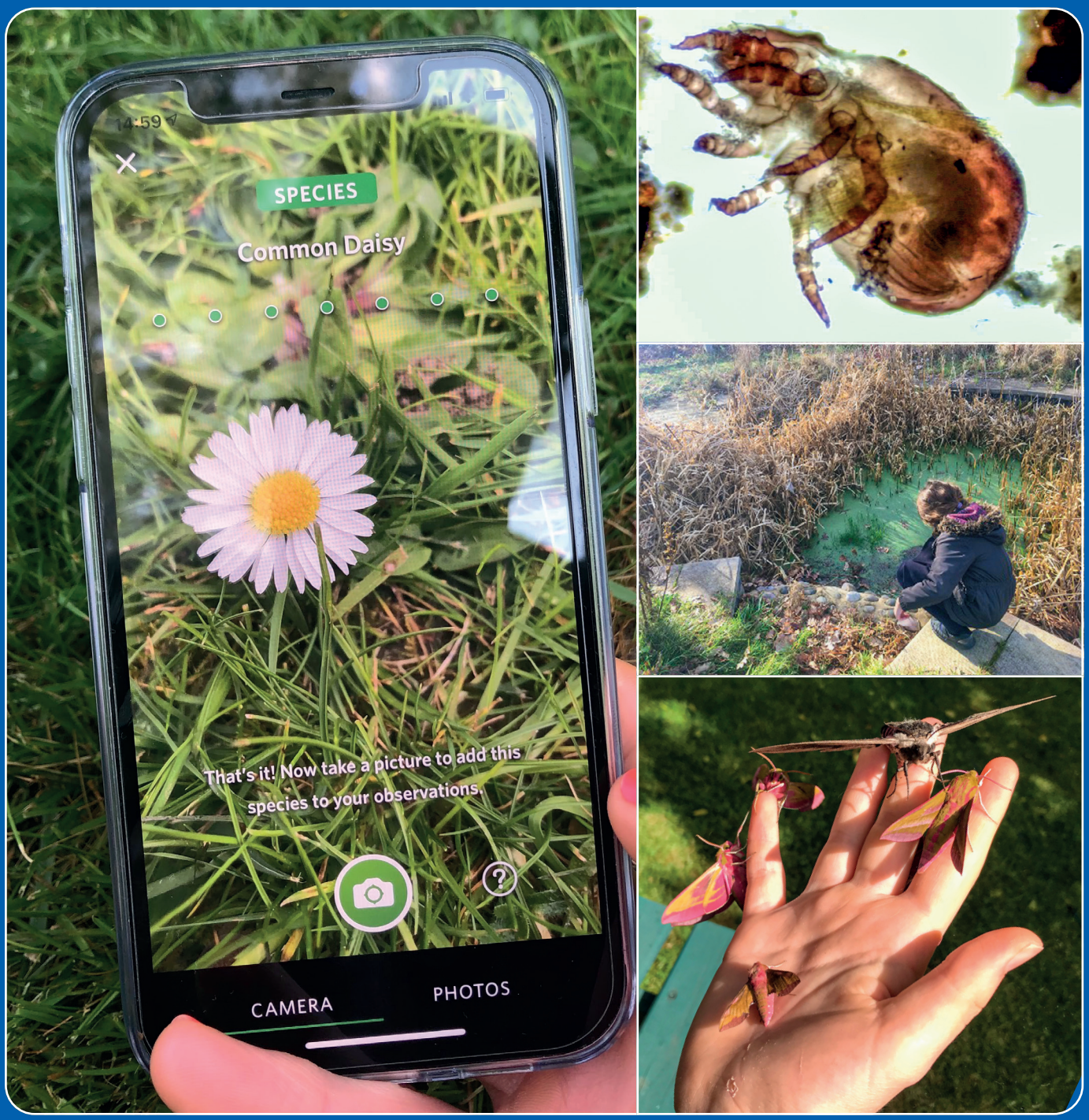
SSR

June 2021
volume 102 number 381



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The Association for Science Education

School Science Review

The ASE's journal for science education 11–19

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The Association for Science Education

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Health & Safety

For all practical procedures described in *SSR*, we have attempted to ensure that:
- the requirements of UK health & safety law are observed;
- all recognised hazards have been identified;
- appropriate precautions are suggested;
- where possible procedures are in accordance with commonly adopted model risk assessments;
- if a special risk assessment is likely to be necessary, this is highlighted.

