



NANOBIOLOGY AND ENVIRONMENT DIVISION

The **Mission** of the Division is to foster, develop and promote at Shaw University, all aspects of life sciences and bio-technologies in those domains where dimensions and tolerances or deviations in the nanoscale range play a critical role



Biotechnology → Nanobiology

Many fundamental biological functions (which constitute the basis for Biotechnology) are carried out by 'nano-size' molecular machineries that have sizes in the nanoscale range of 1-100 nm – e.g. single enzymes, transcription complex, ribosome, transport complex, nuclear pore.

Objectives:



- to promote an **understanding of Nanobiology** and the potential for economic and social benefits.
- to encourage the unique **interdisciplinary environment** needed for meeting the challenges of Nanobiology.
- to set-up **Nanobiology-centered research projects** at the undergraduate, graduate and postdoctoral levels.
- to promote and encourage **Nanobiology research collaboration** internally and externally.
- to **transfer knowledge in Biology in the creation of new materials** such as in quantum electronics

Nanobiology

Research Groups

The Research groups will address the four proposed key research areas:

- Nanobiotechnology/Nanomedicine
- DNA-based Biosensors
- Biomolecular engineering
- Community-based Research & Collaboration

OUR VISION!

Radical New Design concept!



- Biomolecular or biomedical "systems"

which are reconstructed or "assembled" from biomolecular components, and mimic the physiology of living organisms in their operational and behavioral characteristics

- molecular "delivery vessels"

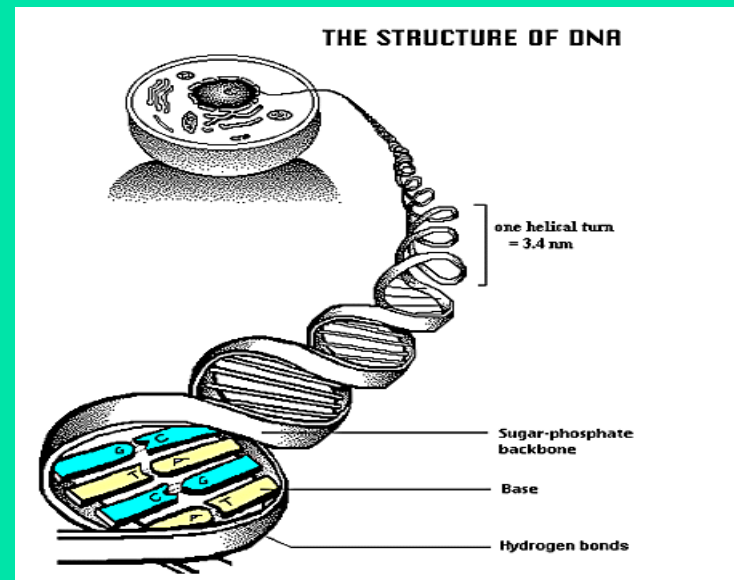
engineered "viral entity" as molecular "delivery vessels" for targeting and entering specific cells to dispense the appropriate "instructional" protein

- "Molecular software"

the molecular components of living cell can be "dis-assembled" and re-constructed and used as a form of molecular software to living cells for the purpose of allowing the targeted cells to "repair" themselves

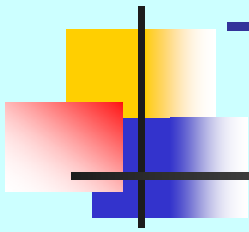
Special Projects

- Nano-analyses of NSAIDs side effects in animal models of diabetes and trauma
(Nanomedicine)
- Fabrication of nanosensor for pain grading
(Nanobiotechnology)
- DNA fingerprinting of North Carolina Sweet Potato varieties and encapsulation of the phytochemicals in diamond-like carbon (DLC) thin films.
(Biotechnology/Nanotechnology)



Sweet Potatoes (*Ipomoea batatas*) varieties

- in our collection to date



<i>Local Name</i>	<i>flesh color</i>	<i>skin color</i>
Japanese	white/beige	purple
Oriental	white/beige	dark red
O'Henry	white/beige	light brown
Bouregard	reddish-orange	medium brown

Some NC Sweet Potato Varieties for DNA Fingerprinting



Bouregard (Brown skin)



O'Henry (Beige Skin)



Oriental (Dark red skin)



Japanese 1 (Purple Skin)



Japanese 2 (Light Purple)

