

range, the present facilities of the Office are entirely inadequate, although now-a-days potential differences up to 20,000 volts and currents of 20,000 amperes are met with in actual practice.

Provision must also be made for the calibration of Wattmeters and Energy meters.

The verification of alternating current measuring apparatus requires further facilities, and in view of the ever increasing importance of alternating current systems, such facilities should be provided without delay.

The verification of Condensers and Self Induction Standards also merits attention.

Another question, practically related to electrical measurements, is the photometry of arc and incandescent lamps.

Preliminary steps have already been taken by the American Institute of Electrical Engineers, looking forward to the coöperation of the office in the official verification of incandescent lamps as secondary photometric standards to enable even the moderate consumer to procure reliable standards at a reasonable rate.

The measurement of high and low temperatures will also be taken up, a knowledge of the exact thermal conditions under which certain industrial operations are conducted being of the utmost practical consequence.

There are two most reliable electrical methods based respectively on the variations of electrical resistance and of thermoelectromotive force with the temperature. Hence, with standards of electromotive force and resistance available, this subject is brought within easy reach.

No claim of originality is made in what has been accomplished. The magnificent work of the Physico-technical Reichsanstalt at Berlin with its staff of scientific and technical assistants and in its almost unlimited resources has been of the greatest help. It has set such a high standard of excellence that it will require years for

similar bureaus, which will surely be organized by other governments, to attain.

FRANK A. WOLFF, JR.

U. S. OFFICE OF STANDARD
WEIGHTS AND MEASURES.

THE ESTABLISHMENT OF A NATIONAL UNIVERSITY.*

THE sub-committee appointed November 3, 1899, beg leave to submit the following report :

The resolution of reference to the sub-committee was as follows :

"That a sub-committee be requested to prepare for consideration by the full committee a detailed plan by which students who have taken a baccalaureate degree, or who have had an equivalent training, may have full and systematic advantage of the opportunities for advanced instruction and research which are now or may hereafter be offered by the Government ; such a plan to include the coöperation with the Smithsonian Institution of the universities willing to accept a share of the responsibility incident thereto.

"It is understood that the financial administration of this plan should be such that whether or not Government aid be given, there shall be no discouragement of private gifts or bequests.

"It is understood that the scope of this plan should be indicated by the governmental collections and establishments which are now available, or as they may hereafter be increased or developed by the Government for its own purposes."

The undersigned members of the sub-committee have been in active correspondence and conference on the matters referred to them. They have made several visits to Washington, and have had the advantage of hearing the views of representative Regents of the Smithsonian Institution and those of the directors of the scientific bureaus of the Government. In particular, they have profited by consultations with representatives of the American Association of Agricultural Colleges and

* Report of the sub-committee appointed November 3, 1899, to the Committee of the National Educational Association, appointed July 7, 1898, to investigate the entire subject of the establishment of a National University.

Experiment Stations, which body has had before it for some time past a project for the utilization, for graduate students, of the resources of the Departments at Washington.

The sub-committee are of opinion that the general plan of action now under discussion by this committee has secured, and will command, the active support of the directors and administrators of the Government's scientific work as well as that of the educational institutions of the country. It is very generally accepted as the best possible way of meeting what is reasonable in the demand for the establishment of a national university. The success of the plan, however, will depend upon the wisdom with which its details are first formulated and then administered.

Fortunately, the Congress of the United States has already declared it to be the policy of the Government to encourage the use of the scientific collections at Washington by properly qualified students, for purposes of research. This was done by Joint Resolution, April 12, 1892, which reads as follows :

Joint resolution to encourage the establishment and endowment of institutions of learning at the national capital by defining the policy of the Government with reference to the use of its literary and scientific collections by students :

Whereas, large collections illustrative of the various arts and science and facilitating literary and scientific research have been accumulated by the action of Congress through a series of years at the national capital ; and

Whereas, it was the original purpose of the Government thereby to promote research and the diffusion of knowledge, and is now the settled policy and present practice of those charged with the care of these collections specially to encourage students who devote their time to the investigation and study of any branch of knowledge by allowing to them all proper use thereof ; and

Whereas, it is represented that the enumeration of these facilities and the formal statement of this policy will encourage the establishment and endowment of institutions of learning at the seat of Government,

and promote the work of education by attracting students to avail themselves of the advantages aforesaid under the direction of competent instructors : Therefore,

Resolved by the Senate and House of Representatives of the United States of America, in Congress assembled, That the facilities for research and illustration in the following and any other Governmental collections now existing or hereafter to be established in the city of Washington for the promotion of knowledge shall be accessible, under such rules and restrictions as the officers in charge of each collection may prescribe, subject to such authority as is now or may hereafter be permitted by law, to the scientific investigators and to students of any institution of higher education now incorporated or hereafter to be incorporated under the laws of Congress or of the District of Columbia, to wit :

- One. Of the Library of Congress.
 - Two. Of the National Museum.
 - Three. Of the Patent Office.
 - Four. Of the Bureau of Education.
 - Five. Of the Bureau of Ethnology.
 - Six. Of the Army Medical Museum.
 - Seven. Of the Department of Agriculture.
 - Eight. Of the Fish Commission.
 - Nine. Of the Botanic Gardens.
 - Ten. Of the Coast and Geodetic Survey.
 - Eleven. Of the Geological Survey.
 - Twelve. Of the Naval Observatory.
- Approved, April 12, 1892.

