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-

ducing only a transient effect. 4. Probably the chief cause of a comparative greater destruction can be found in the difference in soil, and more especially in the climate; that is, when European countries are compared with districts, like California, cultivating a similar variety of vine. It has been a notable feature in California experience that the spread is usually very slow, and only showing noticeable rapidity in exceptional cases. In our observations (see 'Report of college of agriculture, 1886') we have shown that a peculiar growth of roots, induced by late rains, or again by surface manuring, will produce the winged form in great abundance. But the general climate of California is extremely dry during this growing period, and therefore no such roots are apt to be formed; while in the portions of Europe where the spread has been most rapid, their type of vine being similar to that of our own, a growth of fine surface rootlets is undoubtedly induced by the summer rains, and myriads of the winged-form insects developed and spread to adjoining vineyards. The effect of fertilizing on the production of similar rootlets is doubtless greater than is usually supposed.

4. Is there any reason to suppose that the pest will be mitigated by natural causes as time goes on? As yet there seems to be no evidence in favor of such a supposition. This case should be analogous to that of other insect pests, which have been overcome only by insect enemies. This insect has been with us many years; and yet no enemy which can destroy all the forms has appeared, although the gall-type, accessible above ground, has undoubtedly been decreased in numbers by such enemies as the thrips, tyroglyphus, and others. No enemy with the needed multiplicity of forms, enabling it to traverse the vine and at the same time all parts of the roots, is known. Until such does appear, there is little doubt that the loss caused by any local disturbance will soon be replaced by the other types, and thus the species will be continued. F. W. MORSE.

Berkeley, Cal., April 22.

Topographical models or relief-maps.

I hope you will find space in your paper for the following description of a new method of making topographical models from contour maps. I completed it a few weeks ago, and have made several models of complicated surfaces.

Make a careful tracing of the contour lines on waxed or oiled tracing-paper. Linen must not be used, as it will distort the lines when wetted. Paste the tracing on a clear piece of white holly veneer an eighth of an inch in thickness, and cut or have cut, with a fine fret-saw, the lines of contour, leaving spaces now and then, should the lines so run that the intervening wood would drop out. Fasten the veneer to a board, being sure that the surface is flat. Fasten veneer by the edges, and not through the spaces between contour lines. Cut or have cut strips of thin brass, each strip being as wide as the height of each contour line, and insert the strip into the corresponding saw-cut in the veneer. They must be pressed down until they touch the board below the veneer. When all the contours are in place, paint the whole surface over with heated wax, which will prevent the moisture of the clay from distorting the wood. When all is coated, fill in the spaces between the strips with clay until only the edges of the brass show. Where spaces are left, the strips are cut with a slanting end long enough to span the space uncut, and the line of contour is thus unbroken.

By this method nothing is left to the eye, and perfect accuracy is gained. I have made some models for Prof. N. S. Shaler, and it was at his request that I send this description to your paper.

HENRY BROOKS.

Boston, April 26.

Poison rings.

Appreciating your kindness in inserting my previous letter, containing a number of questions as to what we know of the past of the pest phylloxera, and what we may expect for its future, answers to which would certainly interest many laymen like myself, and not discouraged by the lack of response from your readers, I venture to send you this.

In the recently published volume (xx.) of the 'Encyclopaedia Britannica,' under the head of 'Ring,' it is stated that "Pliny records, that, after Crassus had stolen the gold treasure from under the throne of Capitoline Jupiter, the guardian of the shrine, to escape torture, broke the gem of his ring in his mouth, and died immediately." Hannibal is also recorded as having killed himself with his ring; and the writer further says, the "*anello della morte*, supposed to be a Venetian invention, was actually used as an easy method of murder."

Can any of your readers inform me whether any of these ancient rings are still in existence, and, if they are, how they are made, and with what poison they were filled? A. M. D.

New York, May 3.

[We publish this week a reply to 'A. M. D.'s' queries about phylloxera; and, doubtless, information as to 'poison rings' will be forthcoming. — ED.]

A swindler abroad again.

It has just come to my knowledge that the 'tramp' geologist who has been 'wandering up and down the earth' for the last three years, the man of many accomplishments and aliases, is now in the vicinity of St. Cloud, Minn., posing as 'Capt.' I. C. White of the West Virginia university.

I would say, in my own defence, that the title of 'captain' is not worn by me, and that in this case I can establish an *alibi*, with the help of my friends.

Cannot something be done to throttle this nuisance before he scandalizes every geologist in the country? Probably a committee from those whom he has swindled and misrepresented would hunt him down most successfully, and I am sure such a committee could be trusted to squelch him effectually.

I. C. WHITE.

West Virginia university, April 29.

Pompous prolixity of the French.

One reads with amused surprise, on p. 403 of the last issue of *Science*, that the literary style of French scientific writers is characterized by 'pompous prolixity.' We all understand that "that which is not clear is not good French." We had supposed that the genius of that sententious language was as much opposed to pomposity and prolixity as to obscurity.

A. G.