However, errors and omissions can be made, and employers may have adopted different standards. Therefore, before any practical activity, teachers and technicians should always check their employer's risk assessment. Any local rules issued by their employer must be obeyed, whatever is recommended in *SSR*.

Unless the context dictates otherwise it is assumed that:
- practical work is conducted in a properly equipped laboratory;
- any mains-operated and other equipment is properly maintained;
- any fume cupboard operates at least to the standard of CLEAPSS Guide G9;
- care is taken with normal laboratory operations such as heating substances or handling heavy objects;
- good laboratory practice is observed when chemicals or living organisms are handled;
- eye protection is worn whenever there is any recognised risk to the eyes;
- fieldwork takes account of any guidelines issued by the employer;
- pupils are taught safe techniques for such activities as heating chemicals or smelling them, and for handling microorganisms.

Readers requiring further guidance are referred to:
Safeguards in the School Laboratory, 12th edn, ASE, 2020.
Be Safe! Health and Safety in School Science and Technology for Teachers of 3- to 12-year-olds, 4th edn, ASE, 2011.
Topics in Safety, ASE, latest version on the ASE website: www.ase.org.uk/resources/topics-in-safety (login required).
Hazcards, CLEAPSS, latest version, and other relevant publications, on the CLEAPSS website: www.cleapss.org.uk (almost all schools, colleges and teacher training establishments in the UK outside Scotland are members, as are many overseas).
Hazardous chemicals database, SSERC, latest version on the SSERC website: www.sserc.org.uk/health-safety/chemistry-health-safety/hazchem_database-2/ (schools, colleges and teacher training establishments in Scotland).
Preparing Risk Assessments for Chemistry Project Work in Schools & Colleges, SSERC, 2020.

Editorial Board and Associates

Contributing to *SSR*

We welcome contributions for all sections of *School Science Review*. For reference, a full page of A4 text in the journal is about 800–850 words; including two small figures on a page would bring that down to about 600 words. Articles should be no longer than 4000 words in total.

These can be emailed to The Editor, ssreditor@ase.org.uk, or posted to The Editor, *School Science Review*, ASE, College Lane, Hatfield, Herts AL10 9AA. Detailed advice on the submission of articles and Science notes is available on the ASE website at: www.ase.org.uk/submission-guidelines.

Editorial

This, the final issue of the school year, comes at a time when we hope to start returning to a life that is not controlled by COVID-19. Throughout the time of the pandemic, it has been clear that the spread of the virus was less likely outdoors than indoors. So it is appropriate that we have a theme involving education outdoors where there is the opportunity to study nature, with all the benefits that outdoor learning can bring.

Marcus Grace and Janice Griffiths have pulled this theme together quite quickly, and they have even enlisted ASE Chief Executive Officer Hannah Russell to offer an introduction. They will pick up the story on p. 7.

The remaining articles consider a number of different educational methods. Dan Cottle discusses the need for developing mathematical skills. Mathematics underpins all of science and is just as essential as language. It can involve arithmetic, algebra, geometry or statistics, depending on the topic being investigated. I remember one of my own chemistry teachers saying, '*There is nothing on an exam paper that is as impressive as the right answer*'.

From Singapore, a team of three authors explain how computer programs can be developed to assess student understanding, and help in enabling them to improve where necessary. Students might consider that opportunities to do practical work in science are a welcome relief from the use of paper and pen, which can dominate other subjects. But are they thinking or just playing? Sibel Erduran and Stephen Wooding consider how to develop assessment of understanding of the science topic being studied.

So it is appropriate that the final article, from A. A. Bammeke, addresses the importance of language in understanding science and the communication of knowledge and understanding.

I take the opportunity at the end of this academic year to thank the people who loyally provide the *Reviews* and *Science websearch* sections at the end of each issue.

