less important factor than wind-friction. Those interested in the subject will do well to read the chapters on ocean-currents in Croll's 'Climate and time,' and the papers by Croll and Carpenter in the London and Edinburgh *Philosophical journal*, and the Proceedings of the Royal society.

J. S. NEWBERRY.

Columbia college, July 1.

Private research and government science.

Since the promulgation and discussion of the bill to curtail the work of the scientific bureaus at Washington, and Mr. Herbert's appeal "to the best literary and scientific thought of the country to come to our aid and join us in the effort to effect a reform and arrest this pernicious tendency," much has been written and said upon this subject.

One of the chief arguments brought to bear by those opposed to the extraordinary scientific progress being made, and the vast amount of scientific work being done by this country at the seat of its government, is, that this work is proving detrimental to private research in similar channels.

Further, it has been said by the opposition that these scientific publications of the U. S. geological survey are valueless in the book-markets of the world; and Mr. Herbert points to that law in the organization of the survey which specifies that it shall sell all its publications not exchanged at cost, and that during the past six years this sale has realized an amount but slightly exceeding fifteen hundred dollars.

Now, one of the best proofs that this scientific activity on the part of the government is in no way checking private research, has been recently brought forward by Professor Agassiz, who laid before this commission of investigation the titles of forty-eight publications of the Museum of comparative zoölogy at Cambridge, alone.

But perhaps a still better light is thrown upon these two latter questions by an unprejudiced examination of such a catalogue as is published by Dulan & Co. of 37 Soho Square, London. Here we find five of Mr. O. G. Elliot's zoölogical monographs on sale for five hundred and forty-five dollars, and other evidences of the very highest activity in private research in America on every page. Moreover, to prove that the government publications of this country are not held as being valueless in the book markets of the world, we see any number of the publications of the geological survey, and other scientific bureaus of Washington, on sale in the above catalogue, and being sold at prices fully equalling those of private pulications. That more money has not been realized at the survey for the sale of its works, simply speaks in favor of how eagerly they are sought in exchange, leaving but a few copies each year on hand for sale.

The excellent handbooks of geology of this country by Dana and LeConte do not seem to have been suppressed by government interest in this highly important work; and if we run our eyes over the bibliography and illustrations of this science, as set forth in these two volumes, I defy any one to say that the government work is not appreciated, or that private researches in this field are checked. The same holds good for all the other sciences.

I think when the sense of the vote of the "best literary and scientific thought of this country" is taken upon Mr. Herbert's appeal to suppress such works as the paleontological monographs of Marsh, Ward, White, and others, and the magnificent publications in the bibliography of science undertaken and accurately carried through by our government, there will be an enormous zero on his side of the ticket. Government moneys can be squandered on far worse things in the times of peace, than such schemes as powerfully aid the progress of knowledge, culture, science, and learning. Be it said to the credit of this country that she sees fit to invest her surplus means to the advancement of such ends.

R. W. SHUFELDT.

Fort Wingate, N. Mex., June 29.

Expulsion theory of comets.

Mr. Proctor's article in a recent number of the *Nineteenth century*, on the expulsion theory of comets, leads one to believe that the solution of this problem is not only as far off as ever, but that little headway is being made for a general clearing-up of the 'mystery.' There are many serious objections to this particular theory of the origin of comets. We admit, of course, that the earth and Mars, for instance, or even the moon, may have been at one time scenes of vast fiery eruptions, etc. But that this cast-off matter should go out into space in a burning state, and continue to go out, probably, for a great number of years, then return, still in a burning state (the alleged comet),—while the body from which it was expelled, and a much greater size as a matter of course, always remaining in close proximity to the sun, and drawing closer all the time, should cool down and become solid and non-luminous, such as the earth, Mars, or the moon is at the present time,—is certainly something on which Mr. Proctor's theory throws little light. The expelled matter must naturally cool down the same as the body from which it was expelled, and except by accident, considering the distance it would have to travel to meet another source of heat (a sun), we can only come to one conclusion in regard to the expulsion theory, it won't do. G.

Brooklyn, June 29.

Flooding the Sahara.

Mr. G. W. Plympton's very interesting and suggestive article on the flooding of the Sahara (*Science*, vol. vii. pp. 542–544) induced me to make some numerical estimates, based upon the data furnished by him, which may be of some interest to readers of *Science*. He shows that "the area, which, lying below the Mediterranean, can possibly be flooded by it" (the united areas of the depressed portions), is, by M. Roudaire's measurements, about 3,100 square miles; and the average depth, if flooded, would be 78 feet. Now, assuming the area of the cross-section of the water of the Inlet Canal to be 2,000 square feet, and the average velocity of the inflowing water during the whole time of flooding to be 2 feet per second (not a low estimate), it follows that the average inflow would be 4,000 cubic feet per second $=3{,}456\times10^5$ cubic feet per day $= 1{,}262{,}277\times10^5$ cubic feet per year.

Again: 3,100 square miles $= 864{,}230\times10^5$ square feet; and, the average depth being 78 feet, the amount of water required to flood it to this depth $= 67{,}409{,}971\times10^5$ cubic feet. Consequently such a canal would require 53.4 years to flood the comparatively small and shallow Saharian lake, under the assumption that during the inflow no water was lost by evaporation or by absorption into the porous bed.