SCIENCE

NEW YORK, NOVEMBER 20, 1891.

THE SCIENCE AND ART OF GOVERNMENT.[1]

GOVERNMENT should be looked upon as the business agency of the nation, and the science and art of government are the science and art of conducting this business agency. The various branches of administration have arisen through pressure from without. Everything that the people have demanded to be done with sufficient unanimity and persistence has been eventually undertaken by the government. One bureau after another has been created by law, placed in charge of proper officers, and conducted to the best of the latter's ability. Most bureaus have grown and expanded in their scope and usefulness. Many have been several times reorganized and the service perfected.

Although the various systems of administrative operation have been largely empirical, devised by men who had little preliminary preparation for the work, improved through the growth and demands of the service, and brought to perfection by thoughtful study of the needs of the public in each individual case, still the whole rests on a rational basis and constitutes a great system of government. The general laws and principles underlying this system constitute the science of government. The carrying out of these laws and principles is the art of government, and although, as in the case of almost all the practical arts, it was empirically developed, there is no reason to doubt that it will be as greatly improved and perfected by its reduction to a science and its enlightened prosecution as such as all the other great industrial arts have been since science has been applied to them.

Among the most promising sources of advantage in the scientific method is the comparative study of government operations. While from a very broad point of view all government is the same, when viewed at all in detail the greatest individual differences are found. Much of this diversity grows out of the natural differences in the conditions of nations, but fully as much is due to the differences in the methods adopted to accomplish the same purpose. Amid all these varying methods there must be great differences in their efficiency. Some are coarse and clumsy, while others are precise and refined. There are all the grades that exist in the manifold mechanical devices of the other arts, those which are best being always those which have most thoroughly utilized natural forces, including the social forces.

The scientific study of government would make the comparative study of methods a leading feature, with a view to the recommendation of those which under all circumstances are the very best. This is only one out of any required number of illustrations that might be given of the superiority of the scientific method in government.

In the science of political economy the subject of government operations is destined to occupy an increasingly prominent place. It is safe to say that no chair of political economy in any institution of learning has ever taught or attempted to teach the practical workings of public administration — the way in which the business of a nation is conducted. It is impossible to teach this branch of political economy without the means of a direct examination of the different systems of government business as they are conducted by their respective bureaus. Each great system, such as those of finance, land, patents, etc., would require a course of lectures, with repeated visits to the departments, inspection of records, books, papers, merchandise. etc. This would require a legal right to prosecute the study in this only practicable way. Nothing short of a national institution, created and authorized by law to teach the science and art of government, could successfully carry out this scheme of education. As a safeguard to our institutions, not less than as means of national progress and enlightenment, no other educational scheme is equal to it in importance.

[1] Read before Section I of the American Association for the Advancement of Science, at Washington, D.C., by Lester F. Ward, Aug. 20, 1891.

A NATIONAL UNIVERSITY, ITS CHARACTER AND PURPOSE.[1]

THE National University recommended by Washington, Jefferson, Madison, and many later presidents and statesmen is almost certain to be realized in the near future. It is the object of this paper to offer some hints as to what ought to be its character and purpose.

In the first place, it should be distinctly national, the creature of the American people and devoted to their use and needs. To this end it should be located at the seat of government and should be exclusively the product of the federal government. It should also be in the fullest sense representative, as is the government itself. Its scholarships should be held entirely by Americans, and should be distributed with local uniformity throughout the entire domain of the United States. Recognizing the intellectual homogeneity of the whole American people, it should have representatives from every section of the country. This could probably best be secured by allotting a given number of scholarships to each congressional district on the basis of representation as determined by the census enumeration. Candidates should be admitted by competitive examination held by the faculty or an examining board appointed by the faculty, to be absolutely free from all political influence. As the intellectual homogeneity of the American people relates to capacity and not to attainment, in order to secure such universal representation, the university should be accompanied by a preparatory department, and those who pass the examination for the university should have no advantage over those who pass for the preparatory department, except that, if a sufficient number pass for the former, examinations for the latter need not be held. Candidates who enter the preparatory department should be given precedence over those from the same district at the end of that course for admission to the university.

The faculty should be chosen by a commission consisting of the most eminent scholars and scientific men in the country, who are entirely above personal and political bias, such, for example, as the National Academy, the Board of Regents

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of the Smithsonian Institution, and other high authorities in the leading departments of learning.

While the institution should be a university in the fullest and widest sense, it should differ from all other universities in one important respect. All universities have their strong chairs, and many rest their reputation on some one leading feature. The leading feature and true reason for being of the national university should be its course of instruction in the science and art of government. This course should differ radically from the usual courses in political economy and political science. These should not be neglected, but in addition to them and of higher range should stand as the basis of university instruction a thorough and exhaustive course in the practical workings of government itself. Viewing government as the great agency for the transaction of the people's business, every department of government business should be fully taught both in its principles and its practice, so that the graduate from the national university should come forth in full possession not only of all that constitutes true statesmanship, but also of the practical details of each of the many great business operations which the government undertakes and carries on.

