



science
& technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA



SAASTA
South African Agency for Science
and Technology Advancement

Public Understanding of Biotechnology Programme



PUBLIC UNDERSTANDING OF
BIOTECHNOLOGY

Brief History



- Launched in 2003
- National Biotechnology Strategy (2001)
- Initiative of the Department of Science and Technology
- Funded solely by DST
- Implemented by SAASTA
- SAASTA is a business unit of the NRF

Objectives



- Promote a clear understanding of the potential of biotechnology
- Increase number learners and students
- Ensure broad public awareness, dialogue and debate on the current and future potential applications

Guiding Principles



- Neutral and balanced mandate: factual and balanced information
- Stimulate dialogue, debate and public participation
- Open communication about benefits and risks
- Innovative, creative approaches
- Communicate in easy, accessible language
- Active involvement of science communities

Activities



PUB/HSRC 2004/5

- Questions linked to biotechnology like genetic engineering and genetic modification
- Over 70% (of 7000 people) were undecided
- Download report from www.pub.ac.za

Public Perceptions Survey 2012/13

- Is South Africa familiar with biotechnology concepts?

MRTs

Media Round Tables

- A forum where media and scientists come together
- Aim: To ensure that the media has a full understanding of the science AND other issues related to the topic to enable them to report more accurately and responsibly to the public.



2008

- Biofuels
- GMOs in wine
- Biotech in medical research

2009

- Bioprospecting
- DNA fingerprinting
- From toxic waters to profitable ponds
- GM Potato

2009 continued...

- Biological forensic analysis
- Role of biotech in food security
- Bio-pharming or bio-harming
- Stem cell research

2010

- Modern day technologies to address biodiversity challenges

BBT Workshops

Educators

- Collaboration with SAASTA Education Unit
- Biotech concepts in the SA school curriculum

Learners

- Science Centres through grants
- Experiments, lectures, meet scientists, quizzes, role models



Industrial Theatre Plays

- Murder mystery play which incorporated forensics and other biotech concepts
- Professional actors that went to schools
- Pilot phase = 19 schools (Gauteng)
- Positive response from learners and educators



Schools Debates



Objectives

- Stimulate interest in SET careers
- Develop skills like research, critical thinking, information literacy, teamwork, presentation of clear and logical arguments

Details

- 10 schools per province
- Workshops, provincial and national contests
- Topics = biotechnology, nanotechnology, hydrogen and fuel cells, palaeontology and biodiversity

Exhibitions

PUB exhibits at the following SA science festivals:

- SciFest Africa
- Sasol Techno X
- Science Unlimited
- Eding!
- Mpumalanga SciFest
- Limpopo SciFest
- Eskom Expo 2011



Resources

Fact sheets

- Animal biotech
- Antarctic research
- Biofuels (basics; benefits and risks; current status)
- Bioprospecting
- Biotech basics
- Biotech structures
- Cloning and stem cells
- DNA profiling
- GMOs
- GMOs in wine
- Genetics of skin colour
- Biotech in medical research

Poster Series

- Wetlands – working for you
- Bioinformatics
- Genetic Conditions
- Cloning
- iQhilika – biotech’s golden brew
- Traditional biotech
- Medicinal plants under threat
- Forensics
- DNA
- Selective breeding
- Biotech through the ages
- Genetic modification of crops

Data response activities

- Educators to use in classroom (GR 9,11,12)

Cartoons

- GM application process
- How are GM crops made?
- How was Futhi cloned?

Periodic table

Careers in biotech

Other books

- DNA detective
- GMOs
- Biotech and biodiversity (GR 10,11)

Interactive CD-ROM

Basic Biotech DVD (with Prof Valerie Corfield)

Media

Print:

- Minimag
- Post Matric
- Business Day Earth
- Career Focus



EASY SCIENCE

Biotechnology

Yeast: what it is and how does it work?

Yeast is single-celled fungi that are able to ferment sugars. Fermentation is the process whereby the yeast breaks down the sugars in the bread dough, or wine-beer mixture into carbon dioxide (CO₂) and alcohol. This is more commonly known as alcohol fermentation. It is the carbon dioxide that makes the bread rise and if you are thinking that bread contains alcohol - it doesn't! Because the yeast is present in the bread dough for such a short time before baking, it creates enough carbon dioxide to make the bread rise, but only a small amount of alcohol which evaporates during baking. On the other hand, wine and beer are left to mature for much longer and therefore the yeast has enough time to make the necessary alcohol.

Biotechnology

Our ancestors, through innovation or just by accident, discovered ways to use organisms to create new foods. This biotechnology using living organisms for human needs has had a huge impact on what we eat. Just imagine a world without pizza, freshly baked french loaves or apricot yoghurt! Nowadays, biotechnology is a broad field comprising of things like genetic modification, forensics, DNA testing, stem cell research and labials to name a few. For more information on biotechnology and related careers, visit www.pub.ac.za, email careers@pub.ac.za or call 012 392 9300.

