

Many other points might be commented upon, but it was not intended to make any extended criticism of a work which quickly proves to be unworthy of extended notice, except as an example of how a government may spend its money during a 'reform' administration. Of the fitness of the author for the task he has undertaken he has himself given the most valuable testimony. He says, "When these computations were begun I was not aware that Baron George von Vega had preceded me in his *Thesaurus Logarithmorum Completus*." This great work of Vega, which every tyro in computing knows, was published in 1794. This is more than a hundred years ago, and it is not easy to understand how one could seriously think of repeating such a performance without finding that it had already been done. The author thinks he has discovered some serious mistakes in Vega, but he delicately refrains from telling what they are, nor does he say that he has yet learned (a hundred years not having elapsed) that in 1889 Vega's tables were freed from all known errors, those discovered during a use of about one hundred years, and republished in Europe in a cheap form by a process prohibiting additional typographic blunders. Had he known this he must certainly have informed the Secretary of the Treasury that the expense of the present publication might be avoided. Not liking to imitate Vega in every respect, he adopted a different arrangement of numbers and logarithms, which he says is the same as that of 'the admirable tables published by Messrs. W. & R. Chambers, London and Edinburgh, 1885.' For this statement the

Messrs. Chambers are surely entitled to action and recovery.

It is but just to the many able and distinguished scientific men serving in the bureau from which this publication comes to say that it was prepared by their chief, published under his name and by his order. They have had nothing to do with it, except, doubtless, to reduce, as far as possible, those errors which yield to ordinary 'proof reading.' Nor must the author be blamed severely, as he is rather deserving of pity. For this costly and worse than absolutely useless production the country is indebted to the 'spoils theory' in politics, and it represents but a minute fraction of what that theory has cost in government scientific work alone. We have good reason to hope that the present administration will avoid the mistakes that must follow in the wake of politics applied to the great scientific bureaus of the government.

THE UNITED STATES NAVAL OBSERVATORY.*

THE history of the Naval Observatory, since its separation from the Hydrographic Office, will naturally be looked for in its annual reports, which are found in the reports of the Navy Department. In 1866 the building of a splendid new observatory was commenced on such a scale that several years were required for its completion. In 1894 Secretary Herbert framed regulations for its government, the most impor-

*We have been requested to reprint this article from the *New York Evening Post* of January 19th. If the criticism of the trivial character of the work of the Observatory is well founded the matter should be brought to the attention of those interested in the efficiency of the scientific work of the government. If the strictures are incorrect those responsible for the management of the Observatory should be allowed to reply in a scientific journal.—ED. SCIENCE.

tant feature of which was the establishment of the office of Astronomical Director, subordinate to that of Superintendent. This arrangement was the act of the Secretary himself, and not of Congress. Both the Superintendent and the Director are detailed from the navy, the first being a line officer, the second a professor; but we find no law establishing their offices.

In one point, at least, the advent of the Astronomical Director is marked by a great improvement. During the years before 1894 the annual reports are confused and disjointed, exciting more curiosity than they gratify, and showing no connection from year to year. Since that date they have been clear and well arranged. But this improvement in form only brings out in bolder relief a feature which runs through nearly all these documents. The report of the Astronomical Director for 1897, which has just been issued, fills six pages; a small space, one would suppose, in which to condense the history of a year's work of such an institution. Yet one-half of this space is taken up with particulars which to the lay reader seem trivial. Is it the Secretary of the Navy or is it an astronomer who will want to know, a year after the event, that on September 3, 1896, the 'finder' of one of the telescopes was supplied with a new leather cap? The most elaborate passage in the whole report is devoted to an account of difficulties encountered in raising an 'elevating floor' by steam-pumps and the happy result of substituting water as the motive power. 'To Professor J. R. Eastman, U. S. N., four star-places were furnished; to Professor Edgar Frisby, U. S. N., two star-places were furnished, and to Professor S. J. Brown, U. S. N., nine star-places were furnished,' these gentlemen being all officers of the Observatory. Do these communications between members of the staff interest the world outside? Does the astronomer want to know in

detail what objects could not be seen with the telescopes, and what good intentions were frustrated by bad weather and other untoward circumstances? If the importance of a subordinate is to be measured by the number of times he is mentioned by name, the most important man in the place must be a Mr. Kahler, whose office is not stated, but who appears to be a mechanic. This gentleman's work is reported with truly astronomical precision as to dates. On September 3, 1896, the disc of a micrometer head was found bent; he straightened it out the next day. September 8th he supplied the clamp for the draw-tube of a finder. January 19, 1897, he finished grinding a lens. February 18th he cleaned, oiled and repaired the machinery of the dial of one of the telescopes, and so on.

