A national university.

The strictures in *Science* (vi. 509) upon the recommendation of Secretary Lamar that a national university be established in Washington, seem to me to be based upon a narrow view of the subject, and to be easily answered. The fact that the project has been opposed by the able president of one of the leading endowed colleges, who would be least disposed to look with favor upon any rival institution, cannot justly be urged as an argument against it, and that a senate committee should have been found indifferent to it in 1872 has no bearing on its merits.

The claim that there is "a fatal defect in any congressional bill to establish a university, so long as the principles of appointment to United States offices, and the tenure of those offices, remain what they now are," cannot be sustained in the face of the excellent and permanent scientific bureaus that have latterly grown up under the government, and to which the secretary refers. The officers of these bureaus have been selected with special reference to their fitness, as is proved by the results; and they have almost, without exception, held office continuously through several administrations, including the recent reversal of parties. No such narrow policy as that of territorial representation has governed these appointments, the government having exercised its right to select from the entire country, and secure the best talent.

But permanent tenure of office is by no means secured in private institutions. Even the highest undergo changes without detriment. Examples here would be superfluous. The government should surely have the same right that these have to improve the quality of its staff of officers. This objection, therefore, seems purely imaginary.

The territorial distribution of scholarships, on the other hand, ought to have nothing objectionable about it. It strikes me as altogether proper. The few students that can at best be instructed in any one institution, however large, are but a small fraction of the number who desire and will receive advanced instruction in the whole country; and it seems right that these few should, as nearly as practicable, represent the whole country territorially. Neither does there seem any inherent evil in permitting the national representatives to control this trifling patronage.

But a true university is not a mere school for the training of great numbers of young people. It is an institution in which the most perfect appliances for original research may be brought together, and where a few who are able and willing to avail themselves of them may have an opportunity to do so. The tenor of the secretary's report clearly shows that this is what he contemplated by a national university. He regards the existing scientific bureaus of the government, with all their apparatus and appliances, as the 'foundation' upon which to erect a university as a 'superstructure,' thus making it a positive aid to the necessary research that the government must carry on. The whole would thus become a great American institute, analogous in some respects to the Institute of France.

Finally, the assumption that the establishment of such an institution would 'be acting on un-American principles,' is, I think, also untenable. It would seem at the outset that a project that found favor in the eyes of 'Washington, Adams, Jefferson, and Madison,' could scarcely be regarded as 'un-American.' Is it, then, implied that schemes of public instruction are generally un-American? Certainly no other country in the world possesses any such system of public schools as the United States, and perhaps no American institution is more popular than our educational system. Whether sound or unsound, popular or state education is at least a thoroughly American idea, and the tendency is constantly to extend it to the higher branches of learning; as, witness the 'grammar schools' of most cities, and the numerous state universities. It is true that this work is chiefly conducted by states and municipalities, as the natural way under a government constituted as ours is; but for a long time there has also existed a national 'bureau of education' at the seat of government, designed to aid and advise, rather than to control the entire system.

Neither can it be considered un-American for the government to encourage and actively prosecute scientific researches. No government in the world is doing so much in this line to-day as the United States, and *Science* stands in an excellent position to know the extent and quality of our government scientific work as well as the practical results which it is producing. In this respect we are becoming the envy of European nations, and they are just now beginning to learn from us that it is sound national policy.

A national university or institute of the kind intimated in Secretary Lamar's report would be thoroughly American in its conception and aims, and would fittingly crown the educational system of the country. Its organization should, and probably would, be largely intrusted to the National academy of sciences, whose advice in scientific matters the government is legally entitled to ask. On the contrary, the objections raised in *Science* seem to reflect the views of a now waning English school of economists, who continually cry 'let alone' to every thing the government undertakes. LESTER F. WARD.

[When a young man enters the service of any of our half-dozen leading colleges, he does so with the knowledge, that, as soon as he has proved himself a valuable member of the body of teachers, he will be given a position with a tenure of office through good behavior, and with a fair salary considering this permanency. In any university established by congress, not only would permanence of tenure be out of the question, but the efficiency will be affected and the very life of the institution threatened each year by the vacillating policy which any legislative body will necessarily pursue with regard to the sustaining appropriations. Whenever this country is ready for an American 'institute,' it will probably be an outgrowth of the National academy, the value of which is as yet not appreciated. Let us go slowly. It must be remembered that the principal advocates of the importance of governmental guidance of human affairs are residents of a country in which no other initiative force has been known. — ED.]

Crystals in maple sirup.

I was surprised on reading in your issue of Dec. 11 the note from Mr. J. H. Sears, in which he speaks of crystals formed in maple sirup being noticed for the first time. I had supposed it to be a very common occurrence. So far as my observation has gone,

unless the sirup be put into the cans in a very watery condition, the formation of a thick layer of crystals at the bottom invariably follows; and I have often seen great difficulty experienced in removing it without breaking the cans. J. EDWARD CHAPPEL.

Warsaw, N.Y., Dec. 14.

International geological congress at Berlin.

