

# Microbiology and Art: an unusual combination?

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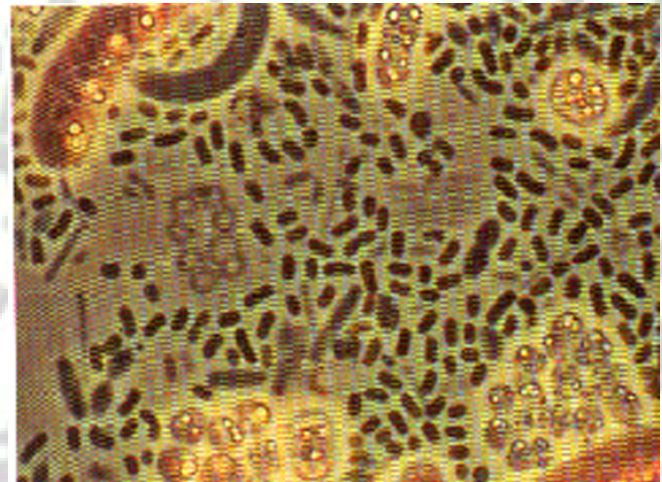
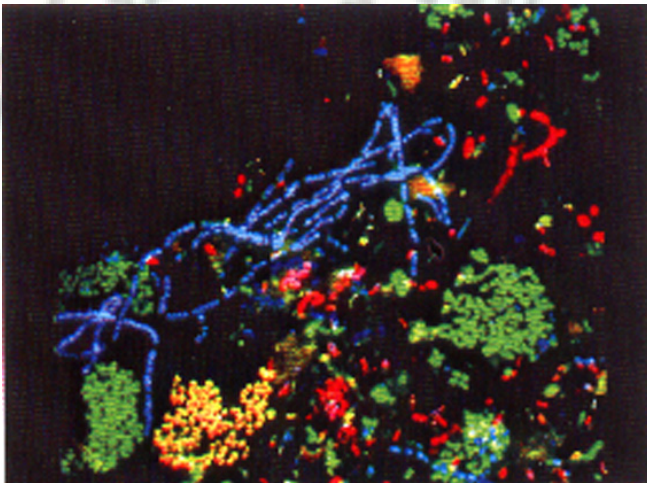
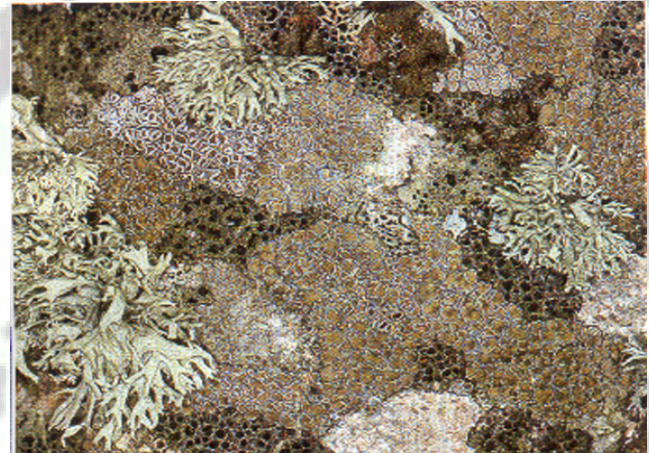
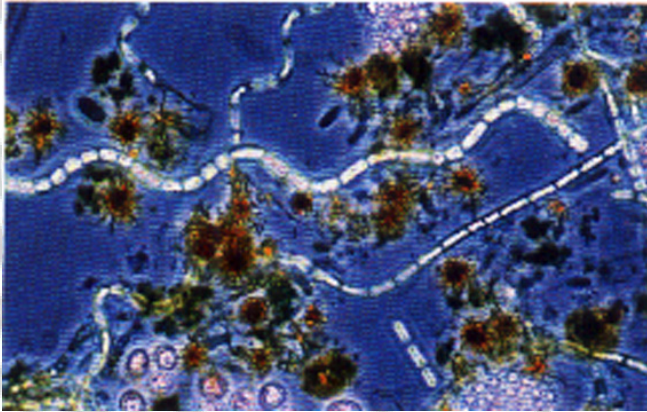
# Microbiology and Art – Lecture Outline for ‘Frontiers’ module (Year 1)

- Microbiology and Art
  - Deterioration of Art
  - Beauty of Microorganisms
  - Microorganisms in Art
  - Microbiology and Art (sciart projects at MMU)
  - Assignment (produce anything linking the two subjects)

