Analysis &db search

http://biotech.gsu.edu/core



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(Level I) General Access Instrumentation

Effectively low maintenance, "relatively" generic, but technically proficient instrumentation that is normally operated by graduate researchers and other research personnel on a daily, routine basis .

(Level II) Specialized Instrumentation

High maintenance, sophisticated instrumentation, available for operation by general graduate researchers and technical support staff **after** they have received specific and thorough training in the appropriate use of the technology.

(Level III) Centralized Instrumentation / Service

(a) DNA Purification & Sequencing (mapping)

(b) Genomics / Proteomics

(c) Atomic Force Microscopy

(d) Mass Spectrometry/NMR

(e) Cell Analysis / Sorting

High maintenance, highly sophisticated instrumentation, operated by qualified, technical personnel.

Level I

General Access Equipment
(relatively low maintenance)

from permeablizing cell membranes -

Gene Pulse Electroporation System (BioRad).....

..to Cell breaking -Sonifier 450

(Branson -top right)

and

French Press (Aminco)

Lyophilizer (LabConco)

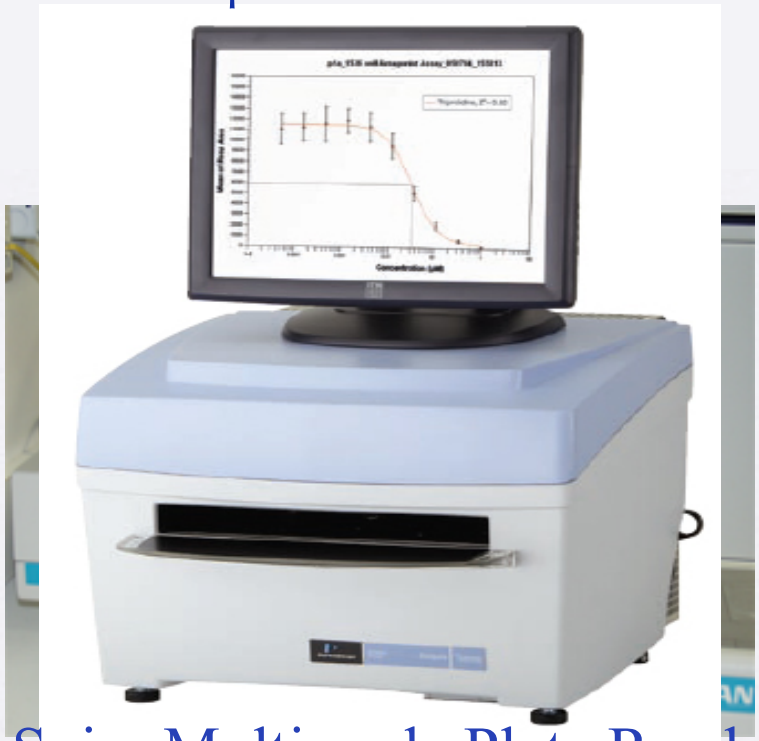
Liquid scintillation Counter LS6500 (Beckman)

Thermocyclers (Eppendorff)

Automated Protein Separation AKTA Explorers / Purifiers (GE)

Victor X3 plate-reader
(Perkin Elmer)

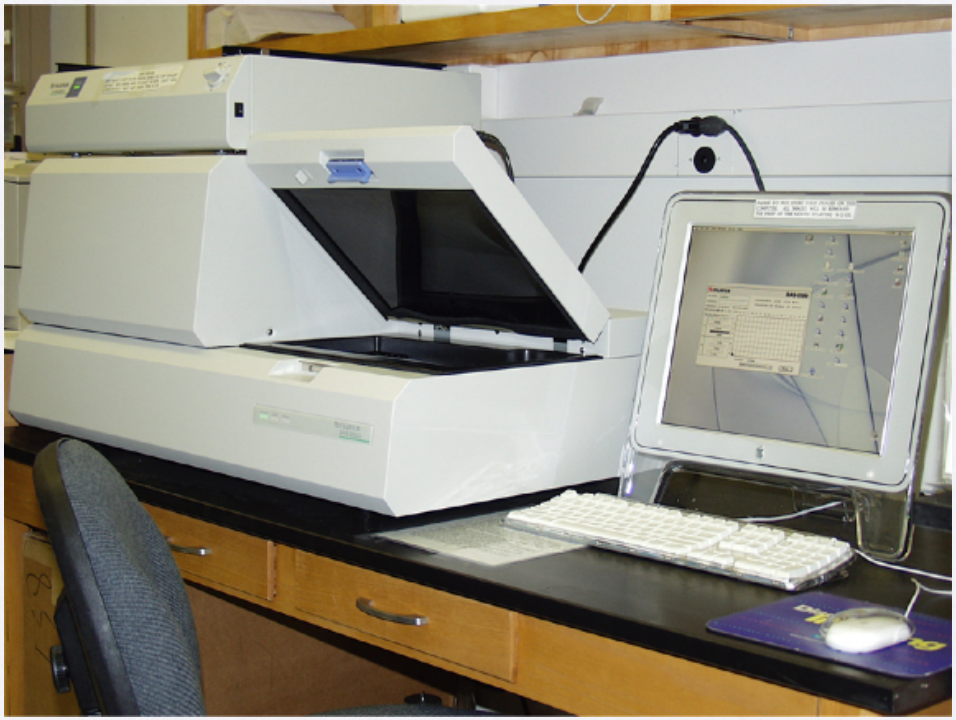
Spectramax iD5



EnSpire Multimode Plate Reader

Assorted Micro-Plate Readers

Omega UV-Imaging System (Ultra-Lum)



Phosphoimager (Fuji) Model Bas 2500

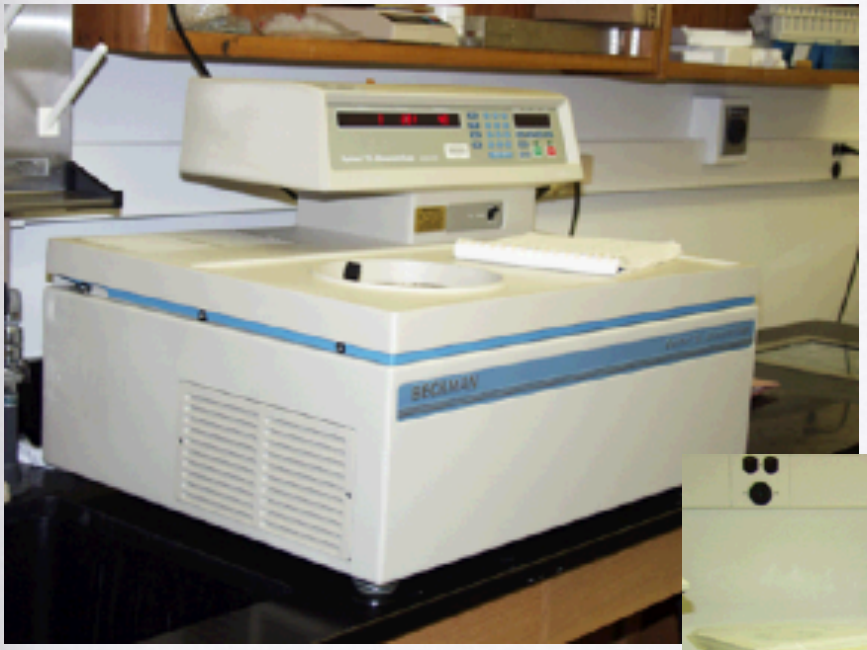
UVP GelDoc
Gel documentation imaging system

Fluorescent Bioimaging System

Typhoon FLA 7000 IP (GE Healthcare)

Chemi-Luminescence Image Analyzer

(Fuji) Model LAS-4000-mini



Optima MAX-XP

Table-top Optima model-

Assorted Centrifuges
and
Ultracentrifuges-

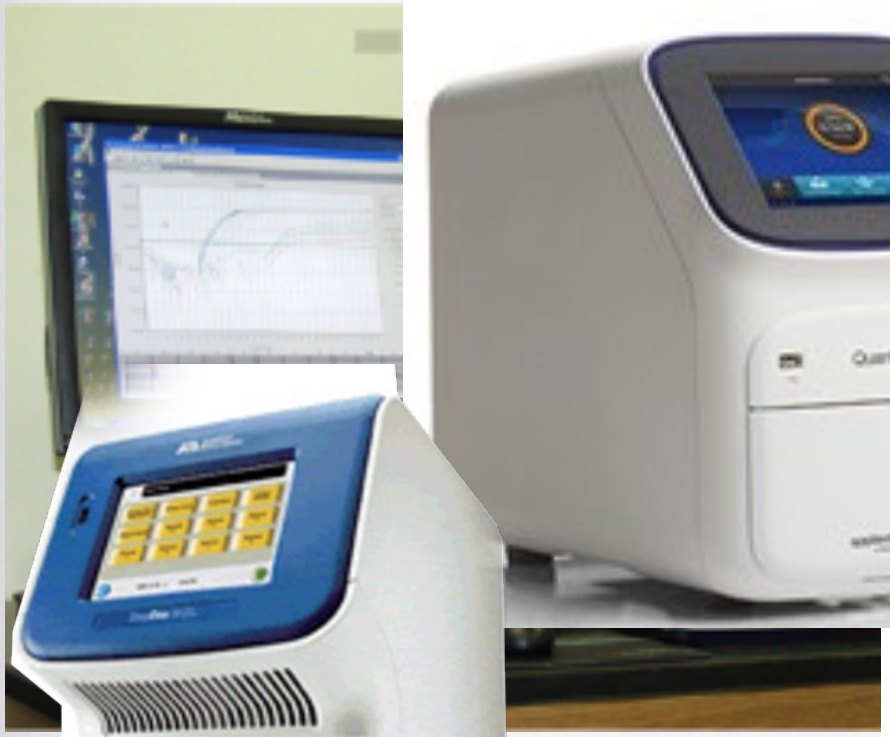
to the Analytical XLA-X1

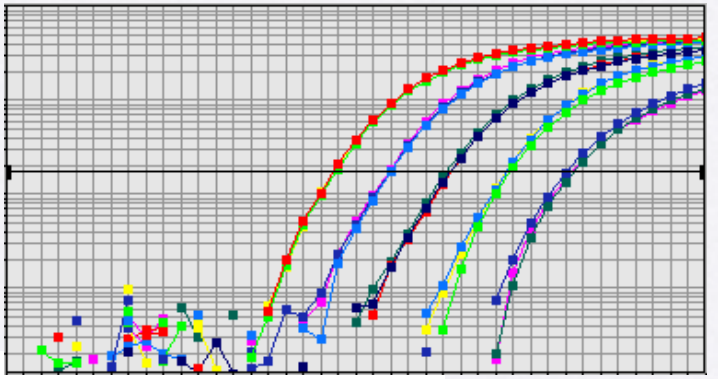
Level II

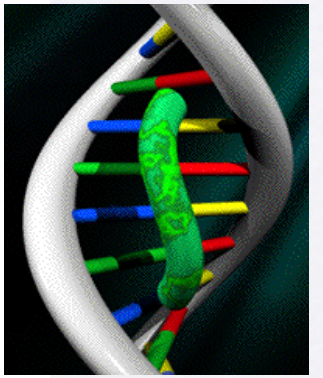
Specialized Equipment
(high maintenance)

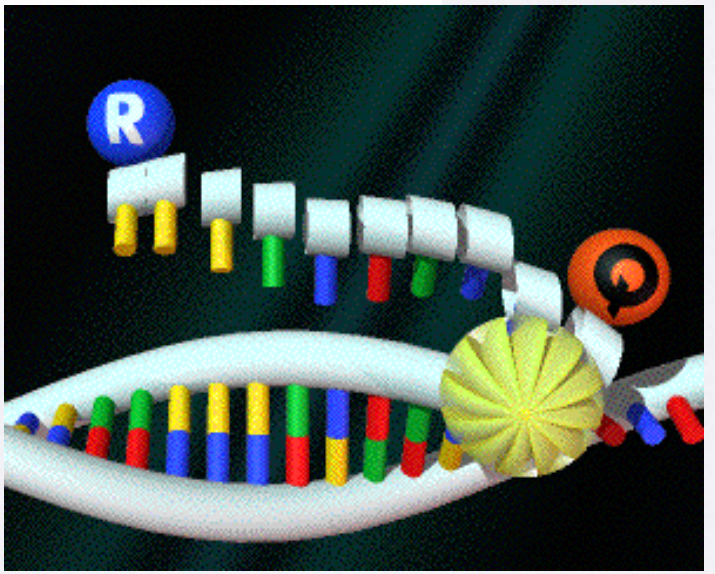
Level III

Centralized Equipment. Service
and Molecular Analysis









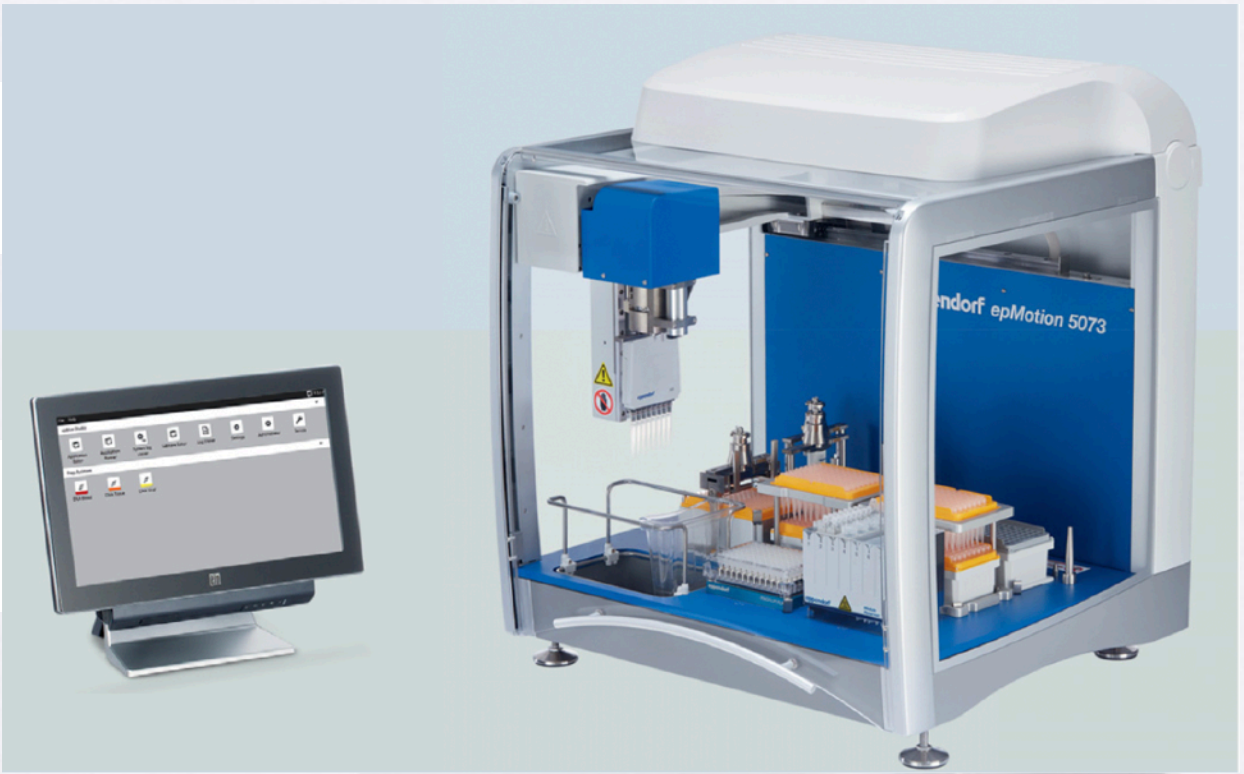
Quantitative PCR (qPCR)

Amplification of DNA/RNA

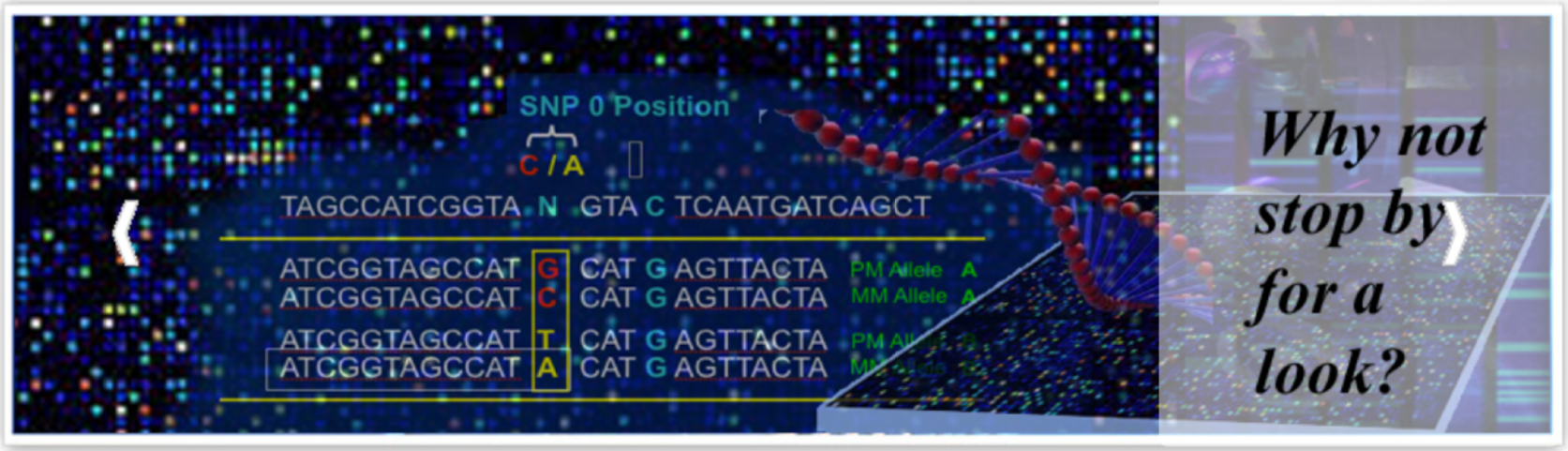
Models ABI/Life 7500 FAST,

Robotic Workstation

Integra Assist Plus (Integra)



Epimotion 5073 (Eppendorf)

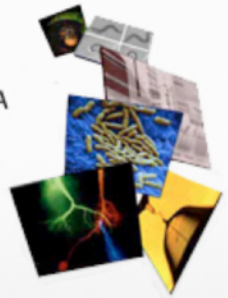


Welcome

Cell, Protein and DNA Core Facilities

About

Welcome to GSU Cell - Protein - DNA Core Facilities



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GSU Biology Core Facility

Supporting Life Sciences at GSU

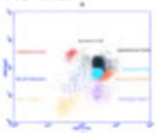
http://biotech.gsu.edu/core_facility/index.html

Georgia State University

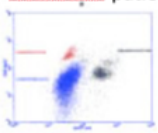
Flow Cytometry

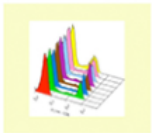
Profiling Cells

Normal



Leukaemia patient

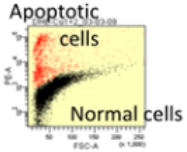




See effects of different drugs on Cell cycle

Apoptotic cells

Normal cells

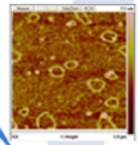


Apoptosis -programmed cell death

Atomic Force Microscopy

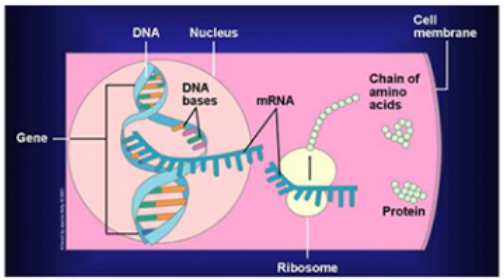
Imaging at the Ångström level

Protein structure analysis



Cellular Functions

DNA Replication

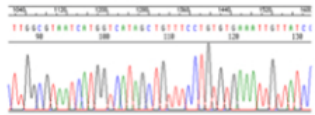


RNA Expression

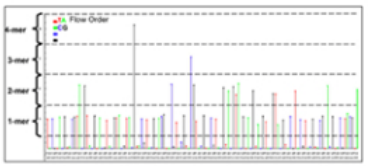
DNA Sequence Analysis:

