

into a fork (*f*), with two yellowish points; these points stand close beneath the yellow anthers, whilst the apical apertures of the red anthers (*a*²) are placed far below them near the stigma; also the style and the stigma (*st*) are coloured so very like the corolla, that from some distance neither they nor the longer stamens can be seen at all. Any large bee (like *Xylocopa*, *Centris*, or *Bombus*), when working on the smaller anthers in order to collect pollen, would, by moving the connective fork of the larger ones, press the apertures of the latter against the ventral side of its abdomen and powder it with pollen. Until now I have only seen a little fly (*Syrphidæ*) and *Trigona ruficrus* visiting this flower, both too small to fertilise it. The fly takes only notice of the yellow anthers; the *Trigonas*, too, always sit down first on these; but most of them (the more experienced specimens?) turn then round, and go to the larger anthers, which offer a more copious pollen-store, and work on them with their mandibles or eat them up entirely. Even if larger bees acted in the same manner as *Trigona ruficrus*, they would have powdered the ventral side of their abdomen before going to plunder the latter. The pollen of both kinds of anthers is white."

HERMANN MÜLLER

Palæolithic Implements in the Thames Valley at and near London. Their Comparative Numbers

IN my former letters, *NATURE*, vol. xxiii. p. 604, vol. xxiv. p. 29, I cited instances of the occurrence of these objects at great heights, indicating great antiquity, at the north and south of London. After the positions of the implements on the different old river terraces are considered, their numbers, as compared with the amount of material excavated, is a subject of considerable interest, as these numbers indicate in a broad way the amount of human population.

Before I give the results of my own experience I may say here that I have had these implements in view for about twenty years. I have not searched for them myself during all this time, although at first I commonly looked over pits and roads for implements and flakes with little or no result.

I had four reasons for beginning a thorough examination of the London gravels:—1. I had long taken a great interest in the subject. 2. I had particularly noticed the implement found in Gray's Inn Lane now in the British Museum, I had looked over Col. A. Lane Fox's collection from Acton and Ealing, and I knew of two implements from the gravels excavated near my own house. 3. I felt disappointed at not meeting with Thames valley implements myself. 4. I had been unwell through overwork, and my doctor told me I should not be well again till I regularly took a four-miles daily walk.

In the early spring of 1878 I determined to walk over the London gravels and note the constituent stones—not walk over the roads and pits once or twice, but ten, twenty, or if need be fifty times, so as to thoroughly acquaint myself with the stratification and materials.

I began in May, 1878, to examine the excavated gravel at Clapton, N.E. London, in the valley of the Lea. Here, after considerable searching, I found an implement and several flakes. I then mapped out the gravels for twenty-seven miles in a line east and west of North London, and wherever the gravel has been exposed in these twenty-seven miles I have been over it a great number of times. In three years—from May, 1878, to May, 1881, I found exactly one hundred implements, mostly lingulate examples (a few ovate), and thirteen trimmed flakes, *i.e.* genuine implements, but worked on one face only. This is equal to one hundred and thirteen perfect specimens. I also found twenty-one butt-ends and six points, some broken in Palæolithic times, others showing modern fractures; side-scrapers, six; flakes about one thousand four hundred; broken fossil bones, teeth, and tusks, chiefly mammoth and horse, not uncommon. Hammer-stones of quartzite, with abraded ends, none. An unabraded quartzite pebble, such as the pebble mentioned by Mr. Perceval, teaches nothing. Even if one end is abraded off, it might have been rubbed off by other pebbles passing over it whilst naturally fixed in the bed of a stream. When both ends of a quartzite pebble are abraded *quite away*, and the abraded parts are of a *distinctly different colour* from the rest of the pebble, such a stone is probably a hammer-stone. I have several genuine examples of these of Palæolithic age, but not from the Thames valley.

On reading these notes some persons may be inclined to exclaim, What a large number of implements! How common these objects must be! My reply is they are by no means common, but as a rule *extremely rare* and *most difficult to find*.

One seldom sees a first-class implement resting flat and clean in the middle of a road or pit, inviting the passer-by to pick it up. They are usually half-buried, with only part of the point, edge, or butt visible, and that part frequently covered with clay or dirt, so that it requires a sharp and trained eye to distinguish the implements and flakes from the ballast with which they are incorporated.

My first attempts were to find how many implements occurred in a hundred tons of London gravel, but I found it impossible to determine this with certainty; I however could accurately find how many miles of the actual drift I had walked over, and my experience is that I walked in three years over four thousand five hundred miles of gravel to find one hundred and thirteen implements, equal to a walk of about forty miles for one implement.

