

The water used was purified by distilling twice and freezing in a platinum vessel, and the sodium sulphate was crystallised until it gave a constant transition temperature.

THE additions to the Zoological Society's Gardens during the past week include a Serval (*Felis serval*) from South Africa, presented by Mr. C. H. Firmin; a Harlequin Elaps (*Elaps fulvius*) from Central America, presented by Captain J. B. Gilliat; a Greater Sulphur-crested Cockatoo (*Cacatua galerita*) from Australia, deposited; a Chinchilla (*Chinchilla lanigera*) from Chili, purchased; a Japanese Deer (*Cervus sika*), a Sambur Deer (*Cervus aristotelis*), a Red Deer (*Cervus elaphus*), a Thar (*Hemitragus jemlaicus*), an American Bison (*Bison americanus*), born in the Gardens.

### OUR ASTRONOMICAL COLUMN.

A REPORTED PROJECTION ON MARS.—A Reuter's correspondent at Cambridge, U.S.A., states that the Harvard College Observatory at Flagstaff reports the discovery of a large projection on Mars at 3.35 a.m. (G.M.T.) on May 26. The position angle of the projection is given as 200°.

REPORT OF THE OXFORD UNIVERSITY OBSERVATORY.—From the report of this observatory for the period May 1, 1902, to April 30, 1903, just issued by Prof. H. H. Turner, we learn that of the 1180 plates which had to be measured and reduced for the Astrographic Chart, 1100 are now completed, 170 of them having been finished during the period with which the report deals.

When these measurements are completed it is proposed to undertake the measures of the plates, obtained during the opposition of 1900-1901, of the planet Eros, for the purpose of obtaining a more trustworthy value for the solar parallax, this work having been undertaken as a supplementary labour by the International Astrographic Committee.

Paragraph vi. of the report gives an account of the fortuitous discovery of Nova Geminorum, which possibly would not have been discovered at Oxford but for the fact that the first batch of plates used in photographing the Nova's region for the Chart proved faulty, and thereby rendered it necessary that this zone should be rephotographed. It was whilst photographing the zone the second time that Mr. Bellamy used the Nova as a "setting" star, thereby causing the inquiry to be set on foot, when the plate came to be measured, which led to the happy discovery that the bright star  $\epsilon$  had used in setting his instrument was a hitherto unknown object.

PERIODICITIES OF THE TIDAL FORCES AND EARTHQUAKES.—In a paper communicated to No. 3, part ii., vol. lxxi. of the *Journal of the Asiatic Society of Bengal*, Mr. R. D. Oldham, of the Geological Survey of India, discusses the relations between the periodicity of the earthquake shocks recorded by a seismograph set up at Shillong, Assam, during the period August, 1897, to December, 1901, and the periodicity of the tidal forces obtaining at that place during the various relative positions of the sun and moon.

After deducing the reasons for expecting the shocks to appear at certain times during the day and night when the tidal force is at a maximum at the place of observation, Mr. Oldham sets out the recorded shocks in a series of tables and curves. On examining these it is clearly seen that there was a real and a very large variation in the diurnal distribution of shocks in Assam during 1897-1901, their greatest frequencies occurring at 10-11 p.m. and 6-7 a.m., and superimposed on this regular but unexplained variation there was a smaller one, which appears to have been due to the tidal stresses set up by the attraction of the sun. If this latter variation is really due to tidal stress, it then appears that the horizontal component of the stress is much more effective than the vertical component, whilst the effects are more dependent on the rate and range of the stress than on its amount.

Mr. Oldham points out that these results are purely provisional, dealing as they do with only a short period of

observation in one particular locality, but urges that they are definite enough to warrant the obtaining of a longer record at a place, situated within or near the tropics, where earthquakes are of frequent occurrence.

### MISHONGNOVI ANTELOPE-SNAKE CEREMONIES.<sup>1</sup>

IN each of five of the seven Hopi pueblos of Arizona are performed during each year from eight to twelve ceremonies of nine days' duration. The rites of the first eight days are secret, and have certain elements in common; all terminate on the ninth day in a public performance, which has many elements of a gorgeous pageant.

Of the summer ceremonies, those held by the Antelope and Snake societies, which cooperate, are the most spectacular and best known. They alternate in each village annually, with the ceremonies performed by the Drab- and Blue-Flute societies. Thus, in even years, the Snake and Antelope societies perform in Oraibi, Shumopovi and Shipaulovi, and all Flute societies in Mishongnovi and Oraibi; in odd years, the reverse is true.

The time of the Snake-Antelope ceremonies is determined by the date of the last day of the Niman ceremony, which occurs in July, and at which time the Katcinas and masked gods disappear until the following winter.

Four days from this time, certain priests of the Snake-Antelope societies meet in a room, make certain *bahos* or prayer sticks, which are deposited in a shrine on the following morning, at which time the village Crier announces from the house-top the date of the first day of the Snake-Antelope performance, four days hence.

At that time, the chief priests of the Snake-Antelope fraternities meet in their respective *kivas* or underground chambers. During the next four days, the Antelope priests gather in constantly increasing numbers in their *kivas*, make *bahos*, indulge in fraternal smoking, and on the fifth day, prepare on the floor of their *kiva* a sand picture and erect their altar.

During this time the Snake priests have been engaged in a ceremonial hunt for snakes, scouring the country to the north on the first day, on the west on the second, &c.

Very early on the sixth, seventh, eighth and ninth days the Antelope priests gather about their altar, and, reinforced by the chief priest of the Snake society and two personages representing the Snake Youth and Antelope Maiden of the legend, sing eight traditional songs. These performances are the most beautiful and sacred of the entire ceremony. On the eighth and ninth days of this singing ceremony there is the added element of two Snake men, dressed as Kalehtaka or Warriors, who perform with the bull-roarer and lightning-shooter, after which they, with an Antelope priest and fifty or sixty young men of the village, repair to a spot in a plain far below the mesa, where, after the deposition of *bahos* and the laying of cloud symbols by the Antelope priest, there begins a spirited and exciting race on the part of the young men to the summit of the mesa. The winner of the race on each morning receives from the hands of the chief of the Antelope priests a small netted gourd containing water from the medicine bowl, which has been fertilised by smoke, which he later deposits in his field.

On the afternoon of the eighth day occurs a public performance in the plaza, participated in by all the Antelope and Snake priests, properly costumed, at which time the Antelope men in turn carry in their mouths a corn-husk packet, receiving it from the *kisi* or booth of cottonwood especially erected in the plaza for this purpose.

On the ninth day occurs the most sacredly guarded event in the Snake *kiva*. At noon the snakes, numbering from sixty to eighty, one-third or one-fourth being rattlesnakes, which have been guarded in this *kiva* in earthenware jars, are placed in one large bag. The Snake priests gather along one side of the *kiva* in line, seated upon stones. In front of the chief priest is a bowl containing medicine water.

<sup>1</sup> "The Mishongnovi Ceremonies of the Snake and Antelope Fraternities," by George A. Dorsey and H. R. Voth. Field Columbian Museum Publication 66, Anthropological Series, vol. iii. No. 5.