

the Thames." A mile to the west at Highbury, other molluscan genera are represented. A list of the Highbury shells is given by Dr. John Evans—"Stone Implements," p. 524.

I now come to the bed of gravel indicated at B (Fig. 1) and A (Fig. 4). It is found at an average depth of 12 feet, and descends to 20 or 30 feet from the surface; this drift contains, chiefly in its upper parts, lustrous sub-abraded Palæolithic implements of medium age. All these tools have been more or less moved and relaid by the agency of water; none are quite unabraded; bones, teeth, and tusks of the mammoth also occur, with other mammalian remains, driftwood, &c. This deposit has been described by Prof. Prestwich in the *Quarterly Journal of the Geological Society*, 1855, vol. xi. p. 107. The material is remarkable for containing immense blocks of sandstone, probably never moved by water alone, and sometimes weighing one, two, or more hundredweights; that these stones fell from blocks of drifting ice seems extremely probable. Some of them measure two feet across, and they must have been brought from the north long prior to the deposition of the trail, and probably long after the time when other immense blocks found at 20 feet and 30 feet at the bottom of the gravel were deposited. Some show glacial striae. Generally in the deepest pits, the third and oldest class of implements is found, the examples are rudely made, massive, deeply ochreous in colour, with a thick ochreous crust, the ochreous tint not derived from the matrix they are now in; they are generally very much abraded, indicating transport from a long distance, or long dashing about in water with other stones, but as the three different classes of implements will be illustrated in my concluding note, and proved to be of totally distinct ages, far removed from each other, I need not refer to them at length here.

It commonly happens, that the higher the gravels above the present rivers, the older they are, but here we have an instance where the newer gravels and more recent implements are from 8 feet to 26 feet higher than the old.

WORTHINGTON G. SMITH

THE COMET

THE Astronomer-Royal has received, through Sir James Anderson, a telegram from Mr. Gill, in the following terms:—"Please inform Astronomer-Royal that comet's declination in my letter of September 11 should be 56 minutes 30 seconds south. Sudden disappearance of comet at ingress on sun's disc observed September 17 days 4 hours 50 minutes 58 seconds Cape mean time. Comet not visible on sun." Mr. Gill's remarkable observation is without a precedent, and an extraordinary illustration of the intense brilliancy which the comet attained at perihelion.

The Emperor of Brazil telegraphs thus to the Academy of Sciences of Paris:—"Rio, 26 Septembre, 10h. 20m. Note Cruls. Grande comète australe visible de jour observée aujourd'hui. Queue 30°. Présence sodium et carbone. 25 Septembre.—Visible de jour au sud de Rio 18, 19, 20. Vue par moi aujourd'hui de 4h. 10m. à 5h. 40m. matin. Splendide 26."

Mr. Ainslie Common, of Ealing, whose daylight observations on September 17 may have an important bearing on the theory of the comet, has furnished us with the following extract from his note-book on that date:—

	Value.
10.45. Found bright comet. S.W. sun.	
10.59. Comet precedes sun, 6m. 5c.s., centre to centre	} 3
11.10. Comet south, sun's limb, 20R 50D = 18' 8" ...	
11.47. Comet precedes sun, 5m. 48s. (?) ...	} 1
11.58. Comet south, sun's limb, 16R 60D = 14' 41" ...	
12.0. Comet precedes sun, 5m. 44s. (good) ...	} 3
12.6. Comet south, sun's limb, 15R 55D = 13' 45" ...	

Clouds came over shortly after this."

Mr. Common has corrected an error in reducing the

last micrometrical difference of declination into arc: one revolution = 53".1. He states that he made an immediate attempt to telegraph to Greenwich and Dun Echt, but the office at Ealing was unfortunately closed.

We have received several drawings from M. Bulard, of Algiers, showing the appearance of the comet as viewed with the naked eye, in one of which the tail is depicted with considerable curvature. Also a sketch of the head as seen in a powerful telescope, exhibiting the system of envelopes rising from the nucleus, which has characterised several recent bright comets (see Figure).