Profiling DNA

Sanger Sequencing – >800 base pairs/run

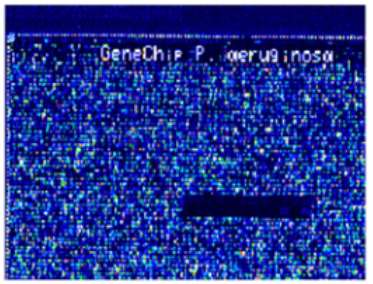


High Throughput Genomic Sequencing – 100,000 base pairs/run



Microarray:Analysis

Profiling mRNA



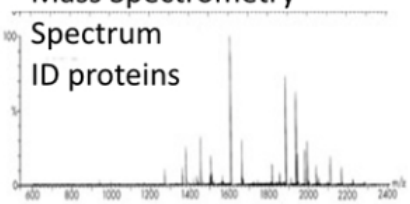
Colour of pin-point dots demonstrates the presence / absence of gene sequences

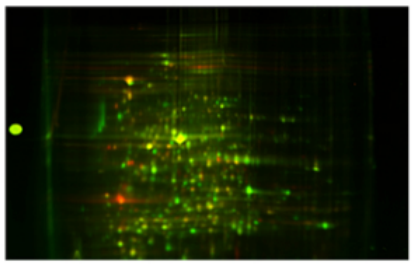
Protein Expression

Mass Spectrometry

Spectrum

ID proteins





Proteomics

Profiling Proteins

2D Protein gel

Protein separation using

Electric charge and molecular weight

GSU Biology Core Facility

Supporting Life Sciences at GSU

http://biotech.gsu.edu/core_facility/index.html

Georgia State University

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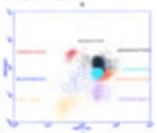
Normal



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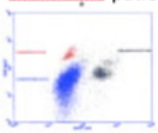

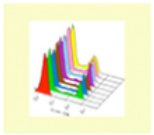

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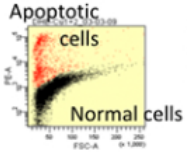

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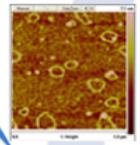

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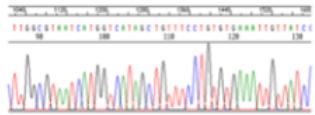

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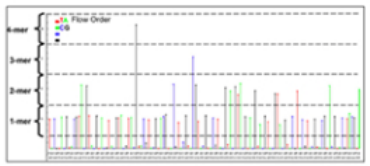
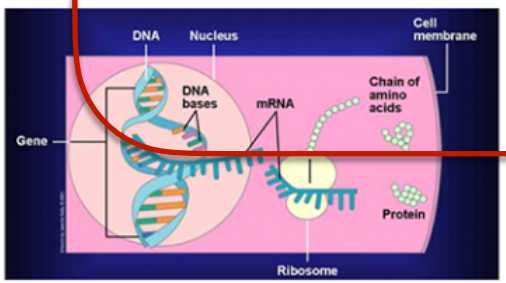




DNA
Replication

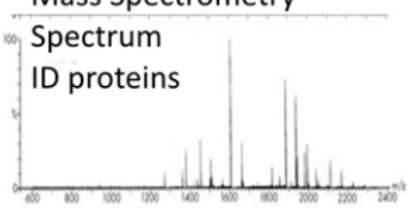
RNA
Expression

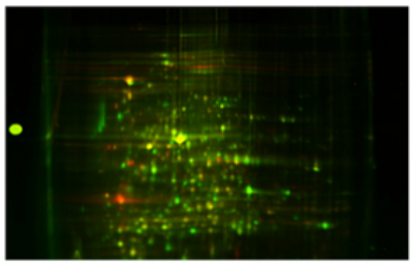
Protein
Expression

Cellular Functions

Mass Spectrometry

Spectrum
ID proteins





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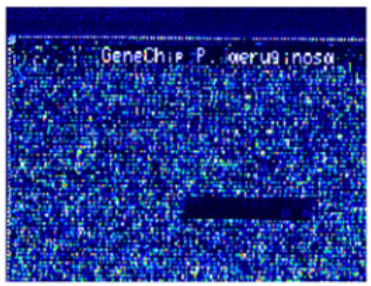

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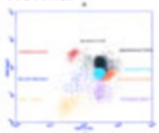

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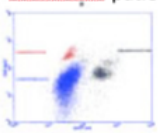

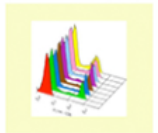

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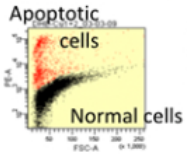

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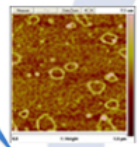

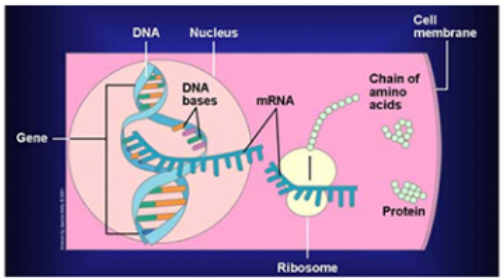

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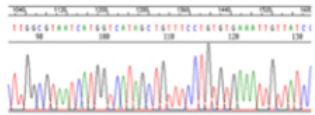

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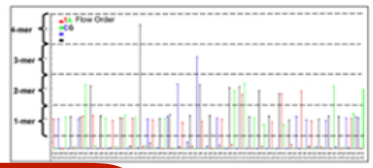

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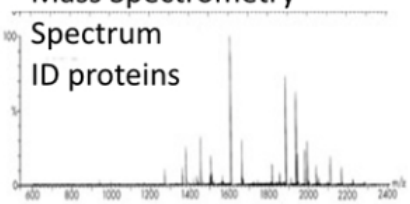

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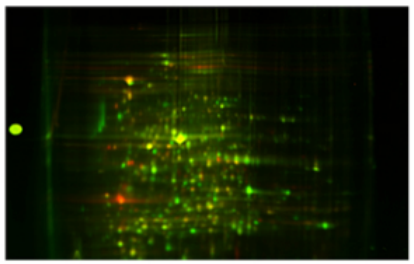

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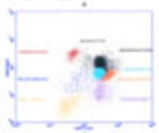

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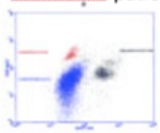

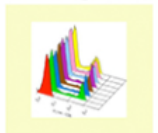

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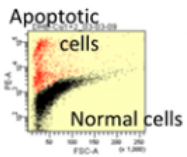

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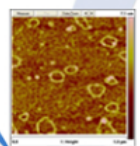

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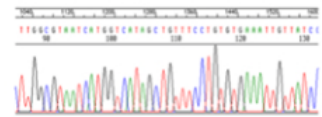

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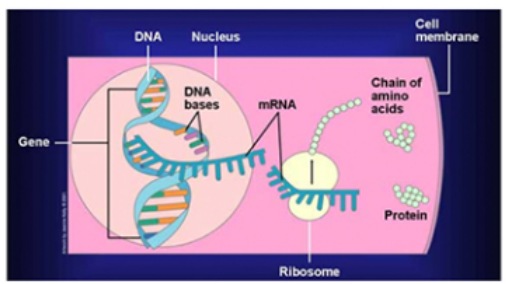

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Protein

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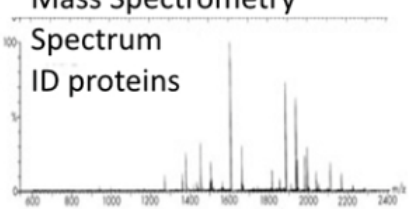

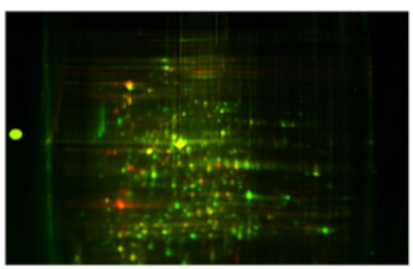

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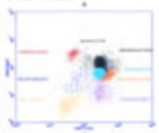

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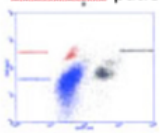

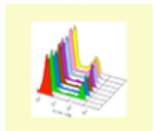

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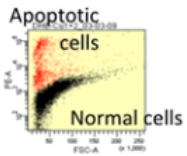

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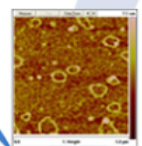

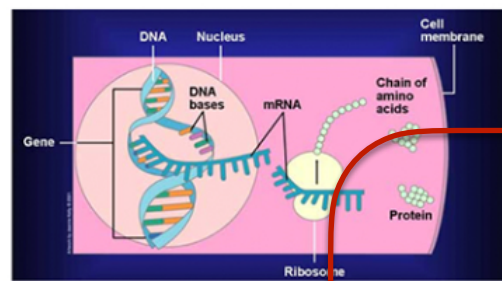

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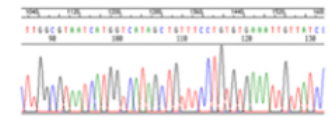

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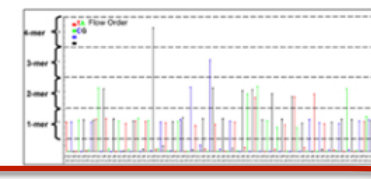
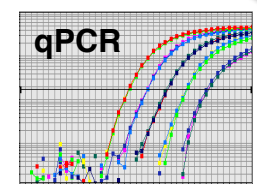


RNA

Expression



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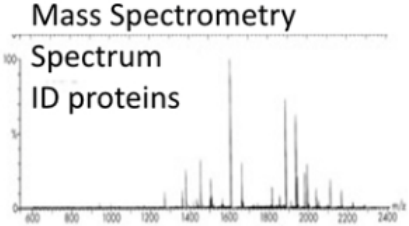

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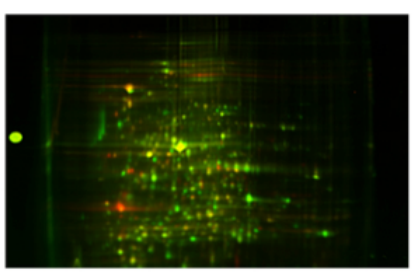

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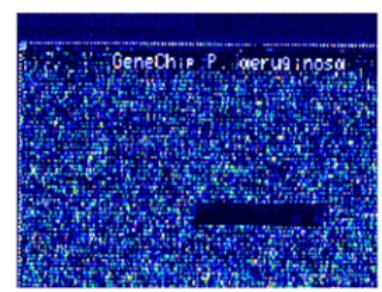

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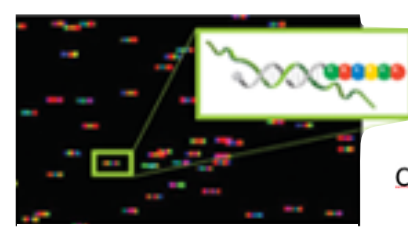

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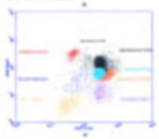

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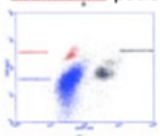

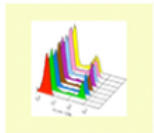

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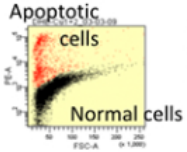

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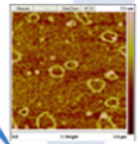

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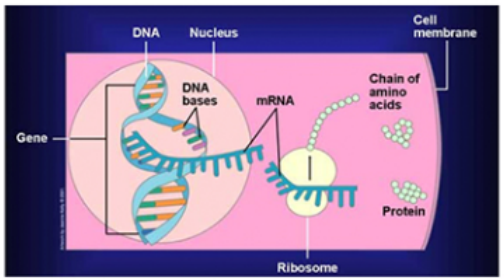

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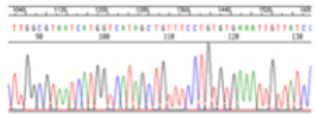

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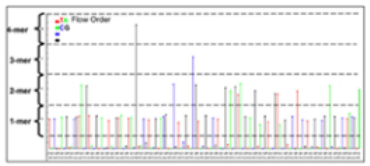

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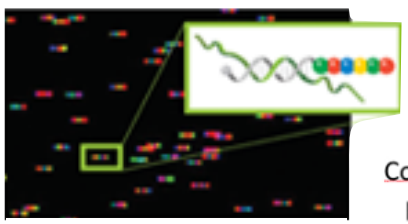

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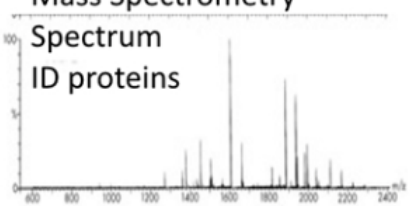

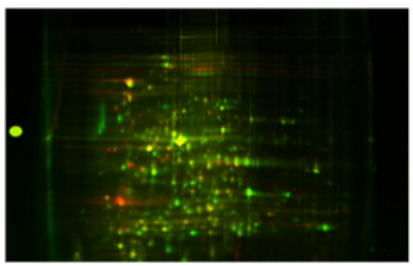

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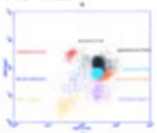

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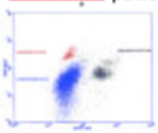

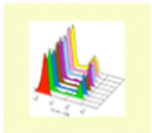

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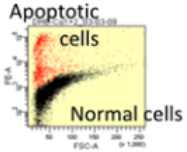

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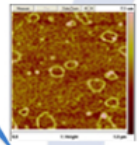

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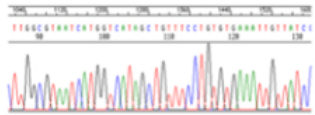

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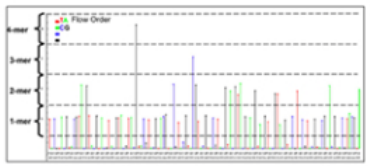

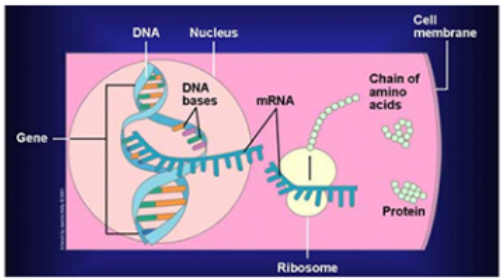

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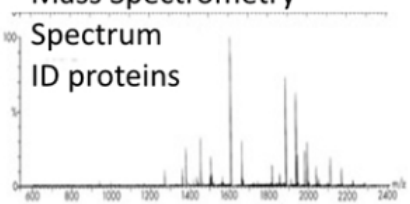
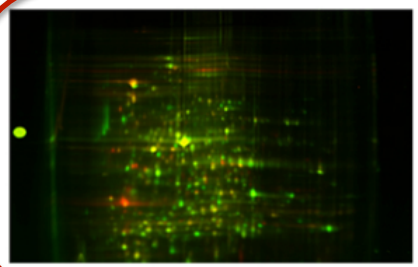


Proteomics

Profiling Proteins



2D Protein gel
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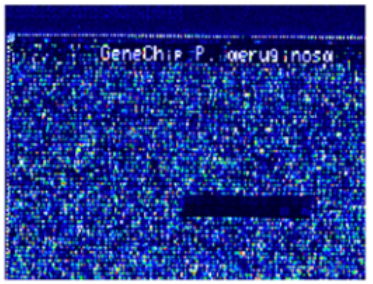

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Flow Cytometry

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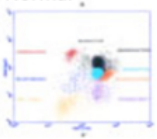
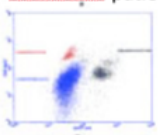
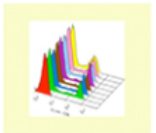


Leukaemia patient

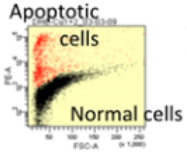




See effects of different drugs on Cell cycle

Apoptotic cells

Normal cells



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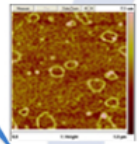

Cellular Functions

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Spectrum

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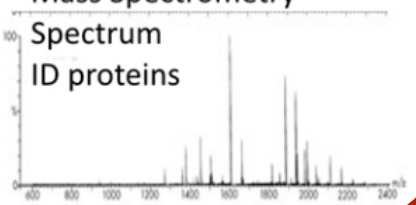

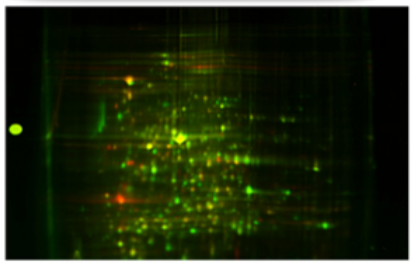

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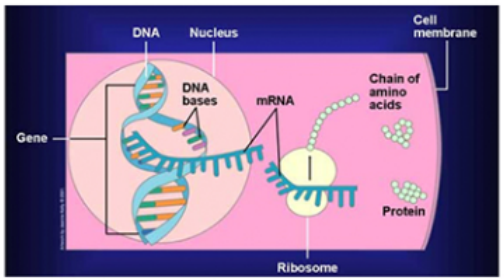


RNA

Expression

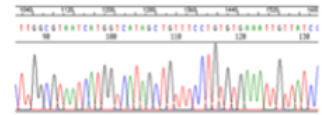
Protein

Expression

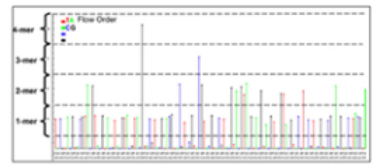
DNA Sequence Analysis:

Profiling DNA

Sanger Sequencing – >800 base pairs/run



High Throughput Genomic Sequencing – 100,000 base pairs/run



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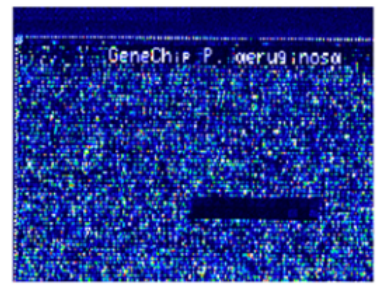

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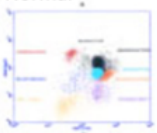

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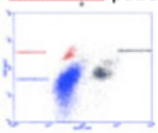

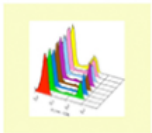

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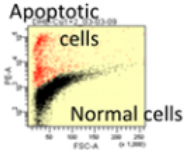

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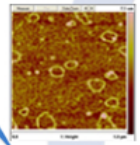

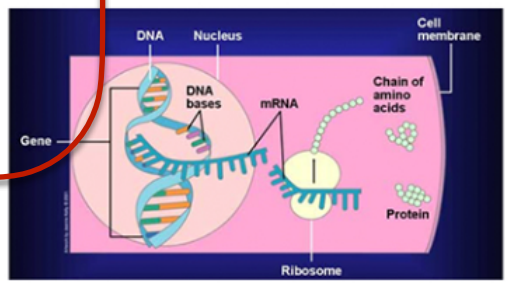

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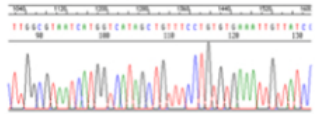

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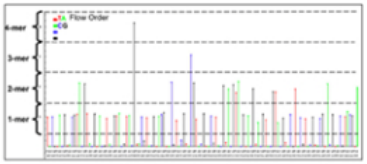

