receive and their prospects for the future leave much to be desired.

There are far too many departments with only a handful of staff teaching small classes of students. The teaching staff will certainly give of their best, but the spectrum of botany that they are able to cover is bound to be severely limited. Moreover, where staff are few there is little or no flexibility for students to choose botanical courses according to their interest. Unlike physical sciences, many botanical disciplines do not have to follow a rigorous step by step progression. Coupled with the absence of any movement of undergraduate students between universities, it is little wonder that many are dissatisfied. It can be very disheartening for a young man or woman interested in plant diseases, for example, to find that in three years they are scarcely mentioned.

Out of botany have developed the applied departments of agriculture, forestry and horticulture. Yet the modern "pure" botany department is completely divorced from these "applied" branches. Surely this is the greatest mistake of all. Apart from the very real disadvantages to botanical education, it has meant that too much of botanical research is now in areas for which the training of a biochemist is more appropriate. Whereas the whole-plant botanist finds the lack of ground space available, the lack of good glasshouses and of sites to place them, and of trained gardeners to tend them, extremely frustrating, it is a regrettable truth that many botanists are simply not interested in plants except as homogenates.

Biologists have often to handle a multiplicity of variables as complicated to analyse as any facing an engineer, yet there is a common reluctance to include in their teaching programmes even the simplest statistical methods of analysis, and the planning of experiments goes unheeded. On the other hand, we find departments priding themselves on the fact that over the last decade they have successfully displaced the monotony of the detailed learning of the principal characteristics of the families and genera of flowering plants; instead the modern student learns the intricate details of metabolic pathways. Thus one kind of descriptive botany is replaced by another, and the overall approach to training botanists is no more scientific than before.

If today the function of botanists in society is in question, then university departments must carry some of the blame, for without doubt many potential and existing botanists, not to mention the general public, are struggling through the trees looking for the wood.

Yours faithfully,
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New Materials Make their Mark

SIR,—Our attention has been drawn to a letter by A. E. Standage in the October 26 issue of *Nature* (**220**, 412; 1968). While Standage is correct in saying that the first worker to make carbon fibres from polyacrylonitrile was A. Shindo[1], it must be pointed out that the highest Young's modulus he obtained was 24×10^6 pounds inch^{-2} and the highest fibre strength was 141×10^3 pounds inch^{-2}. It was only when we used tension applied to the fibres at an early stage of the preparation, which Shindo did not do, that we obtained carbon fibres of moduli in the range 60 to 70×10^6 pounds inch^{-2} and of strengths about 300×10^3 pounds inch^{-2}. These values are more than twice those obtained by Shindo. Our initial publication[2] announcing the properties and applications of high-modulus high-strength carbon fibres was postponed for several months and Dr Standage was made aware of our preparative methods and results well in advance of the publication by Prescott and Standage[3]. We compared the results obtained by Shindo with our own results in a letter to *Nature*[4] and recently presented a paper at an American Chemical Society symposium on carbon and graphite fibres (September 10, 1968) in which we gave the results of laboratory experiments showing the effect of tension applied to the fibres at the first stage of preparation. The work of Shindo was fully acknowledged and contrasted with our own. The fact that patents for our method of making carbon fibres from PAN fibres have been granted in the UK[5] and the US[6] shows that we do have a new technology of making high-modulus high-strength carbon fibres from PAN fibres.

Yours faithfully,
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[1] Shindo, A., *Rep. No. 317, Gov. Ind. Res. Inst.* (Osaka, Dec., 1961).
[2] Watt, W., Phillips, L. N., and Johnson, W., *The Engineer*, **221** (1966).
[3] Prescott, R., and Standage, A. E., *Nature*, **211**, 169 (1966).
[4] Moreton, R., Watt, W., and Johnson, W., *Nature*, **213**, 690 (1967).
[5] British Patent No. 1,110,791.
[6] United States Patent No. 3,412,062.

Parapsychology

SIR,—I was interested to see "parapsychology" as a subject heading in the contents list for *Nature* (**220**, xv; 1968). I find the word parapsychology odd: almost as odd as "extrasensory" when used in conjunction with perception. At the least it indicates muddled thinking, and at the worst an untenable attitude to research. If one allows that any or all of the range of phenomena endearingly called parapsychology exist, one must also allow that an objective experiment is impossible. An amusing example of what I mean can be found in the tortuous attempts to separate telepathic from precognitive, or, worse, psychokinetic effects on the part of the parapsychologists themselves.

Let us consider a parable, which I believe is relevant. A poor man had only one hundred pence, but a certain statistical insight. Wishing to enrich himself, he approached a wealthy and still optimistic gambler, telling him that he had an infallible method for selecting lucky coins which had the apparently marvellous property of consistently coming up heads (or tails, if the gentleman preferred) more often than not. His potential client was somewhat sceptical, but his optimism made him realize that he at least could not lose by watching the demonstration. The poor man tossed all one hundred coins ten times; twenty-two of them came up heads seven times or more. These twenty-two seeming relatively talented, he tossed them again, ten times each. This time selective pressure was more intense and only five coins survived with seven or more heads (although one had ten). The gambler was by now fascinated and could scarcely wait for the climax. It came; on the third series of trials only one coin came up heads even as much as seven times. However, it had already come up heads more than seven times in both the previous trials and the cumulative odds against its particular performance were apparently at least $10^{7.6}$ to 1, quite enough to impress any gambling man.

The parable unfortunately ends here, the scroll on which it is written having been torn asunder, possibly by someone in a considerable fury.

Yours faithfully,
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