Multiple Uses of Chemicals : what to chose?

The OPCW – IUPAC Joint Project:
Chemical Education and Outreach

British Pugwash Group

London 8 April 2008

Alastair Hay

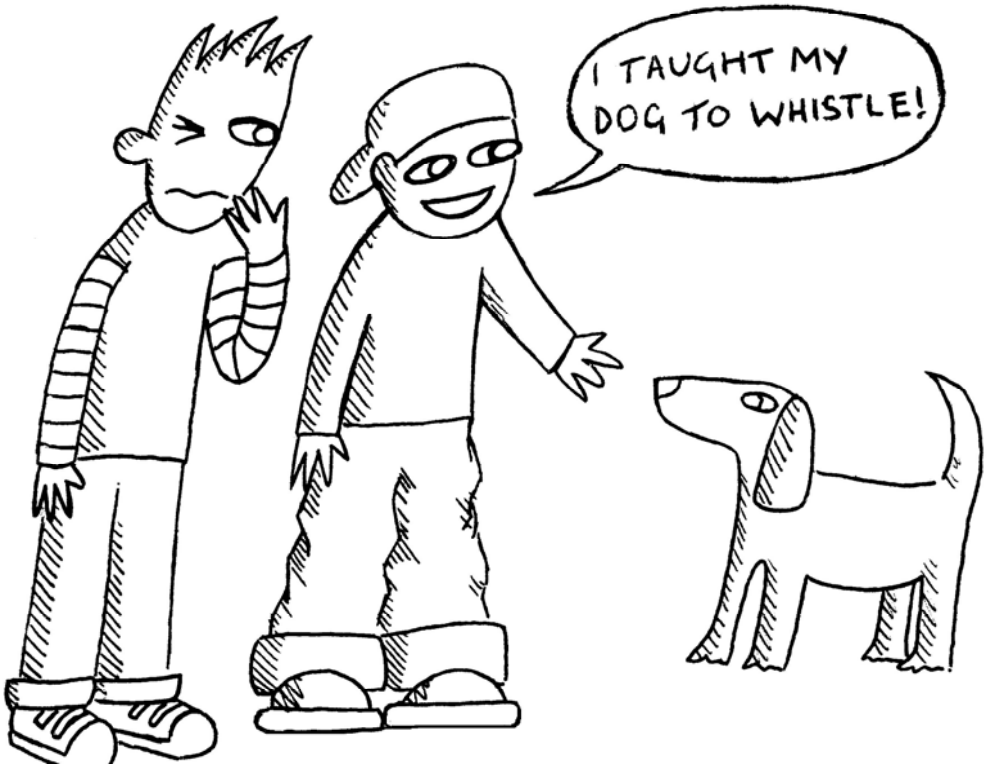
Chemical Weapons Convention:
Educational and Outreach Challenges

- Relevance to and ownership by students and teachers in many countries – *"CWC is someone else's responsibility"*
- Concerns of negative impact on public image of chemistry
- Knowledge base of chemistry teachers at all levels about the issue
- Little formal attention to ethical issues in curriculum
- Remoteness of CWC structure to educational system

Approach

- Place chemical and biological weapons in a larger context – multi-use chemicals
- Start with beneficial aspects of multi-use chemicals, move to mis-use and abuse
- Target chemists and chemistry educators in the domain of influence of IUPAC and OPCW
- Pilot materials with educators, evaluate from the beginning to refine materials and approaches
- Deliver materials over the web
- Address language issues
- Enlist partners for broad dissemination

Active Learning
Your Turn!

