schools existed in England before the Reformation, as for instance those at Wisbech, Week St. Mary, Wimborne, Durlington, and Chipping Campden, appears from Mr. Leach's researches before referred to (pp. 110-114). In fact, the very idea of receiving payment for teaching was scouted until the introduction of secular teachers about the beginning of the eleventh century.

And yet Sir Norman Lockyer speaks of "the iron heel of priestcraft"—an ugly word—as arresting the "new spirit" presumably of free education of the people. Nor is his uncompromising reference to the Jesuits in France more according to facts. However what the Society of Jesus has effected for the cause of education, both literary and scientific, is too patent to any unbiassed student of the history of education to need discussion. Moreover, I should be needlessly occupying space in this journal.

A. L. CORTIE.

Stonyhurst College, October 23.

Organic Variations and their Interpretation.

I HOPE you will allow me to correct two serious errors in Prof. Weldon's reply to my criticisms.

I was never foolish enough to assert, as he implies that I did, that the theory of natural selection attempts to answer the question whether modifications originate accidentally or not. I said that this was the question between the adherents of the theory and its opponents. I quite agree with Prof. Weldon that the theory of natural selection does not involve a theory of the origin of variations. For that reason it is not by itself a theory of evolution.

Prof. Weldon asserts that I said there was no evidence of the entrance of fine mud into the gill-chambers of crabs during life. I said, or wrote, nothing of the kind. He found china clay in the gill-chambers of the individuals which died in his experiments, and I pointed out that this was no proof that the crabs had died because their branchial apparatus was unable to keep out the particles of clay. The clay was not found in the gills of the survivors, and he inferred that they owed their survival to more efficient filtration, due to their relatively narrower frontal breadths. I merely pointed out that the inference was not valid because the dead crabs had been in the muddy water after death, while the survivors were killed after removal.

I do not admit that Prof. Weldon has successfully vindicated his evidence or his conclusions against my criticisms; but as you, Sir, are unable to allow me any more space, I must thank you for printing my first letter, and leave further discussion of the matter for some other opportunity.

Penzance, October 22.

J. T. CUNNINGHAM.

SCIENTIFIC EDUCATION IN RURAL DISTRICTS.

AMONG the problems of technical education which County Councils have had to face, the most difficult is the bringing home of the importance of scientific training to those engaged in agriculture and in rural industries generally. A study of the results achieved in the various counties very clearly brings out the fact that while considerable progress has been made in manufacturing centres where the practical bearing of science is more or less obvious, the agricultural counties have hitherto failed to show a similar progress as the outcome of their efforts to improve the rural industries. Many causes are contributing in this country to check advancement in rural technical education. The general depression of agriculture, the conservatism and apathy of farmers and landowners, the high cost of carriage of farm produce, and the incompetence of technical instruction committees are among these causes; but it would be out of place to discuss such matters in the columns of a scientific journal, and we are content in admitting that the technical committees in agricultural districts have had a far more difficult task imposed upon them than the committees of urban manufacturing centres have ever been called upon to perform.

In bringing under the notice of the readers of NATURE an educational movement which we are firmly persuaded

is a movement in the right direction, we have primarily in view the fact—obvious to men of science, but, unfortunately, not so obvious to those more immediately concerned—that agriculture in its widest sense is as much dependent upon scientific research for its advancement as any other industry. The great importance attached to agricultural stations in the United States and Canada, and on the continent, and the splendid results in the way of agronomic research which are being achieved at these stations, amply testify that other countries are alive to their agricultural welfare. All that has been done in this country by those great pioneers, Lawes and Gilbert, has been the result of private munificence.¹

In view of the fact that the results of scientific research are bound with the progress of time to make themselves more and more felt in all kinds of rural industries, and bearing in mind also the slow rate of development in this direction in our country, we are convinced that the best chance of enabling our agricultural population to appreciate the importance of research and to meet competition is to give the rising generation an opportunity of acquiring some knowledge of sound scientific principles as a part of their early training. If the present generation of farmers and landowners cannot or will not bend to the inevitable, and endeavour to cope with difficulties by scientific method, then, at any rate, let facilities be given to their children for the acquisition of such scientific habits of mind as will enable them, without actually becoming experts in any particular science, to realise exactly how they are situated with respect to their competitors. It is hardly necessary to point out in these columns that in all rational schemes of technical education this principle is recognised as sound. It is remarkable, in view of this acknowledged principle, that so many technical instruction committees should have attempted to begin their work at the wrong end, and should have expended large sums in encouraging sporadic teaching by specialists to adults who, for lack of proper training, are totally unprepared for specialisation in any direction. In most cases a critical analysis of the results obtained under this system shows that unintelligent manual dexterity is the utmost that can be achieved. This, in our view, does not constitute technical education; certainly, so far as agricultural industry is concerned, this kind of instruction is not likely to be of any permanent value.

The agricultural industries may be regarded as furnishing a rallying point round which several distinct branches of science meet. To insure success in such occupations when all the resources of science are being utilised by our competitors, it is becoming more and more imperative that the education of the farmer should, at any rate, be placed on a scientific foundation. We cannot, unfortunately, look at present to the elementary schools for any help in this matter. The children leave too early in life, and such science teaching as they receive (if any) is quite inadequate. The sporadic system encouraged by some County Councils has already been condemned. Still more unfortunate appears to us to be the frittering down policy of administering the technical education grant in the form of doles to districts in proportion to the number of the inhabitants. The few want educating in the thinly populated agricultural districts quite as much, or even more, than the many in the towns. It is more costly to educate the few than the many; therefore the rural districts require more financial aid proportionally than the towns. Under the system referred to, the country districts get less. If an "intelligent foreigner" who came over to inquire into our educational systems since the passing of the Technical Instruction Act, were told that the degree and quality of the education given to a boy or girl had been made dependent on the number of inhabitants per square mile

¹ The fructicultural station established by the Duke of Bedford and Prof. Pickering at Ridgmount also comes under this heading.