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nosed, and with round orbits; those of the second race (Melane-
sians) are dolichocephalic, prognathous, broad-nosed, and with low
orbits. Undoubtedly there is a great mixture of the two races in
many of the islands—a mixture which is taking place at a con-
stantly accelerating speed. All information as to their exact limits
where pure, and to the proportions in which they are blended in
other regions, is of great value, and no time should be lost in
collecting it. Professor Flower inquired how far Mr. Whitmee's
observations confirmed the views of Hale and Quatrefages on the
migrations of the Polynesians?

On PALÆOLITHIC IMPLEMENTS from the VALLEY of the LEA.

By WORTHINGTON G. SMITH, F.L.S., &c.

THE first discovered implement of Palæolithic age belonging to
the gravels of north-east London was found by Mr. G. H.
Gaviller in gravel dug on Hackney Downs in 1866. It is an
ovate implement about four inches long. Later on, in 1868,
Mr. Norman Evans picked up a knife-like or scraper-like
instrument, nearly five inches long, in a gravel pit near
Highbury New Park; both these objects are described and
illustrated by Mr. Evans in his book on the "Ancient Stone
Implements of Great Britain," pp. 523, 525. Still later a rude
pointed implement was found in Dunlace Road, Lower Clapton,
and presented to the Geological Museum in Jermyn Street by
Mr. Anscombe.

The Highbury and Lower Clapton positions are two miles
apart from west to east, and the Hackney Downs position is
exactly intermediate. I am not aware of the finding of any
other implements than the three just mentioned in north-east
London, till my discoveries made during the present year. My
work has been principally confined to Shacklewell (half a mile
north-west of Hackney Downs) and Upper and Lower Clapton;
both the latter positions being in close proximity with the River
Lea. Bones and tusks of large size have at different times been
dug up in various neighbouring localities, once near De Beauvoir
Square, a mile south of Hackney Downs.

I will take the Shacklewell position first, where the surface
is 85 feet above the sea level, the pits being near the north-east
corner of West Hackney Church, and less than 300 yards west of
the Old Hackney Brook, which is now obliterated. The gravels of
this place have been completely described by Messrs. Prestwich
and Evans, so that I need only say in reference to them that
the gravel and sand vary greatly in thickness and disposition

in different positions, so that a section seen in one pit seldom accords with a section seen in another, even though the two pits may be closely neighbouring ones. Freshwater shells as *Unio*, *Corbicula* and *Hydrobia* are generally abundant (though sometimes quite absent) in the Shacklewell sand, and though these shells are very thin and fragile they are commonly found unbroken. Bones of mammalia also occur chiefly in the lower sands or resting upon the London clay. On my first visit to the spot one of the labourers (observing me to be looking over the sand and gravel) asked me if I was looking for bones, as he had recently found some large bones at the bottom of a pit (at that time the pit was filled in and built over);—these bones the man offered to give me, and he went to the place in the field where he had recently placed them, but on reaching the spot the bones were not there. Close by, the contents of numerous dust-bins had been discharged as foundations for new villas, and a large number of vagrants were searching amongst the rubbish for bones and pieces of iron and wood, so that the relics of the extinct animals were no doubt gathered up and sold for “old bones.” The labourers said they would soon be down to the London clay again, in a large and deep pit which I then saw open. After a fortnight I went again to the place, and the men had gone, the pit had been dug out to its lowest depth, filled up with the usual decaying refuse, and upon the exact spot previously occupied by the pit there were four new villas built up to the ground floor.

I found several flint flakes of Palæolithic age *in situ* in these pits, and in a heap of gravel just excavated from a pit close to the rear of the chapel (near Shacklewell Church) I found a massive and rudely chipped butt-end of a pointed implement five inches long, four inches broad, and two and a quarter inches thick—weight, $1\frac{3}{4}$ lbs. Previous to my visit the gravel from these pits had been spread over various roads in the district, and these roads produced three implements, weighing 1 lb. $3\frac{1}{2}$ oz. good characteristic flakes, weight of one $12\frac{1}{2}$ oz., cores, and fragments of worked flint.

The position at Upper Clapton, where I have found a considerable number of flakes, and one well-made pointed implement, is 350 yards east of Abney Park Cemetery, and 150 yards north of the position once occupied by the Hackney Brook. Here there is a coating of river gravel on the surface from a few inches to about three feet in thickness; sometimes the gravel is capped with a layer of brick-earth, varying in thickness from a few inches to two feet. In other places the London clay comes to the surface. The ground falls more than 50 feet in 600 in the direction of the river Lea, the western point of the position

being 107 feet above high-water mark, whilst the eastern point is only 49. Building operations are going briskly on here, and the builders utilise what little gravel there is to the utmost advantage, so that the excavation for this material is in many places less than a foot in depth. In gravel just removed from one of these shallow places on the south side of Cazenove Road, I picked up a good and perfect pointed implement and several characteristic flakes. The gravel distributed over the roads in the same district furnished several good flakes, many spalls, and a few large cores.