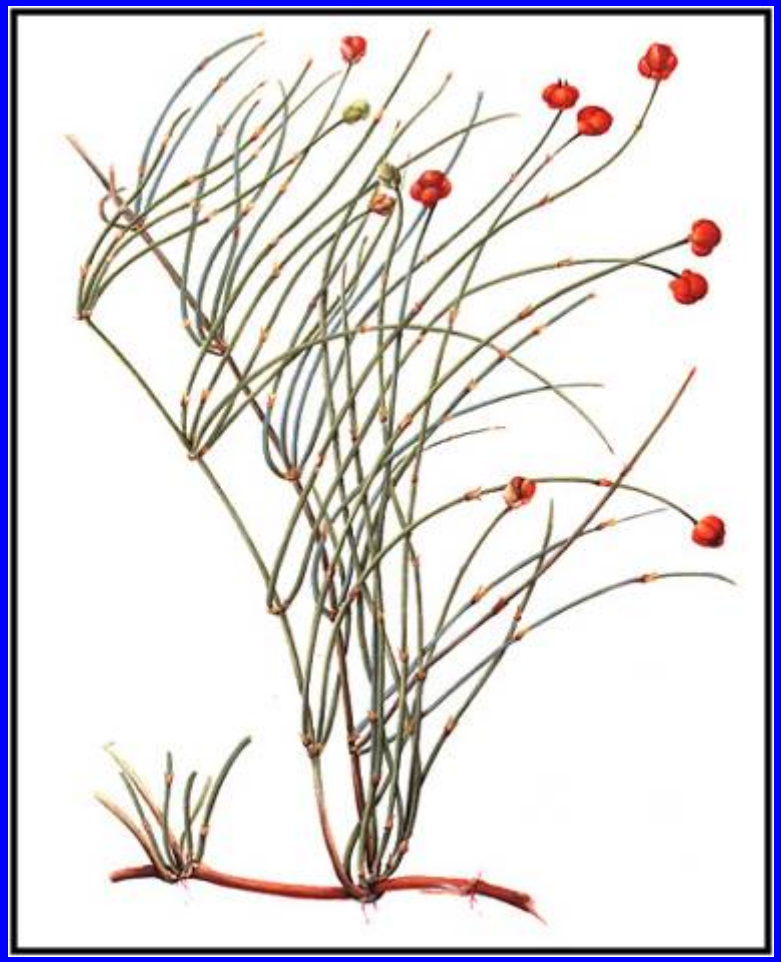



I DON'T HEAR HIM WHISTLING
I SAID I TAUGHT HIM. I DIDN'T SAY HE LEARNED IT
z z z

Multiple Uses of Chemicals

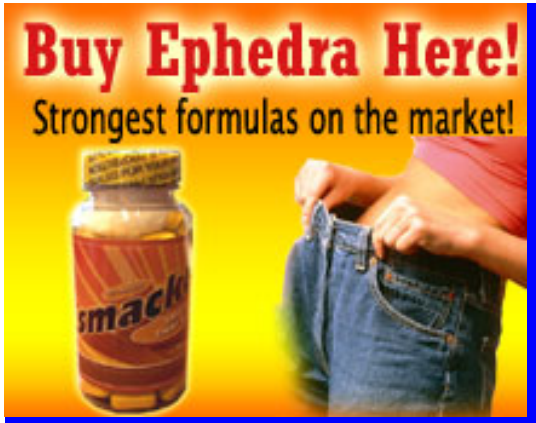
A Chemical Plant

Multiple Uses of Chemicals



A Chemical Plant

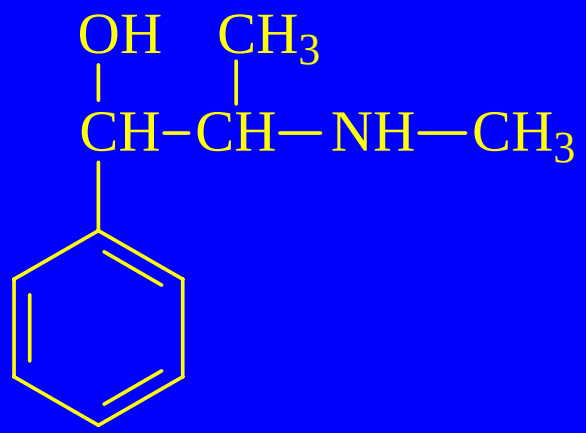
(CNN)



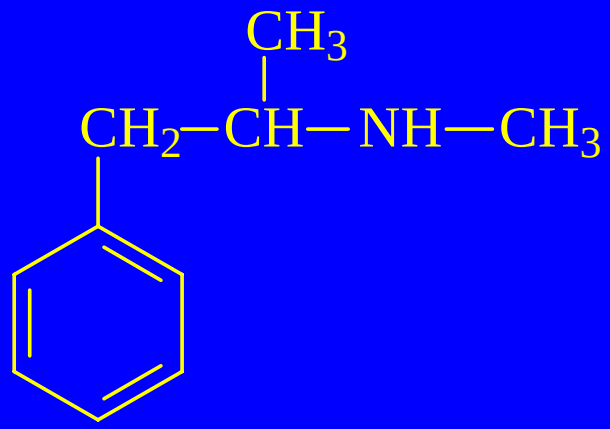
Misuse of Chemicals ephedra extracts banned as diet supplements in several countries

