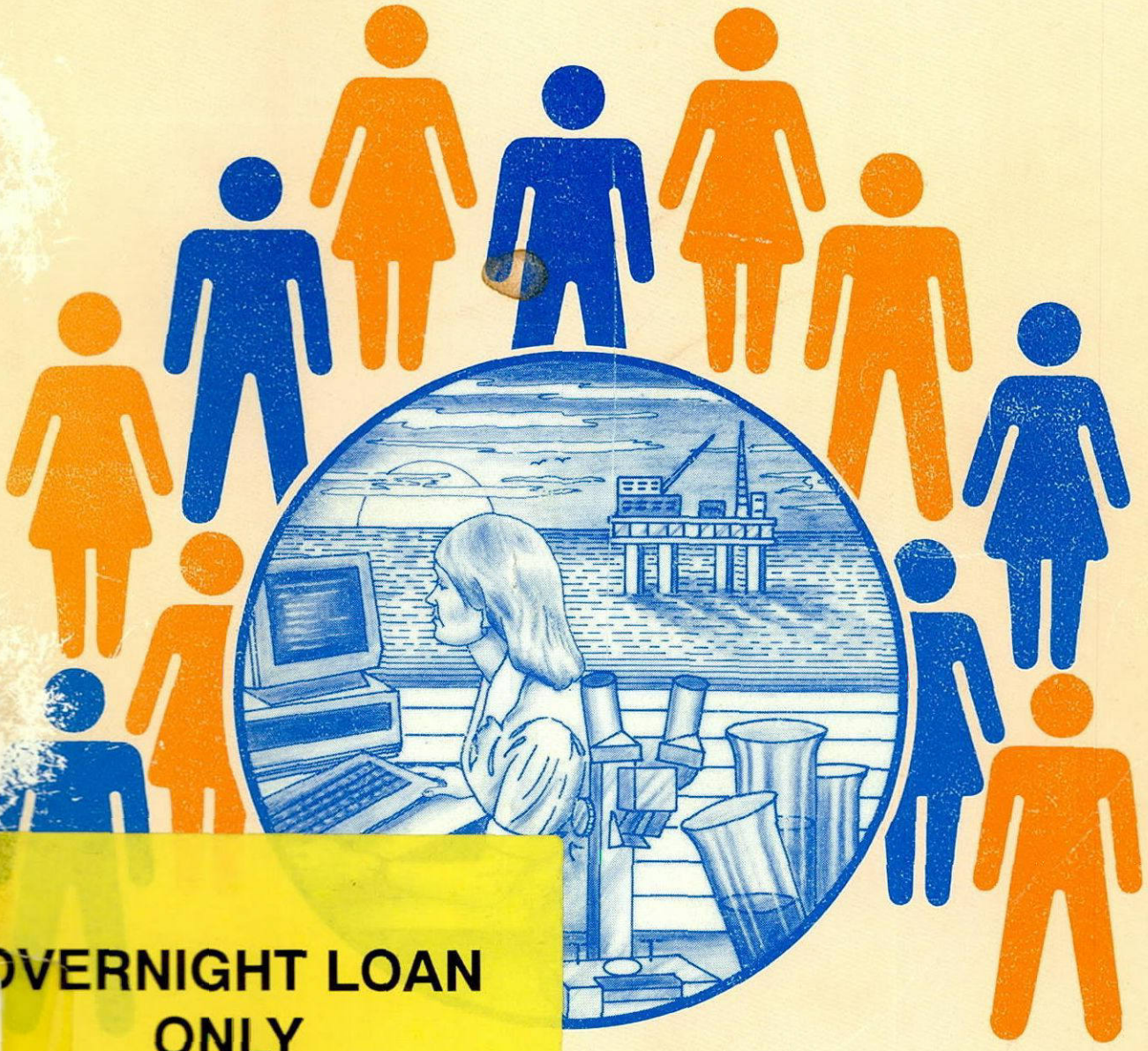
SCIENCE & TECHNOLOGY IN SOCIETY

4



OVERNIGHT LOAN
ONLY

SATIS

ABOUT SATIS

Science and Technology in Society units are designed to be used in conjunction with conventional science courses, particularly those leading to GCSE examinations. Each unit has links to major science topics as well as exploring important social and technological applications and issues.

The units are self-contained and generally require about 2 periods (around 75 minutes) of classroom time. Each unit comprises Teachers' Notes (blue sheets) and Students' materials (white sheets). Full guidance on use is given in the Teachers' Notes accompanying each unit, which also include background information and suggest further resources.

Each SATIS book contains ten units. The units are numbered in a system giving the number of the book followed by the number of the unit within that book. Thus the first unit in the first SATIS book is numbered 101.

