

WHEN the announcements were made of the honorary degrees conferred at the tercentenary celebration of the University of Edinburgh, some surprise was felt that American men of science appeared to be forgotten, while American physicians and theologians were selected with obvious discrimination for their academic distinctions. It is now stated that the authorities at Edinburgh intimated to several Americans devoted to science, that the university would confer upon them the degree of doctor of laws if they would come and receive it, and that, in case of their non-attendance this year, they might be admitted to the honor if present on some future occasion. The list of men thus chosen may not be authentic, and we shall therefore refrain from reprinting it; but, as given in the newspapers, it includes, among others, a geologist and zoölogist, a botanist, an astronomer, and a philologist, every one of whom would be acknowledged in this country as a worthy representative of American science.

THERE is fine opportunity to make the coming electric exhibition in Philadelphia a public educator as well as a brilliant display by giving due care to the explanation of the different groups of exhibits. Only a very small share of the visitors to such exhibitions understand what they see; but by far the greater number would gladly learn more than they know if the way were open. The untaught majority of the visitors may wonder and admire, but they really learn very little. Their curiosity is excited, but their reason is not satisfied. Printed explanations are seldom given: verbal explanations are often too technical to be of much value, even when the exhibitors can be found, and are willing to tell their story for the hundredth time.

This might all be changed, if an extended series of well-considered explanatory cards were composed with the special object of reaching the most elementary inquiry, and arranged in such succession that the visitors who follow around the aisles in proper order should read a concise statement of the elements essential to the various contrivances in the

bewildering display. Take, for example, the batteries, which will surely be exhibited in large variety. At the beginning of this class of exhibits, there should be a large card on which should appear some such statement as the following: "The essential elements of a battery are so and so; these essentials are reached in various ways, thus and thus and thus." Then in further explanation of the different kinds of batteries, which should be classified as rationally and as distinctly as possible, the advantages claimed for each class could be appropriately defined, as cheapness, durability, intensity, constancy, etc.; or the special object in view might be stated, and the peculiar means to this end briefly set forth.

There would be a double gain accomplished by such a method. The direct gain would be a distinctly better understanding of the exhibition among the many intelligent visitors who were not especially informed on electrical matters. The indirect gain would be a step in general education, in the recognition of the relation between the essentials of an apparatus and the contrivances by which they are attained. For most persons the contrivances are of small importance: they cannot be remembered, except in a few cases where peculiar reasons may give them special interest. But the essentials, the principles of construction freed from the details, are of the greatest service to all. The time and work required for the preparation of such guide-cards would be great, but the public would consider them well expended.

#### LETTERS TO THE EDITOR.

##### **Cretaceous phosphates in Alabama.**

IN a previous letter I announced the occurrence of phosphates in the lower beds of the rotten limestone of the cretaceous formation of Alabama. I have since discovered that they are by no means confined to this horizon.

Immediately overlying the rotten limestone, and forming the uppermost strata of the cretaceous formation, are beds of marls and clays, alternating with hard, crystalline, sandy limestones, usually assigned to the Ripley group of Professor Hilgard. Specimens examined from many localities show that these beds in Alabama, from Livingston in Sumter county, eastward nearly to the Georgia line, are very generally phosphatic.

The material from this horizon, which has been examined by me, consists, 1°, of marls — either calcareous clay marls, or light chalky marls — composed, in the main, of carbonate of lime (the few analyses of these marls which have been made, show an average content of about five per cent of phosphoric acid; they occur across the whole width of the state, and are, in many instances, in very good condition for spreading upon the land: a marl of this kind at Coatopa has already been used with very fine results); 2°, of limestone rock, usually crystalline, hard, and sometimes sandy, but occasionally soft and crumbling; in one locality the calcareous matter has been leached out, leaving a porous sandstone: this limestone, which is the Ripley limestone, holds from ten to fifteen per cent of phosphoric acid, and extends entirely across the state: the aggregate amount of phosphoric acid contained in it is enormous; 3°, of nodular or concretionary masses of phosphate of lime, and nuclei or casts of gasteropods, bivalves, nautili, baculites, etc.; these, wherever examined, appear to be nearly pure phosphate of lime, but are found in comparatively limited quantities: not more than half a dozen quantitative analyses have yet been made of the phosphatic material from these beds; but, in making the qualitative tests, I have always used equal quantities of the different substances, and have thus been able to form some estimate of their comparative value.