Triple Stack

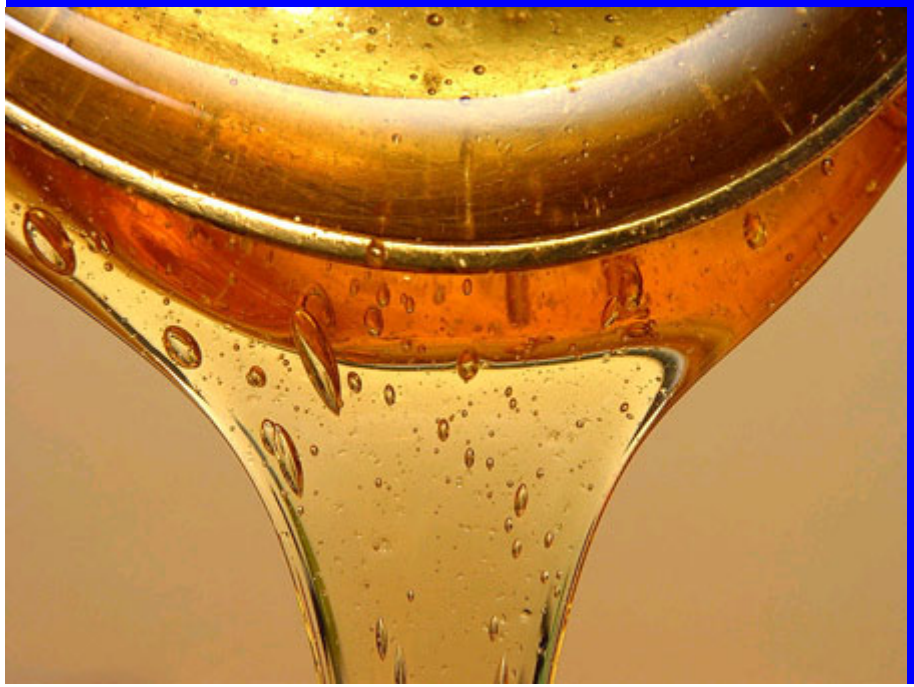
Epehedra
Caffeine
Aspirin (ASA)



pseudoephedrine
(cough suppressant)



methamphetamine
(crystal meth)




TRIPHED
COLD & ALLERGY RELIEF

Export Industry

Multiple-Use Chemicals

- Choices about the beneficial use, misuse, or abuse of these multi-use materials lie in our hands.


2899

Error → Misconduct → Criminal

Non-intentional

Wrong observations

Wrong analysis

Undeclared conflict of interest

Curiosity

Can (suspect) chemical be made?

Suppress knowledge

Make it again

Sell some

Large scale manf.

Intentional

With apologies to M. Nylenna & S. Simansen
Lancet 2006; 367: 1882-4

Role for Science Education? Break-Out Session

- Access to information
- Diversion of readily available materials
- Whose responsibility?
- Understanding and owning ethical responsibility
- Other examples

Chemical & Biological Weapons

$HOCH_2CH_2—S–CH_2CH_2OH \longrightarrow ClCH_2CH_2—S–CH_2CH_2Cl$

thiodiglycol

mustard gas

Water-based dyes in cloth manufacturing industry, including rural industries in developing countries

