fornia. The professorships might as well be divided around among the states, as the places in the board of regents. The influence of sectional feeling could but be felt, and would certainly be injurious.

The demand by the American people for a higher education, referred to by Secretary Lamar, evidently means free education. The gift of such an education would rest in the hands of the members of congress, and would only place so much injurious patronage at their disposal. Our leading universities are already so well supplied with scholarships, and there are so many benevolent people standing ready to give assistance, that no deserving American boy need despair, from want of funds, of obtaining a liberal education.

Another point to be considered, before congress attempts to establish a university, is whether it would not be acting on un-American principles. During the war the country became accustomed to seeing the powers of the government exerted energetically for destructive purposes, and since the war there has been success in turning this power to the aid of the arts of peace, and markedly in the building of railroads. Had we not better leave the paternal government to Europe, and follow the example of our ancestors, who well understood, that, to make the people free and self-reliant, it is necessary to let them take care of themselves, even if they do not take quite as good care of themselves as some superior power might? We have already several good universities. Let us turn our energies to their development, and to the aid of those promised in the newer parts of the country.

THE DECAY OF THE OBELISK.

AT the time the obelisk was placed in its present position in Central park, considerable discussion was aroused as to the ability of the stone to withstand the rigors of our climate. Upon examination the surface of the obelisk appeared so fresh, that authorities consulted at the time seemed to think that we need give ourselves no uneasiness as to the durability of the stone, and concluded that any action of climatic agencies would proceed with extreme slowness. Now, within less than five years, the commissioners of public parks in New York, acting under advice of Dr. Doremus, have found it necessary to cover the obelisk with a preparation of paraffine.

My attention during the past summer having been called to certain forms of weathering, due, as I supposed, to the expansion and contraction of the surface from excessive daily changes of temperature, I desired to examine the obelisk. Through the courtesy of the park commissioners, I was invited to inspect it at the time the scaffolding was first erected for the purpose of making a preliminary examination of the shaft from base to apex. While expecting to find some crumbling, I was quite unprepared for the rapid disintegration observed on all sides.

Comments upon the recent condition of the stone have led to some misconception as to the cause of the weathering. It has frequently been spoken of as the result of the action of the atmosphere, causing chemical decomposition of individual minerals in the rock. This is a mistake. The weathering, in my opinion, is almost wholly a process of disintegration, and not of decomposition.

At the time of the preliminary examination, the surface of the granite was found to be more or less in a state of disintegration; fragments being easily detached with any sharp-pointed instrument, while on the scaffolding pieces several inches in length were removed by means of the small blade of a penknife. One piece which I collected, taken from the west side of the obelisk, measured ten inches in length, and over one-half inch in thickness. A thin tabular specimen from the south face was four inches long by three wide. Since then, I understand, much larger pieces have been removed. An examination of both the firmer parts of the obelisk and the detached pieces present an equally unaltered condition of the constituent minerals. Indeed, the most marked feature of the rock is its fresh appearance.

A thin section of the rock, prepared for examination under the microscope, presents identical characters with those given by Dr. Stelzner of the Freiberg mining academy, who made a careful study of the mineral composition of the stone, to accompany the report of the late Lieutenant-Commander Gorringe. Little need be said here as to its composition. It is a hornblende mica granite, rich in felspar, with the relatively large crystals of hornblende greatly subordinate to the mica. The accessory minerals are magnetite, sphene, apatite, and zircon. It is in no respects an uncommon rock, and in America occurs in many localities in the far west. Even in minute details it bears the closest resemblance to the granite of the great Mormon temple in Salt Lake City. For building purposes the latter rock is probably the better, being more compact and finer-grained.

The microscopic section prepared for the purpose of observing what chemical decomposition, if any, had taken place, shows almost no alteration

product due to recent weathering. A slight decay of minute mica plates may be observed, but for practical purposes it amounts to nothing. The outer surfaces of the detached pieces are equally fresh with the inner surfaces. The felspar is scarcely more altered than when the rock was lying unquarried in the hills at Assuan. The decay is not due to chemical decomposition, but to mechanical disintegration.

