

Mathematics and the Sciences.

I AM grateful to your reviewer for so freely quoting (p. 591) examples from *Descriptive Mathematics*. To these I shall refer in reverse order. The example on rhythm in prose I cannot take space here to explain; I would merely extend it by putting the question, whether there be in any language a group of words or syllables, other than the specific "tra la la", which do for three-time in music what "due, duty, dutifully" do for four-time. The example is evidently a "wandering away from well-trodden paths" on which the reviewer frowns.

The excuse for the example on the secant is that the speed with which the sun crosses the horizon is noticed at once by one who comes to the tropics, and it is the contrast with the insensibly slow speed in temperate latitudes that is suggested. Build on this astronomy if you will, but the example itself is based on a wide range of simple experience.

The quotation of Vieta's formula (*Descriptive Mathematics* 12, Ex. 8) is, I am afraid, divorced from its context, "calculate as far as the slide rule allows Compare with this....logarithms." There is nothing really terrifying about the calculations; the limitations of our tools are soon revealed! The other examples with the astronomical numbers are, for one thing, intended to deliver from the general fear of such numbers. It comes as a great relief to the students to see the ease of dealing with such examples from a commonsense point of view. I have found nothing to equal the slide rule as a means of teaching students commonsense. (Must I take the phrase "all the slide rules in the World" to be a response to my query as to discussions on slide rules?)

It may be useful if, following your reviewer's example, I mention a personal detail. I have no liking for statistical work, and I do none save what the students may require; I have often wondered if it be a disadvantage that I have had no intimate experience of computing.

(i) More important, however, than such matters is the suggestion advanced that the present courses in mathematics are really satisfactory, with the implied denial that there is any special need to make liaison between mathematics and the sciences. Doubtless there are somewhat rare scientific workers who "automatically cultivate the

required speed and accuracy in numerical work", but the general experience is that great numbers are handicapped, and that even books and researches in their subjects are practically closed to them, because they had been given a mathematical training of an unsuitable kind. One aim I should like to do something to achieve is to make such books as Barcroft's *Architecture of Physiological Function*, or A. V. Hill's books and papers, easy reading for the physiologist, and Keynes' *Money*, Vol. I, for the economist. Nine-point circles and factorizations give no aid here; their beauty must be reserved for specialist students.

(ii) As to what is teachable, it was actually the fact that we mathematical teachers generally fail to convey to our students anything more than the impression that we are dealing with interesting puzzles that started me on the investigation which has led at this stage to *Descriptive Mathematics*. The complaint made is that I have overloaded the course, and to the outsider it will certainly appear so. What, I believe, led the Board of Studies in Bombay University to arrange full facilities for teaching this course was that I gave the members of the Board every opportunity to inspect the actual work of the students and to question them personally. It is possible to give students the satisfaction of *Power* with regard to the mathematical operations in question: at the very least they are frequently in a position to apply critical tests to assertions which with the customary training they would have had to accept open-mouthed. '*Experto crede!*', and I am not alone in the Bombay Presidency in having tested this new approach.

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Wilson College,
Bombay,
March 9, 1936.

I AM unwilling to continue the controversy, on the subject; I shall close with a few remarks. In the first place, I have been put at ease by Prof. Maclean's nearly frank statement about his "wandering away", and about his recording through an example one of his experiences as he came over to India from northern latitudes.

Prof. Maclean refers to "the suggestion advanced that the present courses in