(2) A second proposal is that the teachers of a subject at the four colleges should form a board of examiners—either four (or only two) to constitute the board. Presumably each member would set a portion of the papers; in this case, if the four men act, the students at each college would recognise the "pet" questions of their teacher, which, although forming only a portion of the paper, would receive fuller answers than the rest of the paper, and this would mean, practically, that each college would be holding its own examination. Consequently the result would be essentially the same as in the first case. Moreover, the suggestion that all four teachers should cooperate is not quite so feasible as would appear; they would, of course, have to meet on several occasions, and though it is easy enough for a man in Edinburgh or Glasgow to run up to London in a few hours to confer with his co-examiner, yet the geography of New Zealand renders travelling less easy. Auckland and Dunedin are separated by nearly 900 miles, and this journey occupies at least sixty hours. It would be very inconvenient, to say the least, for these two men to spare time to meet, even at a midway point, while the cost to the University of such a scheme would be very heavy. Moreover, details of procedure would be far from easy to arrange.

(3) The purely external system of examination is condemned by most authorities. The real feature of the grievance lies not so much in having the examination for degrees conducted by external examiners in Britain or elsewhere, as in the total exclusion of the teachers from this examination; and it seems to us that the best suggestion is one made by two or three of those consulted, viz. that the teacher of a subject should make a report on each student, which would be forwarded to the examiner, who would take it into consideration in his award. For it is manifestly unjust to a candidate who has worked well throughout the year to be judged only by his answers to a paper, written on a day on which he may be unwell or otherwise unfit.

Every student, before presenting himself for the degree examination, has at present to pass an examination held by his teacher, and in the case of science a practical examination in addition must be done to his satisfaction. The marks awarded in these, if sent to the external examiner, would influence him in his award.

Indeed, it happened on one occasion that the degree had to be awarded entirely on these college examinations, for the ship conveying to England the candidates' answers was wrecked, and all the papers lost.

The reformers cavil at the small encouragement the university colleges give to research, while, as the pamphlet points out, there is opportunity but for a limited amount of original investigation. They rightly complain of the bugbear of examination if it be regarded as the "be-all and end-all" of university training; but, since the examination is part of the British system precedent to obtaining a degree, it is hopeless for a small colony like New Zealand to attempt to eradicate this evil so long as the Mother Country adheres to it.

In New Zealand there is no leisured class who can afford to spend time in pursuing knowledge for its own sake, and the degree is chiefly required by those entering the teaching profession, who must have a fairly all-round training in subjects useful for their purpose.

To such men and women specialisation at an early stage in the university career would be fatal to their prospects; there is no demand for specialists in chemistry or physics or biology, and it would be a cruel thing to encourage a man to spend two or three years in research, with no available opening at the end. Moreover, the libraries and staffing of the colleges are insufficient, as the reformers emphasise, for extensive research, which is best left to the later stages of a man's career, viz. for honours. What sort of research can a student in New Zealand pursue in languages?

It seems clear, however, that certain reforms are needed, but we fear that the reformers must not expect that all their grievances will be rectified immediately.

EXPERIMENTAL ERROR IN AGRICULTURAL INVESTIGATIONS.[1]

IN view of the large number of agricultural experiments carried out in the country it is very desirable that some attempt should be made to put them on a sound basis, so that the results shall have some permanent value and admit of definite interpretation. The experiments cost a good deal of money, practically all of which is found by public bodies, and the work is frequently carried out without any particular regard to scientific method.

Perhaps the most serious defect hitherto has been the ignoring of experimental errors, so that only in very few cases could the experimenter say what degree of accuracy he had obtained or what was the significance of the differences he observed. In order to provide a remedy a day was devoted to the subject at the agricultural subsection to the British Association in 1910, and some of the papers then read have been amplified, and are now issued as a supplement to *The Journal of the Board of Agriculture*.

They are all couched in simple language, and bring home the fact that the value of an experiment depends on the degree of confidence that can be attached to the result. The opening paper, by Messrs. Hall and Russell, deals with field trials, and the general conclusion is reached that the probable error attaching to a single experiment is at least ±10 per cent. It is possible to reduce the error to about ±2 per cent. by repeating the experiment simultaneously on a number of plots, which need not be more than 1/50th acre in extent.

The second paper, by Prof. Wood, discusses analytical results, the sampling of crops, field trials, and feeding experiments, and contains frequency curves and tables of odds, setting out the least significant differences in these usual conditions of the various classes of determinations. The agricultural experimentalist will do well to submit his figures to the simple tests suggested here.

Mr. Pickering deals with experimental errors in horticultural work, which are fairly considerable, and commonly ignored. The experiments and their interpretation are more difficult than in purely agricultural work, and according to the quantity estimated may vary from ±16 to ±20 per cent. for a single tree, or from ±6 to ±8 per cent. for a set of six trees.

Milk investigations are discussed by Mr. Collins. An ordinary fat analysis is shown to be liable to an error of ±0·03 per cent., while the error in the solids-not-fat determination can be reduced to 0·05 per cent., but may be higher.

The Board of Agriculture has undoubtedly rendered very useful service by issuing these papers in so cheap a form, and it is to be hoped that they will be used as extensively as the importance of the subject warrants.

[1] Supplement No. 7 to the Journal of the Board of Agriculture, 1911.