The express purpose of this joint resolution is to encourage the foundation of institutions at Washington which may take advantage of the collections and facilities enumerated. This resolution affirms and establishes the principle which must underlie any such plan for a School or Bureau of Research as this Committee now has before it.

The governmental collections and establishments having been declared available for research, the next question is as to the systematic organization of the work to be carried on and the proper oversight of the persons engaged in making investigations. At this point certain practical difficulties must be met.

These collections and establishments are under widely different jurisdictions. Some

of them are attached to the Executive Departments, others are independent of any control but that of the Congress. Some of them are adequately equipped and well housed, others are most inadequately provided for. To wait for the reorganization of the scientific work of the Government in systematic fashion, is to postpone indefinitely the question of taking advantage of the opportunities which the Government has to offer. In the view of your sub-committee therefore, it is essential, in any plan which may now be adopted, that no attempt be made to alter the existing status of the Government's scientific work; that is a large undertaking, for which time and further experience are necessary. The conditions at Washington must be accepted just as they are. The head of each Bureau or Division which can offer any facilities for research, should be asked to state, in detail, just what those facilities are, how many persons can be received, and under what limitations or conditions. It would be one of the functions of any administrative officer who might be charged with the oversight of a School or Bureau of Research, to make these facilities known, as well as to exercise supervision over the students who avail themselves of them.

The resolution of reference contemplates the active coöperation of the Smithsonian Institution in the conduct of the proposed School or Bureau. The attitude of the governing board of the Smithsonian towards the undertaking, becomes then a matter of great importance. What this attitude is we are able to learn from the action taken by the Regents of the Smithsonian Institution at their annual meeting, held January 24, 1900, upon a communication from the American Association of Agricultural Colleges and Experiment Stations, which asked for the organization of a Bureau of Graduate Study in Washington under the supervision of the Smithsonian. The report of

the committee to which the communication had been referred, contained this language :

"The committee does not hesitate to express its warm and decided sympathy with the general purpose of the movement thus made by the associated colleges. The object sought commends itself to us all, and the zeal and ability with which it has been pressed upon our consideration by the very able and distinguished educators and scientists connected with these colleges furnish ample assurance that the consummation of the great and leading object sought by them is only a question of time. The material already collected in the bureaus and departments of the government furnishes a rich mine of educational wealth that will not be permitted to remain forever undeveloped. This material is now being constantly enriched by the most valuable additions to its present enormous wealth. Already it has invited to the national capital many distinguished scientists, anxious to avail themselves of the superior advantages thus offered for investigation and research.

"Your committee, however, is painfully impressed with the fact that the powers of the Smithsonian Institution as at present organized are scarcely broad enough to embrace the work proposed. And the committee is equally impressed with the fact that even with enlarged authority its present financial condition would absolutely prevent anything like efficient and creditable performance of the work contemplated.

"It is well known to the members of this board that a great wealth of material—material which would be of immense utility in the successful accomplishment of the purposes indicated by the associated colleges—lies buried in the crypts and cellars of the National Museum.

"If our institution is unable for want of room, as it undoubtedly is, even to place this valuable material on exhibition for the public eyes, and as little to arrange it for scientific uses, the problem of providing halls for lectures and meeting the necessary expenditures incident to the work proposed becomes serious and formidable in the extreme. Your committee is not prepared to make definite recommendations to the board for its final or ultimate action. That which is clearly inexpedient to-day may become not only expedient but eminently desirable to-morrow."

It is felt by the Regents of the Smithsonian Institution that their present powers are hardly broad enough to embrace educational work, and also that it is doubtful whether the Congress has power, under the Constitution, to appropriate money, raised by taxation, for purposes of education. In

view of the past construction of the 'general welfare' clause of the Constitution, and in view of the fact that the Smithsonian Institution was established 'for the increase and diffusion of knowledge among men,' your sub-committee are unable to share these doubts.

At the same meeting of the Regents of the Smithsonian Institution to which reference has been made, Mr. Alexander Graham Bell introduced the following resolution, which is to be the subject of consideration at a later meeting :

"In order to facilitate the utilization of the government departments for the purposes of research, in pursuance of the policy enunciated by Congress, in a Joint Resolution approved April 12, 1892 :

Resolved, That Congress be asked to provide for an Assistant Secretary of the Smithsonian Institution in charge of Research in the Government Departments, whose duty it shall be to ascertain and make known what facilities for Research exist in the Government Departments, and arrange with the heads of departments, and with the officers in charge of Government Collections, rules and regulations under which suitably qualified persons may have access to the Government collections for the purposes of Research, with due regard to the needs and requirements of the work of the Government ; and it shall also be his duty to direct the researches of such persons into lines which will promote the interests of the government, and the development of the natural resources, agriculture, manufactures, and commerce of the country, and (generally) promote the progress of science and the useful arts, and the increase and diffusion of knowledge among men."