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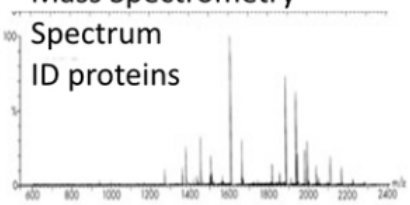

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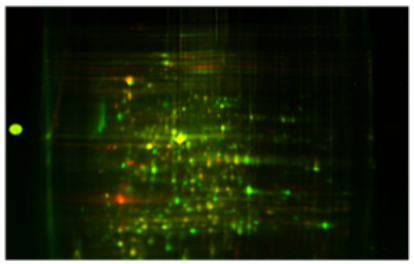

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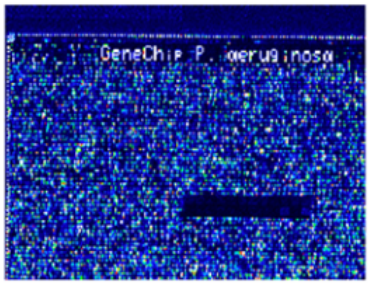

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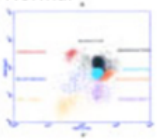

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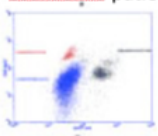

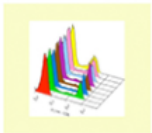

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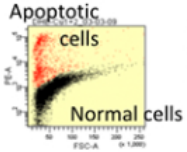

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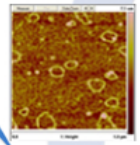

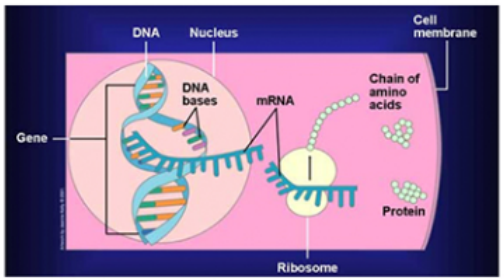

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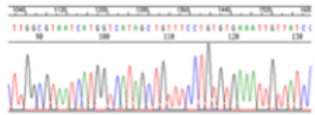

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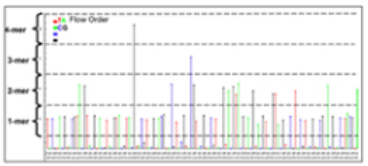

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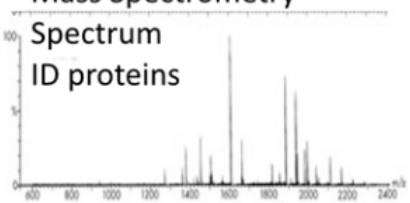

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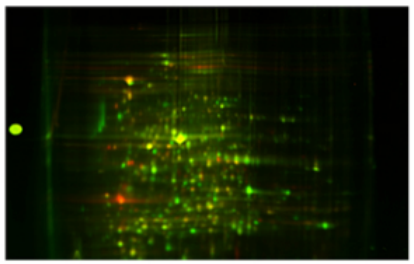

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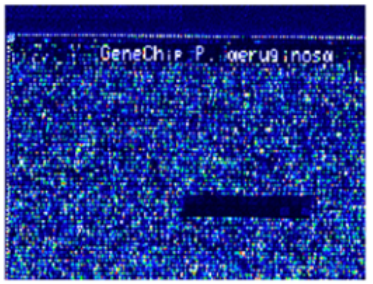

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SUMMER INSTITUTE - ONLINE MODALITY CALENDAR 2022

SUN	MON	TUE	WED	THU	FRI	SAT
June 26	27	28	29	30	31	July 02
	9:00-10:00am Virtual Program Orientation for Summer Institute Online Modality					
July 03	04	05	06	07	08	09
	Holiday (Independence Day)	8:30-10:00am -Welcome Reception and Buddy Meet & Greet Event	Free Day	Classes begin! 8:30-11am: BIOL4905 INTRODUCTION 8-10:20pm: Afternoon course	8:30-11am: BIOL4905 DNA PREPARATION 8-10:20pm: Afternoon course	
10	11	12	13	14	15	16
	8:30-11am:BIOL4905 PROTEOMICS I 8-10:20pm: Afternoon course	8:30-11am:BIOL4905 PROTEOMICS II 8-10:20pm: Afternoon course	8:30-11am:BIOL4905 PROTEOMICS III 8-10:20pm: Afternoon course	8:30-11am: BIOL4905 RNA PREPARATION 8-10:20pm: Afternoon course	Virtual Independence Day Activity	
17	18	19	20	21	22	23
	8:30-11am:BIOL4905 qPCR / ROBOTS 8-10:20pm: Afternoon course	8:30-11am:BIOL4905 DNA Sequence Analysis 8-10:20pm: Afternoon course	Midterm Break	8:30-11am:BIOL4905 Next Gen. Sequencing 8-10:20pm: Afternoon course	8:30-11am:BIOL4905 Automated Microscopy /AFM	
24	25	26	27	28	29	30
	8:30-11am:BIOL4905 Microarray I 8-10:20pm: Afternoon course	8:30-11am:BIOL4905 Microarray II 8-10:20pm: Afternoon course	8:30-11am:BIOL4905 Nanostring 8-10:20pm: Afternoon course	8:30-11am:BIOL4905 Flow Cytometry 8-10:20pm: Afternoon course	FINALS	
31	August 01	02	03			
	9:00-10:00am: Closing Reception		Grades available in PAWS			

Legend:
Orange: Courses Blue: Activities

Core Facilities

Georgia State University | DEPARTMENT OF BIOLOGY
Advanced Biotechnology Core

Home | Instrumentation | Resources | Services | Log In

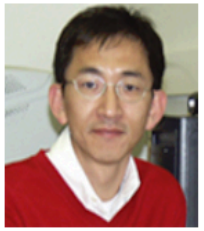
Personnel

Cell, Protein and DNA Core Facilities

John E.Houghton, PhD
Director of ABCore Facilities
Location: 520 PSC
Tel: 404-413-5390 (O)
Email: *jhoughton@gsu.edu*

"Sandy" Ying Sin Hsieh, PhD
Research Scientist II
Rm: 519 / 535 / 659B PSC
Tel: 404-413-5363 (O)
Email: *yhsieh3@gsu.edu*
Instrument Training, Flow Cytometry, Genomics, qPCR, plate readers

Sonja R. Young
Laboratory Supervisor
Rm: 519 / 661 PSC
Tel: 404-413-5363 (O)
Email: sstovall@gsu.edu
Genomics, Instrument Maintenance, Flow Cytometry



Hyuk-Kyu Seoh, PhD
Research Scientist I
Rm: 521 / 537 PSC
Tel: 404-413-5379 (O)
Email: *hseoh@gsu.edu*
Proteomics, Protein purification/separation Sequence Analysis

Jesse Gardner
Research Scientist IV
Rm: 521 / 533 PSC
Tel: 404-413-5370 (L)
Email: *jgardner26@gsu.edu*
DNA/RNA Sequence Analysis, DNA/RNA purification/troubleshooting AFM Service

"Chip" Foster
Facilities
Rm: 519 PSC
Tel: 404-413-5363 (O)
Email: jfoster@gsu.edu
Autoclaves, Instrument Maintenance

Shawn Canavan
Teaching Asst.

http://biotech.gsu.edu/core

iCollege

Welcome

By logging into this system, you agree to comply with University Policies.

CampusID Login:

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Non-CampusID Login:

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INSTRU
CELL PROTEIN a

Personnel / Staff
FAQs
Forms
Operation Manuals
Safety Information
Lab Technology / Training & Access
"How to" GUIDES
Other, Related ABCore Facilities

CoreLab Technology Training & Access

Cell, Protein and DNA Core Facilities

Introduction

All researchers who would like to undertake research in the Natural Sciences at Georgia State University, and who wish to avail themselves of the research facilities and instrumentation within the **Natural Science Centre** and / or the **Petit Science Centre** must go through an initial series of training sessions to familiarize themselves with fundamental aspects of Laboratory Safety and Security, as well as what equipment is available and how to use it. These training sessions are PRIMARILY on-line, but one one on training is available UPON REQUEST by a member of the **ABCore facilities.**

Technology Training & Access COVID-19 CHANGES for SPRING '21'

Registration

ABCORE FACILITIES

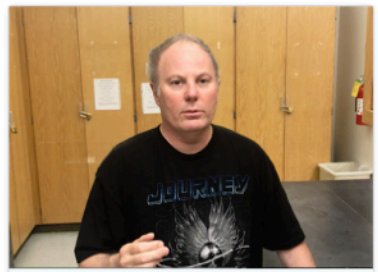
Training Videos -some with, some without audio

BASIC TRAINING: Videos in this section relate to Equipment that are available for "general use" in most Molecular Biology laboratories

AUTOCLAVES PSC

A brief training video on how to use the AUTOCLAVES in PSC 545/645. For further, more detailed information, please contact -Chip Foster

View Video



AUTOCLAVES NSC 3RD FLOOR

A brief training video on how to use the AUTOCLAVES in NSC 336. For further, more detailed information, please contact -Chip Foster

View Video

AUTOCLAVES NSC 4TH FLOOR

A brief training video on how to use the AUTOCLAVES in NSC 484. For further, more detailed information, please contact -Chip Foster

View Video

FILM DEVELOPER

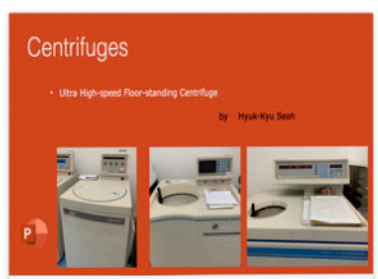
A brief guide on how to use the FILM DEVELOPER in the ABCore facilities. For further, more detailed, information please contact -Sonja Young

View Video

HIGH SPEED CENTRIFUGES

A brief guide on how to use the High Speed Centrifuges in the ABCore facilities. For further, more detailed information please contact -Hyuk-Kyu Seoh

View Video



ULTRACENTRIFUGES (FLOOR)

A brief guide on how to use the Ultracentrifuges floor models in the ABCore facilities. For further, more detailed, information please contact -Hyuk-Kyu Seoh

View Video

ULTRACENTRIFUGES (TABLE TOP)

A brief guide on how to use the Ultracentrifuges Table-Top models in the ABCore facilities. For further, more detailed, information please contact -Hyuk-Kyu Seoh

View Video

LYOPHILIZERS

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Operation Manuals
Safety Information
Lab Technology / Training & Access
"How to" GUIDES
Other, Related ABCore Facilities

CoreLab Technology Training & Access

Cell, Protein and DNA Core Facilities

Introduction

All researchers who would like to undertake research in the Natural Sciences at Georgia State University, and who wish to avail themselves of the research facilities and instrumentation within the **Natural Science Centre** and / or the **Petit Science Centre** must go through an initial series of training sessions to familiarize themselves with fundamental aspects of Laboratory Safety and Security, as well as what equipment is available and how to use it. These training sessions are PRIMARILY on-line, but one one on training is available UPON REQUEST by a member of the **ABCore facilities.**

Technology Training & Access **COVID-19 CHANGES for SUMMER '22**

Registration

ABCORE FACILITIES

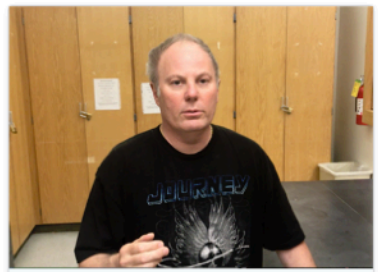
Training Videos -some with, some without audio

BASIC TRAINING: Videos in this section relate to Equipment that are available for "general use" in most Molecular Biology laboratories

AUTOCLAVES PSC

A brief training video on how to use the AUTOCLAVES in PSC 545/645. For further, more detailed information, please contact -Chip Foster

View Video



AUTOCLAVES NSC 3RD FLOOR

A brief training video on how to use the AUTOCLAVES in NSC 336. For further, more detailed information, please contact -Chip Foster

View Video

AUTOCLAVES NSC 4TH FLOOR

A brief training video on how to use the AUTOCLAVES in NSC 484. For further, more detailed information, please contact -Chip Foster

View Video

FILM DEVELOPER

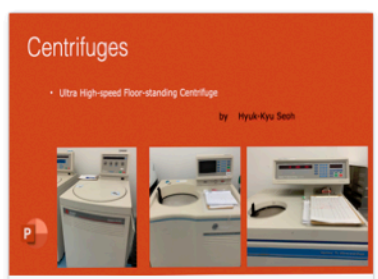
A brief guide on how to use the FILM DEVELOPER in the ABCore facilities. For further, more detailed, information please contact -Sonja Young

View Video

HIGH SPEED CENTRIFUGES

A brief guide on how to use the High Speed Centrifuges in the ABCore facilities. For further, more detailed information please contact -Hyuk-Kyu Seoh

View Video



ULTRACENTRIFUGES (FLOOR)

A brief guide on how to use the Ultracentrifuges floor models in the ABCore facilities. For further, more detailed, information please contact -Hyuk-Kyu Seoh

View Video

ULTRACENTRIFUGES (TABLE TOP)

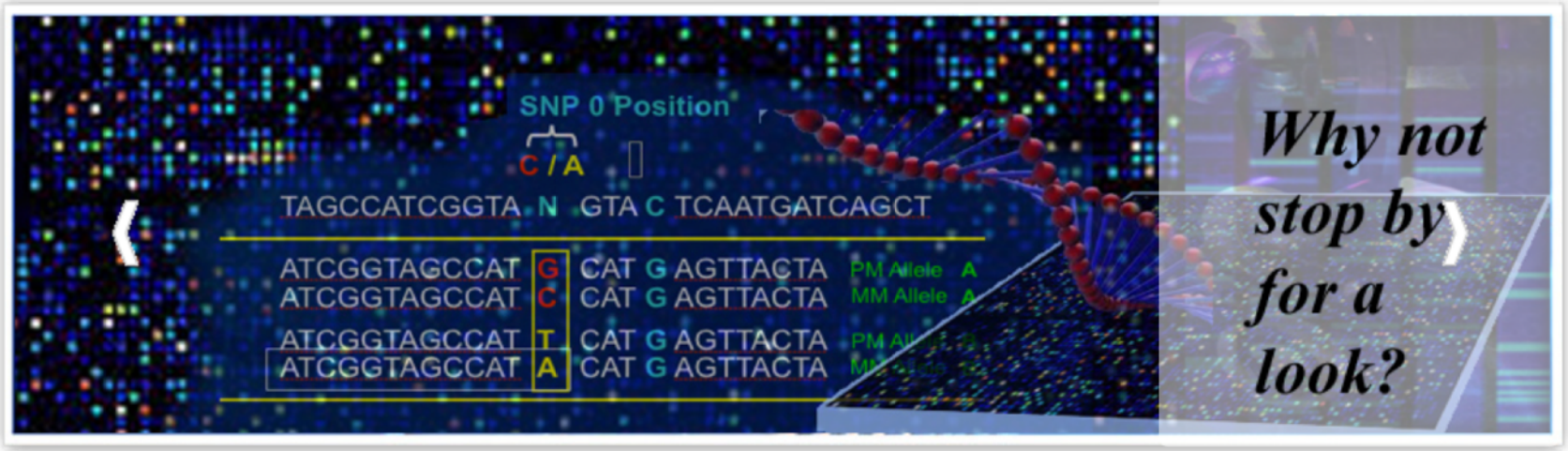
A brief guide on how to use the Ultracentrifuges Table-Top models in the ABCore facilities. For further, more detailed, information please contact -Hyuk-Kyu Seoh

View Video

LYOPHILIZERS

A brief guide on how to use the Lyophilizers in the ABCore facilities. For further, more detailed, information please contact -Hyuk-Kyu Seoh

View Video

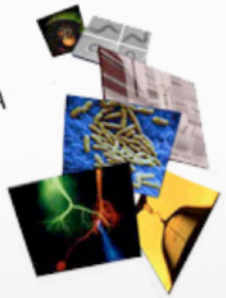


Welcome

Cell, Protein and DNA Core Facilities

About

Welcome to GSU Cell - Protein - DNA Core Facilities



Resources

Find answers to your questions here

Contacts

John E. Houghton

Director of Core Facilities

Tel: 404-413-5390 | Email: jhoughton@gsu.edu

Debby Walthall

Research Scientist

Tel: 404-413-5363 | Email: dwalthall@gsu.edu

Services

Learn about some of the services that the core facility offers

Instrumentation

Find out what equipment and facilities are available for your use

What's New?

Find out what's new in the Cell - Protein - DNA Core Facilities

SUMMER INSTITUTE - ONLINE MODALITY CALENDAR 2022

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Legend:
Orange: Courses Blue: Activities