Organization for Prohibition of Chemical Weapons

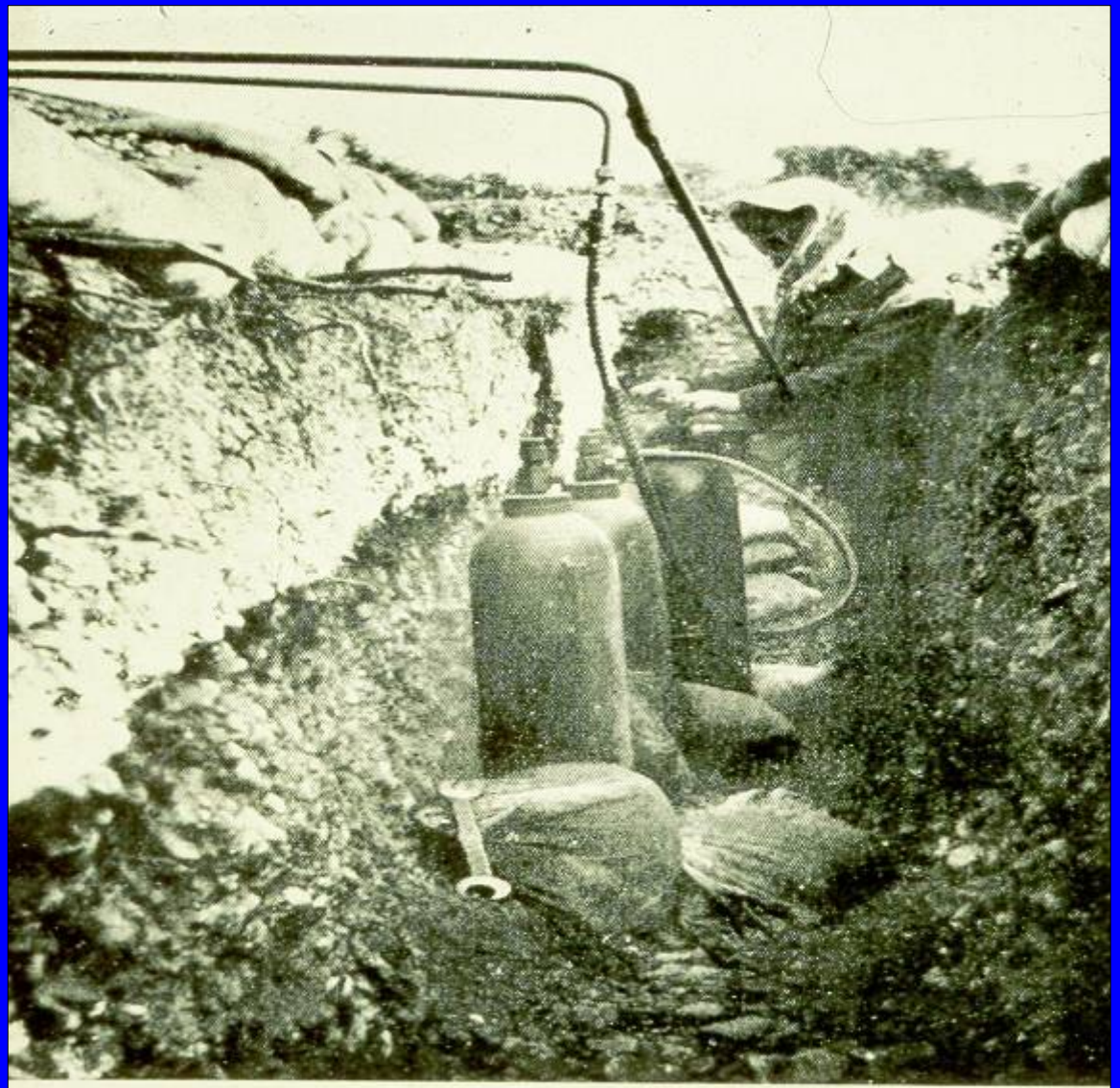
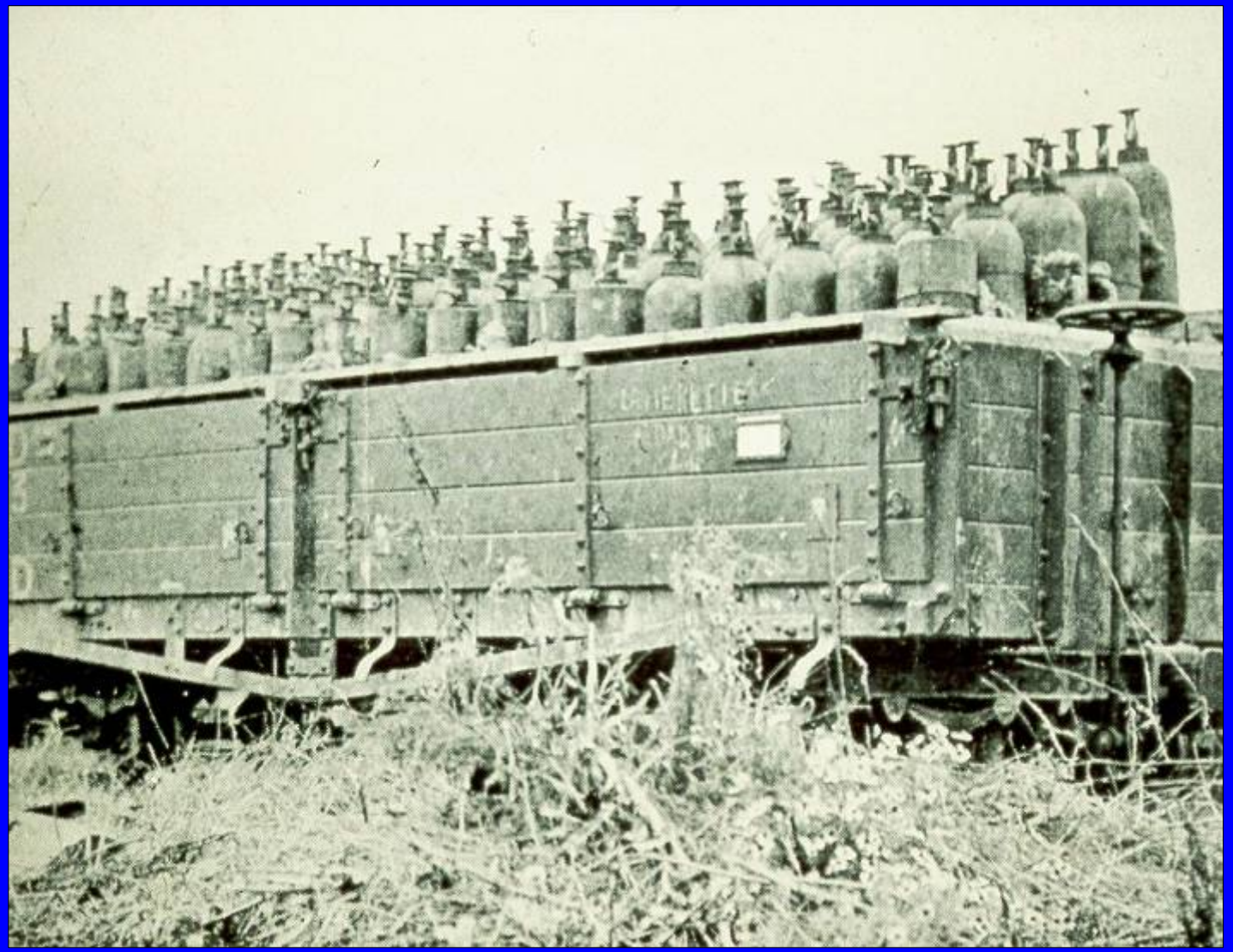


