between Hell Gate and Blackwell's Island, working by degrees through the sound until meeting with the Palinurus coming west.

— Some estimate of the signal service as a promoter of original research may be gathered from the fact that two of the three gold medals awarded by the Royal geographical society were secured by Lieutenant Greely and Sergeant Brainard, for geographical discoveries. Professor Langley was awarded the Draper medal by the National academy, for discoveries at Mount Whitney; and the Royal society of science, letters, and arts, has made Lieutenant Finley a member with its highest honors, for his original work on the subject of tornadoes, all of which was under the direction of the signal service in its legitimate duties.

— The secretary of state has forwarded to the house of representatives a letter from the American minister at Paris, enclosing an invitation to the United States to be represented at the convention of the Philomathical society of Bordeaux, France, to be held Sept. 1. The purpose of the convention is to consider all questions relating to commercial and industrial education. A letter from commissioner of labor, Wright, suggests the following gentlemen as delegates: Prof. C. M. Woodward of the St. Louis manual training school, Prof. W. P. Atkinson of the Massachusetts institute of technology, and professors from the Columbia school of mines and Stevens institute.

— Alfred Rabaud, founder and president of the Geographical society of Marseilles, died on April 12, aged fifty-eight.

— Reymond communicates some interesting notes as to the geology of the region of the great African lakes, especially of the south-east part of the Tanganyika and Nyassa basins, from specimens collected by Giraud. The region appears almost exclusively composed of primitive rocks. The only sedimentary rocks collected were from south of Tanganyika, at Yendivé station, and from Mpasa, two or three days' march from the northern end of Lake Nyassa to the north-west, on the route between the two lakes. These rocks are of a schistose character, contain Cyrena and remains of Lepidosteus, and are referred by Reymond to the upper cretaceous or lowest tertiary age. This agrees with what is known of the geology of Africa in general, where the cenomanian and nummulitic strata alone are found resting on a vast denuded plateau. The beds of brown iron ore, which cover a very large extent of country, and are worked by the natives, are supposed to have been leached out, as it were, from the crystalline rocks, by the action of the water and carbonic acid held in the vast bogs and spongy marshes of the region. One of the chief characteristics of central Africa is the absence of calcareous formations. The metallic wealth of the country, except for iron, is little known; but Giraud reports copper rather abundant between Bangweols and Luapula. In South Africa the sedimentary beds are of greater extent, and contain a considerable amount of coal of inferior quality. The collection of fresh-water and land shells made by Giraud comprises, according to Bourguignat, ninety-three species and several new forms.

— What appears to be a justifiable complaint against the delay in printing scientific reports is made by Commissioner Colman to the senators and representatives. Of the forty-five thousand copies of the first annual report of the bureau of animal industry, ordered nearly two years ago, scarcely a twentieth part have been so far delivered by the printer. Another work, Riley's report on the cotton and boll worm, long since ordered, and in the printer's hands, has not yet been delivered, though stereotyped for nearly a year.

— In a recent letter to Professor Riley, U. S. entomologist, Mr. J. Birkbeck Nevins of Liverpool gives an analysis of dried locusts from observations made by Edward Davis, president of the Liverpool literary and philosophical society, as follows: —

	Without wings.	Wings developed.
Phosphoric acid (P_2O_5).....	1.92%	1.89%
Tribasic phosphate of lime.....	4.21%	4.13%
Nitrogen.....	10.14%	10.64%
Ammonia.....	12.31%	12.92%

This shows that these dried locusts are as rich in nitrogen as meat, guano, or dry blood, and contain enough phosphoric acid to greatly increase their value as a manure which English authorities estimate at about twenty-five dollars per ton.

LETTERS TO THE EDITOR.

**** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

Science at Cornell.

WILL you allow space to one who has known Cornell from the beginning, who has watched her progress with the greatest interest, and who knew personally Mr. Cornell and President White, for a few comments upon recent letters in *Science* in regard to 'Science at Cornell'?

It seems to the writer that almost every one connected with Cornell misconstrues the fundamental law. President Adams says, "It includes not simply agriculture and the mechanic arts, but," etc. President White speaks of the efforts of the trustees being "devoted to agriculture and the mechanic arts alone." When, some years ago, a committee of the legislature was appointed to investigate Cornell, and report as to the way in which the provisions of the law and the charter were being carried out, that committee was shown the machine-shops and farm, and the work of the professor of agriculture and of the professor of mechanic arts, as though these departments comprised the whole of the provision made at Cornell for fulfilling the requirements of the law. The law says, to teach *such branches of learning as relate to* agriculture and the mechanic arts. Does that mean that boys shall be taught to hoe corn, or plant potatoes, or shove a jack-plane, or swing a hammer? What are those 'branches of learning that relate to agriculture'?

