

KABARAK UNIVERSITY.

**4TH ANNUAL INTERNATIONAL
CONFERENCE.**

**PURE AND APPLIED SCIENCE FOR
ADVANCEMENT OF RESEARCH AND
DEVELOPMENT.**

TOPIC:

**REDIRECTING THE WHEELS OF
NATURAL PROGRESION: SYNTHETIC
BIOLOGY AND THE AFRICAN
BIOTECHNOLOGY REVOLUTION.**

**GARANG B.N., & AUGUSTINO OSORO
ONKWARE**

PURPOSE AND GOALS OF THE STUDY.

- To review the novelty and potential industrial applications of synthetic biology in Africa.
- To review the state of synthetic biology in Africa,
- To review the various political and social hindrances stopping the effective application of synthetic biology in solving the developmental agendas in African countries.

MATERIALS AND METHODS.

- Published papers in reputable professional journals and books were used as the main source of information and references
- Internet articles / searches and web page downloads from reputable professional sites were reviewed

INTRODUCTION.

- Synthetic biology is the design and construction of biological devices and systems for useful purposes.
- synthetic biology as an independent discipline is fairly recent, its origin and development has a history spanning the twentieth century and is very much tied to the developments of techniques in biotechnology, genetic engineering and microbial gene manipulations.
- Synthetic biologists thus design and construct complex artificial biological systems .
- The goal of synthetic biology is to extend or modify the behavior of organisms and engineer them to perform new tasks.



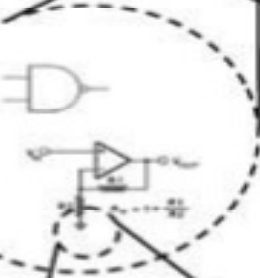
Networks



Computers



Modules



Gates



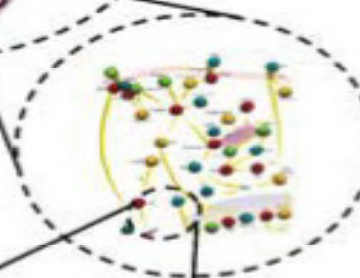
Physical layer



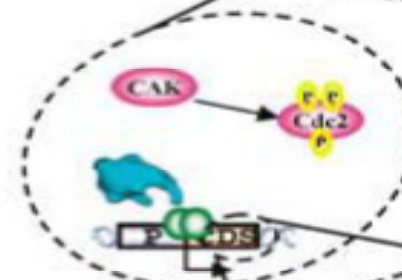
Tissues, cultures



Cells



Pathways



Biochemical reactions



Proteins, genes...

INTRODUCTION.CON.....

- The commercial application of SB & biotech products is occurring in developed nations Africa lags behind in all aspects of biotech.
- The role of SB & biotech in economic transformation of developing countries is the subject of intense academic inquiries.
- The debate is on two extremes .the perception that SB/biotech is the solution to the continents economical problems and that the technology will do more harm than good to the continent

LEVEL OF AFRICAN COUNTRIES IN APPLICATION OF SB& BIOTECH

- African countries are at different levels of the biotech revolution.
- Those that have commercialized biotech products and using third generation genetic engineering techniques ,e.g. Egypt, south africa,zimbabwe.
- Those that are using the third generation techniques with no products, eg Kenya,uganda,and Ghana.
- Those that are in second generation level mainly using tissue culture techniques e.g. Tanzania, Zambia etc.

<p>South Africa</p>	<p>Genetic engineering of cereals: maize, wheat, barley, sorghum, millet, soybean, lupins, sunflowers, sugarcane; vegetables and ornamentals: potato, tomato, cucurbits, ornamental bulbs, cassava and sweet potato; fruits: apricot, strawberry, peach, apple, table grapes, banana Molecular marker applications of: diagnostic for pathogen detection; cultivar identification.</p>
<p>Zimbabwe</p>	<p>Genetic engineering of maize, sorghum and tobacco, micro propagation of potato, cassava, tobacco, sweet potato, ornamental plants, coffee Marker assisted selection.</p>
<p>Zambia</p>	<p>Micro propagation of cassava, potato, trees (Uapaca), banana Hosts SADC Nordic-funded gene bank of plant genetic resources.</p>

Kenya	<p>Production of disease free plants and micro propagation of pyrethrum,bananas,potatoes,strawberries,sweetpotato,citrus,sugarcane,Micropropagation,of,ornamentals (<i>carnation,alstromeria, gerbera, anthurium, leopard orchids</i>) and forest trees In vitro selection for salt tolerance in finger millet, Transformation of tobacco, tomato and beans transformation of sweet potato with proteinase inhibitor gene, transformation of sweet potato with feathery mottle virus coat protein gene, tissue culture regeneration of papaya In vitro long-term storage of potato and sweet potato, marker assisted selection in maize for drought tolerance and insect resistance ,</p>
Uganda	<p>Micro propagation of banana, coffee, cassava, citrus, granadilla, pineapple, sweet potato In vitro screening for disease resistance in banana ,Production of disease free plants of potato, sweet potato and banana.</p>

CONT.....

- Synthetic biology has been hailed as the key to a new post-oil global economy of abundance for all.
- The applications of this technology in developed countries has already started as witnessed in May 2010, when Craig Venter, claimed that his company had created the world's first self-reproducing organism.
- South Africa have made collaborations with multinational companies to promote this new technology. Undoubtedly, Synthetic Biology's own poster project has been the joint research carried out at UCB to create synthetic artemisinin, a key anti-malarial drug the research began in 2004.

CHALLENGES OF THE TECHNOLOGY IN EAST AFRICA

- Lack of critical mass skilled personnel, weak linkages and networks internally and externally.
- Unreliable access to modern communication systems technologies and power sources.
- Lack of national and regional policies strategies and legislations to protect intellectual property rights.
- Indigenous crops research funding given by outside donors for consumption outside Africa

CONCLUSION

- The study has shown, synthetic biology is a novel technology, which if exploited in a scientifically ethical manner can improve food and energy security, alleviate poverty, revolutionize the industrial sector, reduce greenhouse gases and promote environmental conservation in Africa.
- that proper adoption and investments in the area of SB& biotechnology has very great potentials in solving the majority of the current economical problems that developing nations face.
- The way forward for Africa as a continent with regards to the maximization of the applications of the developments and gains achieved in the field of synthetic biology will be to adopt more vigorous practical actions in order for synthetic biology to benefit the people of this region in terms of food security, economic growth, improved health and environmental protection.

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