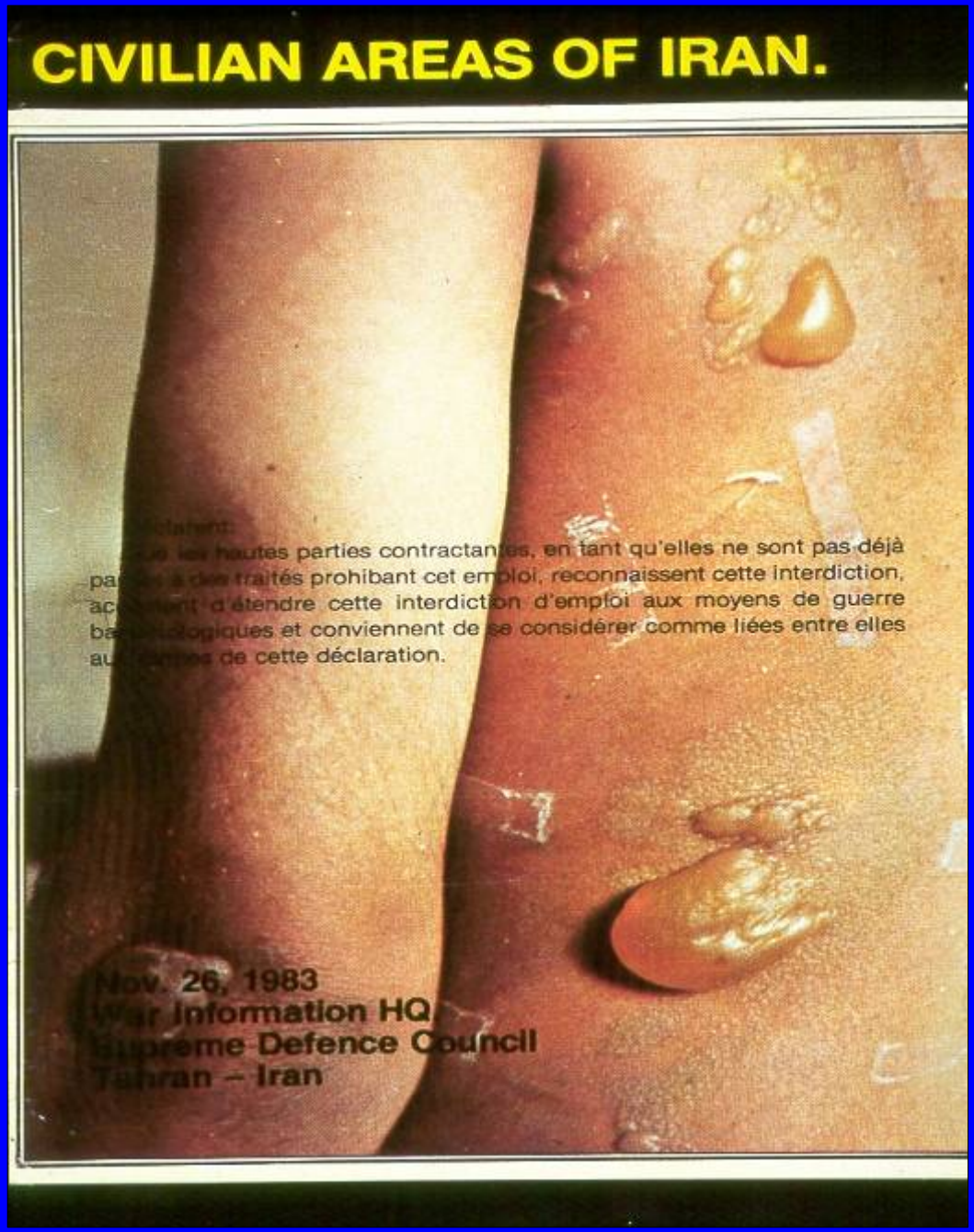
Photo. by C. R. Alderson.