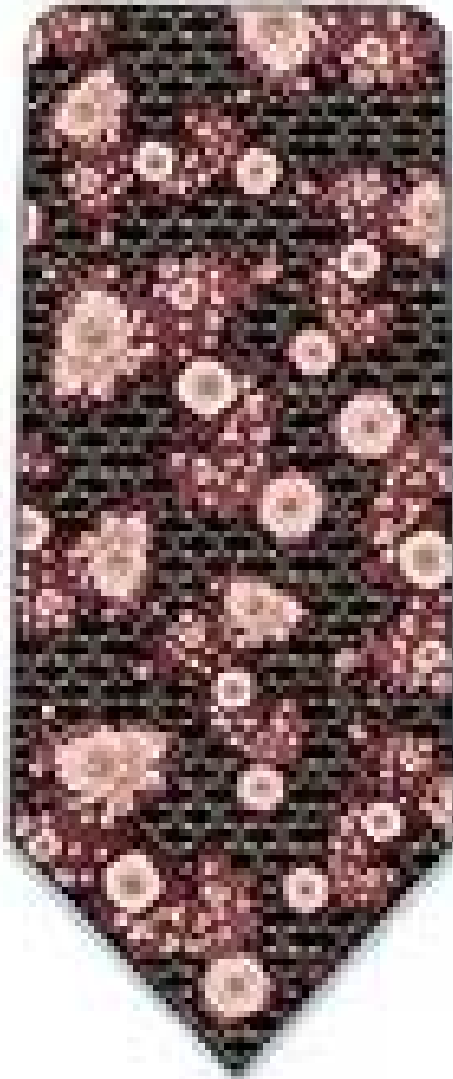
# Deterioration and Conservation of Art

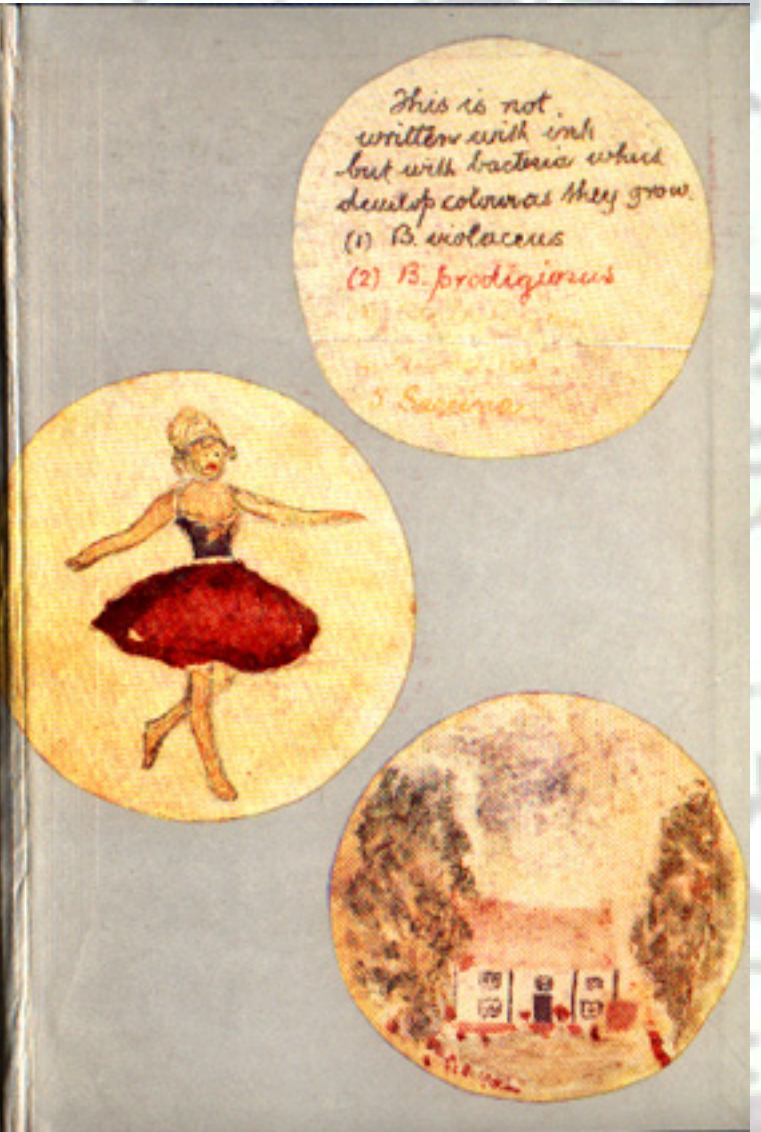


# Art about, of, and by microorganisms

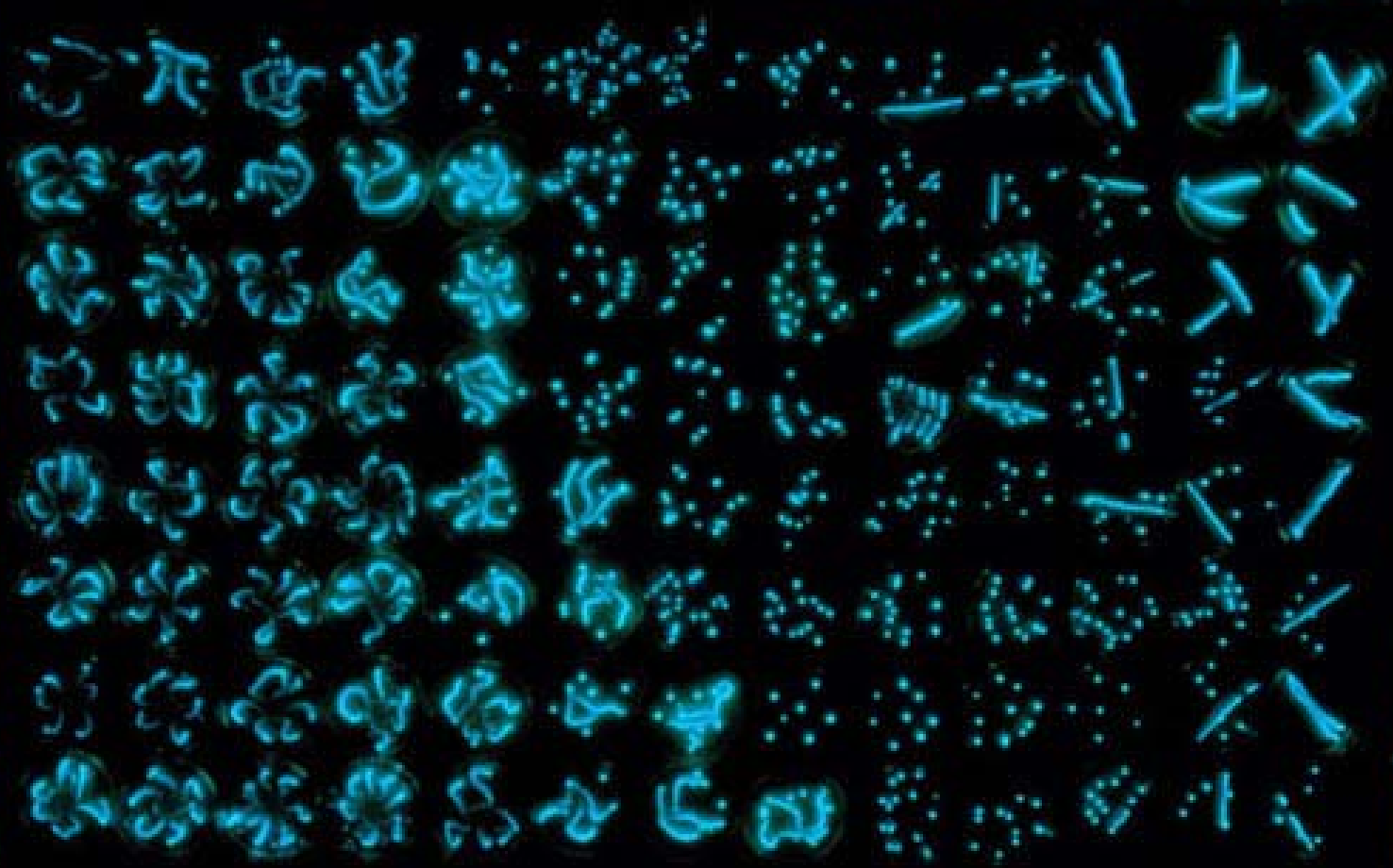


[www.iawareables.com](http://www.iawareables.com)



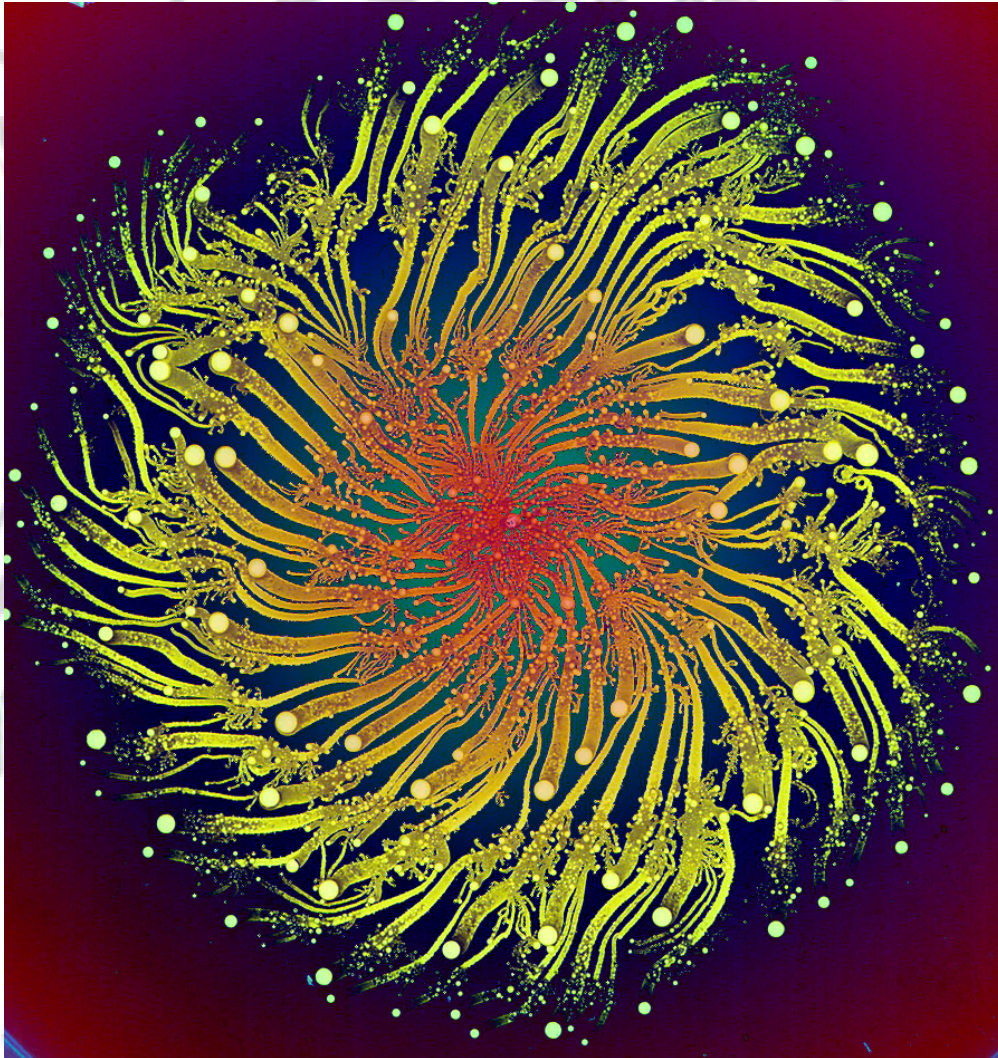


This is not  
written with ink  
but with bacteria which  
develop colours as they grow.  
(1) *B. violaceus*  
(2) *B. prodigiosus*  
*Suzanne*