Mathematics, the physical and natural sciences, drawing, mechanics, and the characteristic studies of mechanical and civil engineering, — all these 'relate to' agriculture, or the mechanic arts, or both. The law requires that the *leading object* of the institution founded under it shall be to give instruction in such branches. Will this be the 'leading object' if, as suggested by President Adams, only six hundred thousand dollars of the endowment should be devoted to this purpose? To the writer nothing can be plainer than that, to fulfil the law, whatever other endowment is accepted, whatever other branches are taught, the institutions founded upon the land-grant must make "such branches of learning as relate to agriculture and mechanic arts" (not agriculture and mechanic arts themselves) the *leading object* of instruction.

President Adams says the instruction contemplated by the law includes not simply agriculture and the mechanic arts, but other scientific and classical studies, military tactics, and the several pursuits and professions of life. This last is made to appear by quoting the last paragraph of the much-quoted passage first.

The meaning of that whole passage seems so plain, that it is strange that such diverse interpretations should be put upon it. It requires the founding of an institution whose branches of learning relating to agriculture and the mechanic arts shall be the leading object of instruction, and where other sciences and the classics may have a place, in order that the industrial classes in the several pursuits and professions of life may there receive a 'liberal and practical education.'

Can any thing be plainer than that the institution contemplated by the land-grant act should have for its leading object, whatever else it does, to provide for the instruction of the industrial class in such branches of learning as they most need in their pursuits?

Now, have the branches of learning that relate to agriculture and the mechanic arts been so well provided for that it is time to reduce expenditures in those directions for the purpose of establishing law and medical schools and what not? Large additions have been made to the material equipment of some of the departments; but not one of them can be considered fully equipped, and some have suffered in usefulness the last year from the cutting-off of appropriations. Some important branches are suffering for want of instructing-force. This is notably the case in chemistry and physics, where the number of instructors is less than for the same branches at some of the classical colleges, and much less than at some of the technical schools.

The proposition to multiply departments at Cornell seems to the writer most unwise. It is far better to take the highest rank in a few departments, if those are in the direction of the object contemplated in the foundation, than to take a lower rank in a wider field; and it is certain that the income of Cornell will need to be much larger than at present before she can take first rank in all the departments now established. A. W.

Phylloxera.

The following answers were suggested by the questions relating to the phylloxera, asked by 'A. M. D.' in the issue of *Science* for April 2, 1886.

1. Was it known as a pest in this country before its introduction abroad? The gall-type of the phylloxera was first known and described by the state entomologist of New York in 1856, seven years before the same form was known in any European country. Unmistakable evidences of its existence reach much farther back, even to 1843. In later years more or less injury was done, but the true cause of the trouble was not known until the discovery of the root-type in 1868.

2. When and how did it reach Europe? The effect of the pest was first noticed in France, by M. Pinarum, in 1863; the gall-type was described by Westwood, in England, in the same year; and the first statement of the disease in Germany followed two years later; but it remained for Prof. J. E. Plouchon to first announce, in 1868, the discovery of the root-type, and to give to it the name it now bears. During the same year the winged form was discovered, and the following year the root-type was asserted to be of the same species as the gall-type of the United States. The vineyards were noticeably diseased some time before, particularly those near some American vines which were a part of a heavy importation made in 1860, — the probable time of the introduction of the pest. Undoubtedly the pest reached France through these cuttings or stocks. The fact of transporting by cuttings is further evidenced by later experience in Germany, Switzerland, and other countries where infection began among American stocks.

3. Why is it more injurious in Europe than in its native habitat? Four reasons may be given: 1. Insects indigenous to a country are frequently kept in subjection by its enemies. Such is the case to a great extent in the Mississippi valley, where the galls of the phylloxera are often cleared of its inhabitants by depredating enemies. This restriction is removed in the new country, and the pest has full chance for development. 2. The predominating varieties of vines of Europe, and also of California, are of the kind most attractive to the root louse, while Mississippi valley produces largely gall-bearing varieties of vines, which to a greater or less extent resist the attacks of the root-louse. 3. The predominance in Europe of the most destructive type, the root-louse, against the gall-louse in the Mississippi valley, — the one attacking the roots, and affecting the vine permanently; the other attacking the foliage, and pro-