

## NON-BEAN COUNTERS

**T**HIS ISSUE OF THE BULLETIN contains several articles about mathematics, or rather about the average bioscience student's fear/hatred/incompetence at mathematics, and what we as university teachers might do about it. Quantification is just as important in the biosciences as it is in the hard sciences and engineering. 'I often say that when you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind'[1] Descriptions of biological organisms and phenomena are alright, but you need to have some conception of the size of what is being described, whether it is typical or average, whether the phenomenon is reproducible, etc.

Where does this fear of maths come from? Is it from school or from everyday life? Shop assistants and bar staff don't have to add up any more: the till tells them what change to give. Do they have any idea of whether the numbers are correct or not? Hospital lab staff are instructed to put standards through the analysers from time to time to check that the values that are obtained are sound. Do your students simply believe the numbers that come up on the spectrophotometer: do they ever check, and do we tell them that they should do this?

So dealing with accurate numbers and measurements is important in bioscience and so too is the ability to deal with approximations. Rough calculations are good, but calculators militate against this! It helps if you have some idea of what the answer is going to be when you are using a calculator. You don't always need to be highly accurate: a mitochondrion is *about* the same size as a typical bacterial cell. The number of cells in the human body is *about*  $10^{14}$ . The average molecular weight of an amino acid residue in a protein is *about* 100, so a protein of  $M_r$  25,000 has

*about* 250 amino acids in it. Not many students know these things, although I am sure that we tell them. For some reason they are rarely happy with rough, in the head, calculation. Why is this?

Should we be teaching these mathematical skills, and not just skills but shortcuts and how to do "back of the envelope calculations" or should we expect students from high school to come equipped with them? Expectations or not, we still have to cope with students who are totally flummoxed when asked to make a one-in-ten dilution of a solution, or calculate the magnification of a micrograph. And I'm not even mentioning statistics at this point! In this edition of the *Bulletin* we offer an article by Vicki Tariq on using an e-learning approach to maths teaching, and Nancy Rothwell's article reminds us that school children see physical sciences as more difficult (they are) which leads to lower take-up of courses and inevitably escape from maths as much as possible. There are two reasons for this: one is that they don't like doing "hard" things, and the other is that seeing that these subjects such as Physics, Chemistry and Maths as "hard," they calculate that they will achieve lower exam grades and therefore not be so well placed for the university entry competition. The fact that there are quite a few bioinformatics courses running in the country as well as bioinformatics modules appearing in undergraduate courses, adds emphasises further that maths and IT skills are vital. Please join in the debate . . .

[1] Lord Kelvin (*Popular Lectures and Addresses, 1889-94*)

**Professor Ed Wood**  
Centre for Bioscience  
[e.j.wood@leeds.ac.uk](mailto:e.j.wood@leeds.ac.uk)

### CONTENTS

- 1 NON-BEAN COUNTERS  
**Professor Ed Wood**
- 2 TAKING A FAST APPROACH TO IMPROVE THE ASSESSMENT EXPERIENCE  
**Dr Richard C. Rayne**
- 3 THE FUTURE OF BIOLOGY IN THE UK  
**Professor Nancy Rothwell**
- 4 USING A CONTEXTUAL E-LEARNING APPROACH TO TEACHING MATHS  
**Dr Vicki Tariq**
- 5 BIOLOGY – A SUBJECT FOR LIFE!  
**Sarah Blackford**
- 6 CENTRES FOR EXCELLENCE IN TEACHING AND LEARNING
- 10 BIOINFORMATICS EDUCATION IN THE UK: ARE WE EDUCATING SCIENTISTS OR TRAINING TECHNICIANS?  
**Dr Catherine Hack and Gary Kendall**
- 11 BEE-J – VOLUME 5
- 12 USING THE JISC PLAGIARISM DETECTION SERVICE IN BIOLOGICAL SCIENCES  
**Dr Joanne L. Badge**