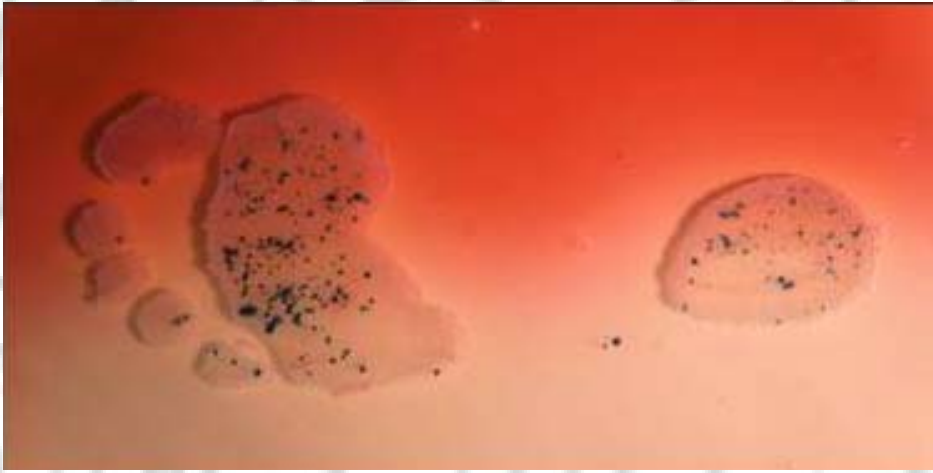
Copyright 2002, MSU-Bozeman Bioglyphs Project

# Colony morphology and stress 'social intelligence'



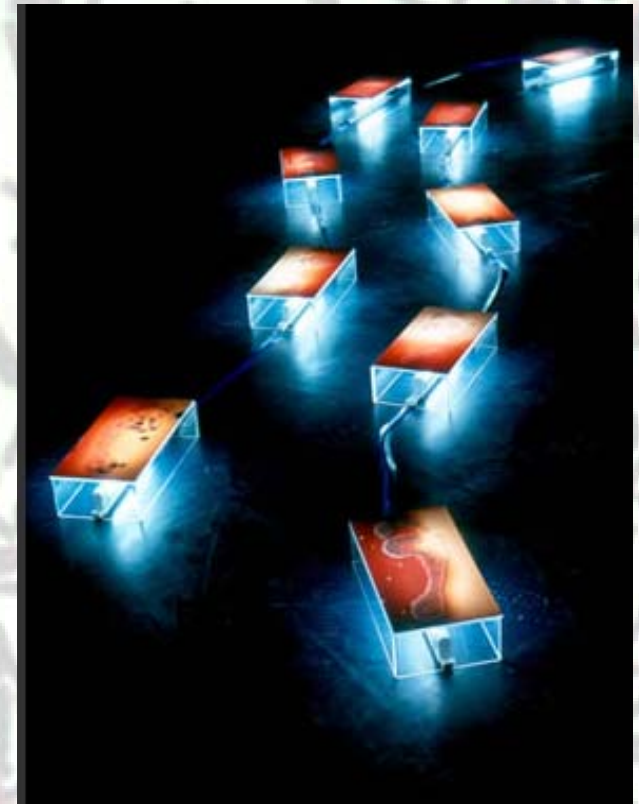
School of Physics and Astronomy,  
Tel Aviv University  
eshel@tamar.tau.ac.il

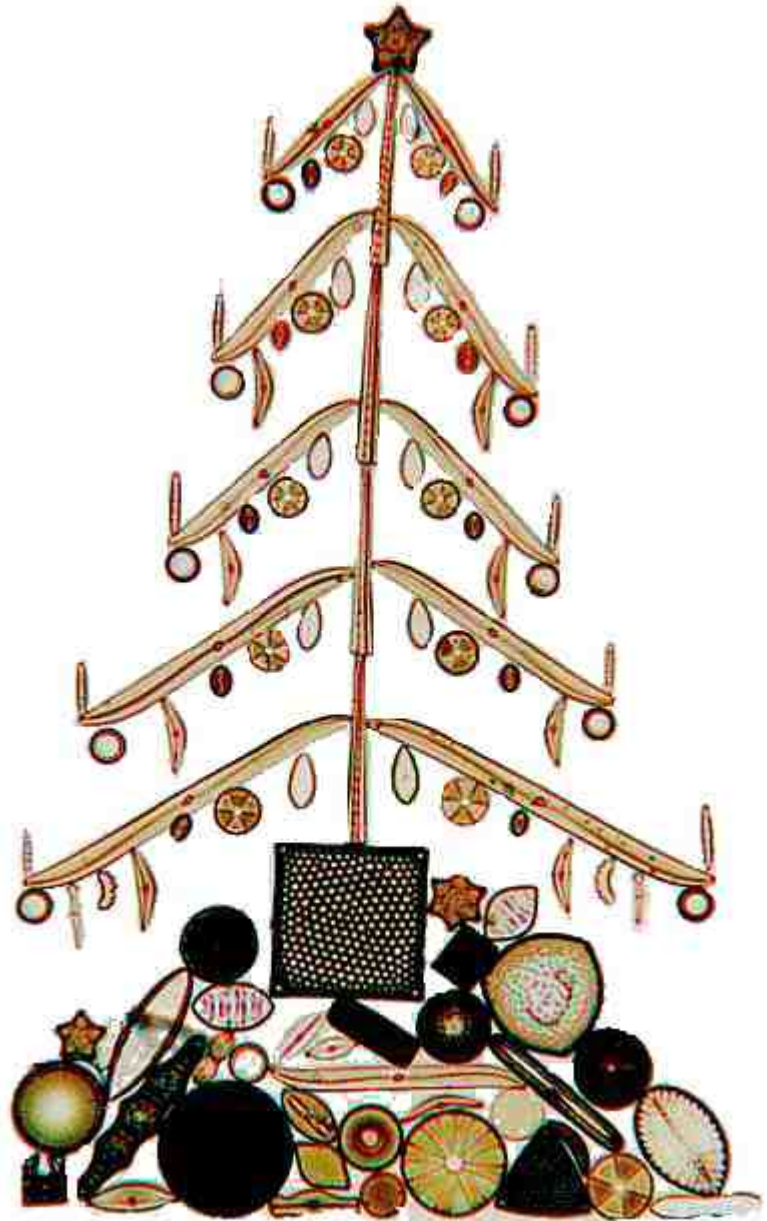
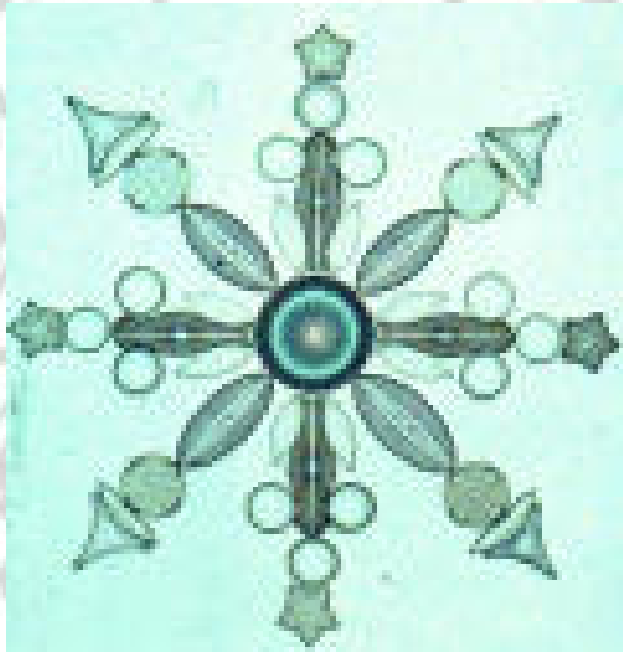




Heather Barnett was born in 1970. In 2000 she collaborated with microbiologist George Hounsome to produce laboratory-based art work. 'Cultured Colonies' explores biomedical representation and the identity of the individual within the medical institution, and pushes the boundaries of what can be considered a portrait. The installation treads a fine line between seduction and repulsion; the clusters of organisms are affluent and colourful, glowing like micro solar systems, yet their origin is disturbing and their ability for growth shocking.