In addition to the SATIS books, a general Teacher's Guide to the project is available, giving guidance on some of the teaching techniques involved as well as ideas for further activities.

Many people from schools, universities, industry and the professions have contributed to the writing, development and trials of the SATIS project. A full list of contributors appears in the Teachers' Guide.

The material which follows may be reproduced without infringing copyright provided reproduction is for student use only. The permission of the publishers must be obtained before reproducing the material for any other purpose.

NATIONAL CENTRE

WITHDRAWN FROM ST. MARY'S UNIVERSITY COLLEGE

St. Mary's College
Strawberry Hill
MONSTRA TE ESSE MATREM
Library

First published 1986 by The Association for Scie
© The Association for Science Education

Designed by P&PS (Cambridge) Ltd. Tel: (0353) 740389

COPY 2
£5-00

SATIS 4
List of units in this book

The Association for Science Education
College Lane
Hatfield
Herts AL10 9AA

ISBN 0 86357 040 2

National Stem Centre
N16645

List of units in the SATIS series

SATIS 1

101 Sulphurcrete
102 Food from Fungus
103 Controlling Rust
104 What's in our Food? — a look at food labels
105 The Bigger the Better
106 The Design Game
107 Ashton Island — a problem in renewable energy
108 Fibre in your Diet
109 Nuclear Power
110 Hilltop — an agricultural problem

SATIS 2

201 Energy from Biomass
202 Electric Vehicles
203 Drinking Alcohol
204 Using Radioactivity
205 Looking at Motor Oil
206 Test-tube Babies
207 The Story of Fritz Haber
208 The Price of Food
209 Spectacles and Contact Lenses
210 The Pesticide Problem

SATIS 3

301 Air Pollution — where does it come from?
302 Living with Kidney Failure
303 Physics and Cooking
304 A Medicine to Control Bilharzia — Part 1
305 A Medicine to Control Bilharzia — Part 2
306 Fibre Optics and Telecommunications
307 Chemicals from Salt
308 The Second Law of — What?
309 Microbes Make Human Insulin
310 Recycling Aluminium

SATIS 4

401 Fluoridation of Water Supplies
402 DDT and Malaria
403 Britain's Energy Sources
404 How would you Survive? — an exercise in simple technology
405 The Label at the Back — a look at clothing fibres
406 Blindness
407 Noise
408 Industrial Gases
409 Dam Problems
410 Glass

SATIS 5

501 Bridges
502 The Coal Mine Project
503 Paying for National Health
504 How Safe is Your Car?
505 Making Fertilizers
506 Materials for Life — new parts for old
507 Computers and Jobs
508 Risks
509 Homoeopathy — an alternative kind of medicine
510 Perkin's Mauve

SATIS 6

601 Electricity on Demand
602 The Limestone Inquiry
603 The Heart Pacemaker
604 Metals as Resources
605 The Great Chunnel Debate
606 The Tristan da Cunha Dental Surveys
607 Scale and Scum
608 Should we Build a Fallout Shelter?
609 Hitting the Target — with monoclonal antibodies
610 Robots at Work

SATIS 7 and Index

701 Electricity in Your Home
702 The Gas Supply Problem
703 Vegetarianism
704 Electric Lights
705 Physics in Playgrounds
706 Dry Cells
707 Artificial Limbs
708 Appropriate Pumps
709 Which Anti-Acid?
710 What is Biotechnology?
Index

WITHDRAWN FROM ST. MARY'S UNIVERSITY COLLEGE
ST. MARY'S COLLEGE 158644 STRAWBERRY HILL
507 ASS

The evacuees

During the Second World War many children from South Shields on Tyneside were evacuated to the Lake District to avoid the danger of bombs. While they were there the school dentist noticed that their teeth were remarkably good. He told this to a visiting Ministry of Education dentist named Weaver, who inspected them and was also impressed. Weaver asked for an analysis of the South Shields water supply. He found it contained 1.4mg of fluoride per litre.

