very trifling: that was one of the advantages of this machine; and another was, that the machine brought up large portions of earth at a time, and enabled them to judge of the stratum in which they were working, in a way and to an extent that had never before been accomplished.

Mr. CARTER, in reply to Mr. Eddison, said that he regarded the machine as calculated to work a complete revolution in the mode of supplying water to large towns. After a few other remarks, during which the Chairman alluded to the importance of the papers which had been read that morning, a vote of thanks was given to Mr. Carter, and the meeting adjourned till evening.

At the Evening Meeting, Mr. E. H. DURDEN was called to the chair, when Mr. W. S. WARD, the Hon. Sec., gave a résumé of the papers which had occupied the morning meeting, for the benefit of those persons who were not present at the reading of those communications. He next read a valuable statistical paper—

ON THE SUPPLY OF SHELLS, HORNS, BONES, AND WOODS USED IN THE CUTLERY TRADES OF SHEFFIELD, COMMUNICATED BY WM. FISHER, JUN., ESQ., OF SHEFFIELD.

The employment of ivory in cutlery having been treated of by others, the first substance used in hafting cutlery to which I should ask your attention is mother-of-pearl. This beautiful and durable material is largely imported into England from the coasts of the South American, Indian, and Chinese seas; but the only nacreous shells possessing sufficient thickness for Sheffield purposes, are received from Manilla and Singapore. The smaller shells from Bombay, Panama, and other ports are used chiefly in Birmingham, and are there worked into buttons, or used for inlaying purposes. The Manilla and Singapore fisheries produce annually from 300
to 400 tons of shell, most of which is sent to this country. The consumption here, however, I should estimate at somewhat below 100 tons per annum—the rest of the import is used for the best Birmingham goods or exported to the continent. The present value is now about £130 to £140 per ton; but the supply and demand is so variable that Manilla and Singapore shell has been sold within the last fifty years at almost all rates between £60 and £600 per ton. These shells are in Sheffield cut into scales and handles by circular saws, and the pieces have afterwards to be ground down on stones singly and by hand, to a level surface and a required thickness. This tedious process aids in making this a costly covering for cutlery, and as the substance is both hard and brittle, when the handles or scales are fluted or carved, the price is of course still more enhanced. Commencing with the statistics of the Horn trade, I shall have to estimate the supply of foreign horns, as since 1847 I find no record of the imports and clearances of these articles. When they were chargeable with duty, all sorts were classed together, and from 1843 to 1847 the imports ranged from 1,600 to 2,700 tons per annum, and averaged 2,250 tons. The clearances for home consumption varied from 1,200 to 2,200 tons per annum, and averaged 1,600 tons. I estimate that the subsequent clearances for home use have been fully equal to that average, and that 1,400 tons per annum are worked up in this town. Of the Ox and Cow Horn but little is used for cutlery purposes, nearly all the hollow portion is cut into suitable lengths, opened, flattened by heat and pressure, and worked into combs or lanthorn leaves. The solid point is used for knife and umbrella handles, and the hollow parts of such horns as are mottled with grey or black and white, are used for penknife scales, hollow parts that are not particularly well-suited for combs, being pressed into scales for sword or razor handles. The imports of Horns are large from South America (one
million annually), the Cape of Good Hope, Australia, and other parts. The home produce is also very considerable. Assuming that the population of London is $5\frac{1}{2}$ times that of Liverpool, and that there is a proportionate slaughter of oxen, the horns produced by the London slaughter would exceed in count 388,000 per annum, and the value, with the slough that fills the hollow part, would at present exceed £40,000. The pith or slough that fills the horn is crushed for tillage or boiled for sizing in the clothing districts. Horns vary in value from 20s. to 100s. per 123, and have been 50 per cent. above these rates.

Buffalo Horns are imported from Calcutta, Bombay, Siam, and Madras, and I suppose that some 350 tons are worked-up in Sheffield annually. Buffalo Horns are sold by weight and are at present worth from £15 to £30 per ton—the count runs from 700 to 2,000 to the ton, and taking the average at 1,400, the mortality among Buffalos in the East required to supply our Sheffield needs will be about 245,000 per annum. I should imagine the export of this article to the continent is nearly equal to the consumption here; and as there is also a considerable import of tips or solid points of horns, 800,000 to a million Buffalos each year must die in India, to account for the horns and tips brought to England from thence. The horns are here sawn by circular or hand saws into suitable lengths, boiled and cut by a sweigh knife, the hollow parts into pieces suitable to be pressed into scales, and the solid parts into pieces suited for pressing into knife or umbrella handles. These are the chief uses of Buffalo Horns, but some parts are used for dressing combs. Snuff boxes, drawer handles, miniature frames, stirrups, and many other articles are also pressed from Buffalo Horn. The waste from Buffalo and Ox Horns, Tips, and Hooves, when light and thin, is used as tillage, but the heavier portion has of late years become more valuable to burn for Prussian
blue. For this purpose its present value is £5 to £6 per ton; and I am informed by a collector that about ten tons' weight is produced weekly in Sheffield. This appears a large weight; but a very considerable proportion of waste is produced in working horn, and the waste from the makers of buttons from cattle hoofs is no doubt included in the estimate. Of Ox, Cow, and Buffalo Horn Tips, I suppose 350 tons per annum are used in Sheffield, in addition to those from the horns cut in the town, these are chiefly pressed; but such of the Ox and Cow Tips as are sound and richly mottled are called self-tips, and are worked to the required shape by the circular saw and the file. The heat requisite for pressing them would damage the colour, and pressed horn being much more liable to run out of shape with use, self-tip handles make a much more durable handle than pressed horn, and have a very superior appearance.