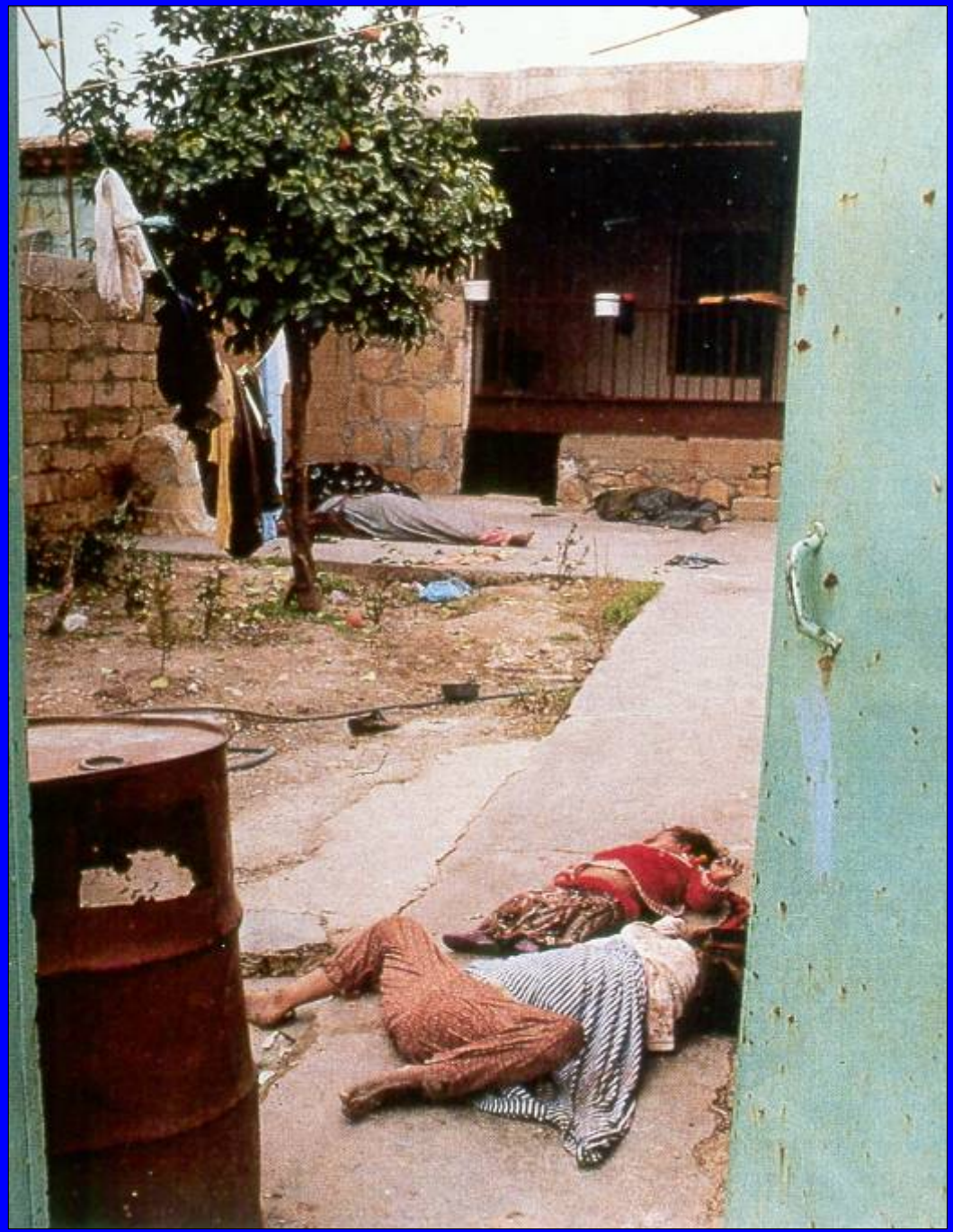
Helfaut. Practice with cylinders.