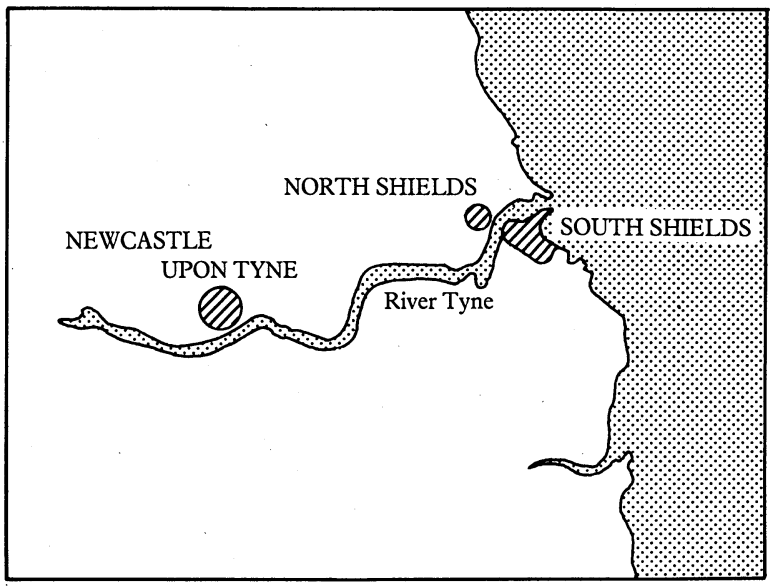


Figure 2 Tyneside

Across the River Tyne the town of North Shields took its water from a different source. This source had a fluoride content of less than 0.25mg per litre. Weaver inspected the teeth of 1000 children from each of the two towns. Half of these children were 5 years old, when we normally have 20 temporary 'milk teeth'. The rest were 12 years old with 28 permanent teeth. The number of decayed, missing or filled (DMF) teeth that he found are shown in Figure 3 on the next page. They show upper and lower jaws separately. Results on the left and right side of the mouth are added together. The total teeth inspected in each position was 1000.

Look carefully at the diagrams in Figure 3, then answer questions 4 and 5.

Questions

4 *Explain what the results in Figure 3 tell you about the effectiveness of fluoride.*

5 *Suppose you were a member of the National Pure Water Campaign, who are against adding fluoride to water supplies. How would you argue* against *this evidence?*