The following elements of this comet have been calculated by Mr. Hind from the Dun Echt and Coimbra meridian observations on September 18, a meridian observation at the U.S. Naval Observatory, Washington, on September 21, and an observation made at the Collegio Romano, at Rome, on the morning of October 2, obligingly communicated by Prof. Millosevich:—

Perihelion passage, September 17.2169, Greenwich M.T.

Longitude of perihelion 276 14 36	} Apparent
" ascending node 346 6 58	
Inclination 37 58 59	} equinox
Logarithm of perihelion distance 7.906527	
Motion—retrograde.		

These elements afford further indication of disturbance of the comet's motion near the time of passage through perihelion. At the moment when Mr. Gill observed the comet upon the sun's limb, when the distance from the sun's centre was consequently 16'.0, the orbit gives the central distance, as 10'.9, or the comet projected upon the sun's disc. Considering that Mr. Gill's observation was made less than one day previous to the accordant meridian observations at Dun Echt and Coimbra, it is not easy to see how such difference could arise from error of elements, which represent the middle position employed in their determination within a minute of arc.

The following expressions for the comet's heliocentric co-ordinates x, y, z , referred to the equator, are to be used in connection with the X, Y, Z of the *Nautical Almanac*, in the calculation of geocentric positions:—

$$x = r. [9.99521]. \sin (v + 9 \ 6.2)$$

$$y = r. [9.98774]. \sin (v + 277 \ 2.4)$$

$$z = r. [9.44252]. \sin (v + 130 \ 17.5)$$

r being the radius-vector, and v the true anomaly.

[Mr. Gill writes on September 19: "Yesterday and today the comet is a brilliant daylight object, and was observed on the meridian by myself with the Transit Circle. We have a whole lot of Alt-Azimuth observations which will be reduced as soon as possible. They were the only kind of observations possible, as the comet was only visible by glimpses through holes in the cloud between September 8 and perihelion."

In a letter addressed on the same day to the Astronomer Royal (with a copy of which he has favoured us) Mr. Gill says: "On Sunday, the 17th inst., the comet was followed by two observers with separate instruments right up to the sun's limb, where it suddenly disappeared at 4h. 50m. 58s. Cape M.T.]"

NOTES

PROBABLY some of our readers may have heard that Mr. W. Spottiswoode met with an accident recently. The fact is that on September 30 last he broke his left humerus within the capsule, through the overturning of the tricycle he was riding. He has, we are glad to learn, been carefully attended, and is getting on as well as possible.

A PRIVATE letter to this country conveys the intelligence of the death, on September 11, at Kandy, of Dr. Thwaites, F.R.S., for many years director of the Royal Botanic Gardens, Peeadeniya, Ceylon. We shall defer to a future issue some particulars of his life.

THE death is announced, at the early age of forty-eight years, of the well-known scientific photographer, Dr. D. Van Monckhoven.

WE are glad to learn that a memorial signed by Professors Paget, Humphry, Hughes, Newton, and Moseley, Drs. Michael Foster and S. H. Vines, and Messrs. G. H. Darwin, E. W. Blore, Coutts Trotter, A. Sedgwick, and J. W. Clark, was presented to the Vice-Chancellor of Cambridge University (Dr. Porter) on the 4th inst., representing the desirability of establishing some memorial of the late Prof. Balfour in the University. The Vice-Chancellor, in accordance with this request, has called a meeting of Members of the Senate and others for October 21, at 4.30 p.m., in the Lecture-Room of Comparative Anatomy, in the New Museums, "to take steps to establish in the University a memorial of the late Prof. Balfour."

SOME forty eminent German botanists met at Eisenach on September 16, under the presidency of Professors Pringsheim, Cramer, and Willkomm, and founded a German Botanical Society. The new society has its seat at Berlin, and its object is to form an effective and supporting centre for all efforts in the domain of scientific botany in Germany.