'Cultured Colonies' is made up of 9 glowing footprints. The normally harmless organisms have grown in an exaggerated form that would be potentially dangerous to the host.



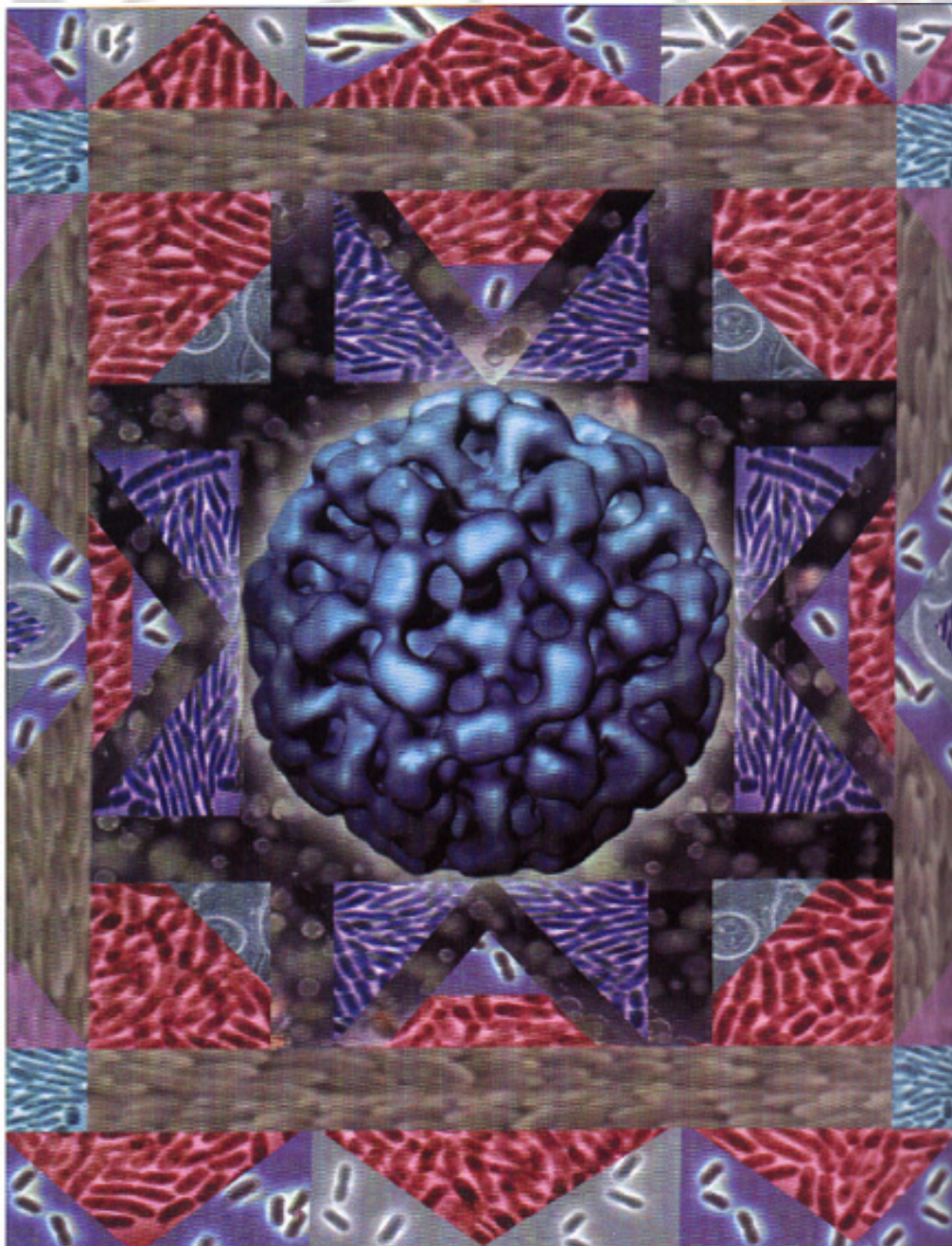


[www.diatoms.co.uk](http://www.diatoms.co.uk)



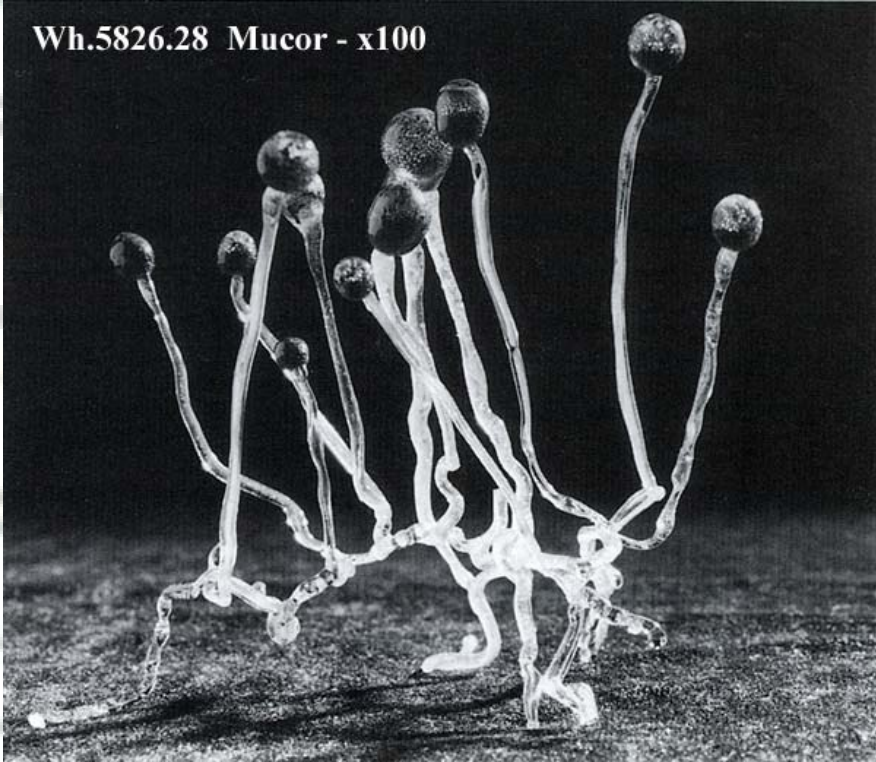
‘Rice’  
Biofilm art, Japan

Gorbouchina



ASM

Wh.5826.28 Mucor - x100



Whipple Museum of History of  
Science, University of Cambridge



Fountains of the forest –  
the interconnectedness between trees and  
fungi (AD Rayner)



([wellcome.ac.uk](http://wellcome.ac.uk))