In preparing the obelisk for its recent coating of paraffine, the workman carefully picked off with small iron tools all the loose scale and exfoliated material still adhering to the solid rock. My friend, Mr. Samuel Parsons, superintendent of parks, informs me that this refuse weighed 780 pounds, — a truly astonishing amount, when we consider that for 3,400 years the obelisk withstood the effects of time better in Egypt than during the last five years in Central park.

In my opinion, the process of disintegration has been an extremely slow one, caused by a constant expansion and contraction of the constituent minerals near the surface, due to diurnal variations in temperature. In a climate like that of New York, where these diurnal changes are frequently excessive at all times of the year, the tension between the minerals would naturally tend to a mechanical disintegration of the rock. Granite being a poor conductor of heat, the effect of these constant changes would be felt only at short distances below the surface, causing in time minute fractures and fissures along lines of weakness. Into these openings percolating waters, upon freezing, would rapidly complete the work of destruction. The result would be what we now find, — a scaling-off, or exfoliation, of the exposed surfaces. In structure the rock of the obelisk is coarse-grained; and the minerals, being less firmly held together than in many more compact varieties, yield more readily to changes of temperature.

Observation showed that decay progressed somewhat more rapidly upon the south and west faces of the obelisk than upon the north and east. Upon the south and west the direct rays of the sun would act more intensely during the day, but the temperature by night would be nearly the same on all sides. Now, if the cause of the decay was due to expansion and contraction, disintegration would be greatest on the surfaces exposed to the severest strain (the south and west), notwithstanding that the opposite sides would be those most exposed to the driving cold storms.

It seems most probable that the obelisk, during its long exposure in Egypt, must have been slowly undergoing change, the minerals losing some of their cohesive power, and only required a lower temperature to hasten what had been in progress for ages.

Upon this subject the experiments of Professor Wigner, published in the *London analyst* of 1878, on rock from the twin obelisk now standing on the Thames embankment, are of considerable interest. Pieces of the twin obelisk were placed at Professor Wigner's disposal by Mr. W. Dixon, the English engineer, who had charge of the removal of the prostrate monolith from Egypt to London. They represented portions from the under surface, which had been buried in sands, and also from the upper exposed surface. Both pieces were found nearly free from chemical decomposition; and analysis showed but slight oxidation of the iron in the surface rock. Experiments, however, upon the absorbent power of water of the two samples, gave widely different results. Professor Wigner estimated that the sound rock, which had been buried in sands, absorbed 7.8 grains of water per square foot of surface; and the weathered or exposed rock, 46.1 grains per square foot of surface, or nearly six times as much as the fresher rock. He says, "The 46 grains from absorption per square foot gives us a comparatively fair estimate of the amount of water which can be retained in the weathered surface, and which is ready, by its expansion and freezing, to split or disintegrate that surface still further." According to Lieutenant-Commander Gorringe, a high authority, the London obelisk, which stood at Alexandria until the early part of the thirteenth century, was probably thrown down by the severe earthquake which visited northern Africa at that time. If we may assume, as is probable, that for the greater part of the 500 years the London obelisk was partially buried in sands, the difference in the absorbent power of water in the two specimens may be taken as measure of the effect of climatic agencies in Egypt during that period.

The New York obelisk, subjected to precisely similar agencies, would be in condition, after its transportation to America, to disintegrate rapidly when exposed to a lower temperature, and the consequent freezing and melting of the water absorbed through the interstices.

ARNOLD HAGUE.

Washington, Dec. 3.

THE MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION.

THE American public health association began its thirteenth annual meeting at Washington, Dec. 8.

After the opening ceremonies, a letter was read from the board of health of Montreal, stating that the epidemic of small-pox in that city was started by an imported case from Chicago, Feb. 28 of the