The import of Stag and Deer Horns is probably about 450 tons per annum, and this import is exclusively for Sheffield. The chief supply is from the East Indies: and from Colombo (in Ceylon), Calcutta, Bombay, and Madras 350 to 400 tons per annum are shipped. The remaining supply is received from Germany, Italy, Southern Russia, Spain, and Norway. The German is the most esteemed, and it is worth from £100 to £180 per ton. The supply from that country lessens each year as the forests decrease and the native cutlery manufacture extends. The present value of Indian Stag Horn is from £30 to £50 per ton. Some years ago it was £65 to £80. Stag Horn is sawn into scales and handles by circular and hand saws, and the waste pieces are boiled for sizing in the cloth-making districts. With the exception of the Elk (not yet extinct in Germany, and having the heaviest of horns), the Deer tribe have horns heavy and solid in proportion to the heat of the
climate in which they are produced. The horns dropped on
the hills and plains of Hindostan and Ceylon are very heavy
and almost as solid as bone. From Southern Russia we
have Deer horns lighter than the Indian but heavier than
the German, and the Rein-deer Horn from Norway and
Lapland is much lighter and more pithy than the German.
It is, however, much less valuable as the surface is white
and quite smooth. Its value is not more than £15 to £21
per ton. Taking the import from India at but 350 tons,
and the average weight at 1,400 per ton, it appears that
the "fall" (as it is termed) from 240,000 head of Deer is
annually collected in India for Sheffield uses. Very few
manufacturers cut their own Stag Horn; it is chiefly cut
up by horn cutters who supply cutlers with handles and
scales.

The Bones cut here for cutlery purposes are chiefly
those extending from the knee to the hoof of the Ox. In
Loudon these bones are carefully boiled by the neat's foot
oil makers, and by this process the colour is so improved
that in common cutlery bone handles (for the forks) are
often used as ivory. From 600,700 to 700,000 is about
the supply Sheffield receives annually from London, and the
value is 15s. to 18s. per hundred. The consumption for
cutlery will probably be 400,000 or 450,000, the remainder
being used for button moulds. The supply of bones from
the country districts I have no means of ascertaining, as
they are chiefly brought by hawkers of pots, &c., and pass
direct into the hands of the bone cutters. As to the extent
of supply from abroad, I am also at a loss, as the returns
do not distinguish between tillage bones and such as are
suited for manufacture. The total import of both classes
is about 30,000 tons per annum. The tillage bones are
worth from 130s. to 140s. or £6 to £7 per ton, and others
£8 to £17.
Tortoise Shell is now little used for cutlery, and of what is so used part is merely the scrap shell from combmakers. I dare say that not above 1,000 lbs. weight of plate shell is at present used in Sheffield for knife scales. The present value of West Indian shell is 18s. to 25s. per lb., and Manilla 25s. to 38s. or 40s.

When ladies vied with each other as to who should have the largest comb, the value of the best was 50s. to 63s. per lb.

The chief woods used for cutlery purposes are Cocus, from Cuba and Jamaica, and Ebony, from Africa and the East Indies; there is also a consumption of Bar, Partridge, Pheasant, Beech, and Yew woods, for cutlery purposes, and 400 or 500 tons per annum will be about the average consumption of these woods.

Of the extent to which cutlery is made with silver, silver-plated, porcelain, iron, or pressed wood handles, I am entirely ignorant. The following, to the best of my judgment, is a fair summary of the value of raw materials with which I am acquainted that are used for knife handles and scales:

<table>
<thead>
<tr>
<th>Item</th>
<th>£.</th>
<th>£.</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 Tons of Ivory, averaged at... 500 per Ton</td>
<td>45,000</td>
<td></td>
</tr>
<tr>
<td>100 &quot; Mother-of-Pearl ..........................</td>
<td>130</td>
<td>13,000</td>
</tr>
<tr>
<td>350 &quot; Buffalo Horns ............................</td>
<td>20</td>
<td>7,000</td>
</tr>
<tr>
<td>250 &quot; Tips ......................................</td>
<td>25</td>
<td>6,350</td>
</tr>
<tr>
<td>350 &quot; East India Stag Horn .. 40 ...............</td>
<td>40</td>
<td>14,000</td>
</tr>
<tr>
<td>50 &quot; German, Spanish, and Italian ................</td>
<td>100</td>
<td>5,000</td>
</tr>
<tr>
<td>1000 Lbs. Tortoise Shell at........ 25s. per lb.</td>
<td>1,250</td>
<td></td>
</tr>
<tr>
<td>400,000 London Bones of 120, at ... 18s. per 120</td>
<td>3,600</td>
<td></td>
</tr>
<tr>
<td>Foreign and country Bones, say about ... 4,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>450 Tons Cocus, Ebony, and other woods ..........</td>
<td>£8 per Ton</td>
<td>3,600</td>
</tr>
<tr>
<td>Total ...........................................</td>
<td>£102,700</td>
<td></td>
</tr>
</tbody>
</table>
The value of the labour expended in working these materials into handles or scales is very various,—in some instances, as in pressed handles, it is greater than that of the raw material; in others, as in plain ivory handles, it is much less.

The last communication for the meeting was a verbal description by Mr. Ward, of the "Collodio-Albumen Photographic process, as applicable for copying Mechanical and Scientific Objects." It was announced that the next quarterly meeting would be held in Sheffield, early in March, 1856.