The outcrops of the phosphatic beds occurring at the base of the rotten limestone, already described in a former letter, pass near the following places, — Pleasant Ridge, Eutaw, Greensboro, Hamburg, Selma, Prattville, Wetumpka, Tuskegee, and Society Hill, — while the beds now described above, outcrop along a line about thirty miles south of the former, passing through or near the following places, — Livingston, Coatopa, Moscow, Dayton, Prairie Bluff, Minter Station, Fort Deposit, Union Springs, Flora, etc.; the one line of outcrop being along the northern border of the 'prairie region,' the other along its southern border.

It is, further, an interesting fact that the upper beds of the rotten limestone itself are phosphatic. I examined recently the outcropping limestone from Livingston for six miles northward, and in every case found it to be more or less phosphatic; and in a few places I found *nodular* phosphates in small quantity. In other localities, as at Boligee, and between Newberne and Uniontown, at a distance from either border of the rotten limestone, occur phosphatized nuclei of shells. I have not yet had the opportunity of examining the strata at these places, and cannot, therefore, say whether or not the phosphates are confined to these nuclei, but am inclined to think that phosphatized strata occur at intervals through the whole thickness of the rotten limestone, as well as at its base and summit.

Whether any of these phosphates may be profitably shipped to distant points or not, it is certain, that, in the phosphatic marls and greensands, our farmers, in the 'prairie region' at least, have the materials for restoring the fertility of their soils at a comparatively small cost.

EUGENE A. SMITH.

University of Alabama, July 12.

### Swarming insects.

I am not a properly qualified reporter of scientific facts, but the following observations have interested me:—

I sat on the doorsteps of 626 Euclid Avenue some days ago, watching the 'Canada soldiers,' of which

gnat-like looking insect I enclose a specimen. They filled the air. They were absolutely myriads. The north wind, I am told, brings them from over the lake; but they are ephemeral, and their dead bodies are almost as numerous on the pavements as their live bodies in the air.

As I sat watching their flight, my attention was attracted to a singular smoke-like appearance on the top of a tall elm which stood at the edge of the street-curb. From the topmost branches of this tree rose vertically into the air four or five waving, flickering tongues of what at first looked like smoke. To describe their peculiar lambent motion, I can think of nothing better than the 'cloven tongues of fire' mentioned in the 'Acts of the apostles,' or the darting, flashing spires of the aurora borealis, only the color was smoky, not fiery. I give a rude delineation. The



waving, playing motion of these smoky spires is simply indescribable. They would fade and re-appear, wave back and forth as if swayed by the wind, mount higher and higher, until sometimes one would leap up twenty, thirty, or forty feet into the air. The look was as if the tree was smoking, the thin wiry columns of smoke streaming up into the sky. Closer examination disclosed the fact that these pillars of smoke in the evening twilight were really columns of winged insects, but whether the 'Canada soldiers,' or a smaller insect, I could not see; and inquiry elicited the further fact that this phenomenon is not exceptional. Perhaps it has already been noted in your journal, but I venture to send you this brief and imperfect account of it. A Cleveland resident, to whom I have read this, is quite confident that it was a smaller insect which was thus disporting itself.

EDWARD ABBOTT.

Cleveland, O., July 9.

[The 'Canada soldier' sent is a large ephemeropterid, found in immense numbers about the Great Lakes. The pulsating swarms of small insects seen about the tree-top were undoubtedly formed of gnats (*Chironomidae*), allied to the mosquitoes. The phenomenon has been frequently witnessed, both in this country and in Europe, to the great astonishment of the spectators. — ED.]