As is well known, the French Institute is divided into five classes, which meet together once every year. The president of this reunion is chosen in rotation from among the president of each of the five sections. The chair will be occupied this year by the president of the Academy of Sciences, who is styled director, and who happens to be M. Dumas, one of the two perpetual secretaries of the Academy of Sciences. M. Dumas will deliver on this occasion an address which it is stated will be of special importance. This meeting will take place on October 25 next.

M. DUMAS delivered at the sitting of the Academy of Sciences of October 9 an address summarising the works of the International Commission of Weights and Measures. He stated that the commissioners had executed a comparison between the

original meter and kilogramme deposited in the Archives, with the new standards. The difference had been proved to be 0.000006 m. for the meter, and 0.00001 gram for the kilogramme. The consequence is that a slight correction will be required for the measures taken with the international meter as the comparison between two measures of length can be executed with a precision of one part in ten millions. The new international kilogramme can be used without any correction at all.

TWO International Conferences will open in Paris on Monday next. One of these is for the object of settling upon a plan for the protection of sub-marine telegraph cables; the other is to establish throughout Europe the important desideratum of technical uniformity in relation to electricity. England, France, Germany, Austria, the United States, Spain, Denmark, Norway, and Sweden will be represented.

M. GABRIEL DE MORTILLET, Professor of Archæology to the School of Anthropology of Paris, has just published through Reinwald a work under the title of "Le Præhistorique," which may be considered as the first complete manual for the study of the Archæological Museum of St. Germain. M. Gabriel de Mortillet has been attached to this establishment from its foundation by Napoleon III. up to the present time, and is industriously engaged in its completion. The author, who is one of the few living geologists who investigated the formation of glaciers in Switzerland with Agassiz, attempts at the end of his volume to determine how far distant is the epoch when *Homo Sapiens* made his first appearance on the earth, by estimating the rate of progression of blocks which were carried by former ice-fields, and he comes to the conclusion that the space of time that has elapsed since that event to the present exceeds 200,000 years.

THE meteorological station on the summit of the Säntis has recently been opened, and this latest Swiss station promises to be of importance with regard to the progress of meteorological science. In its altitude of 2504 metres it is surpassed only by the observatories on the Stelvio (2548 metres), the Pic du Midi in the Pyrenees (2877 metres), and the station upon the Colorado Peak (4340 metres).

THE *Panama Star and Herald* of September 14 gives details of several earthquake shocks which had visited the isthmus during the preceding week, doing much damage, but, fortunately, only causing two deaths. At 3.20 a.m. on Thursday, the 7th, the inhabitants were aroused from their beds by one of the longest and most severe earthquake shocks ever experienced in the city. It was preceded by a hollow, rumbling noise. The motion was wave-like, and proceeded almost directly from north to south. The first and most severe shock must have lasted at least 30 seconds. Extreme damage was done to buildings. A second and milder shock occurred about half an hour after the first. The Pacific Mail steamship *Clyde*, arriving from San Francisco, reported that the earthquake was severely felt on board. Passengers declared that it appeared as if the vessel were lifted bodily from the sea and allowed to fall back. The effects of the earthquake along the railroad were most marked. The stone abutments of several of the bridges were cracked and almost split, and the earthworks sank in half a dozen places. In several places where the direct action of the shock appears to have made itself most strongly felt, the rails were curved as if they had been intentionally bent. The severe shock on the morning of the 7th was followed during the day by several others of less intensity, and at 11.30 p.m. a sharp shock alarmed the whole city, and drove the people from their houses to the squares. Another slighter shock occurred at about three in the morning; but, fortunately, neither it nor its predecessor added further ruin to that already incurred in the city. All the shocks were felt on the islands in the bay, and some houses suffered at Taboga. On the morning of the 7th, at about 3.15, the residents of Colón