outer limit of the nebula will be about half a million miles further out, the temperature being zero at the outer limit. This means that molecular motion will not there exist. The forces there acting will be gravitation and the repelling action of light waves from the central nucleus.

The entire mass of Neptune will exist in a space far more highly rarefied than any Crookes tube vacuum.

It is, of course, possible for such nebulæ to exist, but it certainly is impossible to believe that such a nebula can throw off a system of planetary bodies. The greater part of our solar nebula must have existed as solid meteoric matter, with a temperature approaching alsolute zero. Only the central part, which is now represented by the sun, was largely gaseous, and at a higher temperature.

DISCUSSION AND CORRESPONDENCE.

INSTABILITY OF THE WATER SUPPLY OF THE RIO GRANDE.

TO THE EDITOR OF SCIENCE: In 1540 when Coronado's men were exploring on the Rio Grande, they reported arriving eighty leagues below Tiguex at a place where the river vanished into the ground. Some Amerinds of the region told them it reappeared again much larger farther down. This they did not verify.

As their report of this disappearance, I believe, has usually been ascribed to 'Spanish exaggeration,' it is interesting, as well as important, to place beside it Humboldt's mention, in his 'Political Essay on New Spain,' p. 213 (English translation by John Black), of a similar phenomenon, which took place in 1752.

> The whole bed of the river became dry all of a sudden for more than 30 leagues above and 20 leagues below the Passo, and the water of the river precipitated itself into a newly formed chasm and only made its reappearance near the Presidio de San Eleezario. This loss of the Rio del Norte remained for a considerable time; the fine plains which surrounded the Passo and which are intersected with small canals of irrigation, remained without water and the inhabitants dug wells in the sand with which the bed of the river was filled. At length after the lapse of several weeks the water resumed its ancient course, no doubt because the chasm and the subterraneous conductors had filled up.

From this it seems fair to infer that the Spaniards of 1540 were witnesses of a phenomenon which repeated itself in 1752.

Springs have also been known to be changed, in that region, by earthquake shocks, and it would, therefore, appear that in the past there has been considerable instability in the water supply. There is a probability that a large branch entered the Rio Grande, from the northeast, just above El-Paso, in Coronado's time, which has since vanished, leaving only marshy spots where it once ran. These changes in volume of springs and in stream-flow have, it is needless to say, an important bearing on the archeology of that district.

F. S. DELLENBAUGH.

SPECIAL ARTICLES.

BIOLOGICAL SURVEY OF THE WATERS OF SOUTHERN CALIFORNIA BY THE MARINE LABORATORY OF THE UNIVERSITY OF CALIFORNIA AT SAN DIEGO.

THE marine biological survey undertaken by the Department of Zoology of the University of California of the Pacific Ocean adjacent to the southern coasts of the state in 1901,* continued for six weeks in the summer of 1902 at San Pedro, with a limited amount of shore work and some attention to the plankton of San Pedro harbor, and transferred in the summer of 1903† to San Digeo or, more specifically, to Coronado on the peninsular side of the Bay of San Diego was again taken up during the holiday intermission of the university for a period of three weeks from December 15, 1903, to January 6, 1904. The committee of the Chamber of Commerce of San Diego, which raised the funds for the work of the preceding summer provided also, in the

* W. E. Ritter, 'A Summer's Dredging on the Coast of Southern California,' SCIENCE, Vol. XV., p. 53, 1902.

† W. E. Ritter, 'Preliminary Report on the Marine Biological Survey Work carried on by the Zoological Department of the University of California at San Diego,' SCIENCE, Vol. XVIII., pp. 360–366, 1903.