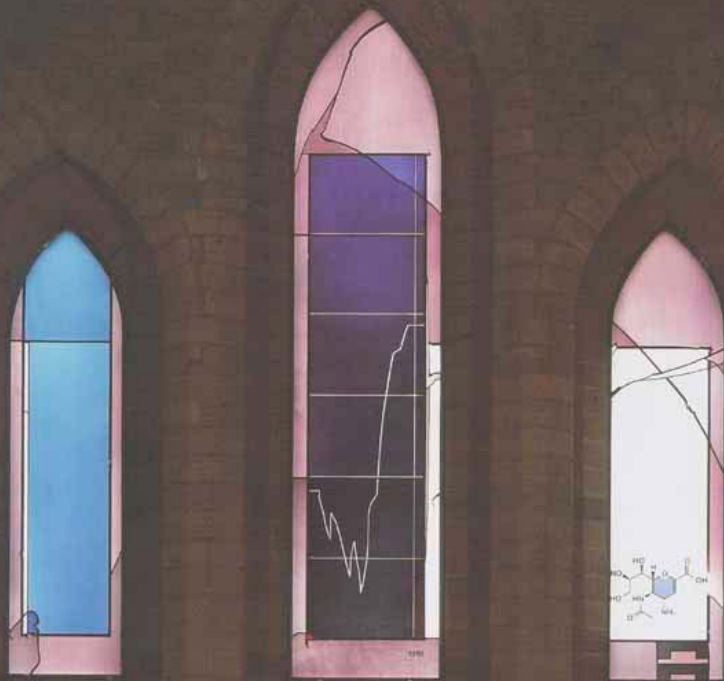






# Medical Science and Stained Glass

The Johannes Schreiter windows at the Medical Library,  
The Royal London Hospital, Whitechapel



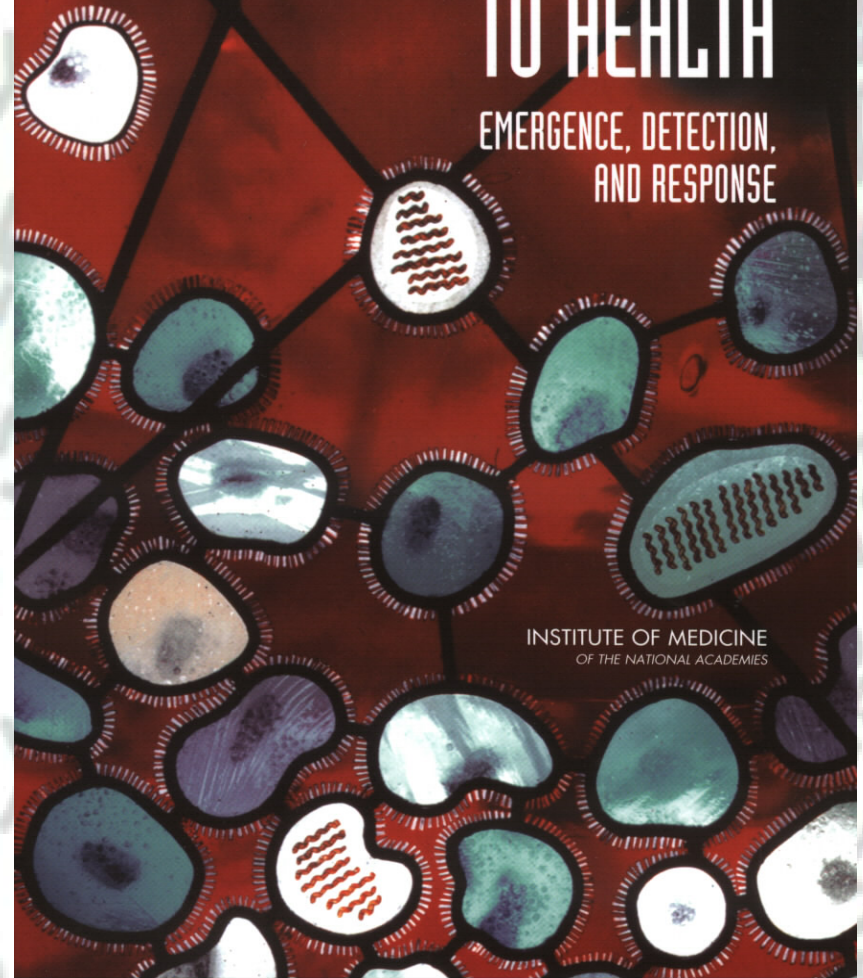
Caroline Swash

The Influenza Pandemic Window

EXECUTIVE SUMMARY

# MICROBIAL THREATS TO HEALTH

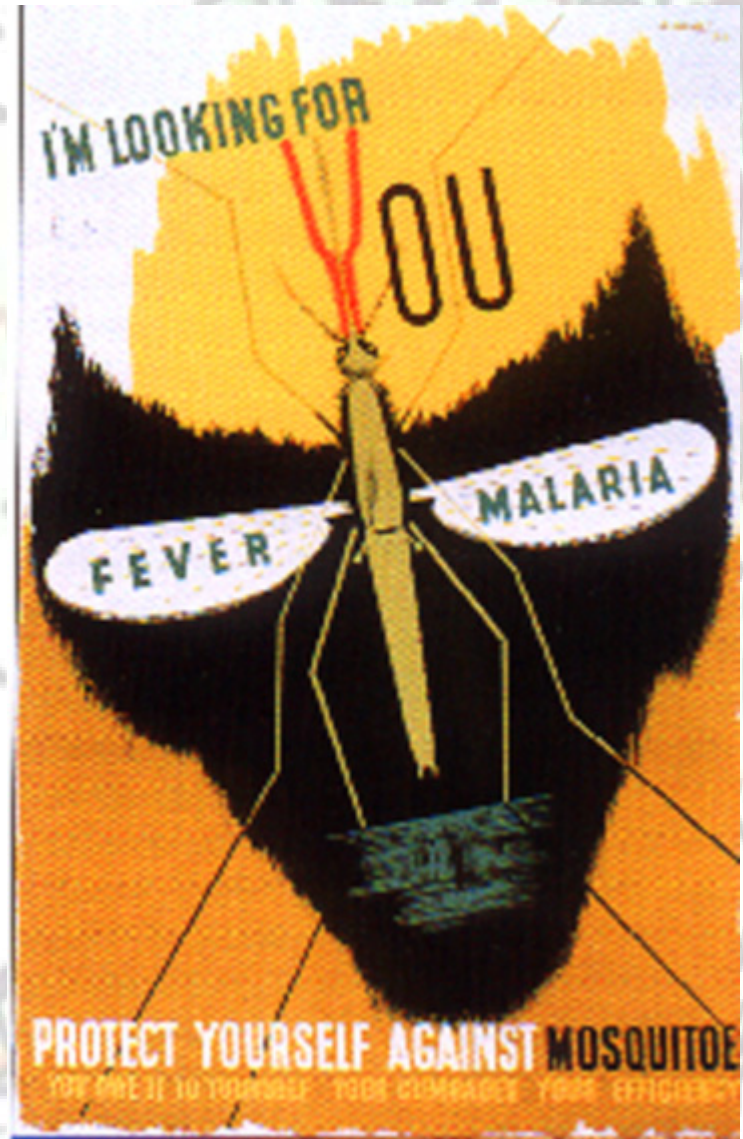
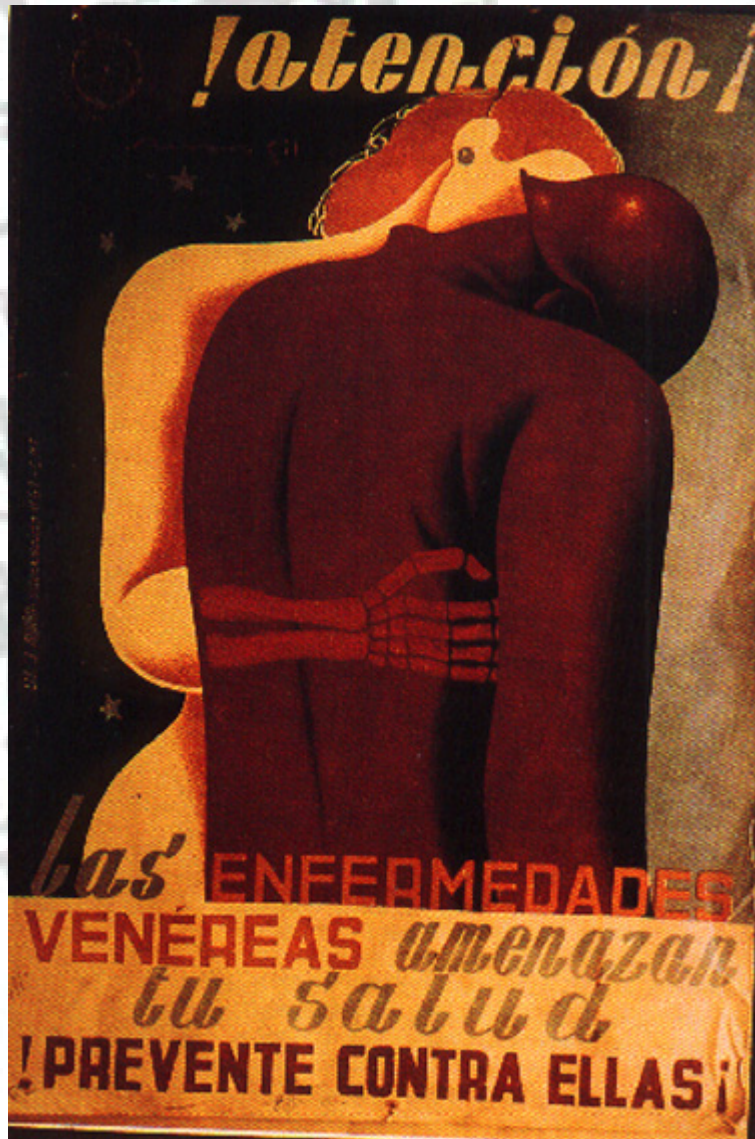
EMERGENCE, DETECTION,  
AND RESPONSE