Of course the implements may be more frequent in some places, as at Milford Hill, Salisbury, and Warren Hill, Mildenhall, and much less frequent in others, but the above statement is my personal experience in the twenty-seven miles of river-gravel to the north of the Thames at London. The men working in the roads and pits often questioned me, and I set all the men to look for the implements during my absence: the whole of the men together in three years produced twenty-two extra implements, ovate or lingulate, and worked on both sides.

The mere accumulation of implements was by no means my object. I felt from the first that to entirely depend upon workmen was a great mistake, as all ill-defined instruments must be lost. I therefore personally looked out for genuine new things, and especially wished to ascertain, if possible, what the implements themselves had to teach of the *men who made them*, how the implements were deposited, and if possible to calculate their age in years. With these objects in view I have kept a manuscript book, giving the exact circumstances of finding of every implement in my collection, not only in reference to the implements belonging to the Thames Valley, but to nearly all the implementiferous river-valleys of this country. With equal care I have kept a list of non-implementiferous positions, and my experience is, the lower gravels of the Thames as at Hammersmith and Battersea are barren. As soon however as a seventy or eighty feet terrace is reached, the implements and flakes crop up. Two implements have been found in the Thames at Hammersmith and Battersea, as recorded by Mr. Evans ("Stone Implements," p. 528), but these, of course, were washed out of a higher bed. I have found several flakes and an implement at Clapham Common and Battersea Rise, but here the heights are seventy to ninety feet. The most persistent searching at Lower Battersea and Hammersmith has produced with me absolutely nothing. With your permission I will give further results in a future letter.

WORTHINGTON G. SMITH

125, Grosvenor Road, Highbury, N.

THE COMET

WE have received the following further communications on the lately-visible comet:—

THE appearance of a large comet has afforded an opportunity of adding to our knowledge of these bodies by applying to it a new means of research. Owing to the recent progress in photography it was to be hoped that photographs of the comet and even of its spectrum might be obtained and peculiarities invisible to the eye detected. For such experiments my observatory was prepared, because for many years its resources have been directed to the more delicate branches of celestial photography and spectroscopy, such as photography of stellar spectra and of the nebulae. More than a hundred photographs of spectra of stars have been taken, and in the nebula of Orion details equal in faintness to stars of the 14.7 magnitude have been photographed.

It was obvious that if the comet could be photographed by less than an hour's exposure there would be a chance of obtaining a photograph of the spectrum of the coma, especially as it was probable that its ultra-violet region consisted of but few lines. In examining my photographs of the spectrum of the voltaic arc, a strong band or group of lines was found above H, and on the hypothesis that the incandescent vapour of a carbon compound exists in

comets, this band might be photographed in their spectrum.

Accordingly at the first attempt a photograph of the nucleus and part of the envelopes was obtained in seven-teen minutes, on the night of June 24, through breaks in the clouds. On succeeding occasions, when an exposure of 162 minutes was given, the tail impressed itself to an extent of nearly ten degrees in length.

I next tried by interposing a direct-vision prism between the sensitive plate and the object-glass to secure a photograph which would show the continuous spectrum of the nucleus and the banded spectrum of the coma. After an exposure of eighty-three minutes a strong picture of the spectrum of the nucleus, coma, and part of the tail was obtained, but the banded spectrum was overpowered by the continuous spectrum.

I then applied the two-prism spectroscopie used for stellar spectrum photography, anticipating that, although the diminution of light would be serious after passing through the slit, two prisms, and two object-glasses, yet the advantage of being able to have a juxtaposed comparison-spectrum would make the attempt desirable, and, moreover, the continuous spectrum being more weakened than the banded by the increased dispersion, the latter would become more distinct.

Three photographs of the comet's spectrum have been taken with this arrangement with exposures of 180 minutes, 196 minutes, and 228 minutes, and with a comparison spectrum on each. The continuous spectrum of the nucleus was plainly seen while the photography was in progress. It will take some time to reduce and discuss these photographs and prepare the auxiliary photographs which will be necessary for their interpretation. For the present it suffices to say that the most striking feature is a heavy band above H which is divisible into lines, and in addition two faint bands, one between G and h, and another between h and H. I was very careful to stop the exposures before dawn, fearing that the spectrum of daylight might become superposed on the cometary spectrum.

It would seem that these photographs strengthen the hypothesis of the presence of carbon in comets, but a series of comparisons will be necessary, and it is not improbable that a part of the spectrum may be due to other elements.