We remain wondering whether we shall soon be free of restrictions or will continue to have disruption to smooth provision of education. Only time will tell.

Geoff Auty
Editor, *School Science Review*

Two corrections to 'Measuring the circumference of the Earth' by Keith Gibbs, Geoff Auty and Stuart Farmer in *School Science Review*, March 2021, 102(380), 46–49

What a difference a day makes

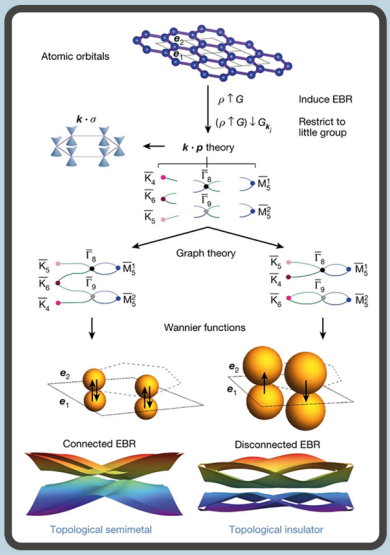
On p. 48, it was stated that the year 2000 was not a leap year. However, Peter Borrows has pointed out that it was.

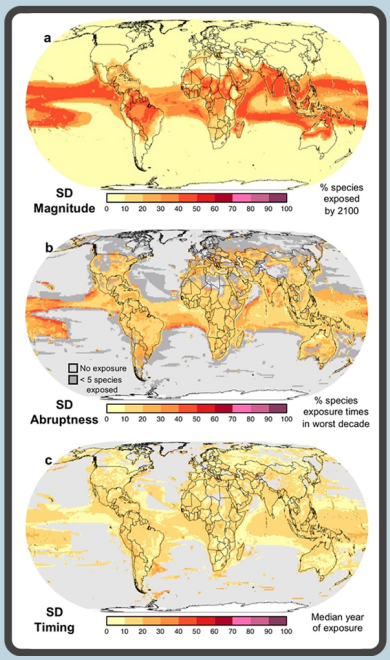
I had relied on traditional knowledge of leap years being every 4 years except at the end of a century and that the Northern Hemisphere summer solstice (or 'longest day') was mostly on 21 June but occasionally on 22 June, but was surprised to find that although 21 June was quoted in diaries as the solstice in 2020, the longest daylight had occurred on the other side of the world the previous evening (20 June in the UK time zone).

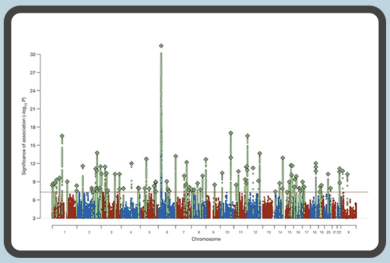
Adding a day every 4 years is nearly correct at keeping the solstice on the same day, but it is more accurate if skipped once a century (years ending 00 being chosen). But that is a slight over-correction. To improve accuracy, the years divisible by 400 are not leap years. That has caused the summer solstice to be mostly on 21 June since 2000, but occasionally on 20 June. However, the Northern Hemisphere spring equinox has been on 20 March every year, except 2003 and 2007, and will continue to be so throughout this decade. See https://stonesofwonder.com/stones7.htm.

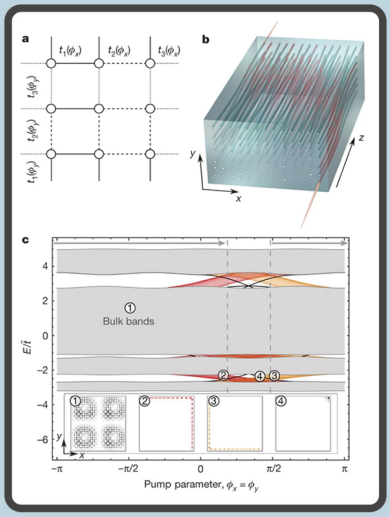
The second error was more obvious. On p. 47, it was stated that we would take measurements on Sunday 21 June 2020 (which is correct). But on p. 48, the wording 'Sunday 20 June 2020' was my typing error.

Geoff Auty









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