INSTITUTE OF MEDICINE  
OF THE NATIONAL ACADEMIES







# Work produced after 'Art' Lecture



It is a well known fact in literary fields that scientists influenced the work of writers and that science or specifically concerns about illness and death are common features in art and literature.

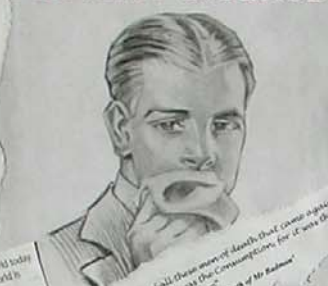
Tuberculosis, or consumption, played a part in many of the great "classic" novels that we still read today. If we look at Charlotte Brontë's *Jane Eyre* or *Moby-Dick* in Herman Melville's *Typee*, it is clear that the concept of "consumptive heroines" was used in the arts. These heroines were also seen in many famous operas, like for instance *Aida* or *La Bohème* and *Pierrot* in *La Traviata*.

It is a fact that Tuberculosis was used by novelists, poets, playwrights, and artists alike as a means of exploring emotional and spiritual themes and ideas. Tuberculosis was used especially, as opposed to many other infections, because there came with it an idea that TB sufferers were "sensitive souls." Tuberculosis was felt to be a disease particularly associated with artistic creativity.

To have TB, was in previous years, as Susan Sontag says, "as becoming frailty, the sign of a superior nature", and nineteenth century literature certainly reflected that in a streaked full of descriptions of almost symptomless, unlightened, beautiful deaths from Tuberculosis, particularly of young people.

The idea that TB was somehow something, meant it came to be associated with a certain sensitivity of character and that its sufferers were therefore romantic and interesting.

## PREVENT DISEASE



"The Carriage of All these men of death that came a patient have to take from us, and the Convention of Mr. Baines"   
 - Jane Austen, 1816. "The art and work of Mr. Baines"

### Tuberculosis

Among infectious diseases TB is the leading killer of adults in the world today. Some 2 million people will be a fully asymptomatic TB every second. In 2002 and 2003 over 150 million people were newly infected by TB every second. In 2002 and 2003 over 150 million people were newly infected by TB every second. In 2002 and 2003 over 150 million people were newly infected by TB every second.

Every person is healthy lungs. Every person is healthy lungs. Every person is healthy lungs. Every person is healthy lungs.

Meats of us become infected from other people as we breathe. Meats of us become infected from other people as we breathe. Meats of us become infected from other people as we breathe.

The first infectious usually back. The person is well and he never smears from his lungs. It is important to find the first infection in children.

## CARELESS SNEEZING, COUGHING, SNEEZING, SPREAD INFLUENZA and TUBERCULOSIS



PROTECT YOURSELF FROM TUBERCULOSIS CONSULTATION OF YOUR DOCTOR OR CLINIC

Edward Munch (1861-1944) Edward Munch was a Norwegian painter and graphic artist like other artists Munch painted from his own life experiences, and when he was young he experienced the death of his mother and sister to Tuberculosis.

Munch used a violent and emotional style to portray themes of isolation as well as death, fear and anguish. His images were often so powerful and shocking that his work was often not easily understood by the public. Edward Munch's well-known masterpiece, *The Scream*, is considered to be the most powerful image created in the Expressionist style. It depicts human fear, pain and humanity and is said to have been created from the effects that Tuberculosis had on Munch's family and the people around him. The scene is left to make his own conclusions as to what the artist is trying to illustrate, but many critics have suggested that Munch's most famous painting is a depiction of the emotional side of Tuberculosis and that the disease certainly influenced his work.

Edward Munch has definitely left a lasting influence on the history of art.

## FIGHT TUBERCULOSIS



YOUR LUNGS Are Your Lungs Weak or Painful?

CONSUMPTION COVER UP! YOUR COUGHS AND SNEEZES

RAY SPREADS TUBERCULOSIS - FLU - TUBERCULOSIS

THE RETURN OF THE WHITE PLAGUE

THE RULES OF HEALTH

FEELING A DRAUGHT. A Microbe is in and, and, in this kind of thing, and it is not

## Healthy looks can hide TUBERCULOSIS



Captain of Death: The Story of Tuberculosis

PROTECT THEM FROM TUBERCULOSIS

THE NEXT FROM TUBERCULOSIS

THE RETURN OF THE WHITE PLAGUE

THE RULES OF HEALTH

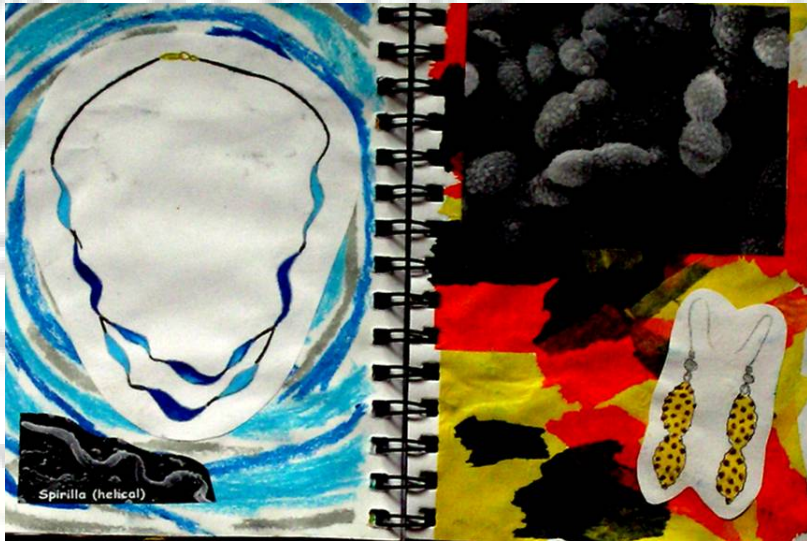
THE RETURN OF THE WHITE PLAGUE

THE RULES OF HEALTH

FIGHT TUBERCULOSIS Red Cross Christmas Seal Campaign

THE RETURN OF THE WHITE PLAGUE

THE RULES OF HEALTH





*'Aspergillus'*  
 by Natasha Khan  
 School of Biology, Chemistry & Health Science  
 First prizewinner in the 2006  
 Microbiology & Art Competition  
 Sponsored by Leica Microsystems *Leica*



