cians, of which Esperanto is the official language. Their journal for May consisted of 24 pages devoted to important medical subjects. Thus far, physicians have made more use of Esperanto than any other profession. They realize the importance to medical science of an easy means of communication between men of the profession all over the world and are rapidly coming to make use of Esperanto for this purpose.

Some of the large type foundries of Europe are now prepared to furnish the few special letters required in printing Esperanto, in various styles.

Five international congresses for Esperanto have been held, between thirty-five and forty nations being represented either officially or unofficially in the last three. The sixth international congress for Esperanto will be held in Washington, D. C., in August, 1910.

A strong organization exists in Europe, with headquarters at Geneva, for the production of technical vocabularies for Esperanto. The writer has been requested to act as secretary for this organization for the United States. He would be glad to communicate with scientists in all parts of the country who may be interested in this work. It will only be a few years until technical vocabularies will be available, so that all important results of investigations can be printed in Esperanto, and thus become available to the whole world.

The fact that there are eighty-six periodicals published in Esperanto, eight of which are published in the United States, may be taken as an index of the growth of the movement for an international language, a movement which now seems assured. Having taken the trouble to learn the language I wish to assure those who are interested that the amount of labor involved in learning Esperanto is certainly not more than one fiftieth that required to learn German.

W. J. SPILLMAN
U. S. DEPARTMENT OF AGRICULTURE

GEOLOGY AND COSMOGONY

TO THE EDITOR OF SCIENCE: 1. In reply to Professor Barrell's communication in your issue of July 2, 1909, it is sufficient to say that he carefully passes over the legitimate question under discussion, which is that the mountains are formed by the sea, and not at all by the shrinkage of the earth, as taught in most of the books on geology. Since he has thus evaded the issue, his long-drawn-out discussion requires no further notice.

2. In reply to Moulton's statement in your issue of July 23, let me say that my work on the spiral nebulæ and on the formation of the solar system, under the secular action of a resisting medium, was essentially completed July 14, 1908, and my subsequent application for copies of his papers (received here in October, 1908) was simply to enable me to make exact references in some of the arguments refuting his theories. This is well known here, for I was all the while in frequent consultation with members of the astronomical and mathematical faculty at Berkeley, and they were fully informed of the results at which I had arrived. My results were held back for over six months (cf. *A. N.*, 4308), and so new did the conclusions appear to the astronomers of the Pacific coast that when my paper was given to the Astronomical Society of the Pacific, January 30, 1909, several of them stated in public interviews in the San Francisco papers that they were exactly the opposite of previous theories.

3. In the *Astrophysical Journal* for October, 1905, Moulton develops a theory that spiral nebulæ are formed by one star passing by another, and causing spiral ejections of prominences under tidal forces. This idea seems to have originated with Chamberlin, as outlined in his paper on the "Function of Disruptive Approach, etc."[1] Here are some of the arguments against these Chamberlin-Moulton theories: If such tidal disruptions were in progress, spiral nebulæ would be prevalent in the Milky Way, and above all in globular clusters; such is not the case. Perrine has recently shown, in Lick Observatory Bulletin No. 155, that the globular clusters are quite devoid of nebulosity of any kind. Lastly, if spiral nebulæ are due to the disruption of one star by another, then both stars would usually be disrupted in passage, and spiral nebulæ should

[1] *Astrophys. Jour.*, 14, 17–40, 1901.

thus occur in pairs, which is not a fact. This theory of spiral nebulæ is therefore directly contradicted by the most obvious phenomena of the heavens.

4. In the same number of the *Astrophysical Journal* it is announced that Saturn's ninth satellite, *Phœbe,* can not now escape from the control of the planet, so, "conversely, it has never come under Saturn's control from a remote distance." Of course this interpretation of the use of Jacobi's integral is wholly unjustifiable. Under the secular action of a resisting medium such a capture is perfectly possible, and it has actually taken place, not only for the retrograde satellites, but for all of them.

5. The planets and satellites could have been formed in but one or more of the three following possible ways, and in no others whatsoever: (*a*) Detached from their central masses by acceleration of rotation, as imagined by Laplace. (*b*) Captured from the outer parts of a nebula devoid of hydrostatic pressure and thus added on from without, as announced by the writer in *A. N.,* 4308. (*c*) Formed right where they now revolve by the agglomeration of cosmical dust.

Now the possibility (*a*) is forever excluded by what I have called Babinet's criterion (*A. N.,* 4308); while (*c*) will not be seriously considered by any one of ordinary understanding. This leaves (*b*) as the only possible mode of formation.

6. Not content, however, with proving by the logical process of exclusion that the planets and satellites were captured, I have since developed a rigorous proof, based on a correct interpretation of Jacobi's integral under the physical conditions existing in actual nature, of just how the capture of satellites comes about. A series of papers on this subject is just now appearing in the *Astronomische Nachrichten,* No. 4341–42, 4343, etc.

7. It is thus proved that the planets were captured by the sun and have gradually neared that central mass under the secular action of a resisting medium. This cause and no other has given the orbits their round form. It is proved also that the satellites likewise were captured by their several planets. If Moulton and Chamberlin have reached any but negative results, I have not yet seen them, and I shall look forward with interest to their publication. Since naturally a thing has occurred in but one way, it is evident that there are in general an infinite number of ways in which *it did not occur.* Such negative results may be as numerous as the sands of the sea, or as the points in space; but they will no more nourish our minds than empty space will feed our bodies. I submit that protest against such vacant results is certainly justifiable.

T. J. J. See

U. S. Naval Observatory,
Mare Island, California,
August 2, 1909

"um" and "ium" endings

The Editor of Science: A subject which has interested me for some time is the existing lack of uniformity in the ending of the names of some chemical elements. In view of the fact that nomenclature is under discussion at the present time, possibly some remarks on the above subject may not seem presumptuous.

Some of my spare moments have been employed in trying to find if there were any conclusive reasons why five of the elements should have the endings they possess rather than endings in conformity with the majority of their brothers in the list of elements. The five I refer to are glucinum, lanthanum, molybdenum, platinum and tantalum.

Using Roscoe and Schorlemmer as authority, the number of "um" and "ium" elements is forty-seven. Five of these (the above mentioned) have "i" absent in the ending. Of the latter the Oxford English Dictionary and the Century Dictionary are authorities for spelling glucinum, lanthanum, tantalum both with and without the "i." Therefore there remain but two of the elements which as far as I have been able to discover are never spelled with the "ium" ending. In fact the leading text-books on chemistry and writers on scientific subjects spell all five elements with the "um" ending. So we are justified in believing it to be common usage to leave out the "i" in the spelling of the five elements under consideration.