

Key Stage 4 Worksheet

Podcast: Will Maggots Save the Human Race? With Biomedical Scientist Yamni Nigam

From the series: Exploring Global Problems, by Swansea University



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EXPLORING
GLOBAL PROBLEMS

What is it about?

In this podcast, Biomedical Scientist Professor Yamni Nigam discusses her research into wounds and antimicrobial resistance. Yamni talks about using maggots to combat the antimicrobial crisis and heal infected wounds while working to overcome the “yuck factor” associated with these creepy crawly medical powerhouses.

Listen to the podcast:
swansea.ac.uk/research/podcasts/yamni-nigam/

Open the file in your web browser to click on the links.

Why is antimicrobial resistance a problem

The easiest and most effective way to treat bacterial infections is with antibiotics. There are many kinds, but all of them work by killing bacteria or preventing their growth and spread. Unfortunately, the ease of access and effectiveness of antibiotics has led to their overuse for treating minor infections and in intensive farming. As a result, antibiotic-resistant bacteria, such as MRSA, have started to evolve – making the infections they cause much harder to treat. The World Health Organisation (WHO) has classified this microbial resistance as a “widespread serious threat”, making the discovery and implementation of antibiotic-alternatives of utmost importance. The pharmaceutical industry in general has shown a reluctance to invest in researching new antibiotics, as it is more profitable to develop drugs for long term conditions. Fortunately, due to research by biomedical scientists- such as Professor Yamni Nigam, alternatives are starting to be put forward.

Why use maggots?

Professor Nigam's research is primarily on the use of maggots (fly larvae) as an alternative to antibiotics in the treatment of infected wounds (**maggot therapy**). The process involves placing maggots, either loose or in a permeable bag (like a teabag), onto a wound and placing a dressing on top (so the maggots cannot escape or be seen). Medicinal maggots perform 3 helpful jobs:

1. Get rid of dead tissue – maggots eat necrotic (dead) tissue. The maggots can safely work their way into any nooks and crannies more effectively than could be done with surgery. There is also no chance of them removing any healthy tissue as they can't eat it.
2. Disinfect the wound – maggots release an antimicrobial fluid to kill bacteria on the tissue they are eating. They react to infection, producing more fluid when there the infection is greater.
3. Stimulate healing – maggots help to kickstart our own healing process once the infection is gone.



Maggots are like nature's janitors!

Maggot Myth-Busting

Even though the science behind maggot therapy is sound, lots of people turn down the option. Research shows that this is because people have a negative association with maggots. Professor Nigam is working to change people's negative perceptions by informing them of how helpful they can be and by myth-busting preconceived notions. Check out some common ones below!

“Maggots are dirty and would introduce dangerous bacteria!” – Only clinical-grade maggots are used, which are from specially reared greenbottle flies. The eggs are treated to ensure they are sterile.

“Maggots are medieval. Medicine has progressed past such primitive procedures.” – The benefits of using maggots are well-researched and have shown positive results in many cases where antibiotics have not. The treatment has undergone extensive testing using modern scientific methods to confirm effectiveness. They are available on NHS prescription.

Maggot Myth-Busting Continued...

“They would eat me alive!” – Maggots cannot digest living tissue and leave it alone.

“They would turn into flies on me.” – Maggot therapy is only in place for a relatively short time. They would be removed long before the maggots became flies.

“I’m scared it would hurt” – The maggots grow from about 1 mm – 1 cm during the treatment so it is possible you would feel some wriggling. Like all medical treatments, our bodies can react in different ways with some finding it painful and others not feeling anything at all.

“Couldn’t we do the same with a pill?” – Work is being done to turn the maggots’ ability to disinfect wounds into a pill. Maggots can react to infection severity, however, making them more effective than a potential pill. Maggots also get rid of dead tissue and stimulate healing and these helpful effects would be lost.

Exercises

Fill in the gaps

Antibiotics are the _____ way to treat _____ infections.

They work by killing _____ or preventing their _____ .

Why do we need alternatives to antibiotics?

What are the 3 helpful functions of medicinal maggots?

- 1.
- 2.
- 3.

Draw your own maggot! (give it a cool hat or... umm... a scarf?)

What do you think is the greatest barrier to people using maggot therapy? How would you combat it?

Find out more about it

- Visit [loveamaggot](#) for more on medicinal maggots!
- Read this NHS information sheet to find out more about the benefits and risks of maggot therapy.
- **Watch this (Content Warning!)** - maggots/dead animals/infected wounds) National Geographic video if you would like to see medicinal maggots in action.
- Use this **BBC Bitesize study** guide to learn more about treating, curing and preventing disease.

For teachers and home schoolers

Links to Science in the National curriculum for Wales (KS4)

GCSE Biology

ECOSYSTEMS, NUTRIENT CYCLES AND HUMAN IMPACT ON THE ENVIRONMENT

Food chains and food webs showing the transfer of energy between organisms and involving producers; first, second and third stage consumers; herbivores and carnivores; decomposers – Maggots' role as a decomposer is discussed in the breaking down of dead tissue.

The importance of micro-organisms, bacteria and fungi in decay: microorganisms feed on waste materials from organisms, when plants and animals die their bodies are broken down by micro-organisms bringing about decay, micro-organisms respire and release carbon dioxide into the atmosphere – Bacterial infections leading to dead, decaying tissue is mentioned.

DISEASE, DEFENCE AND TREATMENT

The fact that pathogens include micro-organisms such as bacteria, viruses, protists and fungi; the basic structure of a bacterial cell and virus – Bacterial infections are discussed.

The fact that antibiotics, including penicillin, were originally medicines produced by living organisms, such as fungi; how antibiotics help to cure bacterial disease by killing the infecting bacteria or preventing their growth but do not kill viruses – Antibiotics and the methods by which they work are introduced.

How some resistant bacteria, such as MRSA, can result from the overuse of antibiotics; effective control measures for MRSA – The concept that overuse of antibiotics has led to resistant bacteria and a need for alternative treatments is discussed.

How some conditions can be prevented by treatment with drugs or by other therapies – Maggot therapy as an alternative treatment to antibiotics is discussed in detail.

How new drug treatments may have side effects and that extensive, large scale, rigorous testing is required; the associated risks, benefits and ethical issues involved in the development of new drug treatments, including the use of animals for testing drugs and whether this is superseded by new technologies – That maggot therapy will have undergone modern testing procedures is mentioned.



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