Should the Regents decide to adopt this resolution, and should the Congress act favorably upon the request which it contains, a Bureau of Research would be established competent to do the work which this committee have in mind.

In this way all of the ends which this committee has deemed desirable, would be accomplished—save one. That one your sub-committee believe to be of the highest importance. It is the co-operation of the

universities and colleges of the country in carrying on such systematic research work as is contemplated. That such co-operation should be provided for, by the constitution of an advisory board or in some other way, your sub-committee deem essential, not only in the interest of the work itself, but also in that of the universities and colleges. That they would be greatly benefited by the new stimulus which would come from united effort in assisting to conduct such research work as is proposed, is certain.

An alternative plan is worthy of careful consideration. This is to make the Bureau of Education, instead of the Smithsonian Institution, the administrative center of the Bureau of Research. To accomplish this would involve, perhaps, the long-desired erection of the Bureau of Education into a separate department, on a plane with the Department of Labor, and the provision of an appropriate salary for the Commissioner instead of the pittance of \$3000 now allowed. The executive head of the Bureau of Research might then be an assistant Commissioner of Education at a salary of \$4000 or \$4500. One marked advantage of this plan is that the intellectual outlook of the Bureau of Education is likely to be broader than that of the Smithsonian Institution, as the Bureau is in close touch and active correspondence with all the educational institutions of the country, and not merely with those whose main or sole interest is in the field of the natural sciences.

If it is decided that the initiative in this undertaking shall lie with the Regents of the Smithsonian Institution, then your sub-committee are prepared to recommend the following course of action :

1. That the Regents of the Smithsonian Institution be requested to ask the Congress of the United States for a special appropriation for the work of research and investigation, to be conducted under their supervision by persons properly qualified therefor. Such work to be so conducted as to utilize the libraries, scientific collections, apparatus and laboratories owned

by the United States and in charge of officers of the United States, for investigations and researches, under regulations to be prescribed by the said Regents, and as far as shall be mutually agreed upon between the said Regents and the heads of the several executive departments of the Government, the Librarian of Congress, Commissioner of Labor, Commissioner of Fish and Fisheries, and the Secretary of the Smithsonian Institution, with a view of carrying out the policy of Congress, declared in the Joint Resolution of April 12, 1892.

2. That the Regents be requested to ask the general public for gifts of money, to be used in providing buildings, laboratories, equipment and endowments, for purposes of instruction, such instruction to be limited to students who are graduates of properly accredited institutions, or those who are otherwise properly qualified, it being understood that it shall not be the purpose of the Smithsonian Institution to confer degrees of any kind in connection with such instruction.

3. That the Regents be requested to formulate a plan for the appointment of an Advisory Board; the members of said Board to represent the leading educational institutions of the country, with a view to securing the active co-operation of the colleges and universities of the country in carrying on this undertaking.

If, however, it is decided that the Bureau of Education is the best administrative center for this work, then we recommend the following course of action:

1. That the Congress be requested to erect the Bureau of Education into an independent department, on a plane with the Department of Labor, and to provide a salary of not less than \$5000 for the Commissioner of Education.

2. That the Congress be requested to provide for an Assistant Commissioner of Education, at a salary of not less than \$4000, whose duty it shall be to ascertain and make known what facilities for research exist in the government departments and collections at Washington; to formulate, in connection with the heads of the several departments and the officers in charge of Government collections, rules and regulations under which suitably qualified persons may undertake research in those departments and collections, with a view to carrying out the policy of Congress as declared in the joint resolution approved April 12, 1892; and to exercise general supervision over the persons permitted to undertake such research.

3. That the Department of Education, so organized, be requested to formulate a plan for the ap-

pointment of an advisory board, representing the colleges and universities of the country which receive aid from the government or which have not fewer than 25 resident graduate students in any one year, with a view to securing the active co-operation of such colleges and universities in organizing and maintaining the work of research at Washington.

4. That in accordance with a plan to be prepared and adopted by the Department of Education, in consultation with such advisory board or its executive committee, the colleges and universities of the country be asked to give credit, toward the requirements for their higher degrees, for research carried on at Washington under the supervision of the Department of Education.

Under the terms of either of the plans proposed it is assumed that the persons admitted to carry on research will be graduates of a college or university in good standing, or will have had an equivalent training.

Such a bureau of research, whether it be placed under the care of the Smithsonian Institution or under that of the Department of Education—which would supersede the existing Bureau of Education—would be a source of strength to the higher education of the United States and a great advantage to the Government in its work of promoting the progress of science and the useful arts, and in applying the result of scientific investigation to the development of the natural resources of the country, of agriculture, of manufactures, and of commerce.

We regret that our colleague, Dr. J. L. M. Curry, has, through absence from home, been prevented from sharing in the formulation of this report.

Respectfully submitted,

WILLIAM R. HARPER,

NICHOLAS MURRAY BUTLER.

CHICAGO, ILL.,
Feb. 26, 1900.

ASSOCIATION OF AMERICAN ANATOMISTS.

THE Association held its twelfth session December 27 and 28, 1899, at New Haven, Connecticut, in conjunction with the affiliated societies. There were present nine-