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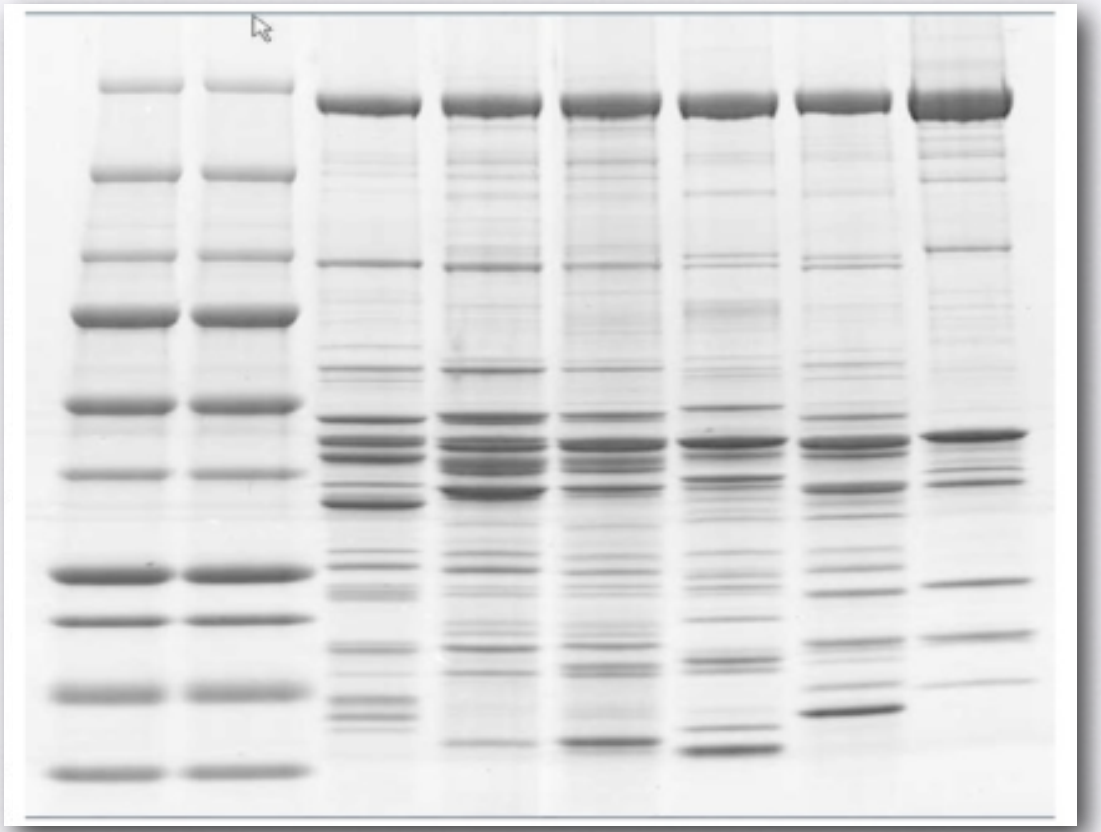
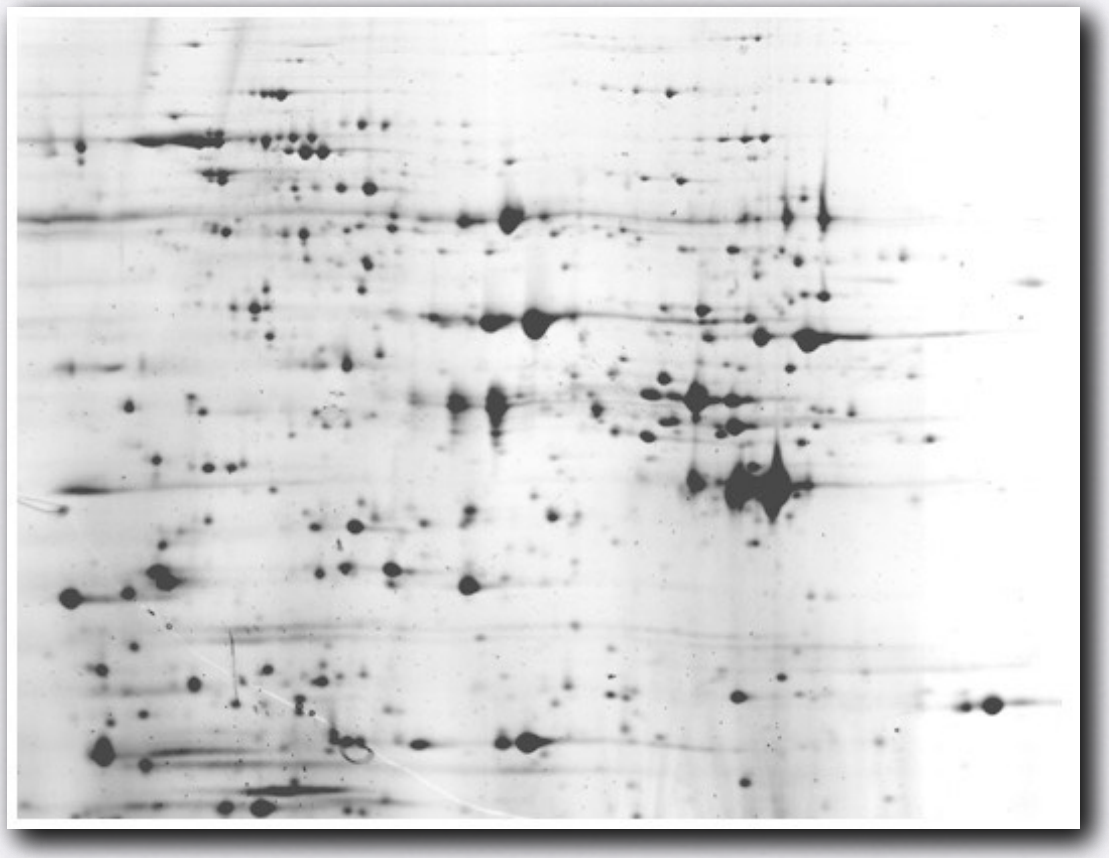
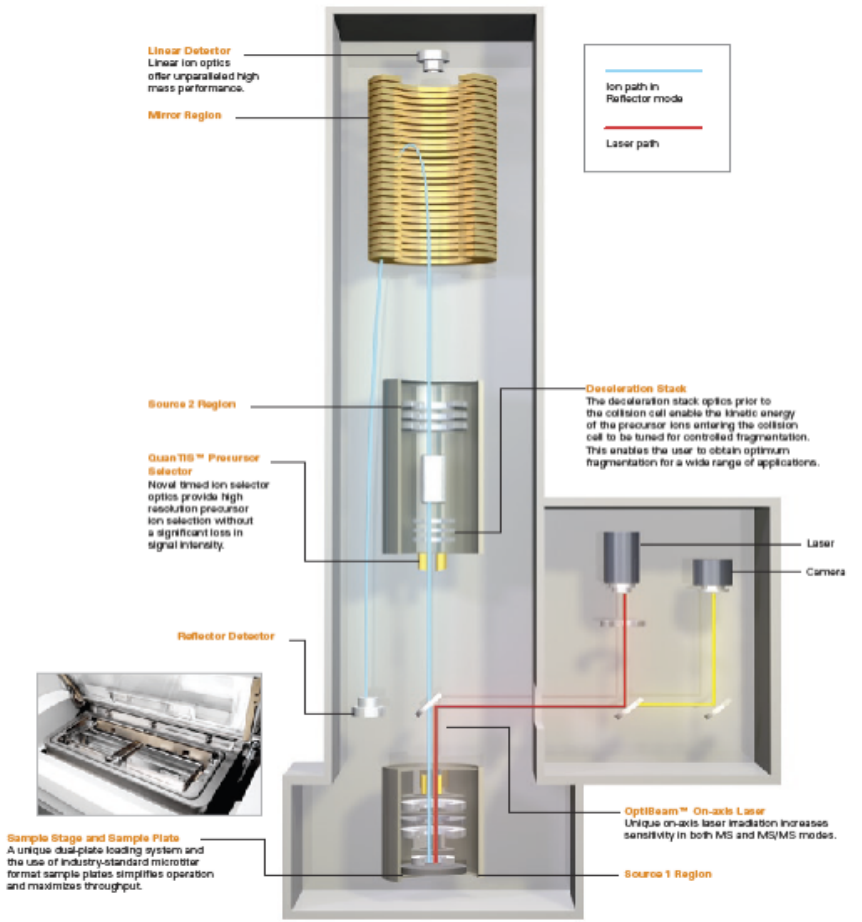
Proteomics:

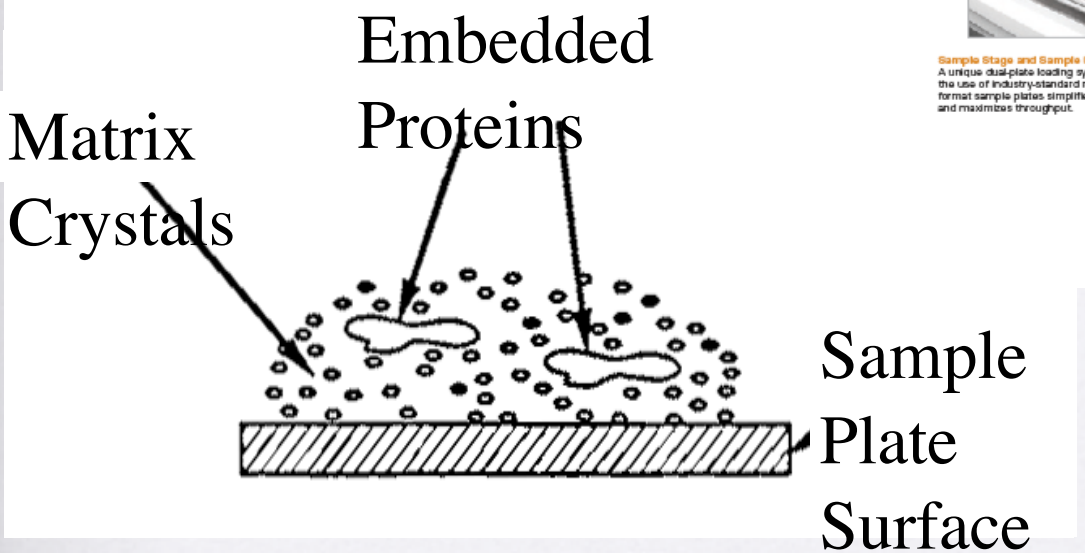


Proteomics:



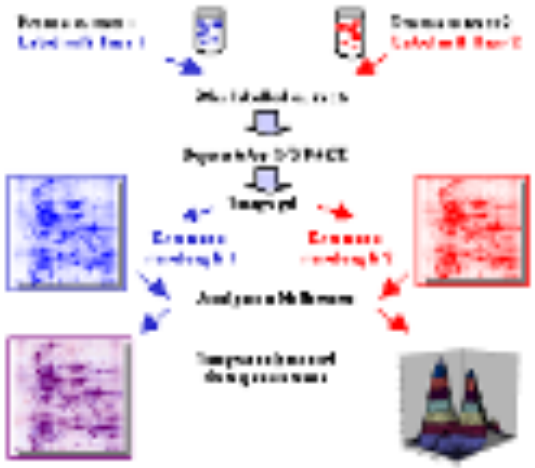
Ettan II 2D gel Proteomics System complemented by a MALDI TOF/TOF(ABI) Model 4800+

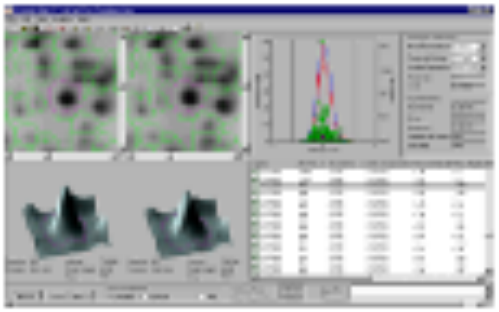

Linear Detector
Linear ion optics offer unparalleled high mass performance.
Mirror Region
Ion path in Reflector mode
Laser path
Source 2 Region
Deceleration Stack
The deceleration stack optics prior to the collision cell enable the kinetic energy of the precursor ions entering the collision cell to be tuned for controlled fragmentation. This enables the user to obtain optimum fragmentation for a wide range of applications.
QuanTIS™ Precursor Selector
Novel timed ion selector optics provide high resolution precursor ion selection without a significant loss in signal intensity.
Laser
Camera
Reflector Detector
OptiBeam™ On-axis Laser
Unique on-axis laser irradiation increases sensitivity in both MS and MS/MS modes.
Sample Stage and Sample Plate
A unique dual-plate loading system and the use of industry-standard microtiter format sample plates simplifies operation and maximizes throughput.
Source 1 Region

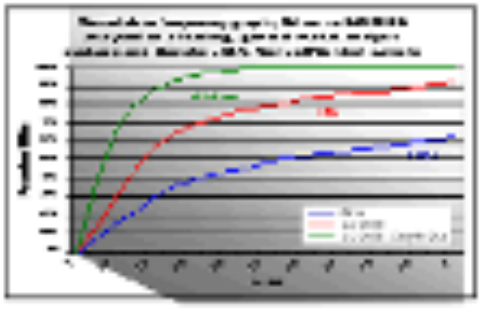

Matrix Crystals
Embedded Proteins
Sample Plate Surface

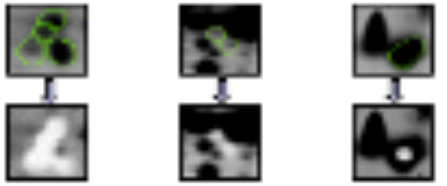
Proteomics:

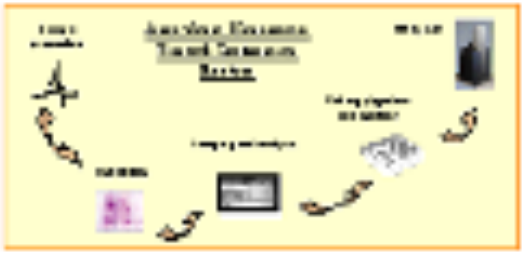
Fluorescence 2-D differential in-gel electrophoresis platform

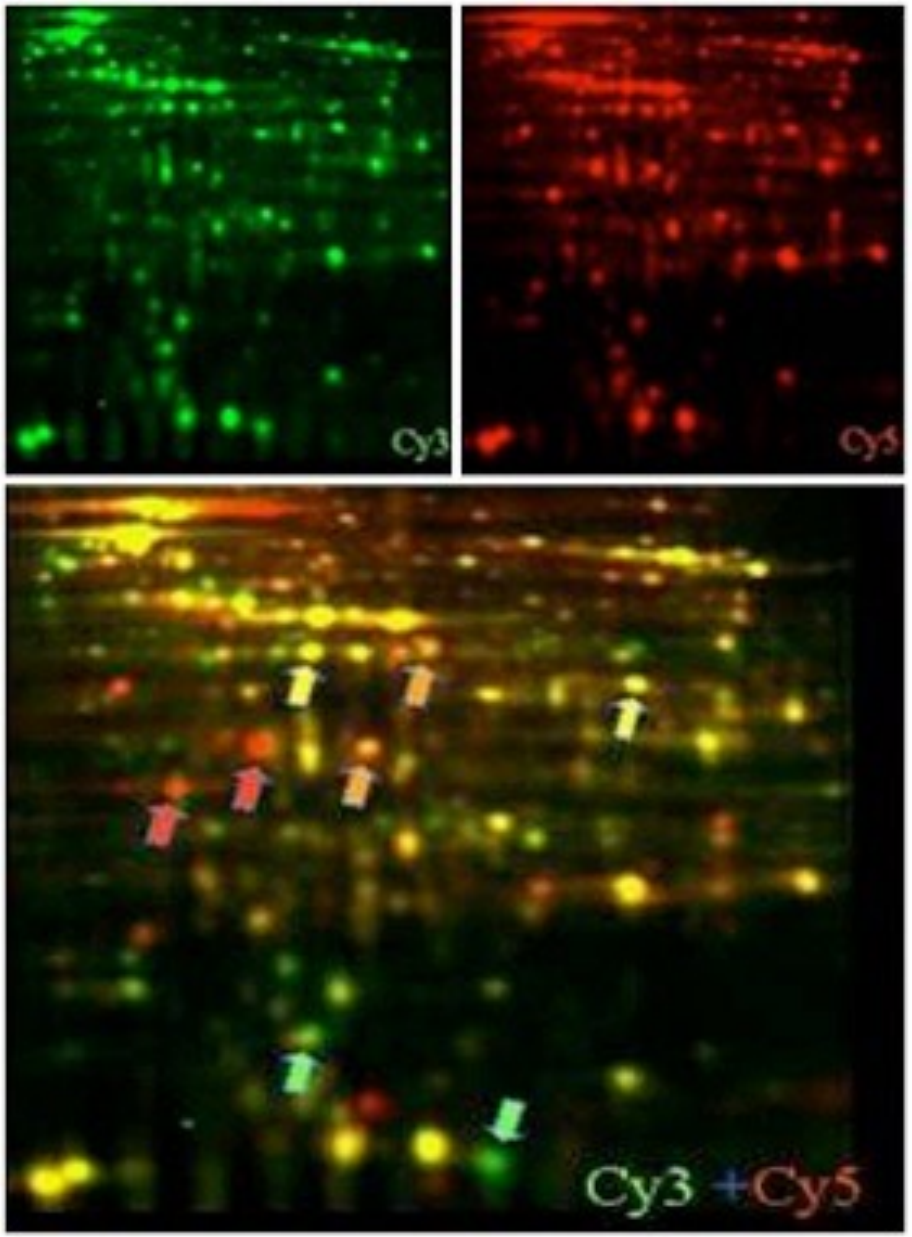











Cy3
Cy5
Cy3 +Cy5

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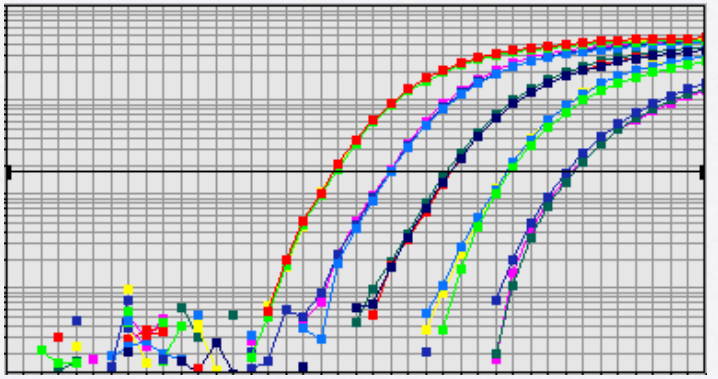


Quantitative PCR (qPCR)