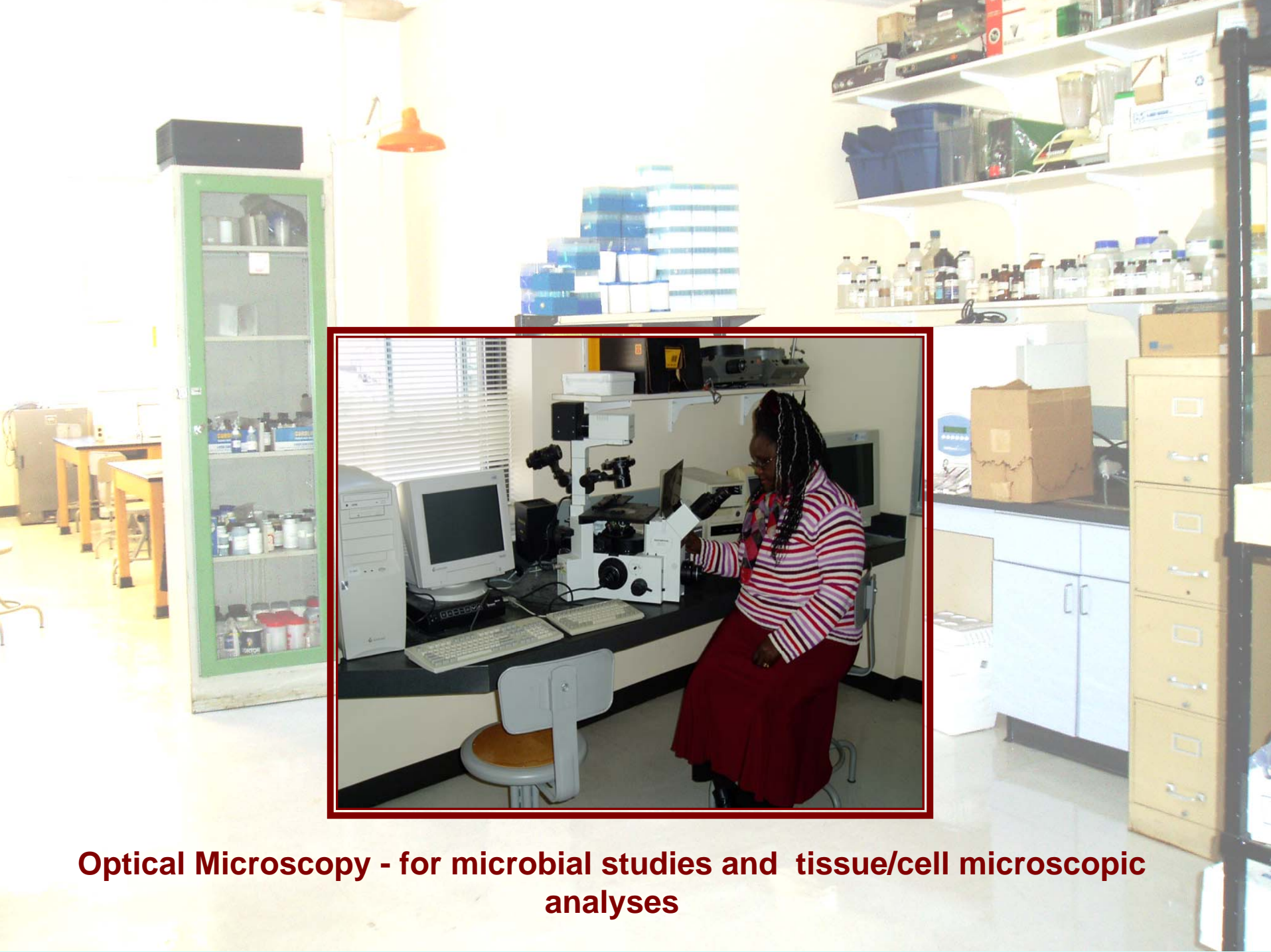
Microbiology Lab.



PCR equipment for DNA Amplification



Plant tissue culture facility



Optical Microscopy - for microbial studies and tissue/cell microscopic analyses



Activities include:

- Teaching
 - Undergraduate
 - Microbiology – 4 credits
 - General Biology – 4 credits
 - Development of Biotechnology & Nanobiology programs
 - Undergraduate mentoring towards research in Biotechnologies
 - Postgraduate
 - Research concept development and supervision – proposed through partnership for initial take off
- Research in Nanobiology
 - Bionanotechnology
 - Nanomedicine
 - Biosensors
- Professional consultancy services
- Intense Fund seeking



Expected Outcomes

- raise the educational prospectus of Shaw students
- from earning B.Sc. degrees, with minimal research experience, to earning MSc and PhD degrees with massive research experience in leading-edge fields
- design of customer nanotechnology applications, which should bring in large financial remunerations.
- enhance R&D in science and technology applicable to security, health, and education issues.
- elevate the academic level of Science at Shaw University
- greatly enhance the development of nanotechnology in an HBCU.

Shaw University

Nanobiotechnology Team

- **Helen Asemota**, PhD - Professor of Biochemistry and Molecular Biology & Head of Nanobiology Division
- **Grace Ndip**, PhD – Assoc. Professor of Chemistry
- **Christopher Njue**, PhD – Assistant Professor of Environmental Chemistry
- **Kurt Garrett** – Biochemist & PhD Candidate
- **Moyo Fapojuwo** – Nutrition Scientist & PhD Candidate
- Ianthe Dorset – Undergraduate Student
- Andrease Gause – Undergraduate Student
- Aisha Williams – Undergraduate Student
- Bianca Brice – Undergraduate Student
- Gisela Malcolm – Undergraduate Student



Collaborators

- Elvira Williams, PhD – Dean & Director of NNRC
- Abdennaceur Karoui, PhD – Head of Nano-Optoelectronic Div.
- Deva Sharma, PhD – Head, Education & Outreach Div.
- Mercy Fapojuwo, PhD – Assoc. Professor, Instructional Education
- **Dr. A. Wheatley** – University of the West Indies (UWI), Mona
- **McLaughlin Wayne, PhD** – Head of Dept., Basic Medical Sciences, **UWI**
- Dr. O. Sadik – Professor of Chemistry, **NYU Binghamton**
- Dr. F. Jackson – Professor of Molecular Anthropology, **University of Maryland**
- Dr. R. Fish – Veterinary Medicine **NCSU**
- **Dr. F. Oladeinde** – Chemistry Dept., **Morgan State University**
- Dr. R. Ofoli – Professor of Chemical Engineering, Michigan State University