Activity: Make your own yoghurt

*Please ask an adult to help you with this activity

You will need:

- 1 litre full cream milk
- 2 spoonfuls natural yoghurt (not flavoured or sweetened)
- Sugar, honey or fruit (optional)
- A pot
- 2 sterile containers

1. Heat 1 litre of milk on the stove or in the microwave until the milk is just under boiling point.
2. Remove the pot from the heat and wait for the milk to cool down to about body temperature (about 30°C)
3. Stir in 2 spoonfuls of natural yoghurt and pour the mixture into sterile containers and cover. In order to sterilise the containers, you can put them into an oven of about 100°C for about ten minutes. If they are not oven-proof, you can immerse them in boiling water for about ten minutes.
4. Put the containers in a place that you can keep warm for about 4-8 hours. The longer you leave the yoghurt, the thicker it will become.
5. Remove the yoghurt from the warm place and refrigerate it.
6. Once the yoghurt has fully cooled, you can add sugar, honey or fruit, or just eat it exactly as it is.
7. Remember to keep some for using on the starter in your next batch.

What about cheese and yoghurt?

Well, these are also produced using a fermentation process, but yeast is not the fermenting agent. Rather, specific strains of bacteria are used for what is known as lactic acid fermentation. These lacto and bacteria or LAB, change the lactose in type of sugar found in milk into lactic acid, thus giving yoghurt and cheese a sour taste. It is said that yoghurt was discovered by accident thousands of years ago in the Middle East and was only introduced to the western world during the 1900s. The origins of cheese are less certain. There is speculation that the art of cheese-making began between 8000-3000BC in the Middle East or Central Asia, but evidence is scarce.

Food: Baking, Brewing and Fermentation

Thousands of years ago man discovered how to make bread, cheese, yoghurt and not to mention wine and beer. These foods and drinks have become part of our daily lives.

Bread has been around for thousands of years, but before the discovery of the use of yeast, bread was unleavened. This means that it was flat like a mat or pit bread. The Egyptians were among the first to add yeast to bread dough to make bread rise. This happened between 4000 and 6000 years ago, isn't that amazing? The technique has been passed down generation after generation and has spread throughout the world resulting in many different bread varieties. Likewise, yeast is also used to make wine and beer. There are types of alcoholic drinks with wine being made from grapes and beer being made from barley, wheat and sorghum among other grains. It is unsure where these drinks originated, however we know that it predates yeast bread.

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NRF SAASTA
 National Research Foundation
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Public Understanding of Biotechnology

Kyle cooks up a storm

Oh, I love the month of April! Why? It's Easter. My mom and granny always bake the most scrumptious goodies. The whole house smells like hot-cocoa-hum - YUUMMEE! I was sitting in the kitchen, doing my homework, when I started thinking about the chemistry involved in the kitchen, especially during the baking of bread and cake.

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Radio:

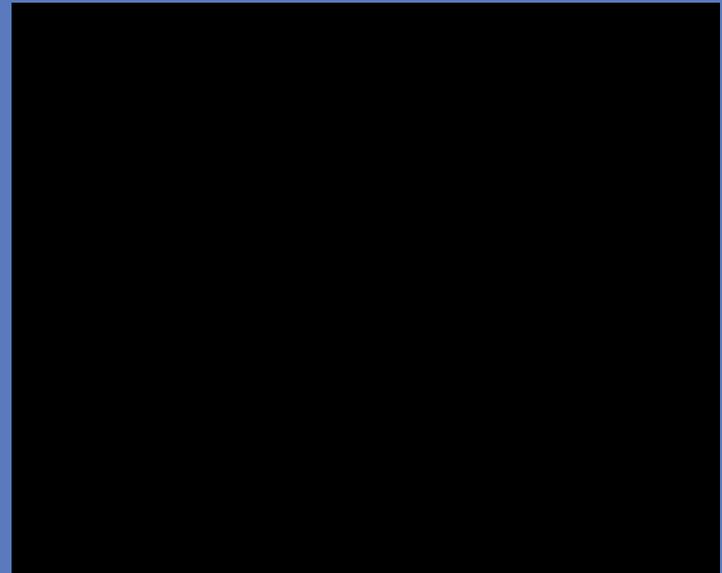
- Biotechnology feature on Khaya FM 95.9 (Dube Drive)
- Interviews with various biotech specialists

PSAs

Public Service Announcements

Aired on SABC

- Biomining
- Forensics
- Genebank
- GMOs
- Traditional medicine
- Vaccines



Biotech World Exhibit



- Completed by the Foster Brothers in 2010
- Touch-screen exhibit that explores:
 - Indigenous knowledge (IKS)
 - Stem cells and medical research
 - Biofuels
 - DNA in forensics
 - GMOs



http://www.in3sixty.com/education/20110110_PUB/internet/lowres/pub_intro.html

CTF



Critical Thinkers Forum

- Growth of the South African Biotechnology Sector (November 2010 in Cape Town)
- Agriculture, Food Security and Emerging Technologies in South Africa (March 2011 in Bloemfontein)
- Acid Mine Drainage in SA – possible solutions? (July 2011 in Johannesburg)

Get Involved



Students

- Role modeling campaigns
- Exhibitions

Scientists

- Science Communication Workshops
- CTF participation
- Resource input/development
- Facilitation of BBT workshops for educators
- Speak to a scientist

Contact us



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Thank You!