The administrative offices of the government should be filled as soon as possible from graduates of the university, so that at length the civil service force of the United States should consist exclusively of persons who have had a thorough training in the theory and practice of government.

PRINCIPLES AND METHODS OF GEOLOGIC CORRELATION BY MEANS OF FOSSIL PLANTS.[1]

THE value of paleontology to geology depends primarily upon the principles by which the paleontologist is guided in the application of his data, and accordingly upon the methods he adopts in bringing such data to bear upon the questions which geology presents for solution. This is especially true of paleobotany, and the chief reason why that branch of paleontology has thus far been so little help to geology is that unsound principles or improper methods have been employed in reasoning from paleobotanical data.

Among the leading principles by which the paleobotanist should be guided may be mentioned the following: —

1. It should not be expected that widely separated deposits having similar floras are necessarily identical in age, since the present well-known laws of geographical distribution are likely to have been operative to a greater or less degree in past geologic ages, and the flora of the entire globe has probably never been homogeneous throughout. Different deposits may therefore be homotactically correlated without being contemporaneous, while, on the other hand, those having very different floras may have really been contemporaneous.

2. The great types of vegetation are characteristic of the great epochs in geology. This principle is applicable in comparing deposits of widely different ages where the stratigraphy is indecisive. For example, in rocks that are wholly unknown, even a small fragment of a carboniferous plant proves conclusively that they must be paleozoic, or a single dicotyledonous leaf that they must be as late as the cretaceous.

3. For deposits not thus widely different in age, as, for example, within the same geological series or system, ample material is necessary to fix their position by means of fossil plants. As this is the most common case, it is the neglect of this principle that has led to the greater number of errors and done most to bring paleobotany into disrepute. The geologists have expected too much of paleobotanists, and the latter have done violence to the truth by attempting to satisfy the extravagant demands of the former. On the other hand, where the material is ample fossil plants are as reliable as any other class of paleontologic data.

4. The correct systematic determination of fossil plants concerns biology and does not concern geology. Much of the contempt exhibited in some quarters for paleobotany has arisen from the impression that there is great uncertainty with regard to the true nature of vegetable remains. This uncertainty is greatly exaggerated even by botanists, who are apt to imagine that nothing can be known of a plant without having all its organs and parts before them. But the geologist need not be affected in the least by these discussions, since all that is required from his point of view is that the fossil be definite, constant, and easily recognizable, as is usually the case with plants. Such as possess these qualities and are also characteristic of a given deposit have their full diagnostic value independently of the question whether their true systematic position has been determined or not.

As regards methods in geologic correlation by means of fossil plants, it is chiefly important that the tables of distribution be complete and comprehensive; that is, that they embrace all the forms found elsewhere, and that all the other localities and formations in which they occur be indicated. It is also important when comparing floras as ancient as the Mesozoic, that those species be enumerated which are obviously related to those of the deposit to be determined. In the discussion of such tables of distribution due regard should be had for the fact that the types of earlier floras often pass up into later ones, and when the latter are much more abundant than the former their occurrence argues much more strongly for the earlier than for the latter date — for the Devonian than the Carboniferous, and for the Cretaceous than for the Tertiary. Many serious errors have been committed by ignoring this principle.

[1] Read, by Lester F. Ward, before Section E of the American Association for the Advancement of Science, at Washington, D.C., Aug. 21, 1891; a translation into French was also read in part before the International Congress of Geologists at the same place, Aug. 29, 1891.

NOTES AND NEWS.

THE public meetings of the Nineteenth Century Club, New York, during the coming season, will be held on the following Tuesday evenings, viz., Nov. 17, Dec. 15, Jan. 12, Feb. 16, Mar 15, and Apr. 12. There will be six conversational meetings of the members of the club during the coming season, to be held upon the first Friday evening in each month.

— The following papers were entered to be read at the November meeting of the National Academy of Sciences: Some Aspect of Australian Vegetation, and The Nomenclature of Vegetable Histology, by G. L. Goodale; On Certain New Methods and Result in Optics, by Charles S. Hastings; An Exhibition of the New Pendulum Apparatus of the United States and Geodetic Survey, with Some Results of its Use, and On the Use of a Free Pendulum as a Time Standard, by T. C. Mendenhall; On Degenerate Types of Scapula and Pelvic Arches in the Lacertilia, by E. D. Cope; The Proteids or Albuminoids of the Oak-Kernel (second paper), by Thomas B. Osborne, introduced by S. W. Johnson; Astronomical Methods of Determining the Curvature of Space, by C. S. Peirce; On Geographical Variation among North American Birds, considered in relation to the peculiar Intergradation of *Coloptes Auratus* and *C. Cafer*, by J. A. Allen; On the Variation of Latitude, by S. C. Chandler; The Tertiary Rhynchitidæ of the United States, by Samuel H. Scudder; On a Color System, by O. N. Rood; Preliminary Notice of the Reduction of Rutherford's Photographs, by K. Rees, introduced by E. C. Pickering; On the Application