Amplification of DNA/RNA

Models ABI/Life 7500 FAST,

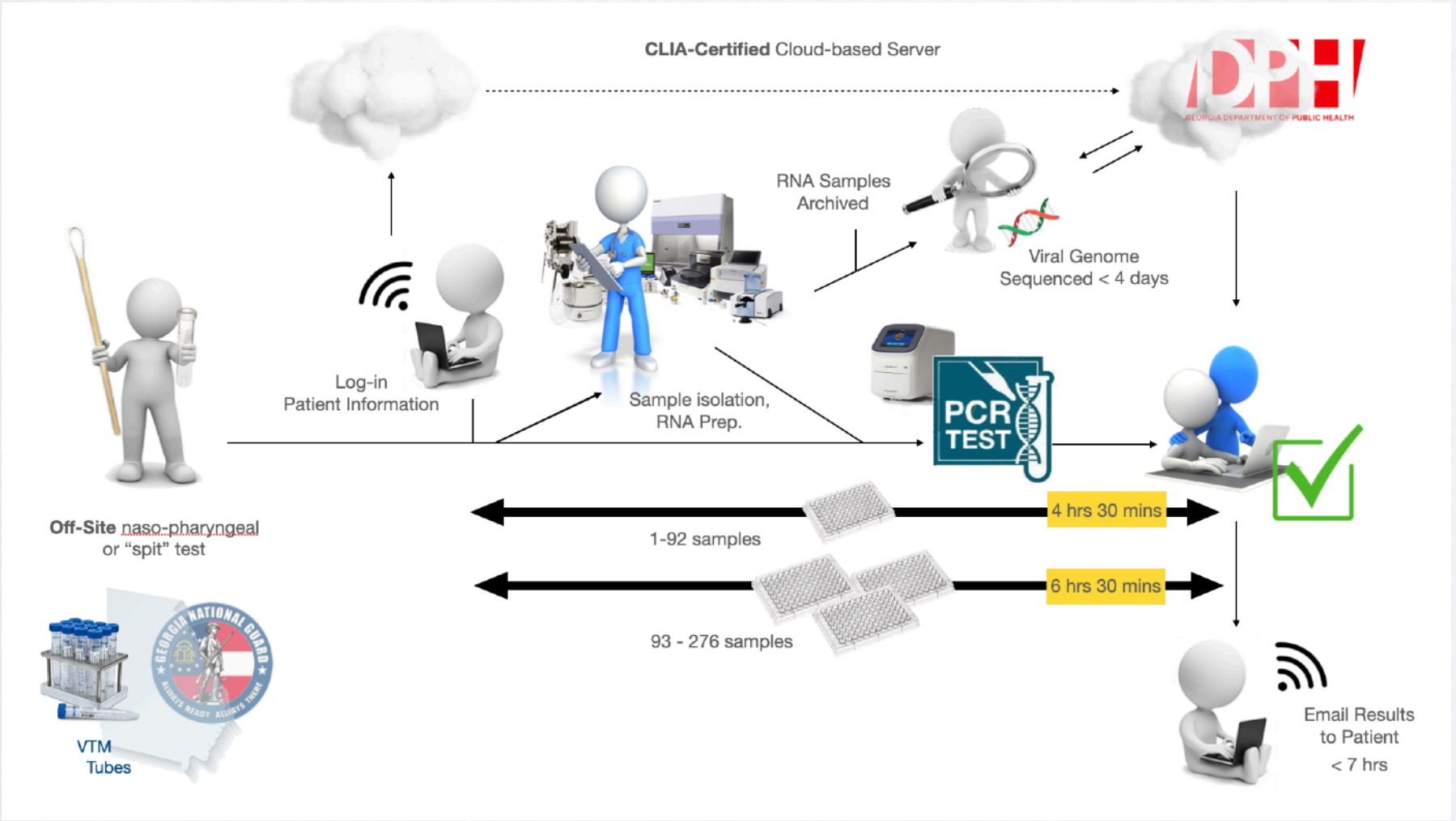
SARS-CoV-2 Pandemic

CLIA-certified
COVID-19 PCR testing lab

2020-22

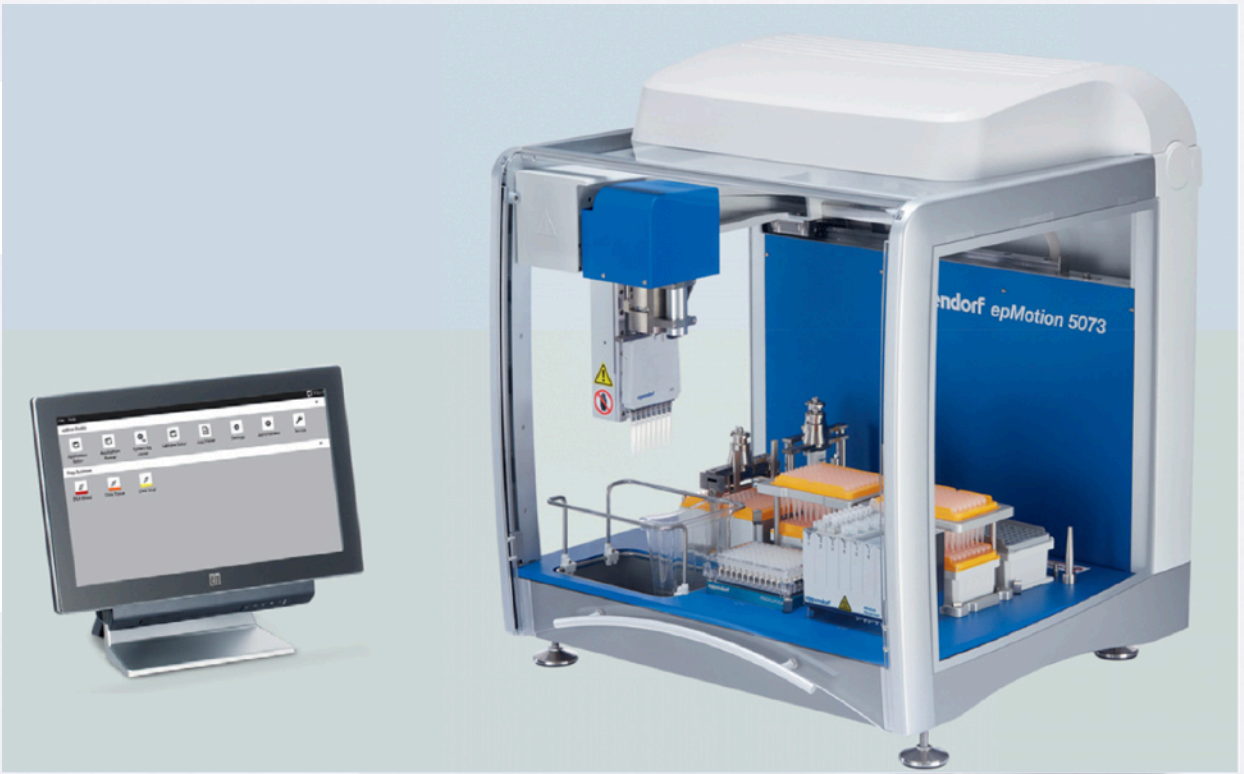
ore

F acilities


CLIA-Certified Cloud-based Server
DPH
GEORGIA DEPARTMENT OF PUBLIC HEALTH
RNA Samples
Archived
Viral Genome
Sequenced < 4 days
Log-in
Patient Information
Sample isolation,
RNA Prep.
PCR
TEST
Off-Site naso-pharyngeal
or "spit" test
1-92 samples
4 hrs 30 mins
93 - 276 samples
6 hrs 30 mins
GEORGIA NATIONAL GUARD
VTM
Tubes
Email Results
to Patient
< 7 hrs

Robotic Workstation

Integra Assist Plus (Integra)



Epimotion 5073 (Eppendorf)

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Capillary DNA Sequencers
(ABI/Life Technologies) Model 3500xl

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Legend:
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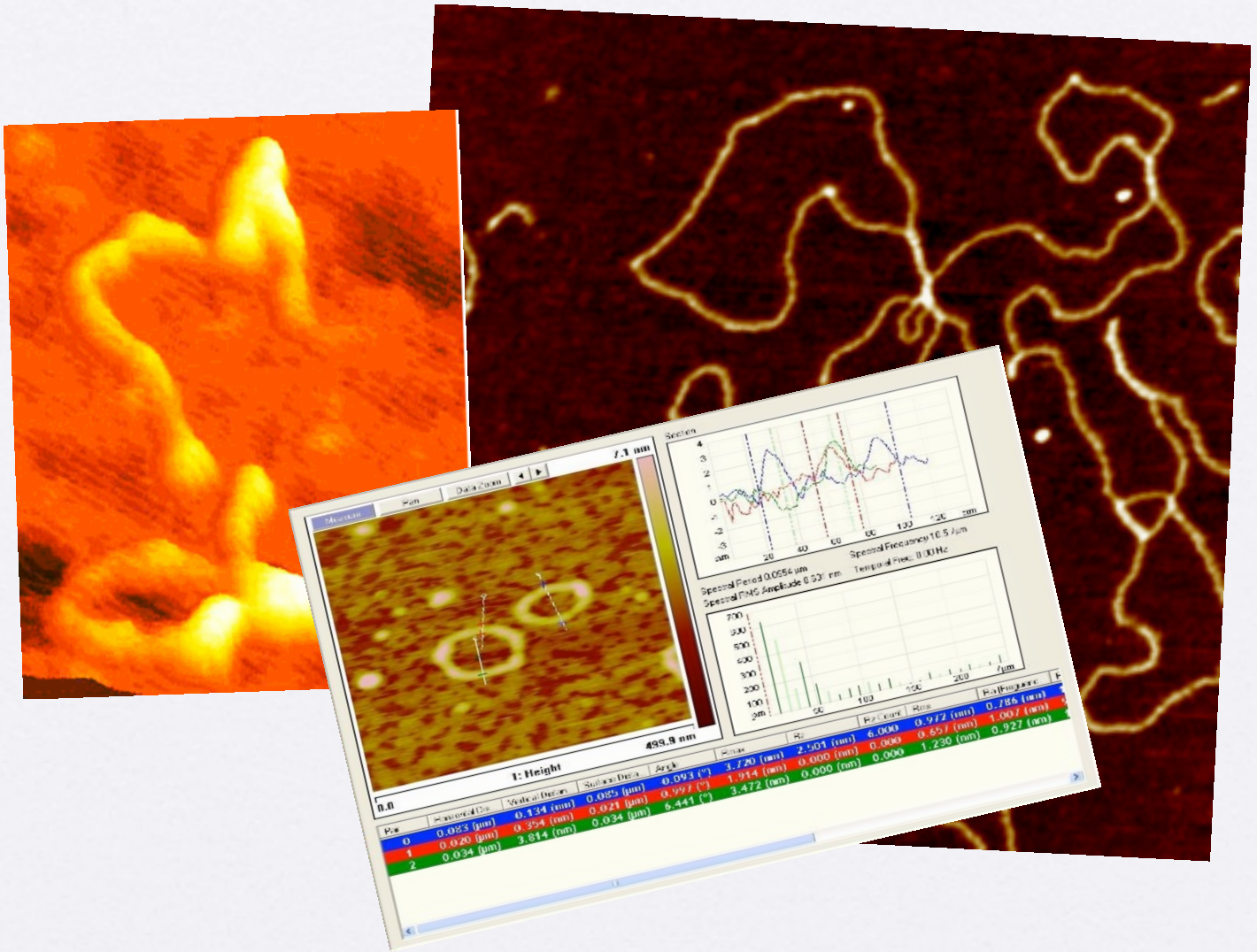
Automated Fluorescent Microscopes

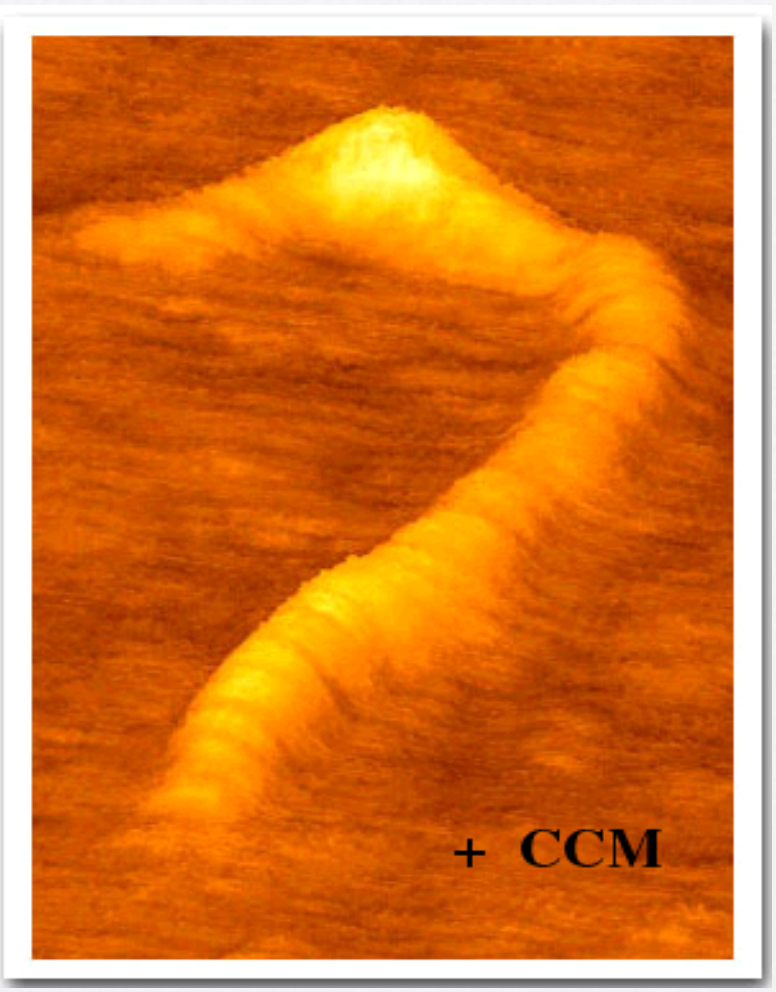
Axioimager II / Observer (inverted) (Zeiss)

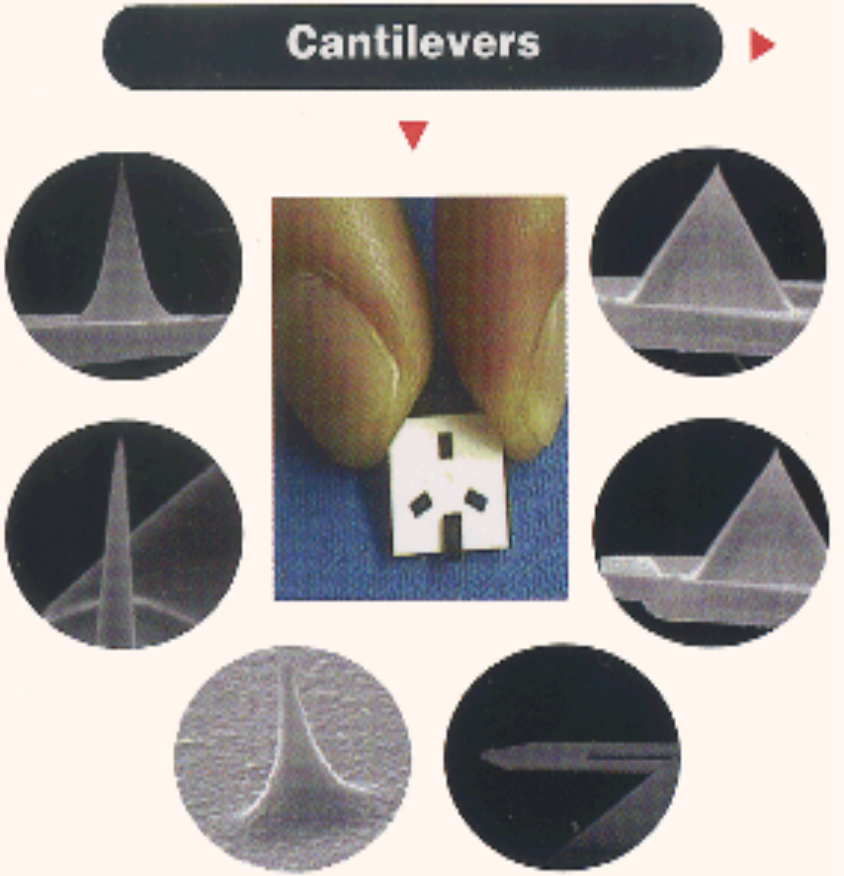
Automated Fluorescent Digital Microscope

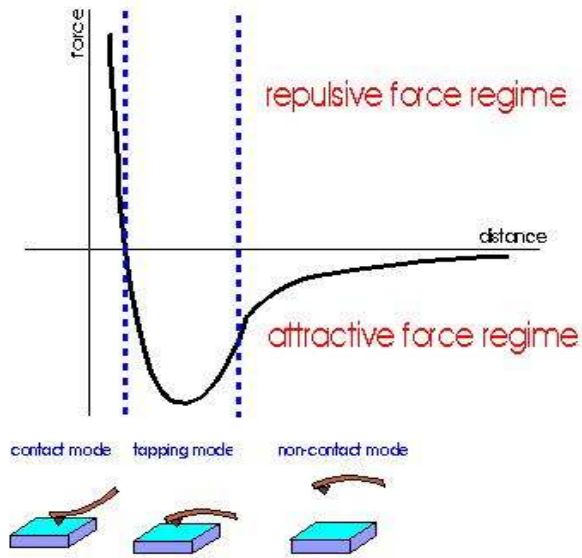
(Keyence) BZ-X700

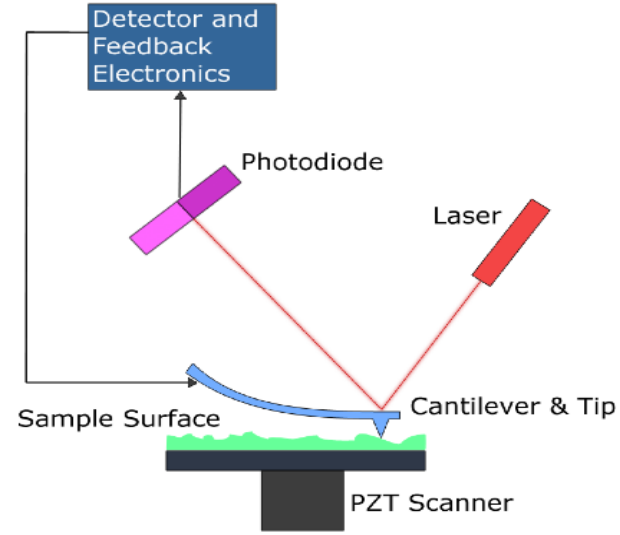
Atomic Force Microscopy:



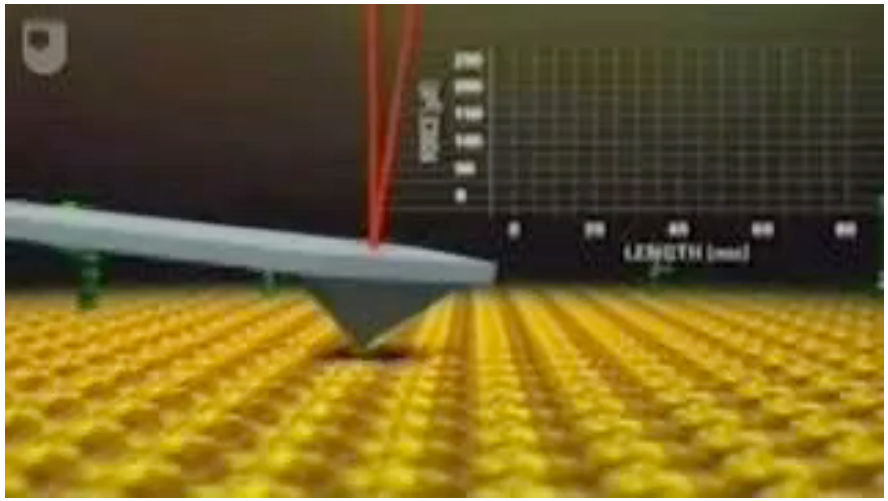

+ CCM


Cantilevers





Atomic Force Microscope (AFM) operates by measuring attractive or repulsive forces between a probe or "tip" and the sample. The tip is located at the end of a leaf spring or "cantilever". A laser beam is reflected off the cantilever. Any angular deflection of the cantilever caused by the change of the force between tip and sample is represented by the angular deflection of the laser beam. Images are taken by scanning the sample relative to the tip and measuring the deflection of the cantilever as a function of lateral position. Different from traditional microscope, image from AFM is three dimensional.



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Legend:
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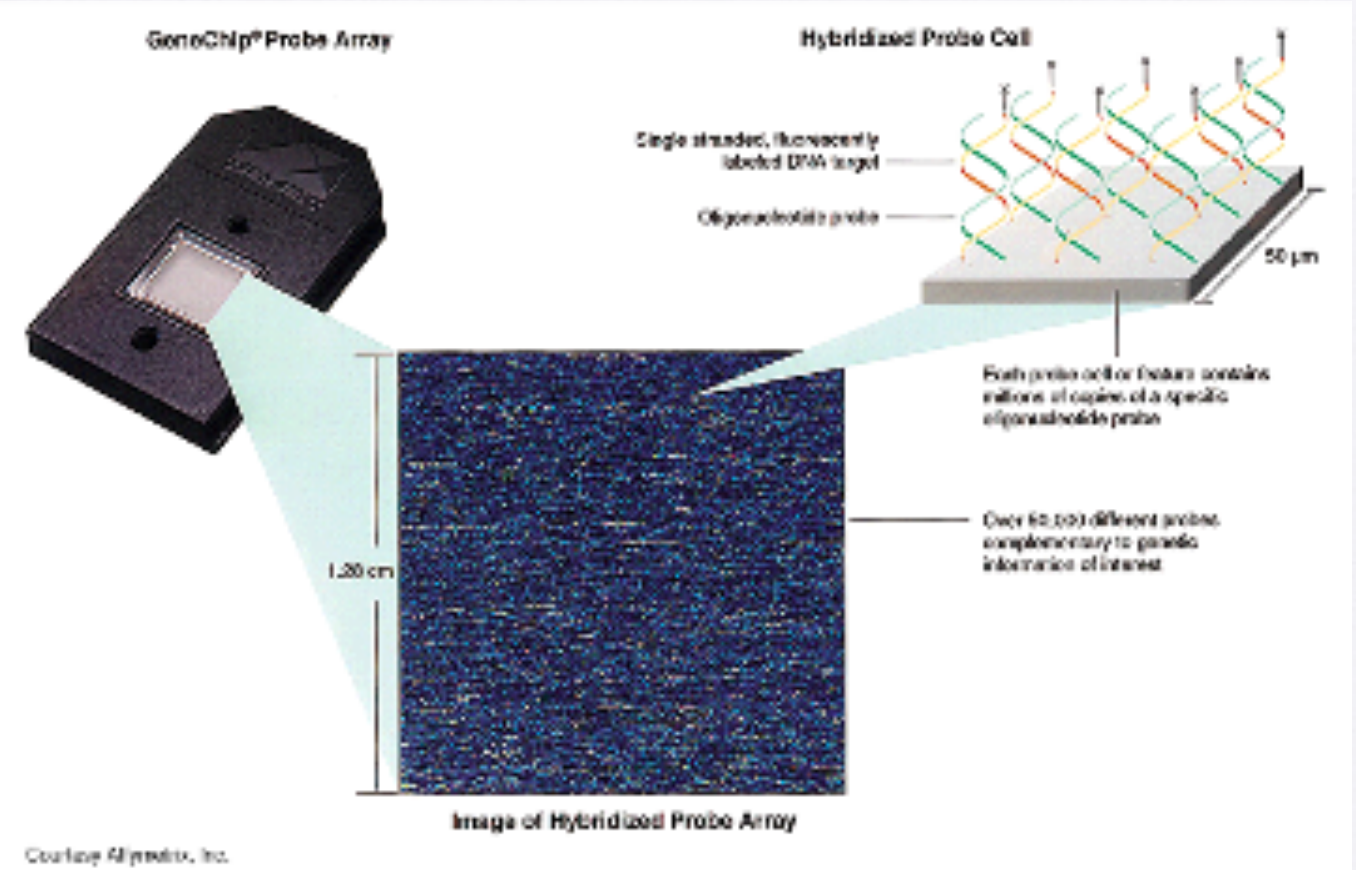
Genomics:



Microarray Technology: enables us to monitor variable mRNA expression -at the level of the genomic mRNA expression.