On referring to the original notes which I took during the sessions of the International geological congress, I find that Mr. Archibald Geikie moved to strike out all the words after 'Coudroz' except 'l'Old Red,' in the paragraph (l. c., p. 15) of the report of the committee on uniformity of nomenclature, my account of which Dr. Dewalque criticises in *Science*, Dec. 11. Upon this, M. Renevier asked, 'on principle,' that the whole paragraph be struck out, on the ground that the congress ought not to go into such details. There is no mention in my rough notes that this was done; but in the fair copy, which I submitted to some of the leading members of the congress for their approval or correction, I find a pencil note to the effect that M. Renevier's motion was carried. I cannot recall the authority for this note, which was embodied in the short summary which, with the assistance of Professor Williams, I prepared for *Science*. I should like to state here, that in spite of the employment of the greatest possible care, and the assurances of the accuracy of the account of the meeting, which is about to appear in the *American journal of science and arts*, from some of the most active participants in the discussions, some errors, though I trust none of importance, will probably be found. To those who are aware of the exceedingly inferior acoustic qualities of the hall, and the involved nature of some of the discussions and votes, these will be thought pardonable. PERSIFOR FRAZER.

Philadelphia, Dec. 12.

Earthquake-shocks more violent on the surface than in mines.

It has been sometimes observed that earthquake-shocks are felt more severely in mines than at the surface. This may be accounted for partly by the rapid decrease of the shock-motion (wave-height) which is supposed to vary inversely as the square of the distance from the focus or radius of the agitated sphere, partly by the quenching of the earth-wave by repeated reflections in passing through media of different elasticities, and by the fracturing of the imperfectly coherent media through which it passes. But the converse phenomenon, viz., the greater severity of shocks on the surface than in mines, is, I believe, far more common. This was very conspicuous in the Inyo earthquake of 1872; for buildings were shattered and the earth was broken in many places, and yet persons working in the mines were scarcely aware of any movement. The same has often been observed in Peru.

There are two ways in which I imagine this may be explained. The more obvious is as follows: As long as the earth-wave is within the earth, the back-and-forth movement (shock-movement) is largely restrained by the work of elastic compression of the earth in front necessary for the progress of the wave. But as soon as it reaches the surface the motion is free or unresisted, and therefore much more rapid, — so rapid as often to break up the surface, and throw loose lying bodies high into the air. But there is another explanation which is perhaps more doubtful, and which, therefore, I offer with some hesitation as a mere suggestion, in the hope that some one may be able either to follow it up or else to disprove it.

In the *Philosophical magazine* of June, 1849, p. 404, the royal astronomer, Professor Airy, drew attention to the peculiar phenomena of what he calls broken waves, or broken-headed waves. These are retarded, discontinuous waves; in other words, breakers. If a normal wave strike against a sea-wall, it will of course be reflected; but if a breaker, a broken or broken-headed wave, thus strike, the swell or unbroken part is reflected as usual, but the broken part is not. If it strike perpendicularly, the broken part is thrown up and destroyed. If it strike at small angle, then the broken part runs along as a strong wave clinging to the surface of the wall. I have myself observed this behavior of broken waves.

Professor Airy then applies this principle to the explanation of certain phenomena of whispering-galleries. The voice produces normal waves; but a hiss, a buzz, and therefore a whisper, produce broken, discontinuous waves. Now, in these galleries the voice is reflected in the ordinary way; but a whisper runs along, clinging to the surface of the wall and dome, and may be heard, if the ear be applied to the wall, at much greater distance than the much louder voice.

Now, may not this principle be applied also to earthquake-waves? 1°. The surface of the earth must be regarded as a very perfect reflection for waves emerging from below; as much so, in fact, as for sound-waves entering the earth from the air. Therefore normal waves emerging on the surface must be largely reflected back into the earth again. 2°. But earthquakes are pre-eminently broken, retarded, discontinuous waves. Passing, as they do, through an imperfectly elastic and slightly coherent medium, which is fissured and crushed at every step of its progress, the normal continuity of the waves is destroyed, and the waves retarded and their energy dissipated, by change into other forms of force, especially heat. For this reason the velocity of heavy earthquake-waves is always much less than that of normal elastic waves in the same medium. For this reason, too, they are rapidly quenched, and therefore extend much less distance than they otherwise would. 3°. If, then, we assume that earthquake-waves are broken and retarded waves, they ought to follow the law pointed out by Professor Airy. When they strike full on the surface, as at the epicentrum, they simply destroy themselves by the work of breaking the surface, and are not reflected. When they strike at small angle, as at a distance from epicentrum, they must run along as a strong wave clinging to the surface. JOSEPH LE CONTE.

Berkeley, Cal., Dec. 5.

An unreliable treatise on disinfectants.

That 'unreliable treatise on disinfectants' criticised by you Dec. 4, deserves even less mercy than you have shown it. When the publisher declares that there is no indorsement of the essays as scientific, and the one selected as the best is chosen as a standard of the excellence of the work as a whole, all persons in the least familiar with the present position of sanitary science must wonder why the