

profession? That profession is not a fungus, but a gradual development. It has a history, it has a literature, and it has a profound philosophy. How many of our two hundred and seventy-seven thousand teachers know any thing of these? We are forced to believe that this number can be counted by hundreds, perhaps even by scores. Our great universities are the places where reform in this matter should be brought about. Let us see established in each of them courses of instruction in the history, theory, and practice of teaching. Let us hear something about the educational systems in other countries. Cambridge, Edinburgh, St. Andrew's, and other British universities have taken this step, and it has proved a successful one. It is no new thing in France; and such lectures are to be heard in almost every university in Germany. Paulsen in Berlin finds from two to three hundred hearers for his lectures on *pädagogik*, which occupy four hours per week throughout the semester. Our college presidents recognize our need in this respect, but the governing boards do not seem to carry out their recommendations. How much must be said and written on this subject before the authorities understand what is needed to round out this scheme of university education? It is safe to say that not more than three of our leading colleges now offer any scientific instruction in pedagogics.

#### THE GOVERNMENT AND ITS SCIENTIFIC BUREAUS.

THOSE who anticipated that the President, in his annual message to congress, would enunciate some radical views in respect to the relations of the government to its scientific work, have been disappointed. Those who know how sincerely desirous he is to uphold the efficiency of the public service have been gratified. Considering the length of his message and the obvious care which has been bestowed upon many questions, — the coinage of silver and the civil-service reform, for example, — it is noteworthy that all he has to say upon science is contained in a few short paragraphs. Two suggestions which he makes are, however, of very great importance, and deserve the most judicious consideration, — the separation of the signal service from the war department, and the transfer of the coast survey to the navy department. It is remarkable that these recommendations so opposed to one another should be included in one message, and it is by no means obvious

why better administration can be secured in the one case by separating a large corps from the army, and in the other by placing a large corps under the administration of the navy. There are strong reasons for believing that both those bureaus — the signal service and the coast survey — will do better work if allowed to stand as independent corps, — that is, detached from the army and navy. The reasons for such a belief will doubtless be made known to the congressional commission which has been instituted for the investigation of this and allied subjects.

This commission, in continuation of the prolonged inquiries which it carried on several months ago, resumed its work, unless we are misinformed, within the first week of the session. It is earnestly to be hoped that all the matters which come within its view will be soon taken up, and such a report prepared as will enlighten the administration, congress, the men of science in the government service, and the public at large, upon the principles which should govern the various scientific bureaus established in Washington. These principles seem to us very clear, and we hope to see them so definitely announced during the present winter that subsequent legislation will be simplified, and future superintendence made more efficient than ever before.

It is already evident that the alarms which were sounded by some over-zealous correspondents during the last summer and early autumn were exaggerations. One important case of mal-administration was undoubtedly brought to light; but the more thoroughly that case is understood, the more obvious it is that the chief officer upon whom reproaches were cast has been long a sufferer from such serious physical infirmities, and that right-minded men should rather incline to charity than to censure in their estimate of the close of his official career. The full and frank explanations which were promptly made by other chiefs of scientific bureaus have removed the imputations which were cast upon their official conduct. It is not unlikely that congress will institute such inquiries as will reveal the exact situation, and we have not the least doubt that the utmost scrutiny will be encouraged by those whose work has been publicly impugned.

Out of all this discussion there will doubtless proceed further legislation in respect to the scientific work of the government, and probably better methods of administration will be devised than those which have hitherto prevailed. The dangers

which are liable to come from the overlapping of responsibilities and the confusion of purposes can be obviated. Better modes of appropriating money can be devised, and better assurances can be given that those who devote themselves to the government service shall not be inconsiderately superseded. But we doubt whether any system will be adopted which will secure the services of an abler corps, or, on the whole, a more faithful corps, than that which has superintended and directed the governmental work in science during the last twenty or thirty years. Any country may well be proud of the investigations in geology, in geodesy, in geography, in astronomy, in meteorology, in natural history, and in ethnology, which have been performed within that period by a staff of civilians; and to all their achievements must be added the scientific researches and studies of the able officers in the army and navy.

Whatever measures may be adopted with respect to re-organization, one principle should constantly be borne in mind. Science cannot be carried forward by prescribing too definitely the tasks of scientific men. They may be bound by appointed days and hours; they may be told to perform specific duties, — and if only the maintenance of routine work is required, such regulations may secure fidelity and efficiency. But if knowledge is to be advanced, if better methods of work are to be discovered, if greater accuracy is desired, if unknown facts are to be ascertained and recorded and discussed, and, in short, if there is to be real progress, the methods of freedom are to be employed, not those of petty regulation. By this we mean that if the great undertakings which the government has in charge, if especially its surveys of the coast and of the interior, are to go forward, discretion must be given to the chiefs of bureau, and they must be held to accountability for the aggregate success of their work. Honesty, economy, clear and accurate statement of accounts, are, of course, to be demanded in every office: nobody questions this. But the determination of what shall be undertaken in a given year, to whom it shall be assigned, what allowances shall be made for instruments, books, and assistants, — these are questions which experience and judgment must decide. Somebody who has all the facts in mind must make the determination, and he must not be too quickly condemned, because the immediate results of the investigations which he has undertaken are not yet apparent. The highest personal char-

acter should be found in every one who is called upon to direct the labors of a scientific corps; he should be faithful, watchful, careful that all the interests intrusted to him may be promoted; but he should be free within the limitations of his office to select his subordinates, determine their duties, and prescribe their methods. Only by such regulated freedom as this can the highest results be obtained. Discretion with responsibility, in all the higher work of science, will bring the best services from those whose moral attitude is what it should be: no others should be intrusted with the leadership.

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#### THE MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION.

AFTER the paper of Dr. Hunt at the morning session, Tuesday, Dec. 8. (*Science*, Dec. 11), there was presented a paper on forms of tables for vital statistics, by Dr. J. S. Billings. Attention was called to the diverse forms in use throughout this country and Europe, and to the difficulties of drawing valuable deductions from a comparison due to this diversity. The health officer of a city desires information of the diseases which are liable to become epidemic, as to their location, relation to nuisances in the neighborhood, etc., in order that he may know where sanitary work is most needed. For this purpose tables are prepared which are made the basis of his study. These tables are published in the forms of bulletins or reports. Of these there are three principal forms: the weekly, the monthly, and the annual. As ordinarily issued, the weekly bulletin is too elaborate: its proper office is that of warning. If delayed, as it must be if complete and perfect statistics are to be recorded in it, its very object is thwarted, and its warning voice is not heard until after the need for it has passed. The annual form should be complete, and any reasonable delay in its issue to accomplish this is no detriment. The weekly bulletins issued by boards of health have too much the character of an annual report. It should constantly be borne in mind that they are designed for the information of the people: their main purpose is educational. They should state the total deaths, by color, sex, age, and locality; also those for certain diseases, as phthisis, pneumonia, cholera, yellow-fever, and diphtheria. In this form the unit of area is political usually, as by wards. This ward division could oftentimes with advantage be abandoned, and some other unit substituted. It is sometimes very important to have the mortality recorded by blocks, and the deaths which occur in a single tenement-house may not