

energy being transferred, but cheerfully introduces this new idea of a peripatetic entropy.

The fact is, so soon as a man departs from the mathematical definition of a quantity like entropy, he is in danger of all sorts of inconsistency. Conduction of heat implies that temperature is *not* constant in the thinnest slice of a bar or portion of fluid, and we have no right to speak of the entropy of a portion of stuff or of its pressure or of its temperature unless it is in the same state throughout. It is obvious that underlying Mr. Swinburne's statements throughout this book it is not always the entropy of a quantity of stuff that he thinks of; it is often the entropy of a quantity of heat, just as if we said:—Heat H in the furnace at a high temperature θ_1 has entropy H/θ_1 ; in the water of the boiler θ_2 is the much lower temperature, and the entropy H/θ_2 is much greater than in the furnace, and so on. Wherever there is conduction or any kind of irreversible operation there is a growth of entropy. This sort of representation is familiar to all users of the $\theta\phi$ diagram, but they know how to put the matter quite clearly (see NATURE, April 30, 1903) without using terms in a wrong sense, without confusion of ideas, without condemning wholesale what other men have written, without contradicting the fundamental laws of thermodynamics.

This notice may seem to be unduly long; I may seem to waste valuable space in NATURE and give undue importance to an unscientific book. But unhappily it is necessary. Mr. Swinburne's vague denunciations of writers on thermodynamics in letters and articles to the engineering papers have done a great deal of harm to young engineers, and I am peculiarly bound to the very ungrateful task of pointing out his mistakes. A writer who proves that the earth is flat deserves no notice, for he can do no harm, but although Mr. Swinburne's heresies are just as unscientific, just as absurd, they must be noticed and condemned. He uses a jargon which sounds quite scientific to a young engineer; he involves a reader in his mistakes so persuasively that if this reader is an earnest young engineer I feel sure that he must get utterly discouraged with the idea that the study of thermodynamics can be of any use to him. Probably the best of antidotes to this poison are the two articles in NATURE referred to at the beginning of this notice.

JOHN PERRY.

AGRICULTURAL EDUCATION AND RESEARCH IN INDIA.

THE last mail brings an issue of the Allahabad *Pioneer*, containing the resolution of the Government of India regarding the establishment of an agricultural college and research station at Pusa, in Bengal. It will be remembered that Mr. Henry Phipps gave a sum of 20,000*l.* to be devoted to whatever object of public utility (if possible in the direction of scientific research) the Viceroy might prefer, and on the decision to create with this sum an imperial centre for agricultural investigation Mr. Phipps increased his donation by another 10,000*l.* It was at first proposed to make the existing laboratory at Dehra Dun the nucleus of the new work, but the superior advantages offered by the estate at Pusa have resulted in the decision "to make Pusa the headquarters of the Imperial Agricultural Department, and to establish there the laboratories required by the experts, combining with them farms which will offer every convenience for practical work, and an agricultural college." For this purpose the estate has been transferred from the Government of Bengal to the Govern-

ment of India, and the existing staff at Dehra Dun will move to Pusa when the laboratories are ready, which is expected to be in September, 1905.

The agricultural college is intended to serve not only Bengal, but the whole of India, and to provide a supply of trained men, who "will be required to fill posts in the Department of Agriculture itself, such as those of assistant directors, research experts, superintendents of farms, professors, teachers, and managers of court of wards and encumbered estates."

At the research institute it appears that the staff is to consist of two chemists, one being specially concerned with bacteriology, two botanists, one cryptogamic, the other "biological," and an entomologist.

This scheme ought to grow into an institution of the utmost value to India, a country which is full of agricultural industries, involving great interests, yet proceeding wholly by rule of thumb tempered by occasional analyses performed in London. Systematic investigations of the conditions of the industry on the spot have been wanting except latterly among the tea-planters of Ceylon and Assam. Indigo growing affords a case in point; for years it was obvious that the natural product was going to meet with severe if not ruinous competition, yet nothing was done until the artificial indigo had reached the position of being able to undersell the Indian article, then at last a chemist and a bacteriologist were hurried out to try to save the failing industry. But how can the most eminent scientific man be expected to descend from Europe like the god from the car and revolutionise an old and complicated business at sight?

The new institute at Pusa will be well situated among some of the best agricultural developments in India, so that the scientific staff will have an opportunity of learning where their skill can be of service to the cultivator, and of trying to keep this or that industry in a healthy condition instead of being called upon to resuscitate it when *in extremis*. There may be even now a chance for the grower of indigo if only he is given some of the systematic scientific effort which has hitherto been the monopoly of his competitor.

NOTES.

PRESS messages from New York contain an account of the discovery, by Prof. Baskerville, of the University of North Carolina, of two new elements possessing somewhat remarkable properties. By distilling thorium oxide in a quartz tube with carbon and chlorine there are produced a greenish condensable vapour to which the name berzilium is given, and a crystalline, pinkish substance which adheres to the quartz tube and is named carolinium, whilst a certain quantity of thoria remains unchanged in the tube. Prof. Baskerville has at his disposal 5 grams of carolinium and 2.5 grams of berzilium, presumably in the form of volatile chlorides. In a lecture before the Chemists' Club Prof. Baskerville exhibited the two elements in a darkened room, and showed that each of them is capable of shedding an illumination through tubes of copper, brass, iron and glass, all covered with cloth. Further investigations are in progress, in which Prof. Zerban, of Berlin, will cooperate.

PROF. R. W. BOYCE, F.R.S., has been appointed a special advisory member of the committee of the African trade section of the Liverpool Chamber of Commerce on matters relating to health and sanitation.

REUTER'S Agency is informed that the British Antarctic vessel *Discovery*, with Captain Scott and his staff, is not