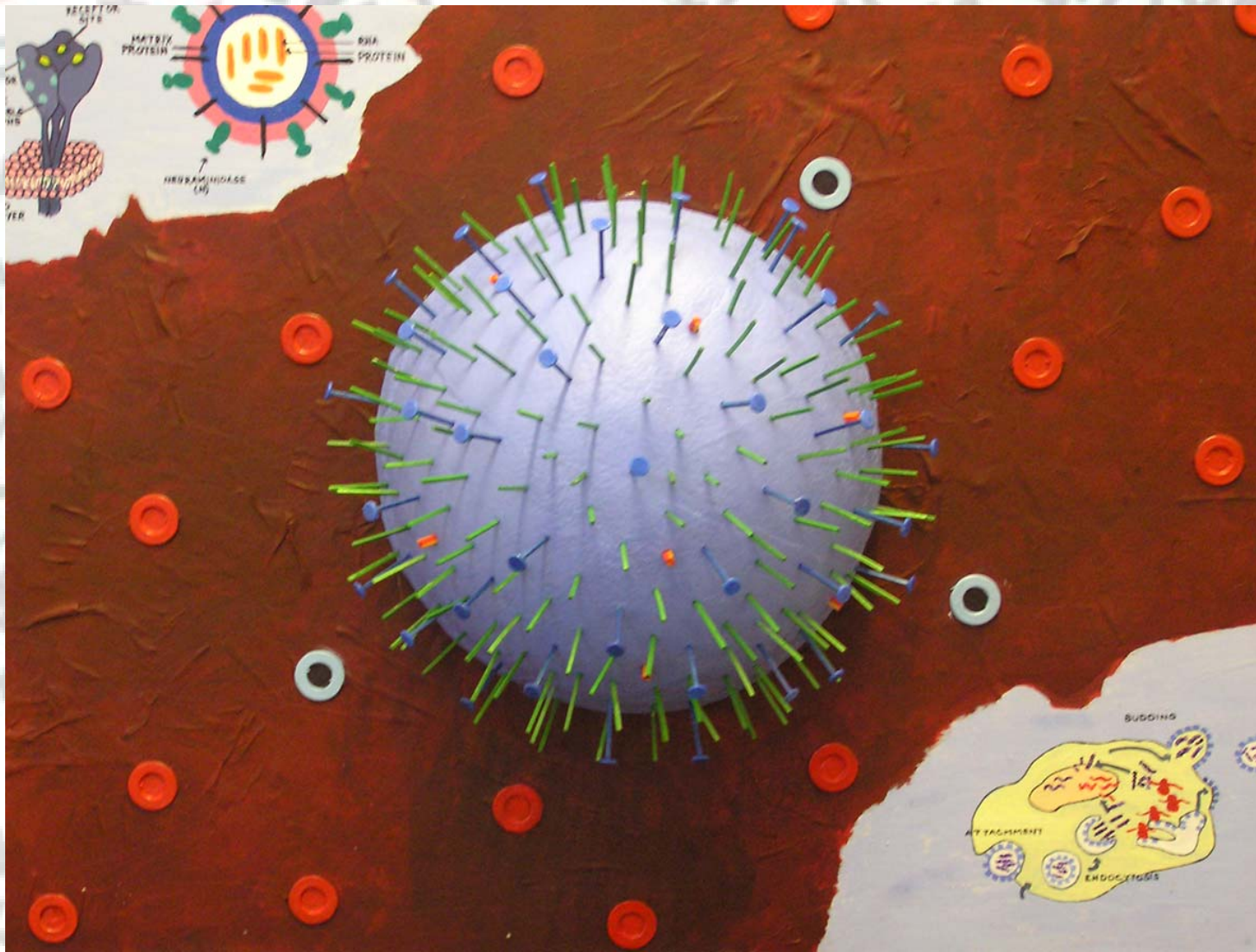




INNER BEAUTY  
OR  
CELLULAR CHAOS???

by Anne Carline & Martin Caron-Estrine







**“Stitching Up Oxford Road”** is a new project creating original textile art from recycled plastic bags along Manchester’s Oxford Road. This activity involving members of the public and the business community is designed to celebrate the rich cultural heritage and diversity of Oxford Road whilst helping Manchester to become a cleaner, greener city. The project is being led by internationally acclaimed textile artist and MMU lecturer Lynn Setterington and a team of willing volunteers.

*“I read somewhere that that every person in the country uses an average of 134 plastic bags every year. The idea of **Stitching Up Oxford Road** is to make something positive out of carrier bags; a wasteful and harmful product in the environment can be turned into a positive and thought provoking textile”*

**Lynn Setterington**

# Stitching up Oxford Road

Biodegradation is the decomposition of organic material by microorganisms, converting the organic material back to  $CO_2$  (or  $H_2O$  if  $CH_4$ ).

Decomposers break down anything from human corpses, waste products and dead vegetation.

Fungi can decompose cellulose and lignin of plant cell walls. Almost any carbon containing material can be consumed by a type of fungi, including air fuel and even wall paper.

The inorganic elements are then recycled into organic compounds by producers. These organic compounds flow more or less levels. This is sometimes called chemical recycling.

Producers, aka decomposers, decompose the organic material in every ecosystem and transfer the basic chemical elements in inorganic forms to abiotic reservoirs ( soil, water or air).

Ecosystems depend on continual recycling of chemical elements between living and non-living components. Generally chemo-heterotrophic (heterotrophic) function as decomposers.

Decomposition is important in structure generation. Methane generated by decomposition of organic material (manure, municipal solid waste + sludge) can be used to make electricity. This is becoming more important because burning  $CH_4$  produces less  $CO_2$  for each unit of heat released and the limit is that it is  $CO_2$  means more global warming than  $CO_2$ .



**PRODUCTION AND USE OF PLASTICS**  
Plastics are resins or polymers, that have been synthesized from petroleum or natural gas derivatives. The term "plastics" encompasses a wide variety of resin each offering unique properties and functions. Plastic production and use has grown because of the many advantages plastics offer over other more traditional materials. (1) longer lifetimes (2) high resistance to corrosion (3) low weight (4) stable resistance.

**Table PLASTIC RESIN CHARACTERISTICS AND PRODUCTS**

Resin Name	Characteristics	Product Examples
Low-Density Polyethylene (LDPE)	Moisture proof, light	Garbage bags
Polyethylene Terephthalate (PETE)	Clear bottle resin combined with plasticizers	Construction pipes, meat wrap, roofing of leather
High-Density Polyethylene (HDPE)	Plastic treatment	Milk and detergent bottles, fuel oil bag
Polypropylene (PP)	Stiff, heat and chemical resistant	Garbage bins, yogurt cups, office furniture
Polystyrene (PS)	Brittle clear, good thermal properties	Disposable foam dishes and cups, concrete pipe
Polyethylene Glycol (PEG)	Tough, shatterproof	Soft drink bottles, food and medicine containers

**Problems Caused by Plastic Waste**  
The major impacts of marine plastics are entanglement and ingestion by marine animals, and aesthetic and economic losses caused by lost fishing gear and by litter on beaches. Entanglement affects seabirds, seals, whales, turtles, fish and cetaceans, may have an adverse impact on the population of endangered species. Fish continue to be caught and killed by lost "ghost" nets. Ingestion of plastic wastes is particularly serious among birds and turtles, injury to the digestive tract, intestinal blockage and starvation.