HENRY DRAPER

271, Madison Avenue, New York

MY first view of the comet was on June 25, when it appeared through a momentary opening in the clouds, with a nucleus that, in size and brightness, seemed to equal Venus at her best. The tail, immediately at its commencement, was exceedingly bright also, but I could see no more of it then, nor at a second view, also momentary, when little more than the head was visible. Notwithstanding the immense development of tail shown by the great comet of 1861 it could not compare for an instant in brightness with the nucleus of the present one as I saw it on June 25.

On June 27 I again observed it wonderfully waned in light, with a tail plainly traceable for ten degrees, and pointing directly to the Pole. The tail was slightly curved to the right; that is, it was convex to the apparent east, or on the preceding side, and was brightest and best developed on that side. There was no time for observation with the telescope when the clouds shut up the skies for the remainder of the night.

On the next night, the 28th, I got a view with the telescope, and by an observation, which was much interfered with by clouds, I made out the position to be, in Right Ascension, 5h. 58m. 44s., and in Declination $63^{\circ} 12' 53''$, at 12h. 15m. Greenwich mean time. The comet was progressively waning, but the tail seemed still about 10° long, and pointed to the Polar star. The nucleus, though growing smaller, was still exceedingly brilliant, and as

large as a star of the first magnitude. The direction of the tail did not differ very much from the comet's apparent course, and seemed *concave* to it, contrary to what is usually observed with other comets. With a power of 126 on a $4\frac{1}{4}$ -inch achromatic I saw a curve of light extending like wings on each side of the head, and outside, with a dark space between them, appeared a large enveloping curve of inferior brightness. I fancied at times that I could discern a very faint third envelope outside all. These curves extended farther in the direction of the tail on the *following* side than on the other, though it was on the latter or preceding side that the tail showed the best definition.

On July 8 the comet seemed much diminished in light and magnitude, though the nucleus was still brightly stellar. I could now see only the inner light-curve extending on both sides of the comet's head, and through it on the following side I distinctly observed a small star shining, as it would appear, with undiminished brightness. The preceding side of the tail was still brighter and better defined than the following. I made the comet's position at 14h. G.M.T. = Right Ascension 7h. 49m. 38s, and Declination $79^{\circ} 27' 21''$.

On July 11 it was still further diminished, and in the bright moonlight there was no longer any light-curve traceable in my telescope. The nucleus however continued remarkably bright and star-like, and there was an extensive nebulosity round it. The tail might be traced by the naked eye three or four degrees. I had on this night a very satisfactory micrometrical observation, but I have not as yet been able to perfectly identify the star of comparison. The calculated light of the comet was scarce more than a tenth of what it was on June 22. It is now fast receding out of naked-eye view, and of little interest except for marking its position. This on July 20, at 12h. 20m. G.M.T., I made to be 11h. 17m. 47s. in R.A., and $82^{\circ} 9' 2''$ in Declination.

Schæberle's comet is now well in view, and would be visible to the naked eye only for the brightness of the sky where it is moving. The weakest binocular is sufficient to show it, and it is rapidly gaining in brightness. On the 27th inst. it appeared to me with a stellar nucleus and a tail visible for about half a degree. I made its position at 14h. 15m. G.M.T. = 6h. 14m. 41s. R. Ascension, and $43^{\circ} 59' 10''$ in Declination. The observation was difficult owing to the brightness of the sky and to clouds.

Millbrook, Tuam, July 28

J. BIRMINGHAM

A POPULAR ACCOUNT OF CHAMÆLEONS¹

THE animal to which I propose especially to direct your attention to-day is one which has been the subject of many observations, and has inspired great interest from the most ancient times.

Its name "chamæleon" is derived from two Greek words signifying "Ground-lion," a name singularly inappropriate, since it is one of those creatures which are specially fitted by their organisation to live on trees, and which are comparatively ill at ease when on the surface of the earth.

It is by no means surprising however that this creature should have attracted the attention it has attracted, such is the singularity of its appearance and the peculiarities of its habits and properties. Neither is it surprising that it should have occasioned many errors and superstitions when we consider the erroneous beliefs current amongst ourselves with respect to our own toads and slow-worms, efts, &c.

Aristotle was acquainted (as was to be expected of him) with the singular motions of its eyes, but even he fell into some curious mistakes respecting it, and he tells us that

¹ Lecture delivered at the Zoological Gardens on July 28, 1881, by St. George Mivart, F.R.S.