Transcriptomic / Genomic Analysis

Design Experiment

Prepare Sample

Probe Array

Hybridize

Hybridization Oven

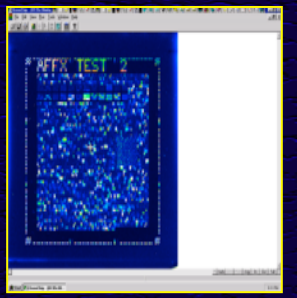
Wash & Stain

Fluidics Station

Scan

Scanner

Analysis



Software

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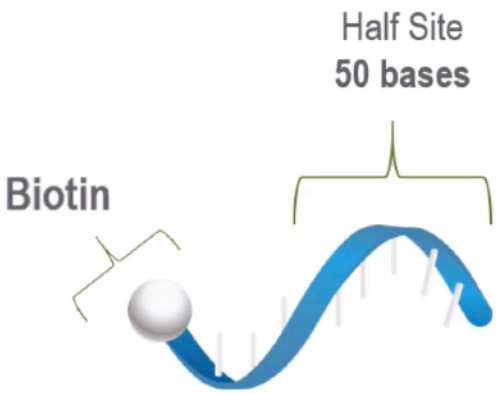
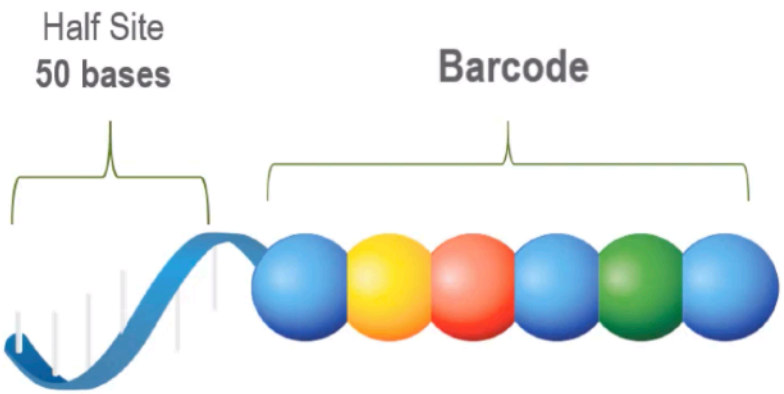
Digital Counting Using Barcoded Probes



Target-specific **Capture** Probe



Target-specific **Reporter** Probe

Barcode	Identity
	XLSA
	FOX5
	PDCD1

nanoString

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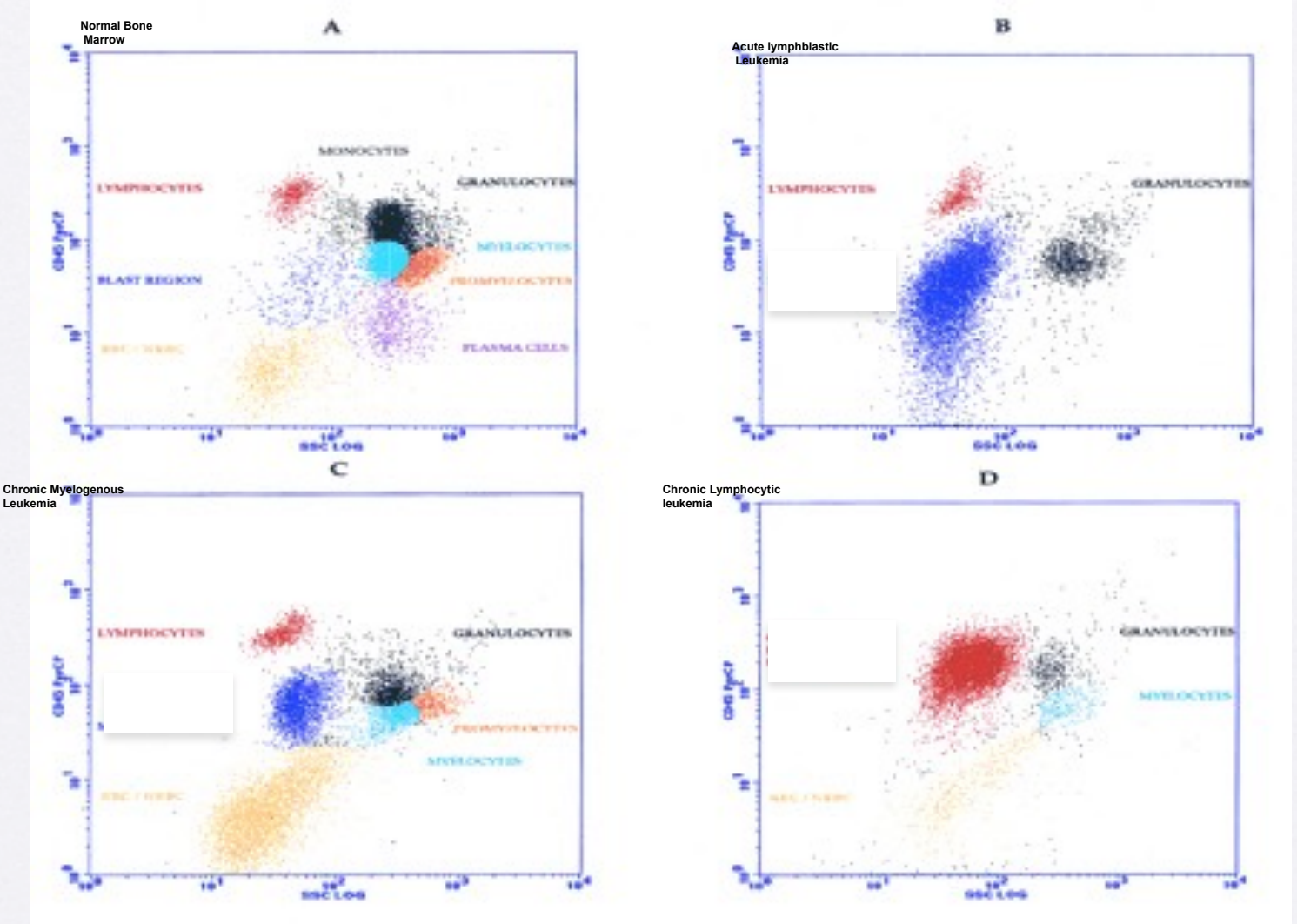
Automated Flow Cytometry

LSR Fortessa (Becton Dickinson)

Automated Flow Cytometry

LSR Fortessa (Becton Dickinson)



Use of up to six fluorescent markers to various specific types of cancer enables precise diagnosis.

http://bloodjournal.hematologylibrary.org/cgi/content/full/90/8/2863

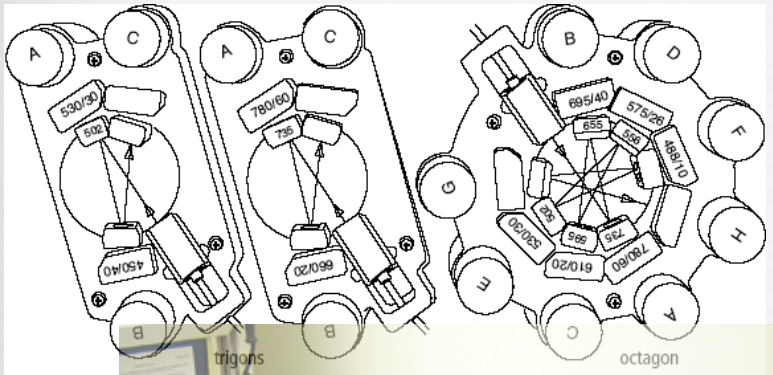
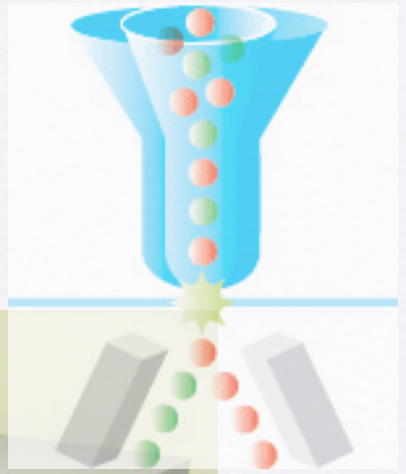
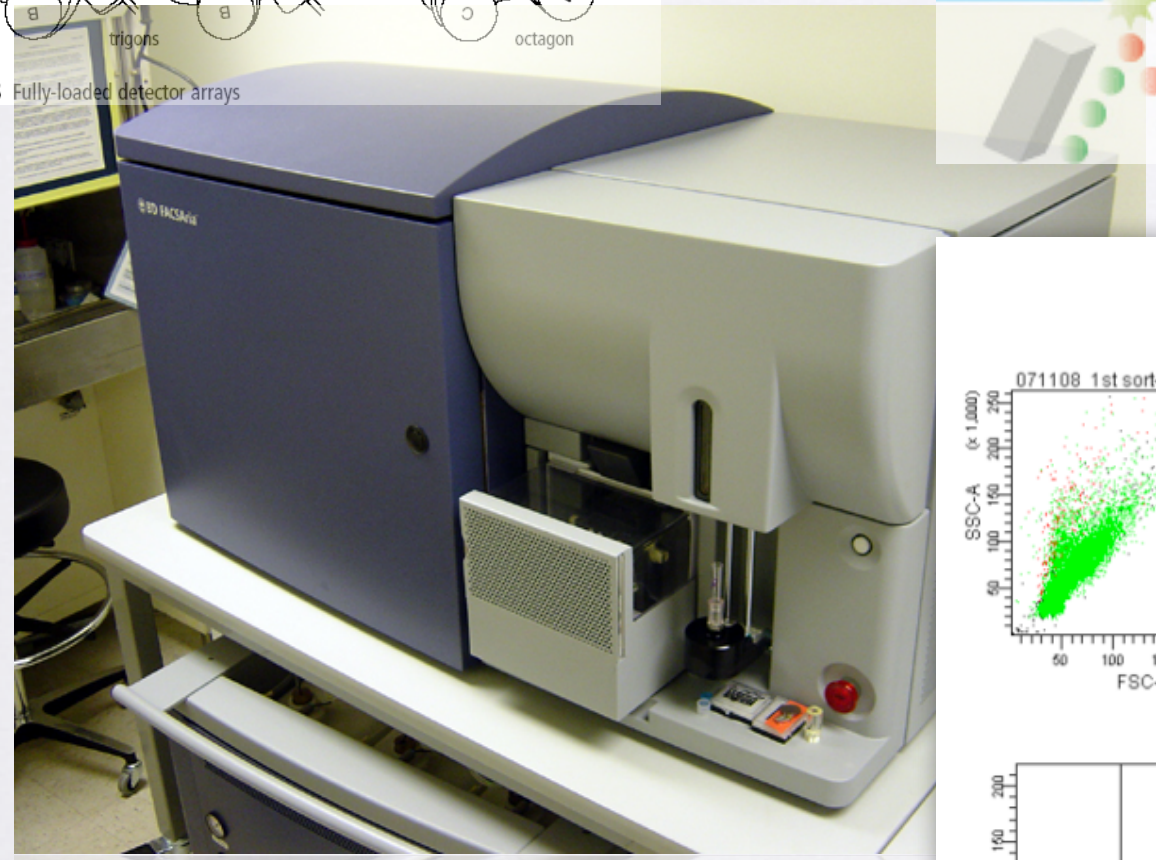
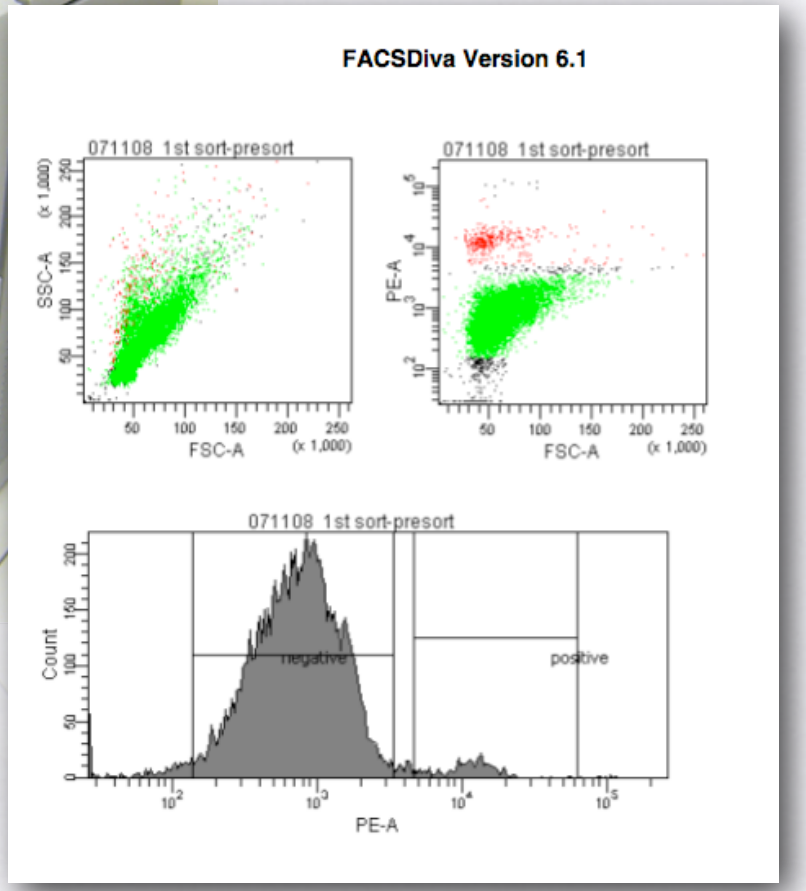


Figure 1-16 Fully-loaded detector arrays







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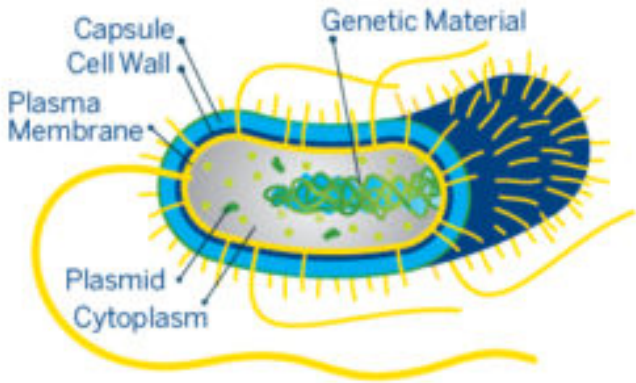
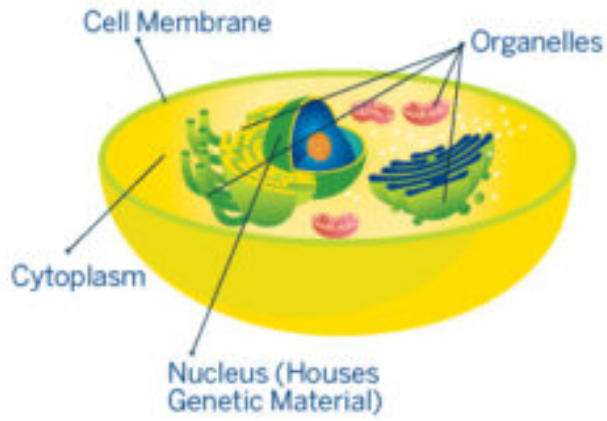
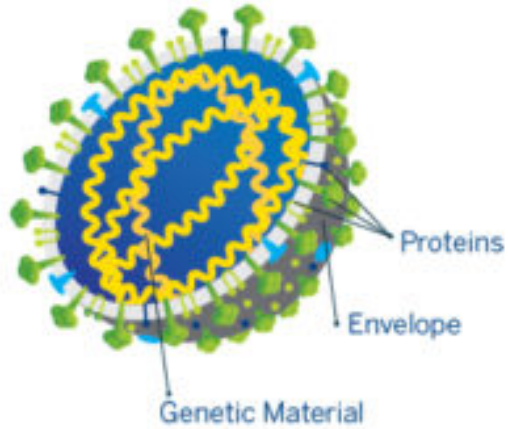
PROKARYOTE



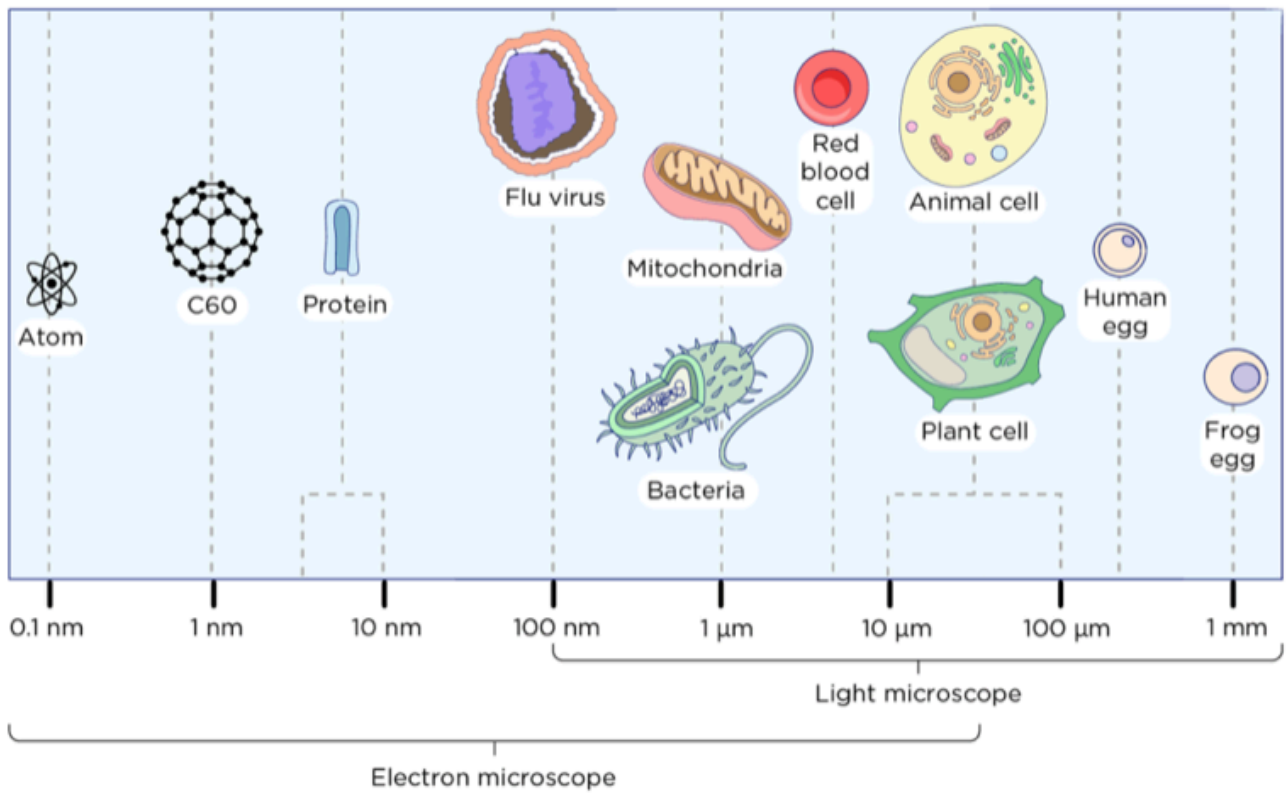
EUKARYOTE

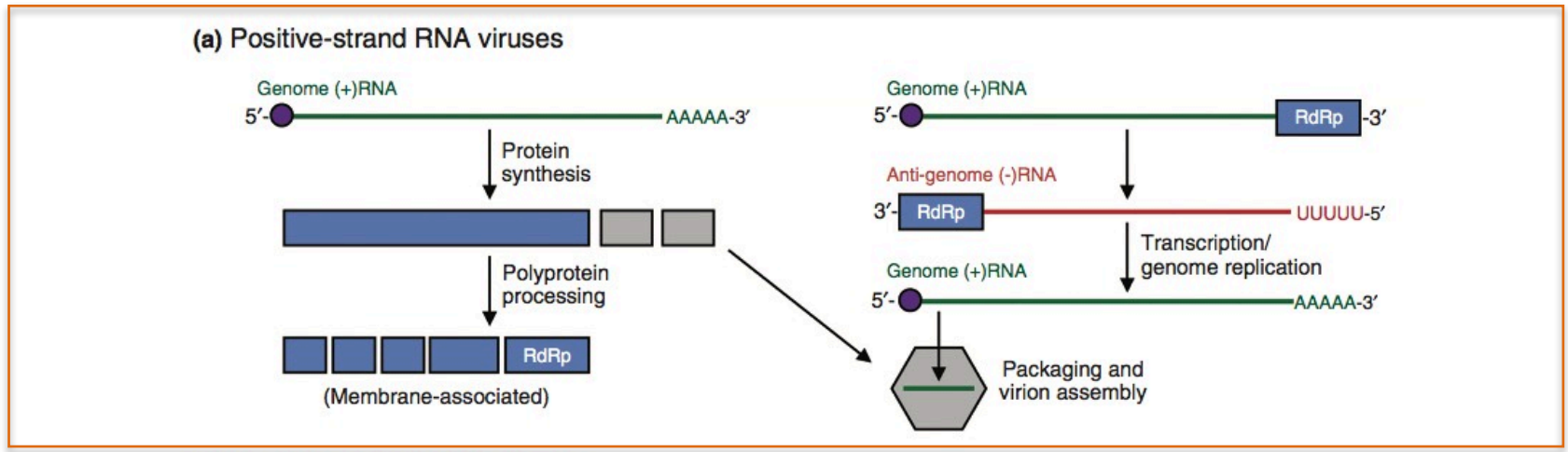


VIRUS



Relative size of prokaryotes and viruses





Overview of transcription and replication strategies for various types of (a) **Positive-strand RNA [(+)RNA] viruses.**

The genomes of (+)RNA viruses are message-sense (green), and they often contain a 5′ m^7G cap (purple circle) and 3′ poly-A tail (AAAAA).