**DEGRADABLE PLASTICS**  
Biodegradation and photodegradation are potential mechanisms currently being explored and commercially developed. Before the application of these techniques can be prominent, the uncertainties surrounding degradable plastics must be addressed.

**Biodegradable Plastics Defined**  
Biodegradable plastics are supposed to be less resistant to degradation than "normal" plastics. Most government technologies being investigated photodegradation and biodegradation.

**Disadvantages To New Biodegradable Plastics**  
Biodegradable plastics do NOT reduce the volume or toxicity of waste produced. In fact, for certain applications, additional plastic may be required to offset the weakening effect of adding biodegradable components. Enhancing the degradability of plastics will have little if any effect on landfill operation or space. Plastic recyclers fear that degradable plastics will contaminate the recycled plastic waste stream, resulting in products that do not perform well. There is a question as to whether degradability might encourage littering.

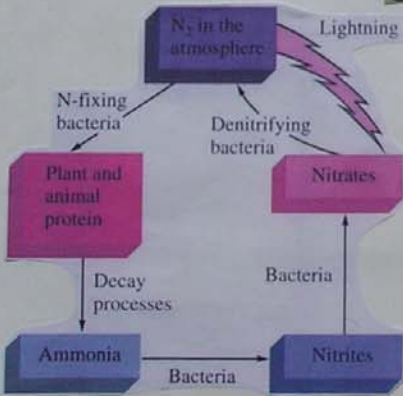
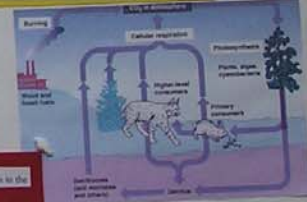


Diagram of the Nitrogen Cycle showing the cycle of Nitrogen in the environment and the role of bacteria.

Diagram of the Carbon Cycle showing the cycle of Carbon in the environment and the processes involved.







# Music

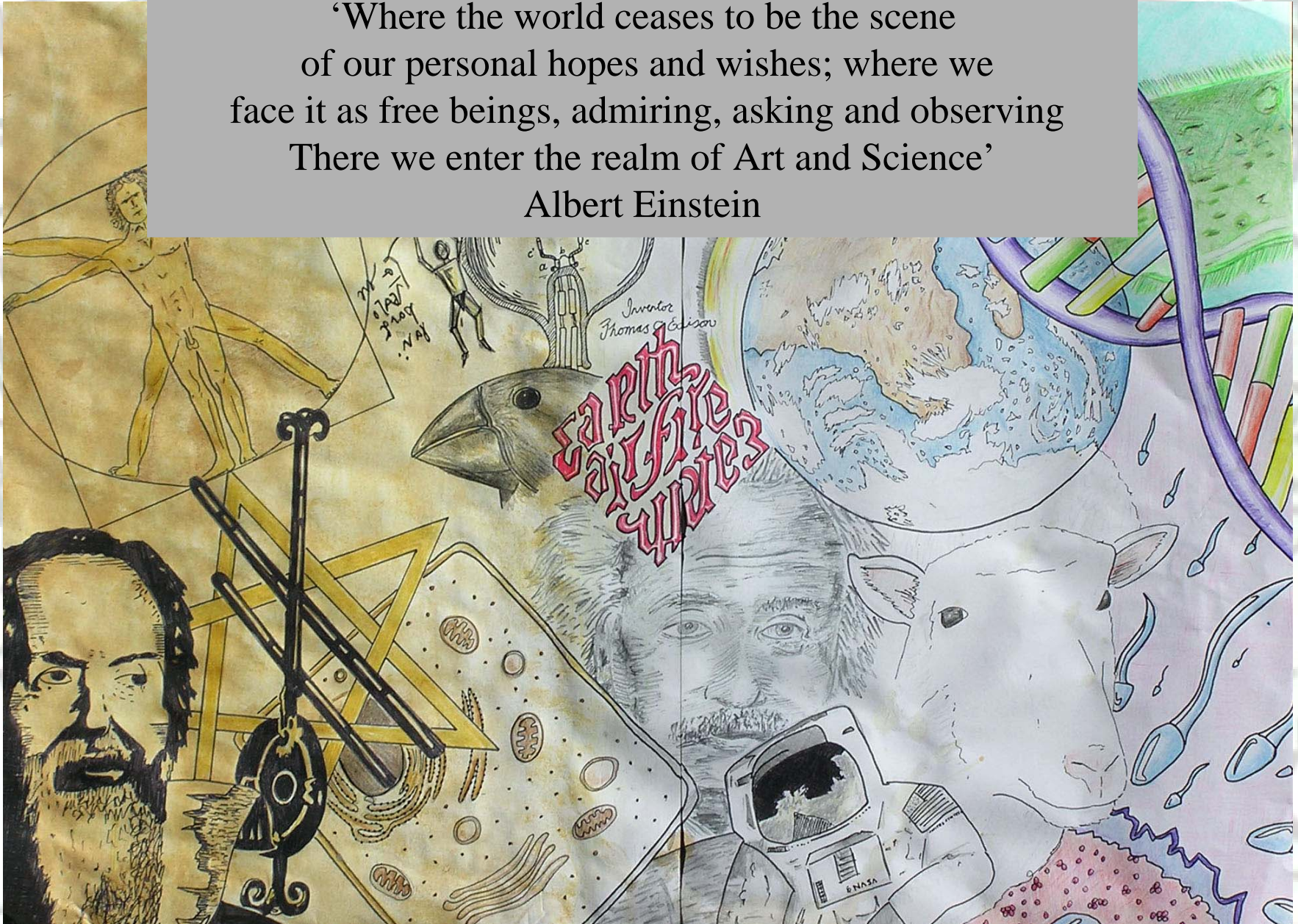
- Prof Helen Davies, University Pennsylvania
- Uses musical mnemonics to help medical students' recall
- Received many prizes, accolades...student nominated best teacher for 15<sup>th</sup> year
- Example: to tune of 'Sound of Silence'
  - Hello, herpes my old friend
  - You'll be with me 'til the end
  - 'cause the virus softly creeping
  - Left its genes while we were sleeping....



# To tune of 'Yesterday'

- Leprosy-
- Bits and pieces falling off of me
- But it isn't just toxicity
- It's just neglect of injury.
- Suddenly,
- I'm not half the man I used to be!
- Can't feel anything peripherally
- From swollen nerves, hypersensitivity.
  - Why don't leprae grow in vitro, we cannot say
  - In vivo, they grow slow, only once in 12 da...a...ays
- Hard to get,
- But the stigma hasn't faded yet.
- Don't keep an armadillo as a pet!
- Clofazamine and dapsons, don't forget...

‘Where the world ceases to be the scene  
of our personal hopes and wishes; where we  
face it as free beings, admiring, asking and observing  
There we enter the realm of Art and Science’  
Albert Einstein



- Microbiology
  - Subject content/concepts
- Communication, imagination
  - Students (learning styles, transferable skills)
  - Peers (professional societies/conferences)
  - Public (PR for subject, understanding of science)
- Any subject can combine with microbiology
- Any subject can combine with art
- Stimulating, interesting, memorable and fun!

**SCIENCE IS BORING**

**ART IS STUPID**

**PROVE US WRONG**

THE FIRST ANNUAL  
**ART OF SCIENCE COMPETITION**  
AT PRINCETON UNIVERSITY

Celebrating the aesthetics of research  
and the ways in which science and  
engineering inform art

- 1st prize - \$250.00
- 2nd prize - \$154.50
- 3rd prize - \$95.50

[WWW.PRINCETON.EDU/ARTOFSCIENCE](http://WWW.PRINCETON.EDU/ARTOFSCIENCE)