The position at Lower Clapton is one mile east from Hackney Downs, and the level is the same with Shacklewell and Hackney. Several pits have been dug for gravel in this place, but the two larger ones only remain open. They are east of, and close to, the building recently erected by the School Board, and they are half-a-mile south of a sudden bend in the Lea, and three-quarters of a mile north of the bed of the now obliterated Hackney Brook. The gravel here is very similar in general *facies* with the Shacklewell gravel, but I have never seen shells in the Lower Clapton sand. This latter position has produced more implements, flakes, and cores than Upper Clapton or Shacklewell, and I am disposed to think that most of the worked flints come from a thin deep-red seam of gravel, which is commonly about 10 feet beneath the surface; at any rate I have found implements and flakes *in situ* in this stratum in all the localities.*

At Craven Park, one and three-quarter miles north of Hackney Downs, at Tottenham Cross, two miles north of the same place, at Lower Edmonton, three and a-half miles further north, I have found several flakes and spalls in the newly excavated gravels, but no implements. Going still further north, and close to Waltham Station, half-a-mile west of the Lea, and $11\frac{1}{2}$ miles from London, gravel has recently been dug from two pits and distributed over some new roads in the neighbourhood. In this material I have found several flakes, spalls, and cores. At Flamstead End, north of Cheshunt, one mile west of the Lea, and $13\frac{1}{2}$ miles from London, there is a very large

* During the year 1878 I have found in the pits and roads about Lower Clapton ten perfect pointed implements, three broken ones of the pointed type, a large knife-like, well-worked flake weighing 11 oz., and at least 100 flakes large and small, and more or less worked. The largest and most massive instrument from Lower Clapton weighs 2 lbs. $3\frac{1}{2}$ oz., the lightest, made from a piece of tabular flint and worked on both sides, weighs less than 4 oz. Two flakes are remarkable; one, beautifully worked, $2\frac{1}{4}$ inches long and $1\frac{1}{4}$ inches broad, weighs only $\frac{1}{8}$ ths of an ounce, whilst the second, which is 4 inches long, $2\frac{1}{4}$ broad and with a large cone of percussion on the plain side, weighs only $3\frac{1}{2}$ oz.: this beautiful example is worked to an implement-like form and is so thin that when held up to a strong light it is transparent throughout.

gravel-pit now open, just behind the "White Horse" Inn. The gravel here appears to be identical with that of Shacklewell, and it abounds with fragments of worked flint. One of the excavated heaps yielded a very large flake with a good cone of percussion. A prolonged and careful search over the entire exposed surface of the gravel as seen in section, produced several worked fragments and a good and carefully-worked flake which had dropped to the base of the section. I was moreover fortunate enough to see two large and well-worked flakes *in situ*. They were resting under five feet of gravel, and were firmly embedded in a position where there was no sand. I detected their presence by seeing the projecting worked edges; the two flakes were close together. From Cheshunt I went to Hoddesdon, 17 miles from London, and a mile west of the Lea, where there are two pits, and from Hoddesdon to Amwell, 19 miles from London, and half-a-mile west of the Lea, where there is a very large pit; the result was not good, as I only met with one flake and a few spalls and fragments at the latter place.

Whilst returning home on May 31st, through Finsbury Park, I observed a load of gravel being shot into the Queen's Road, and on looking over the heap I picked up the butt-end of a pointed implement. A few days previous to this I had picked up a well-made pointed implement a little to the north-east of the Queen's Road locality. On making inquiries of the carter as to where the gravel came from, he said from Hertford, by the Great Northern Railway. On the 4th June, I picked up an excellently-worked flake near the Seven Sisters Station, close to Tottenham on the Great Eastern Railway, and further search was rewarded by another broken implement, several other flakes—one worked to an implement-like form—and a few spalls, cores, &c. On inquiry of the builder's foreman as to where the gravel came from, he said it was brought from Hertford in barges down the Lea. I now inquired of the station-master on the Great Northern Railway at Hertford as to where the gravel was brought from which was despatched to London, and he kindly gave me references to three large pits: two close to and north of the Lea and Hertford, and on either side of the Beane River, and another at Bengoe, between Hertford and Ware, and half a mile north of a bend in the Lea. At the wharfs on the Lea in London I got similar information, and secured a reference to another large pit a mile north-west of Ware and the Lea. I visited all these gravels which are about 130 and 140 feet above the sea level, and reputed to be of middle-glacial character, the lower gravels principally south of the Lea being fluviatile. I also visited a few smaller pits in the neighbourhood, but I got very little in the way of worked flints from any of them; frag-

ments undoubtedly worked by hand, I certainly found, and I was also able to confirm the correctness of the information I had received as to the identity of the gravels with the implement-bearing material brought to London and widely distributed over the roads near Finsbury Park; I have therefore found implements and flakes in the Lea Valley from London to Hertford. Further north, at Bishops Stortford and Pesterford Bridge in the Valley of the Stort, which river joins the Lea at Hertford, Mr. Evans has recorded ("Ancient Stone Implements of Great Britain," p. 530) the finding of two implements by Mr. W. H. Penning; this discovery, linked to mine, carries an implement-bearing valley from London to more than 34 miles north. But in a pit, however large it may be, a great surface of gravel is seldom exhibited, a single newly-gravelled road well washed by rain is better than the best pit. I have lately examined at least 20 newly-gravelled roads, walking down each road in different directions from 5 to 10 or 20 times. In comparison with the tens of thousands of unworked flints, the worked ones are uncommonly rare, and as a rule I have found only one satisfactorily worked flint in a four or five hours' walk over the gravels, so that the mere examination of half-a-dozen implement-bearing pits without a very satisfactory result, is only what must be reasonably looked for.

In conclusion, I think it would be well for Archæologists to notice, collect, and arrange with great care the *rougher and ruder* palæolithic instruments, for possibly it is from these ruder objects (often made by a few well-directed blows) that we shall eventually learn something satisfactory of the ways of the men who made and used the instruments. It is only reasonable to suppose that ornate and elaborate implements were less often made than rough and unfinished ones; the first would require a man of culture and skill, with time upon his hands, the second could be made in a moment or two by the merest savage. Any rough work would speedily damage and destroy some of the beautiful and highly wrought implements; it therefore seems more probable that a greater variety will eventually be found in the rougher implements which were speedily made for instant daily use and as speedily discarded.

On a SCALE to find CRANIAL INDICES.

By GEORGE M. ATKINSON, Esq.

I have pleasure in submitting a scale constructed to show quickly a method for finding the relative decimal fraction

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