Note the primitive pipe connections at first in use.



By permission of the War Office.


CIVILIAN AREAS OF IRAN.
Nov. 26, 1983
War Information HQ
Supreme Defence Council
Tehran – Iran



Chemical and Biological Weapons: Role for Science Education ?

- Access to information
- Diversion of readily available materials
- Whose responsibility?
- Understanding and owning ethical responsibility
- Other examples

Where we are now

- Project complete
- http://www.iupac.org/multiple-uses-of-chemicals
- Material – text and pictures
- Also 4 background papers in 6 languages
- Room for more
- Comments welcome!
  - Alistair Hay (a.w.m.hay@leeds.ac.uk)
  - Peter Mahaffy (peter.mahaffy@kingsu.ca)

-Ethics teaching : what is available?

peep Physics&Ethics Education Project

SEARCH

ADVANCED SEARCH

integrity fairness safety respect what is ethics?

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What is ethics?

Ethics are concerned with how we decide whether human actions are right or wrong. They deal with ideas of good and evil, why we admire the conduct of some people but despise that of others.

Generally, it is a particular context that stimulates ethical thinking, an everyday situation that is in some way problematic. A question arises about what should be done.

- *Should* I miss school to take care of my mum when she is ill?
- *Should* the local Council permit a new mobile phone mast to be erected?
- *Should* the government spend money from taxes on a new weapons system?

This website gives many examples of situations which throw up ethical questions. Ethicists, sometimes called moral philosophers, attempt to provide frameworks for reflections on moral behaviour in such situations.

You'll find these frameworks in the Ethics Toolkit

During our lives, through education and experience we accumulate ethical principles by which we live. Deciding what to do is often not simple, because different ethical principles may suggest conflicting actions.

ETHICS TOOLKIT

ETHICAL PRINCIPLES

peep Physics&Ethics Education Project

SEARCH

ADVANCED SEARCH

weapons

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Weapons

The availability of weapons technology raises many ethical issues. For example most people would accept the need for armed forces for national defence but might question their use in aggressive military operations elsewhere in the world. The existence of chemical, biological and nuclear weapons of mass destruction also suggests more fundamental ethical questions:

- When would it ever be justifiable to use these weapons?
- Who would make that decision?
- How can we prevent terrorist groups from acquiring this technology?
- How can scientists ensure that their research is used for ethical purposes?

This section covers:

- Nuclear Weapons
- Legitimacy of War
- A History of Violence?

IN THIS SECTION

NUCLEAR WEAPONS

LEGITIMACY OF WAR

A HISTORY OF VIOLENCE

TSAR BOMBA

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beep BioEthics Education Project

SEARCH

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University of BRISTOL

wellcome trust

Now open!

Welcome to the BioEthics Education Project

BEEP is here to support the teaching and learning of bioethics.

Here students can find:

- information on a wide range of bioethical issues
- activities and challenges
- online discussion to help you practise argument

And teachers can find:

- teaching resources matched to A level syllabi

NEXT >> What is Bioethics?

PAGE OF THE WEEK

Do you eat vegetarian cheese? Did you know it's made using a GM product?