The estimates for the support of the Observatory during the next year are in round number \$56,000 for current running expenses, and \$34,000 for grounds, roads, building, etc. If to this we add the salaries of officers and professors paid from the navy fund, some \$25,000, it will make a total of \$115,000. The report of the establishment should certainly give the public such information as will justify this expenditure. We should like to know what important researches are being carried on, what improvements are being made in the observations, and what results of value are likely to accrue to astronomical science. But we have been unable to find, either in the reports or elsewhere, anything to gratify this curiosity. Besides trivialities like those we have already mentioned, the astronomical report gives mostly a highly technical statistical statement of the number of observations made with four of the instruments, and of the progress of the calculations connected with them. It is difficult to perceive how even a professional astronomer could infer anything from the bare facts that 109

miscellaneous stars and 2,832 American Ephemeris stars were observed; that 'in declination the interpolation of the refractions has been finished,' etc.

A curious impression conveyed by the report is that, excepting the Astronomical Director, who has the most important part of all, the professors seem to have less important work assigned to them than the assistant astronomers have. The perfunctory flavor which permeates the whole report is especially strong in the statements of the work of the telescopes: "The positions of two stars were measured for the use of the twenty-six-inch telescope. Eight occultations of stars by the moon and five eclipses of Jupiter's satellites were observed. The diameter of Venus was measured on seven different days, and the sun was examined for spots on four days." Why on four days and no more? The report of the work of one professor is condensed into a single line with the remark that he assists Lieut. Charles E. Fox, U. S. N.

We must in justice state that the Observatory does other than astronomical work. It prepares and publishes the 'Nautical Almanac;' but this is done at the expense of a separate appropriation which we have not included in our statement of estimated expenditures. There is a department of meteorology and magnetism. Why pursue meteorology in the presence of the Weather Bureau and the Hydrographic Office? Sad havoc has been made with the magnetic observations by the building of an electric railway in the neighborhood. There are also departments of time service and nautical instruments, the value of which to the naval service, it is declared, 'cannot be overestimated.' Is not this statement a little strained? It is true that a very impressive list of scientific instruments issued to ships of the navy is given. But the careful reader who makes inquiry will find that the greater number of them can be

purchased at prices ranging from 50 cents to \$10 each. Do the inspection, care and issue of these instruments really form an important part of the work of the establishment? If they do, it will be well to reflect that the great ocean liners, obliged to make their time in all states of the weather, must be navigated as carefully as a ship of war, and that it costs their owners nothing to inspect and issue the necessary instruments. Every captain is assumed to be competent for this duty, and we can find no record of a case in which the loss of a ship was traced to the imperfection of a sextant, spy-glass or chronometer.

What was the Observatory built for? What do the scientific men of the country and of the world think of its work? What credit does it do the officers of the navy concerned in its management? What relation has its work to the wants of the naval or any other branch of the public service? What measures are taken by the Navy Department to insure its scientific output being of real value? We are unable to find an answer to these questions in any official publication.

CLIMATOLOGY AS DISTINGUISHED FROM METEOROLOGY.

THE term Climatology is very frequently treated as synonymous with Meteorology. There is an important distinction, however, which should be generally recognized. Climatology is a distinct branch of meteorology, an application which should not be confounded with the broader subject.

Meteorology includes, in the broadest sense, the various atmospheric phenomena. The subject may be conveniently divided into two parts: The study of the laws and principles involved in the movements of the wind; the formation of clouds; the formation and precipitation of rain, snow and hail; the absorption and radiation of heat and the like. The second part consists of