Host cell ribosomes translate the genome into one or more polyproteins, which are co-translationally and post-translationally processed by virally encoded proteases.

Some of the mature polyprotein processing precursors and products include the **RNA-dependent RNA polymerase (RdRp; light blue rectangle)** and cofactors (light blue squares) that mediate viral RNA synthesis in association with cellular membranes.

Other proteins made by the virus include those that will assemble into viral particles (gray squares). The **RdRp** mediates the synthesis of negative-strand RNA [(–)RNA] antigenome (red) using the genome as template.

The antigenome is then converted into new (+)RNA genome by the RdRp and then packaged into nascent virion particles (gray hexagon).

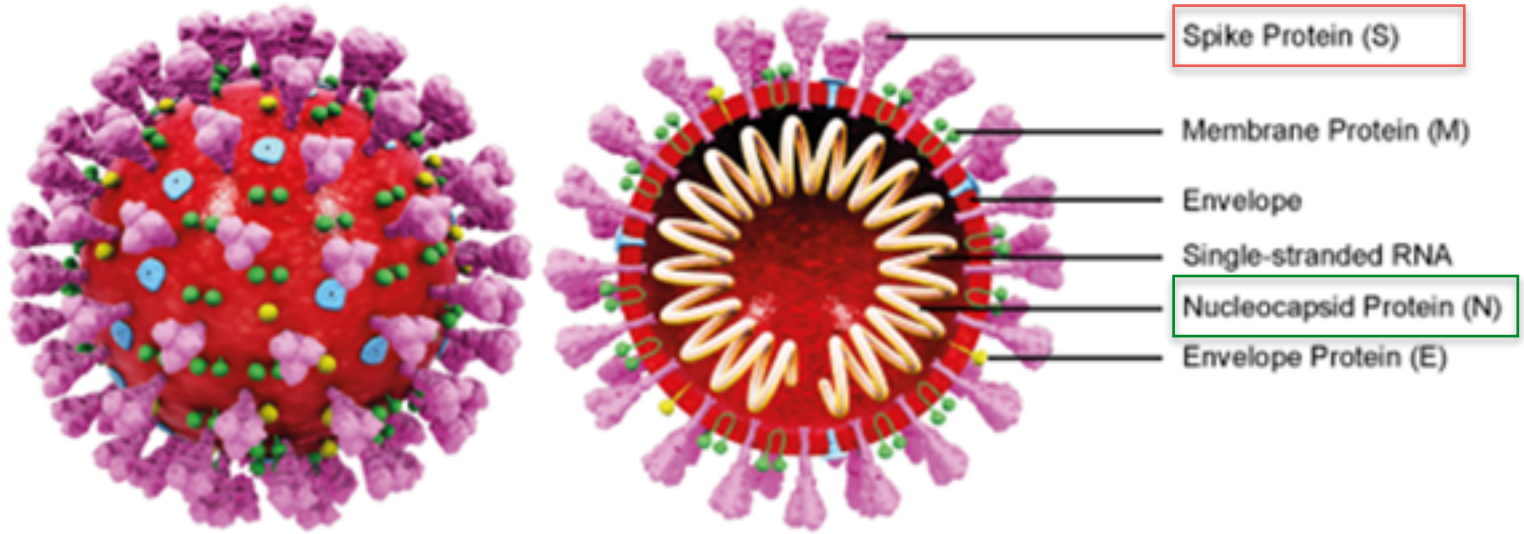


FIGURE 1: Schematic diagram of SARS-CoV-2.

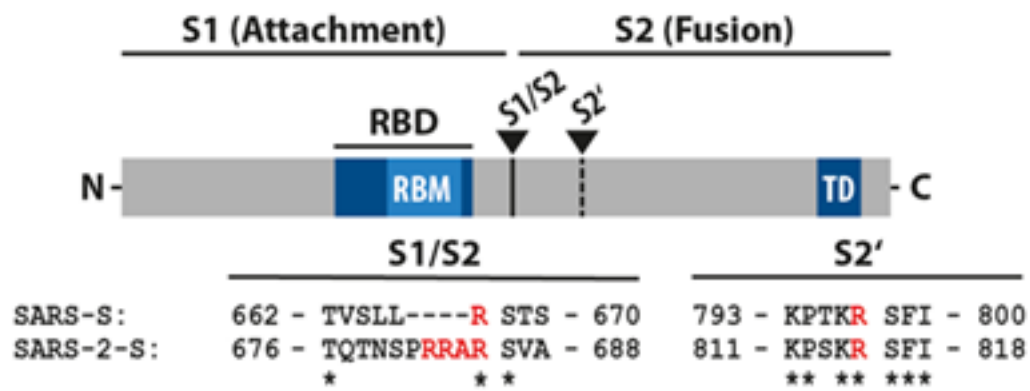
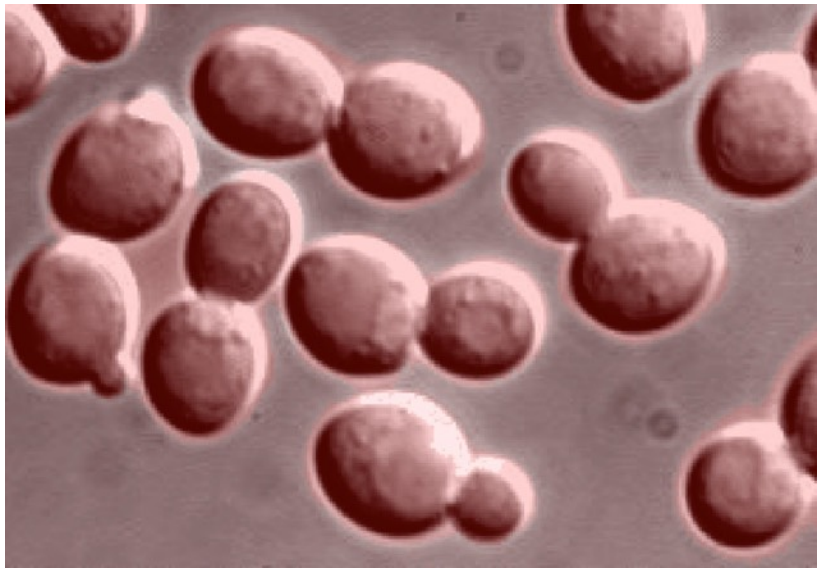


FIGURE 2: Domain comparison overview of Spike Protein S of SARS and SARS-CoV-2.
Schematic illustration of SARS-S including functional domains (RBD, receptor binding domain; RBM, receptor binding motif; TD, transmembrane domain) and proteolytic cleavage sites (S1/S2, S2', see arrows). Amino acid sequences around the two protease recognition sites (red) are shown for SARS-S and SARS-2-S (conserved residues are indicated as asterisks).



Baker's Yeast: *Saccharomyces cerevisiae*

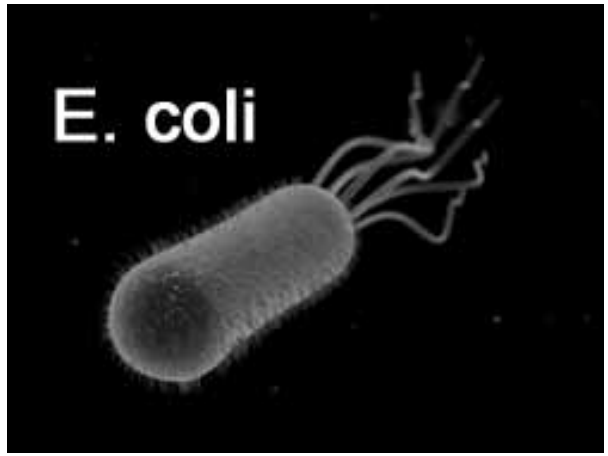
Yeasts are small, ***single-celled plants***. They are members of the family ***fungi*** (singular, ***fungus***), which also includes mushrooms. Fungi differ from other plants in that they have no chlorophyl.

~50 μm

Eukaryote

DNA is linear

Cell wall



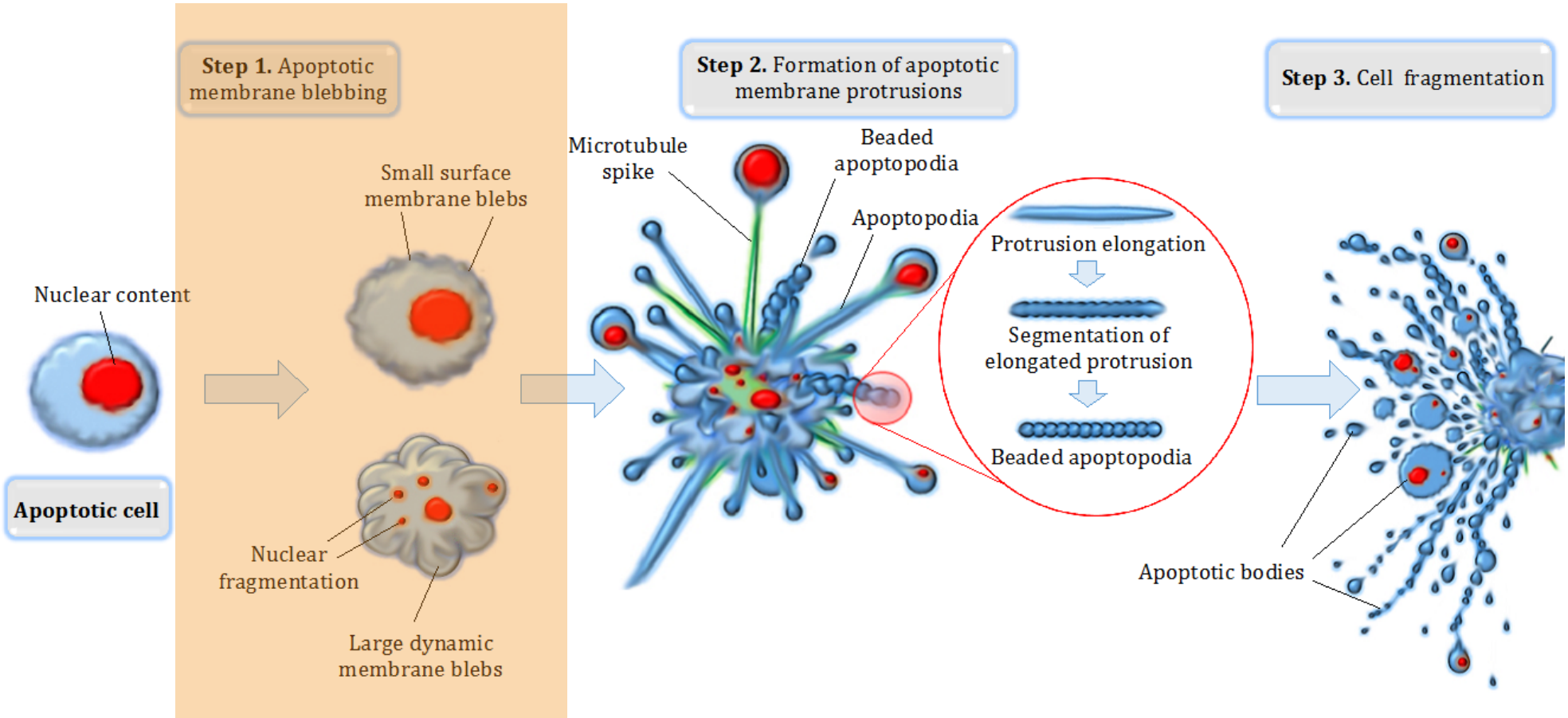
Bacteria thrive on many different types of food. But most yeasts can live only on sugars and starches. From these, they produce carbon dioxide gas and alcohol. Thus, they have been useful to man for centuries in the production of certain foods and beverages. They are responsible for the rising of bread dough and the fermentation of wines, whiskey, brandy and beer. They also play the initial role in the production of vinegar.

~1.5 -3 μm

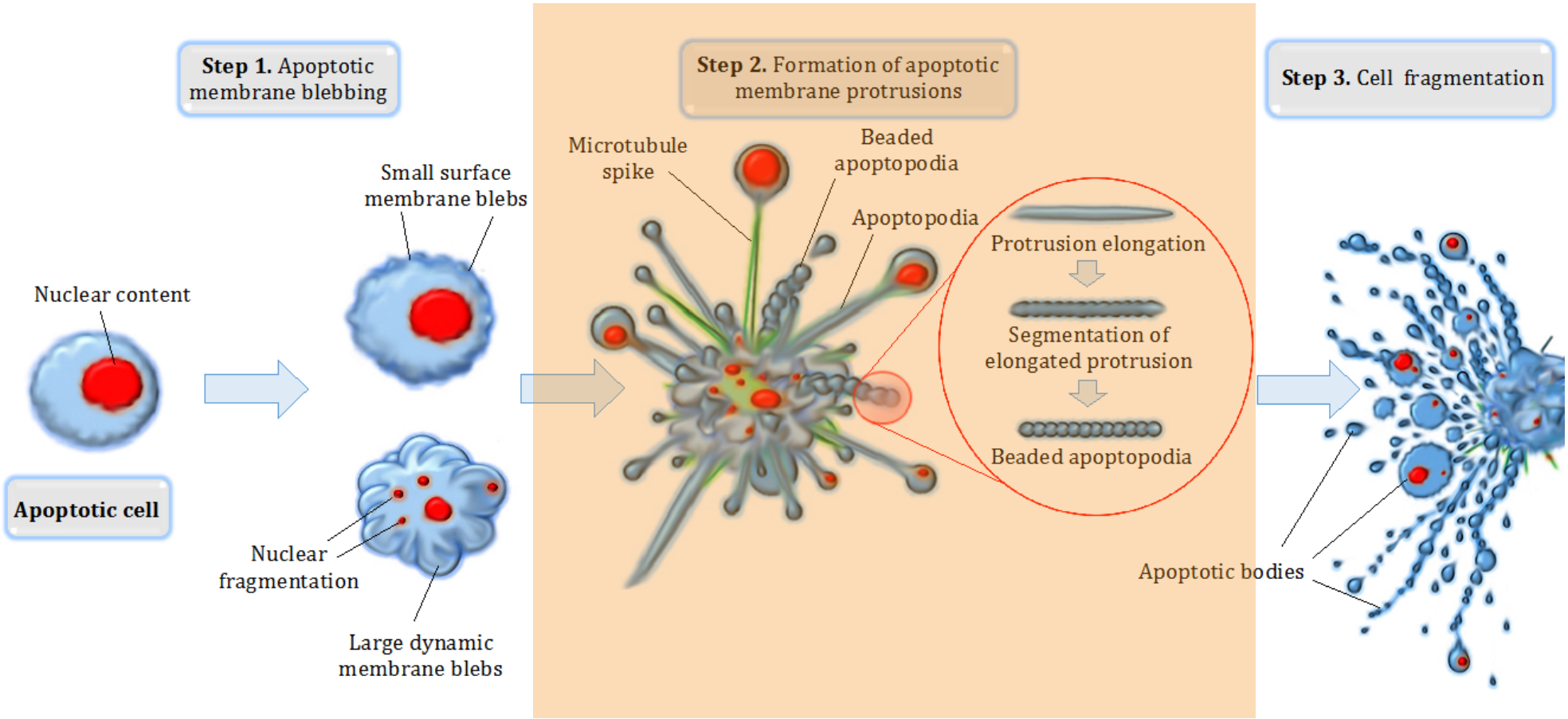
Prokaryote

DNA is Circular

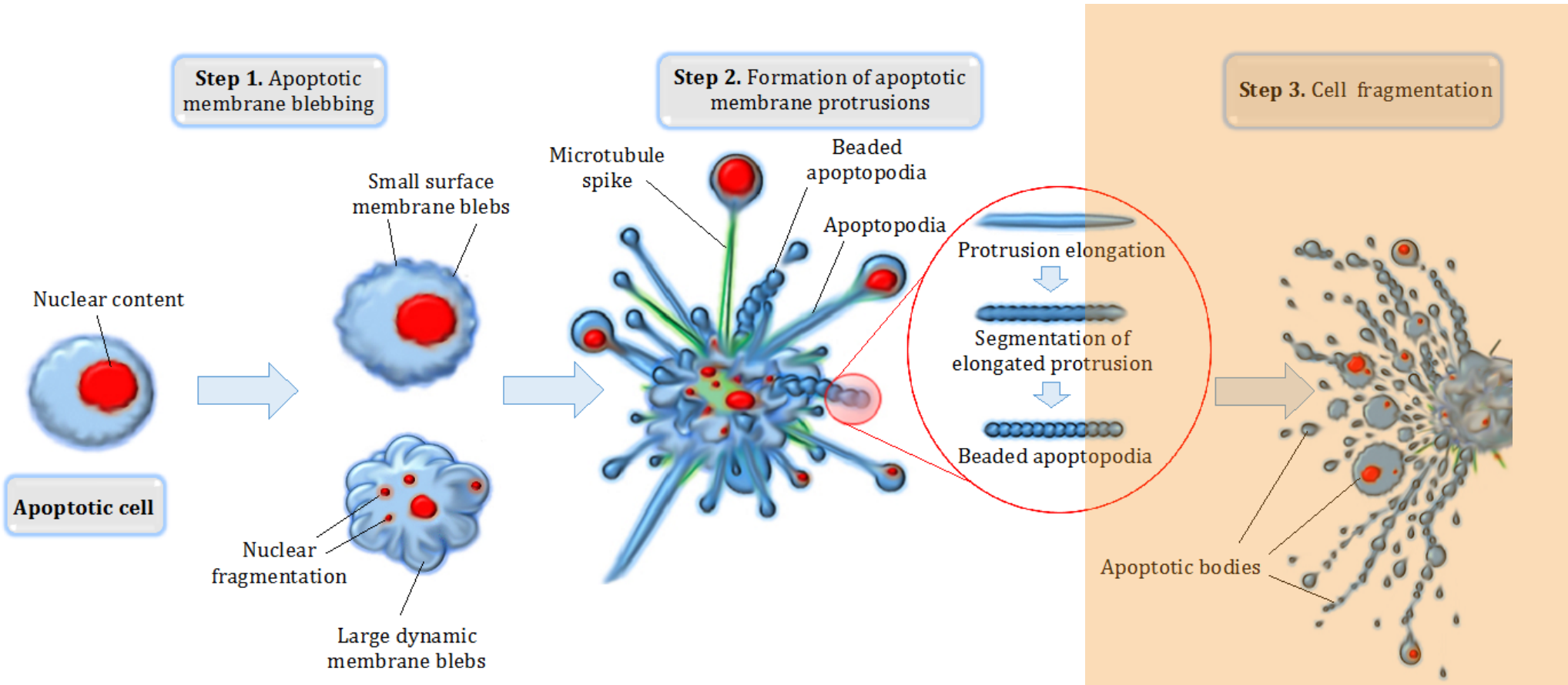
cell membrane



Different steps in apoptotic cell disassembly.