TV & RADIO

Great Green Fuel Gamble?
14 Mar BBC2
Meltdown - a Global Warming Journey
17 Mar UKTV History
Earth Story
17 Mar UKTV History

LATEST NEWS

17-Mar-08
Government figures hide scale of CO2 emissions, says report

17-Mar-08
An act that could save a stranger

17-Mar-08
Glaciers suffer record shrinkage

>>NEWS ARCHIVE>>

Internet

DNA Profiling

Introduction

DNA profiling is the process that creates a virtually unique bar-code like pattern that can be used to identify an individual and to show who they are closely related to. There are 2 main kinds of profiling.

RFLP - Restriction fragment length polymorphism

Much of your DNA simply indicates that you are a human as opposed to a chimpanzee or even a banana. But some of the other fragments vary in shape (polymorphism) in a way that is unique to the individual. RFLP DNA profiling is the process of separating an individual's unique, polymorphic fragments from the ones that everybody has. DNA is extracted from a sample, cut into small fragments by a restriction enzyme and placed at the foot of a block of gel. Electrical current is then applied across the block causing the fragments to move into a pattern according to their length. This pattern is recorded using a radioactive marker and X ray imaging.

STR – Short tandem repeat

This is an allele specific test that can be used on much smaller samples of DNA than RFLP profiling. It relies on the polymerase chain reaction (PCR) to amplify the smaller DNA sample and the fact that each chromosome contains many sections of non-coding DNA – DNA that does not code for a protein but contains areas called short tandem repeats (STRs). Each STR contains repeats of short sequences of bases, such as

ACTIVITY

Case Study

The Story of Baby 81

Read these stories from BBC news about the 4 month only baby found after the Asian Tsunami and who was claimed by nine couples.

DNA test on disputed tsunami baby

Tsunami 'Baby 81 goes home'

Write a side (including diagrams) on how the 'DNA testing' described in these articles would have been carried out.

UPD8 - Climate Change - what will YOU do? - - Microsoft Internet Explorer

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Address http://www.upd8.org.uk/activity/200/Climate-Change-what-will-YOU-do.html Go Links Google Settings

Climate Change - what will YOU do?

Type: Activity
Learning Strategy: Communication
Topic: Communicating science

Global climate change is 'very likely' to have been human-induced, according to the just-published report by the Intergovernmental Panel on Climate Change. In this activity, students plan campaigns to get students – and teachers – at school to take action to combat climate change.

11-16 How Science Works:
3c Present information, develop an argument and draw a conclusion, (using scientific, technical and mathematical language, conventions and symbols) and ICT tools.

Published: 9th February 2007
Reviews & Comments: 9

Internet

Start ethic... Your ... 21-0... Scien... Scien... UPD8... Centr... ASE -... http:... 11:50

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http://www.idea.leeds.ac.uk/EthicalThinking/ Go Links Google

Inter-Disciplinary Ethics Applied
A Centre for Excellence in Teaching and Learning

An Introduction to
Ethical Thinking
By Nafsika Athanassoulis

Home

An Introduction to Ethical Thinking

Written by Nafsika Athanassoulis

This teaching resource introduces students to ethical thinking and is suitable for students in any academic discipline who may not have been taught any ethics before. It can be used either by Tutors who are new to teaching ethics, or those who have more experience but want some further ideas and inspiration.

This is a flexible and customisable resource, which can be tailored to suit the needs of your discipline and provides all the support materials required. Tutors can pick just one or two sessions and include them as part of another module, or choose to run all 10 as a module in its own right.

Each session comes with easy-to-use Tutor Notes, which suggest a variety of possible teaching methods and include suggestions for specific disciplines (for example, Business, Life Sciences, Engineering, Journalism etc.), further readings and assessment exercises.

You are invited to browse this site to give you a idea of the principles and content of this resource, then, if you wish to make use of this resource you are invited to register with this site using the form available here.

This resource is **free** for use by practitioners in UK Higher Education.

Registration is required to:

Trusted sites

Practical approaches for ethics teaching in universities

- Role out programme to each school
- Convince that ethics is needed
- Make topics relevant
- Run workshops with scientist and ethicist on current issues
- Have case studies to encourage debate
- Increase complexity of issues from year 1 to year 3

The next 10 years

- Existing stockpiles of CW destroyed
- Inspections will move from monitoring CW destruction to policing industry
- Not making CW is an ethical decision
- Explain this to chemists
- Develop ethical teaching for chemists and other scientists