(*Limosa ægocephala*) four Flamingoes (*Phœnicopterus antiquorum*) European, purchased; a Barbary Wild Sheep (*Ovis tragelaphus*, ♂), an Angora Goat (*Capra hircus*, ♀ var.), a Japanese Deer (*Cervus sika*, ♀), a Great Kangaroo (*Macropus giganteus*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

THE TOTAL SOLAR ECLIPSE (April, 1893).—M. N. Coculesco, in the current number of the *Comptes Rendus* (No. 22) gives a brief account of his observations made during the last total solar eclipse. The station he occupied was at Fundium. The instruments which he took with him consisted of a telescope of 0·16 m. aperture, with a wooden mounting, a fine comet seeker, a mean time chronometer, and a thermometer. An ordinary photographic camera fixed to the telescope was also employed, five fine negatives of the corona being obtained with it. The plates employed were the ordinary dry plates of gelatine-bromide of silver, and the developer that of ferrous-oxlate. The exposures were of 2, 4, 6, 7, and 5 seconds duration, but the second plate seems to have given the most details. The observation of contacts gave the following results:—

Observation.	Paris M. T. h.	m.	s.
1st contact	2	20	21
2nd ,, ...	3	42	51
3rd ,, ...	3	47	2
4th ,, ...	5	3	36

thus giving 4m. 11s. as the duration of totality. The thermometrical observations showed that on the day of the eclipse the temperature was + 28° C., at the commencement of totality 26°·6, middle of totality 24°·0, and at the end of the eclipse 26°·5. A fall of from 3½° to 4° was thus noticed from the commencement of the eclipse to the middle of totality.

METEOR OBSERVATIONS.—Mr. Denning, in the *Observatory* for June, has a note on the large meteor of April 15, 1893, and also notes on observations of fireballs. With reference to the latter he points out those observations are made by a number of casual observers, and are commonly found to be conflicting and incomplete, the accounts being based on "rough hurried impressions often vitiated by serious errors." In attempting to reduce such observations it is generally found impossible to accommodate the descriptions unless we assume that the several large meteors appeared simultaneously in different paths. These bodies, he says, deserve closer attention than is usually given to them, and accurate observations should be made with regard to their positions, directions, and durations of their flights among the stars. That meteoric astronomy would advance by rapid strides, and that many "moot points in the visible behaviour of meteor-streams would soon receive settlement" cannot for a moment be doubted.

The study of brilliant meteors is one that requires no instrument but simply a good star atlas, and we hope that many of our readers may take Mr. Denning's words to heart and try to elevate this important branch of astronomy so that it can no longer be said that "they come and go, and their transient glories serve no more important end than that of affording startling spectacles to those who are fortunate enough to witness them."

WASHBURN OBSERVATIONS.—In vol. vi. part 3 of the Publications of the Washburn Observatory are the results of the observations made by Mr. Sidney Dean Townley of telescopic variable stars of long period. The method employed was to select two stars for comparison, one slightly brighter and the other slightly fainter than the one to be measured, the difference between these two comparison stars in brightness being less than a magnitude. By this means a very accurate estimation can be made of the brightness of the star in tenths of the interval between those taken for comparison. In estimating the magnitudes of the comparison stars he has employed the limit of visibility of the finder and large telescope (apertures 8·9 cm. and 39·5 cm. respectively), commencing with the former, and going down the numerical scale. The method of recording the values obtained is similar to the notation used by Argelander and Herschel Thus of two comparison stars *a* and *b*, *a* 1 *b* shows that the star observed is very nearly as bright as *a*, while *a* 9 *b* shows that it is very nearly equal in brightness to *b*, the number 1 representing one-tenth of the difference of brightness between the two comparison stars. In the tables, the number of the stars, together with their R.A.'s and declinations, are taken from Chandler's "Catalogue of Variable Stars." About 36 variables are included in this work, the observations extending over the period 1889–1892.

FINLAY'S COMET (1886 VII.).—Comet Finlay is described as circular, 1′ in diameter, 11th magnitude, very diffuse, and with no tail. As it rises just before the morning twilight in this country, it is by no means in a good position for observation. The following ephemeris is taken from a continuation of M. Schulhof's computations, made by M. Coniel, the difference between the computed and observed places being approximately—1m. 43s. in R.A. and + 12′ N.P.D.

M. T. Paris.

1893.	R.A. app. h.	m.	s.	Decl. app. °	′
June 8 ...	1	12	56	... +4	40·6
9 ...		17	35	... 5	9·9
10 ...		22	15	... 5	39·1
11 ...		26	56	... 6	8·2
12 ...		31	38	... 6	37·1
13 ...		36	20	... 7	5·9
14 ...		41	3	... 7	34·5
15 ...	1	45	47	... +8	2·9

GEOGRAPHICAL NOTES.