Different steps in apoptotic cell disassembly.



Different steps in apoptotic cell disassembly.

Caspases (cysteine-aspartic proteases, cysteine aspartases or cysteine-dependent aspartate-directed proteases) are a family of protease enzymes playing essential roles in programmed cell death. ... These are signalling molecules that allow recruitment of immune cells to an infected cell or tissue.

Review > Curr Opin Microbiol. 2004 Dec;7(6):655-60. doi: 10.1016/j.mib.2004.10.012.

Apoptosis in yeast

Frank Madeo [1], Eva Herker, Silke Wissing, Helmut Jungwirth, Tobias Eisenberg, Kai-Uwe Fröhlich

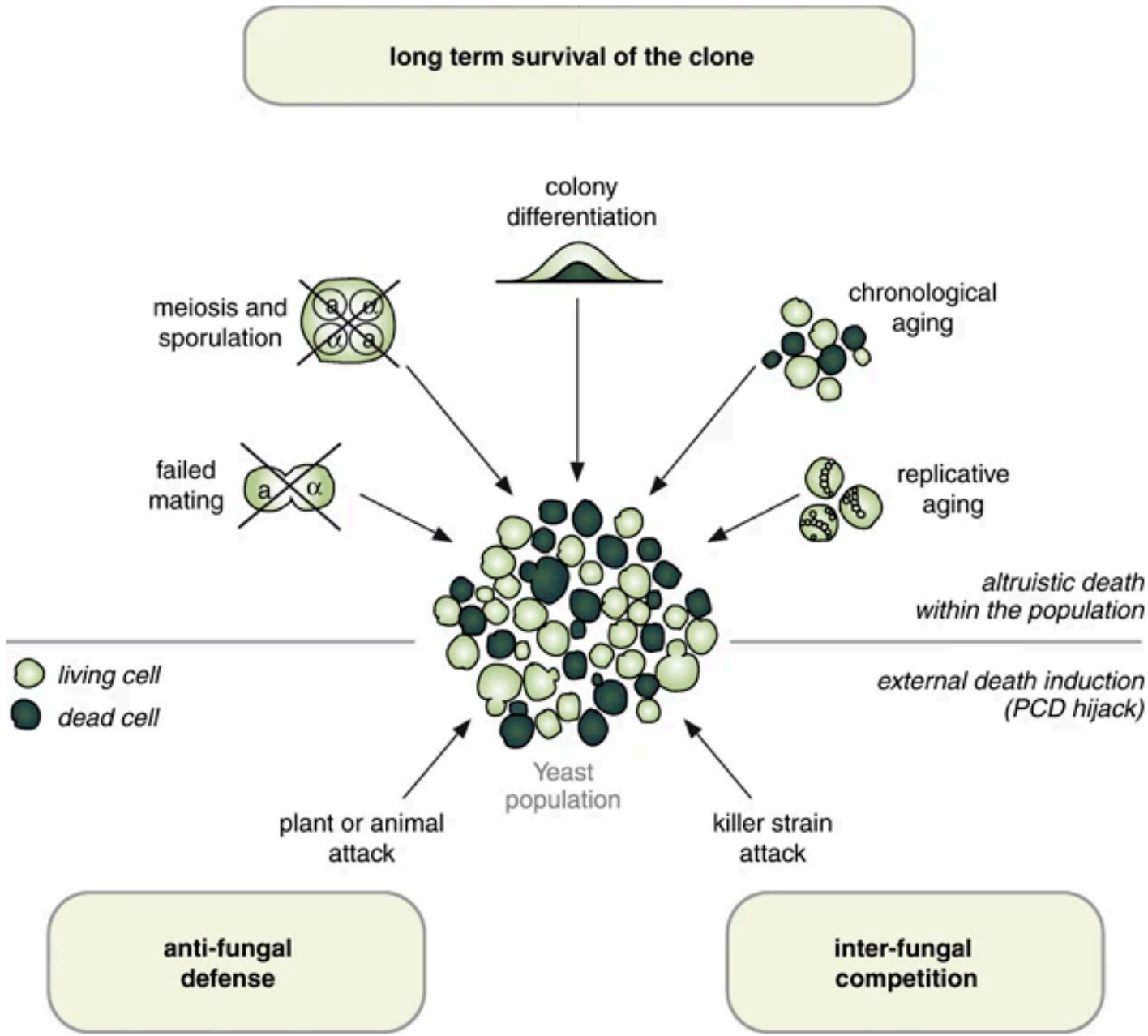
Affiliations + expand

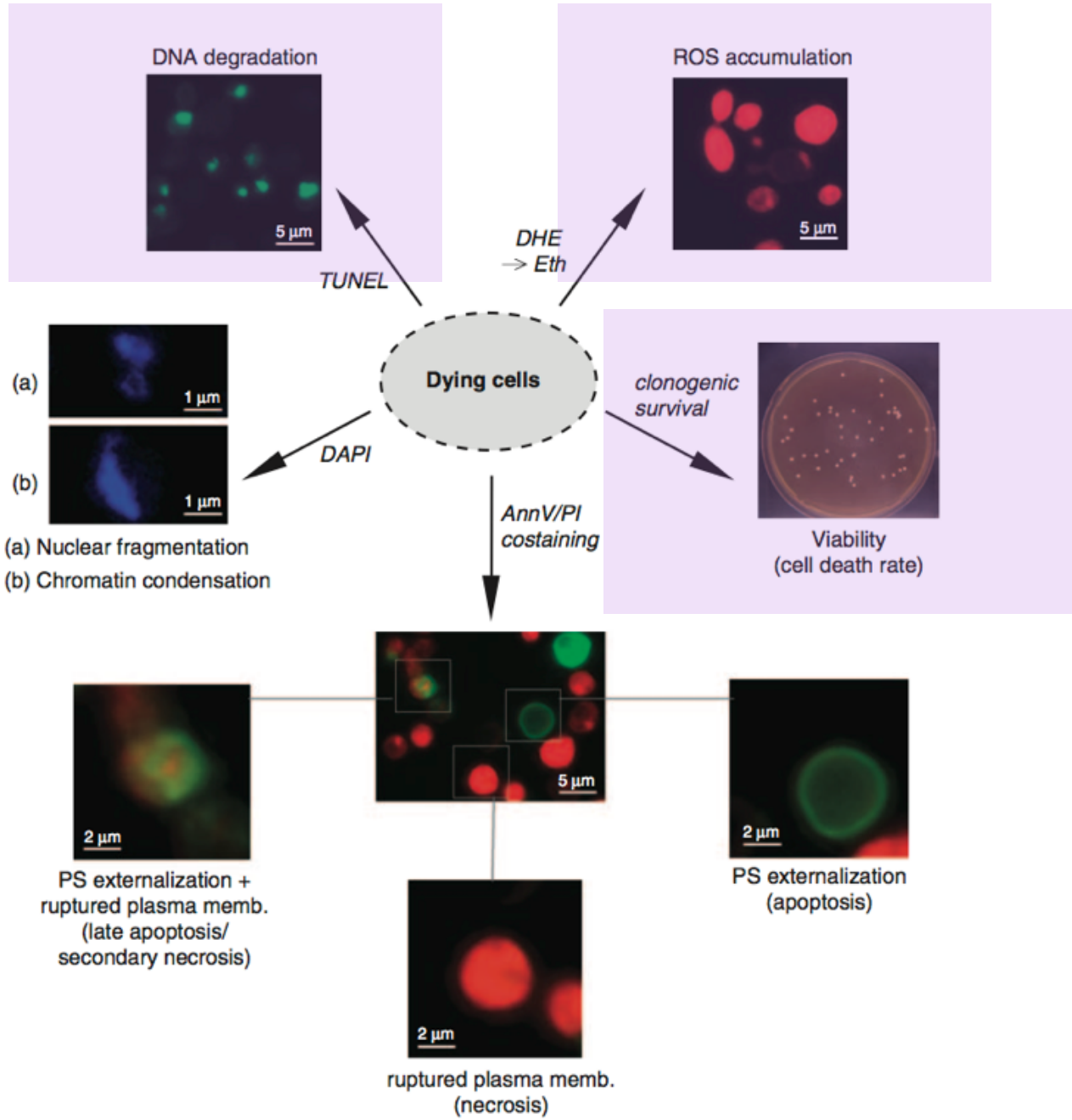
PMID: 15556039 DOI: 10.1016/j.mib.2004.10.012

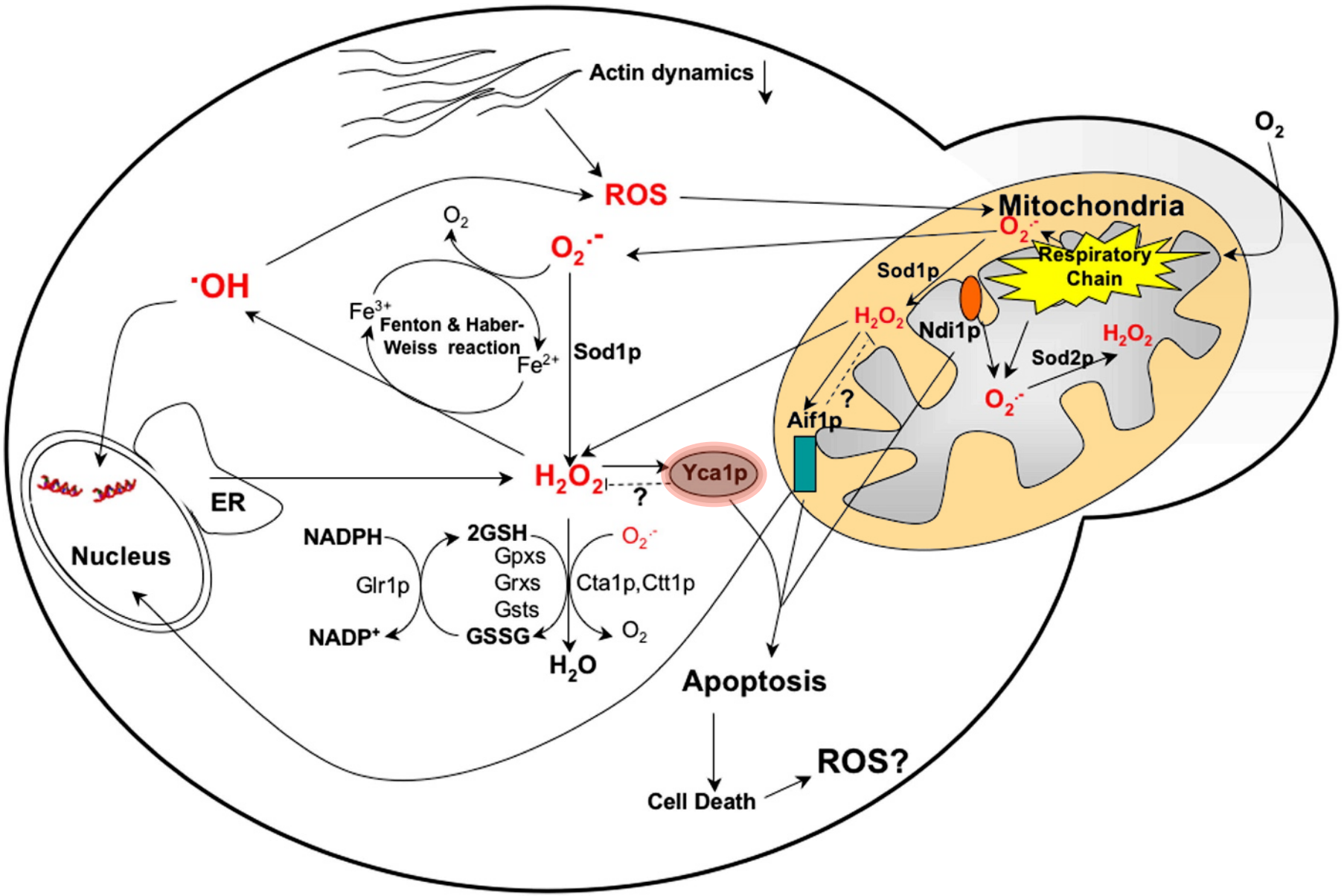
Abstract

Apoptosis is a highly regulated cellular suicide program crucial for metazoan development. However, dysfunction of apoptosis also leads to several diseases. Yeast undergoes apoptosis after application of acetic acid, sugar- or salt-stress, plant antifungal peptides, or hydrogen peroxide. Oxygen radicals seem to be key elements of apoptotic execution, conserved during evolution. Furthermore, several yeast orthologues of central metazoan apoptotic regulators have been identified, such as a caspase and a caspase-regulating serine protease. In addition, physiological occurrence of cell death has been detected during aging and mating in yeast. The finding of apoptosis in yeast, other fungi and parasites is not only of great medical relevance but will also help to understand some of the still unknown molecular mechanisms at the core of apoptotic execution.

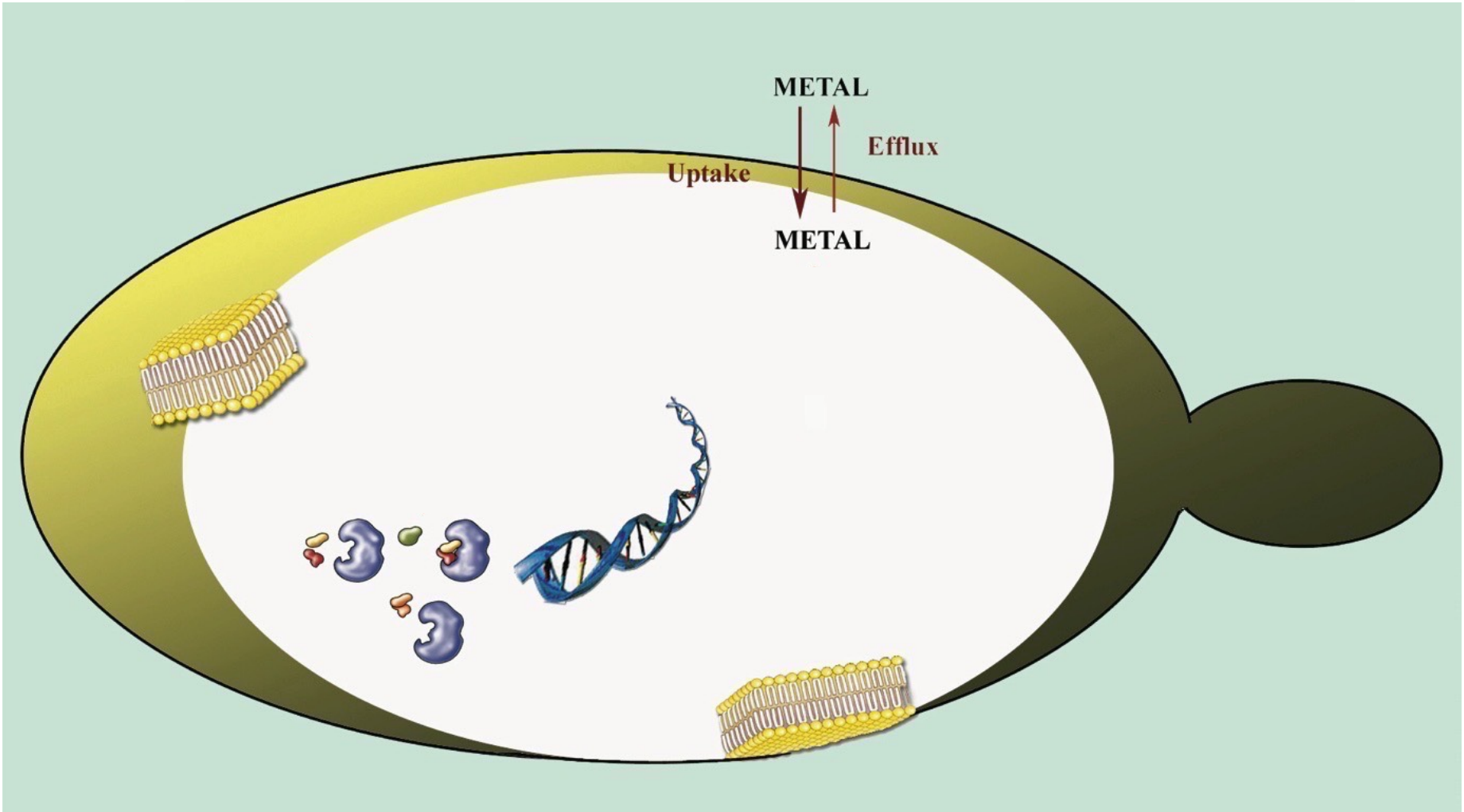
Figure 2


long term survival of the clone
colony differentiation
meiosis and sporulation
chronological aging
failed mating
replicative aging
altruistic death within the population
external death induction (PCD hijack)
living cell
dead cell
Yeast population
plant or animal attack
killer strain attack
anti-fungal defense
inter-fungal competition


DNA degradation
5 µm
ROS accumulation
5 µm
TUNEL
DHE
→ Eth
Dying cells
(a)
1 µm
(b)
1 µm
DAPI
(a) Nuclear fragmentation
(b) Chromatin condensation
clonogenic
survival
Viability
(cell death rate)
AnnV/PI
costaining
5 µm
2 µm
PS externalization +
ruptured plasma memb.
(late apoptosis/
secondary necrosis)
2 µm
PS externalization
(apoptosis)
2 µm
ruptured plasma memb.
(necrosis)


Actin dynamics
ROS
Mitochondria
O_2
$O_2^{\cdot -}$
Respiratory Chain
Sod1p
H_2O_2
Ndi1p
Sod2p
H_2O_2
$O_2^{\cdot -}$
?
Aif1p
$^{\cdot}OH$
O_2
Fe^{3+}
Fenton & Haber-Weiss reaction
Fe^{2+}
Sod1p
$O_2^{\cdot -}$
ER
Nucleus
H_2O_2
?
Yca1p
NADPH
2GSH
Gpxs
Grxs
Gsts
Glr1p
Cta1p,Ctt1p
$O_2^{\cdot -}$
$NADP^+$
GSSG
O_2
H_2O
Apoptosis
ROS?
Cell Death

Metals generate ROS and cause oxidative stress



Metals generate ROS and cause oxidative stress