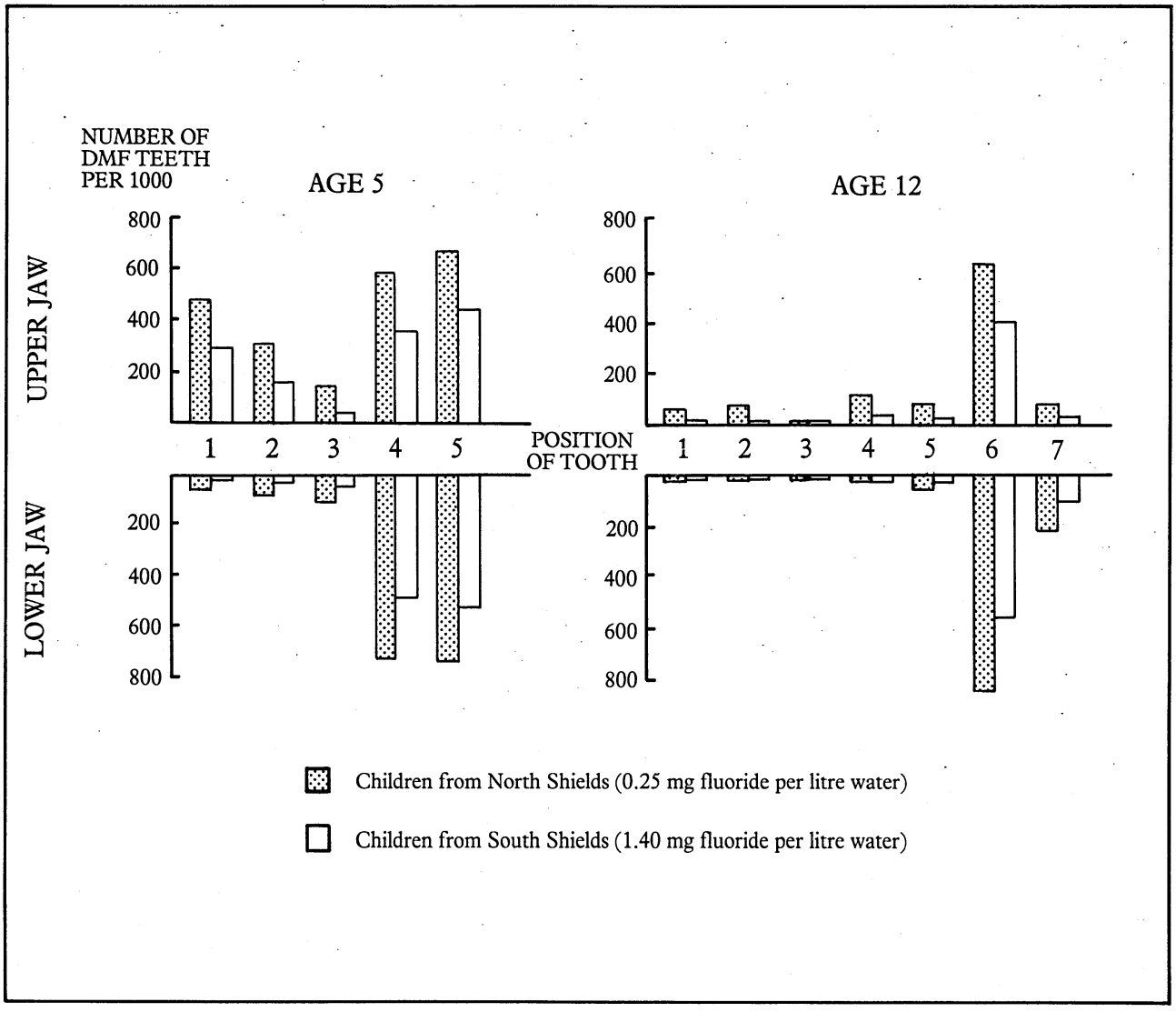


Figure 3 Results of the dental surveys

Fluoridation today

Many countries in the world now fluoridate water supplies. It is estimated that more than 230 million people in over 40 countries drink fluoridated water. It has no effect on the taste or smell or colour of the water so most people probably do not realise that they are drinking it.

In some areas of Britain the water supply has enough natural fluoride in it to strengthen teeth, and people who have lived there all their lives show no harmful effects. In other places extra fluoride is added to bring the concentration to one mg per litre. 5.5 million people drink such treated water.

The British Medical and Dental Associations and the Royal College of Physicians support fluoridation. It is said that fluoridation can reduce tooth decay by 50 per cent at a cost of 10p a person a year. The average cost of filling one decayed tooth is £4.70.

Figure 4 Toothpaste is another way you can get fluoride

Objections to fluoridation

In spite of the support for fluoridation, many people are against adding fluoride to drinking water.

- Some people say a cheaper and more effective way of preventing tooth decay is to make sure people eat the right food and clean their teeth properly.
- People who want to take fluoride can buy fluoride tablets very cheaply.
- There are doubts about the safety of fluoride. Fluoride ions are poisonous in medium or large quantities — 2500mg of fluoride is a fatal dose.
- Some people feel that fluoridating water supplies breaks a basic human right. It makes people swallow fluoride whether they want to or not. These people feel everyone should have the right to decide what goes into their body.

  In 1983 a court in Edinburgh ruled that Strathclyde Council should not add fluoride to their water because it took away the freedom of choice of individuals. However, in 1985 the British Parliament debated on the Fluoridation Bill, which would allow water authorities to add fluoride to water suplies. Many MPs voted against the bill, but it was eventually passed.

Other ways you can get fluoride

We get fluoride from other places as well as drinking water. An average tea drinker swallows 2 to 4mg of fluoride a day. Brushing your teeth with fluoride toothpaste might give about 0.5mg a day.

Fluoride tablets for children can be bought from the chemist and are taken once a day.

Answer questions 6 to 8.

Questions

6 *A man in a pub was heard to say, 'My daughter does chemistry at school and she says fluorine is the most reactive element known. I bet it plays havoc with your teeth. I don't reckon they should add it to drinking water.' How would you explain to him his statement was wrong?*

7 *Apart from fluoride, what other substance or substances do you know of which are added to drinking water? Why are they added?*

8 *Find out if the water supply in your area is fluoridated. Your dentist should be able to tell you, or you could ask the Water Board.*

Part 2 What are your opinions about fluoridation?

Work in pairs on this activity.

The following are different people's opinions about fluoridation of water supplies. Discuss each of them in the light of what you know. Make a copy of the table below and put a tick in the appropriate column. When you have made your decisions, compare them with other pairs and discuss any differences.

Decide whether you *Strongly agree/Agree/are Unsure/Disagree/Strongly disagree.*

	Strongly agree	*Agree*	*Unsure*	*Disagree*	*Strongly disagree*
1 Fluoridation reduces dental decay by about 50 per cent.					
2 The reduction in decay is small. It is no bigger than the variation you expect between different samples of people.					
3 Decay is caused by bad eating habits, such as eating too much sugar, and by inadequate tooth brushing, not by lack of fluoride.					
4 The evidence for the effectiveness of water fluoridation is completely convincing.					
5 Fluoride is perfectly safe and there is no possibility of anyone being harmed by it.					
6 Fluoride is a horrible poison.					
7 Fluoridation is just a way of getting rid of industry's fluoride waste.					
8 Bringing the fluoride content of water up to 1mg per litre by artificial fluoridation does not make it 'normal'.					
9 Fluoridation takes away a basic human right, to decide what goes into our bodies.					

Further points to discuss

Discuss these points with other members of your group.

- Suppose a substance was discovered that prevented people wanting to smoke tobacco. Would you be in favour of adding it to drinking water?
- One day it might be possible to add a contraceptive to water to prevent most people living in an area from having babies. Do you think this could ever be justified?