AT the last meeting of the Royal Geographical Society, Dr. Joseph A. Moloney, medical officer to Capt. Stairs' expedition to Katanga, read a paper descriptive of the journey. The expedition of over 300 men landed at Bagamoyo on June 27, 1891, and marched to Lake Tanganyika through the German territory, following the well-known caravan-track through Tabora. On the way proofs were not wanting that the slave-traders were kept well supplied with gunpowder, in spite of the strict regulations which are made much of in Europe. On October 9 they reached Lake Tanganyika near its southern end, and from conversations with the missionaries and natives obtained some interesting information as to the variations in the level of the water. It appears that the outlet of the lake by the Lukuga becomes periodically choked by sand and vegetation, thus forming a natural dam, which causes the level of the lake to rise. After a time the barrier is carried away and the river issues with great force, flowing strongly for a number of years. The extreme difference in level must be about 18 feet, and the rise and fall probably occupy about fifteen years. On October 31 the caravan started from the west side of the lake. The Kaomba country first passed through was found to abound in minerals, iron and copper being extensively worked by the natives who show much skill in the manufacture of weapons and implements. Bunkeia, the capital of Msiri's territory, was reached on December 14, the journey having been of extraordinary rapidity considering the route taken. Much of the country was swampy, and there were tracts of dense tropical forests reminding Captain Stairs of the Aruwimi basin. Near Bunkeia a famine was raging, and this, together with the tragedies consequent on the conquest of Msiri, brought the expedition into a very bad state. All the Europeans except Dr. Moloney suffered severely, and Captain Stairs never fully recovered. On February 4, 1892, the survivors of the expedition set out on the return journey, and travelling by Lake Nyasa and the Shire reached the Chinde mouth of the Zambesi on June 4.

JUDGE DALY, President of the American Geographical Society, devoted his anniversary address, which has just been published, to a critical study of the portraits of Columbus. He believes that several of those popularly held to be authentic are really original paintings from the life, but the Lotto portrait which has been multiplied indefinitely by the United States Government on commemoration coins and postage stamps he looks on as of very doubtful value.

MR. CARL LUMHOLTZ publishes a letter from North Mexico in the last number of the *Bulletin* of the American Geographical Society, in which he gives some account of his studies of the Tarahumare Indians, who are cave-dwellers although not apparently connected with the ancient cave and cliff-dwellers of the United States. Mr. Lumholtz was engaged in taking down the language, and in making anthropometric measurements of this little-known tribe.

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THE French weekly geographical paper, *La Géographie*, has, after five years in the ordinary garb of a newspaper, assumed a new form, each number consisting of eight quarto pages in a coloured wrapper.

MR. H. YULE OLDHAM, Lecturer on Geography in Owens College, Manchester, has been appointed to the lectureship on Geography in the University of Cambridge, formerly held by Mr. J. Y. Buchanan, F.R.S. Mr. Oldham has mainly studied the historical aspects of geography, and in his appointment the University of Cambridge obviously intends to associate its geographical teaching with the Historical rather than the Natural Science Board of Studies. It is to be hoped that the lectureship will receive more attention from the members of the University than has been given to it hitherto, and that the loss to scientific geography caused by Mr. Buchanan's retirement will be more than made up by increased interest in the less specialised aspects of the science.

MR. H. M. CADELL gives a remarkably interesting map of the site of Edinburgh in prehistoric times in the June number of the *Scottish Geographical Magazine*. The most noteworthy feature is the submergence of the 25 feet raised beach on which the greater part of Leith is now built, and the existence of seven comparatively large lakes of which the shrunken remnants only remain, or which have been entirely drained and reclaimed within the historic period. A summary of the evidence for the existence of these lakes is given in the form of a short article. It is noteworthy that the changes in the surface of the land due to cultivation and building operations have in some cases almost entirely concealed the original features. In the early human period the shores of the Firth of Forth must have been occupied by a succession of swampy lakes dominated by the steep cliffs of the volcanic hills.

SEISMOLOGY IN JAPAN.[1]

THE editor insists in a Wordsworthian manner on calling this the seventeenth volume although it is really vol. i. of the journal: he numbers it as a continuation of publications hitherto issued as the Transactions of the Seismological Society of Japan. The Society was founded in 1880 and for many years its meetings were frequent and well attended. It ceased to live in so far as subscriptions and meetings are concerned in 1892, many of its members having left the country. It may now be said to exist as much as ever it did, but without subscriptions. The transactions are in sixteen volumes of scientific papers to which a general index is published in this first number of the journal, and there can be no doubt of the great value of these papers, or of the ability and industry in experiment and speculation of the men who wrote them. During the twelve years' work of the Society much was accomplished; some order was evolved out of chaos; seismographs have been invented giving absolute measurements of earth motions, and a complete change has been effected in earthquake observation; a chair of seismology has been established in the Imperial University and there is now a bureau controlling a central observatory and some 700 outside stations, together with many seismological laboratories. This is some of the work which the Society has done.

The first paper in this journal "On the Mitigation of Earthquake Effects, and Certain Experiments on Earth Physics" by the editor, reads very strangely to any one unacquainted with the work done by Prof. Milne in the last fifteen years. For example, on the construction of buildings in earthquake countries, his experiments have led to such results that he can speak with certainty on things which used to be merely matters of vague speculation, such as the security given by depth of foundation and the great differences in the earth motions at places within a few hundred yards of one another.

Probably no one can speak with greater authority on photographic matters than Prof. Burton, who contributes an article "On the Application of Photography to Seismology and Volcanic Phenomena." The other papers are:—An abstract of "The Seismometrical Observations for the year 1890," by the editor; "An Account of Experiments on the Overturning and Fracturing of Brick and other Columns by Horizontally Applied Motion," by the editor and Prof. Omori; "On Earth Pulsations in relation to certain Natural Phenomena and Physical Investigations," by the editor; an abstract on observations by Dr. E. Von Rebeur-Paschwitz with horizontal pendulums; a note on old Chinese earthquakes, by Prof. Omori, and a note by the editor on the destructive earthquake of 1891. All these papers seem to me to be valuable and interesting; they ought to be studied by every young philosopher whose mathematical and other weapons are ready, but who is yet without mental employment. The subject is one of world-wide interest, although it may seem to be only interesting to people like the Japanese who are jogged into attention every week of their lives.

The beautiful series of photographs published by Burton and Milne about a year ago are records that can never be branded as lies or exaggerations. Even Dr. Johnson, who to his dying day denied the fact that an earthquake had occurred at Lisbon, would have been convinced by records such as these. Without these photographs it would be difficult to believe in the actual compression in area of land over a large district or in vertical wave motion, travelling along a street as if the earth were water in a canal. The Japanese cannot neglect the study of the subject and other people ought not. Our time also may come, even in England, when in a five seconds interval, three fourths of all the houses in London may tumble into ruin and a quarter of a million sterling may be lost on every square mile of English ground. It is of no use to argue from the long histories of ancient cities. Earth shakes that had no evil effect on the more or less pyramidal architecture of Assyria and Egypt would lay the dwelling houses of London in long swathes upon the ground. One laughs at Alice's White Knight who was so well prepared for sharks, but we also laugh at Mrs. Aleslime whose specific in the real time of danger was "black stockings for sharks." Whatever our own safety may be we must remember that some of the most interesting parts of the world are vitally interested in this question, and the most artistic, most honest, most kindly, most generous and confiding clever people that the world has ever seen are demanding from us that we shall study this question to find out whatever means there may be for mitigating the effects of earthquakes, and more than all, taking away from them the dreadful everpresent feeling of danger, which seems in itself almost sufficient to arrest progress in civilisation.

We western people were till lately represented in Japan on this question by the Seismological Society. What one earnest worker and a few of his friends can do is being done, but in spite of earnestness and devotion, I am afraid that in one respect there must be a lessened result. The existence of the Society was of some weight in maintaining the interest of the Japanese Government on what must seem to non-scientific people a rather hopeless search for information. Even the small and exceedingly intermittent assistance of the British Association grant is of enormous moral value to Prof. Milne; and I think that if the council at Edinburgh had yielded to the representations of section A and granted the modest request of Prof. Milne for £25, they would have done more good than they can do with any equal sum in their present list. We have here a man who is untiring in experimental work, who has the power of keeping enthusiasm alive in other people to a remarkable degree, who is not a wealthy man and who yet spends some hundreds of pounds a year of his own, in making and using apparatus and in publishing a journal which has about seventeen subscribers. And all the work is good; it is thankless work as all work on the beginning of a science must be.

If every reader of NATURE who is interested in the matter and who can afford it, would only send to Prof. Milne a subscription (one pound a year) to this journal, his losses would be confined to his experimental work; the Japanese Government would more certainly continue to interest its officials in making observations, and the subscribers would glow in the consciousness of having done their duty.

JOHN PERRY.

[1] *The Seismological Journal of Japan*, edited by John Milne, F.R.S. Vol. xvii. 1893.

ON LIGHT AND OTHER HIGH FREQUENCY PHENOMENA.[1]

BRILLIANTLY worded, comprehensive, and strikingly illustrated was a lecture delivered by Mr. Nikola Tesla, of which a report has just reached us. In his own words:—

[1] A lecture delivered before the Franklin Institute, at Philadelphia, Feb. 24, 1893, and before the National Electric Light Association, at St. Louis, Mo., March 1, 1893.

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