PROCEEDINGS

OF THE

ROYAL IRISH ACADEMY.

VOL. VIII.

DUBLIN:

PRINTED BY M. H. GILL,

PRINTER TO THE ACADEMY.

MDCCCLXIV.


NATURAL HISTORY

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VOLUME VIII.

1861–1864.

APPENDICES.

PROCEEDINGS

OF

THE ROYAL IRISH ACADEMY.

MONDAY, NOVEMBER 11, 1861.

VERY REV. DEAN GRAVES, D.D., President, in the Chair.

The REV. HUMPHREY LLOYD, D.D., read the following paper :—

ON EARTH CURRENTS, AND THEIR CONNEXION WITH THE PHENOMENA OF TERRESTRIAL MAGNETISM.

(Plate I.)

IN the year 1848, Mr. Barlow communicated to the Royal Society a Paper "On the Spontaneous Electrical Currents observed in the Wires of the Electric Telegraph," in which he established the important fact that a wire, whose extremities are connected with the earth at two distant points, is unceasingly traversed by electric currents, the intensity of which varies with the azimuth of the line joining the points of contact with the ground. The direction of these currents was proved to be the same at both extremities of the same wire, and was shown to depend on the relative positions of the earth-connexions, while it was wholly independent of the course followed by the wire itself. The currents cease altogether when either of the contacts with the earth is interrupted. From these facts Mr. Barlow concluded, that "the currents are terrestrial, of which a portion is conveyed along the wire, and rendered visible by the multiplying action of the coil of the galvanometer."

Mr. Barlow further observed, that apart from the sudden and occasional changes, the general direction of the needle of the galvanometer appeared to exhibit some regularity. He was thus led to institute a series of observations for fourteen days and nights, on two wires simultaneously, one from Derby to Rugby, and the other from Derby to Birmingham, the positions of the needles in both circuits being recorded

every five minutes, day and night. From these observations he concluded—

"1. That the path described by the needle consisted of a regular diurnal motion, subject to disturbances of greater or less magnitude.

"2. That this motion is due to electric currents passing from the northern to the southern extremities of the telegraph wires, and returning in the opposite direction.

"3. That, exclusive of the irregular disturbances, the currents flowed in a southerly direction from about 8 or 9 A. M. until the evening, and in a northerly direction during the remainder of the twenty-four hours."

He was thus led to examine whether any relation subsisted between these movements and the daily changes of the horizontal magnetic needle; and having made, for this purpose, a series of simultaneous observations with a delicate declinometer, he came to the conclusion that although, generally, the currents flow *southwards* during that part of the day in which the variation of the horizontal needle is *westerly* (i. e. from 8 or 9 A.M. until the evening), and *northwards*, when the variation is *easterly* (i. e. during the night and early part of the morning), "yet simultaneous observations showed no similarity in the path described by the magnetic needle and the galvanometer."

An examination of Mr. Barlow's galvanometric observations led me, some time since, to an opposite conclusion; and at the last meeting of the British Association, I stated my conviction, founded on these observations, that the earth-currents, whose continuous flow Mr. Barlow has the merit of establishing, would eventually explain all the changes of terrestrial magnetism, both periodic and irregular. I now proceed to state the grounds of this conviction, and to show, from Mr. Barlow's observations, that the diurnal changes of the earth currents correspond with those of the horizontal component of the earth's magnetic force.

Let us suppose, then, that the forces which act upon the horizontal needle, and which cause it to deviate from its mean position, are due to electric currents, traversing the upper strata of the earth in a horizontal direction; and let ξ denote the intensity of the current in the magnetic meridian, *positive* when flowing *northwards*, and *vice versâ*; and η the intensity of the current perpendicular to the magnetic meridian, *positive* when flowing *eastward*, and *vice versâ*. Then the force of the current in any direction, making the angle ϵ with the magnetic meridian (measured to the east of north) is

$$\varphi = \xi \cos \epsilon + \eta \sin \epsilon.$$

Now ξ is proportional to the force which deflects the freely suspended horizontal needle from its mean position, or to $X\Delta\psi$, X being the horizontal component of the earth's magnetic force, and $\Delta\psi$ the change of declination expressed in parts of radius. Similarly, η is proportional to the force which deflects from its mean position a magnet, which is maintained (by torsion or other means) in a position perpendicular to the magnetic meridian; and is measured (in terms of X) by the rela-

tive changes of the horizontal intensity, taken negatively. Hence the force of the current in any given direction may be determined in terms of the same units.

Now

$$\epsilon = \alpha - \psi,$$

in which α is the azimuth of the line connecting the two stations, measured from the true meridian eastward, and ψ the magnetic declination measured in the same direction. The observations of Sir James Ross, at Derby, give $\psi = -22^\circ\ 25'$; and we have for the line connecting Derby with Rugby,

$$\alpha = -13^\circ\ 7',\ \alpha - \psi = +9^\circ\ 18';$$

and for the line joining Derby and Birmingham,

$$\alpha = +33^\circ\ 27',\ \alpha - \psi = +55^\circ\ 52'.$$

The first column of the following Table contains the mean variation of the magnetic declination at the alternate hours, for the month of May, as deduced from four years' observation of that element at the Dublin Magnetic Observatory. The second contains the corresponding values of the changes of the horizontal intensity, in ten-thousandths of the whole intensity; and the third and fourth the calculated values of the deflecting forces, in the line perpendicular to that connecting the earth contacts at Derby and Rugby, and at Derby and Birmingham, respectively, and expressed in terms of the same units. These latter numbers are, by hypothesis, proportional to the intensities of the currents directed along the connecting wires.

TABLE I.—*Calculated Values of the Intensity of the Currents, traversing the Wires uniting Derby and Rugby, and Derby and Birmingham, respectively.*

Hour.	$\Delta\psi$	$\frac{\Delta X}{X}$	Derby and Rugby.	Derby and Birmingham.
1 A.M.	1′·8	0·4	5·1	2·6
3	2·5	− 1·6	7·6	5·5
5	3·9	− 3·7	11·9	9·5
7	5·2	− 8·4	16·2	15·4
9	2·1	− 16·9	8·9	17·5
11	− 4·1	− 15 9	− 9·3	6·4
1 P.M.	− 7·1	− 3·1	− 19·8	− 9·0
3	− 5·1	6·1	− 15·7	− 13·4
5	− 1·8	14·2	− 7·6	− 14·8
7	0·3	14·6	− 1·5	− 11·6
9	1·0	9·0	1·3	− 5·9
11	1·3	5·2	2·9	− 2·2

The galvanometric observations instituted by Mr. Barlow on these two lines were continued for fourteen consecutive days, commencing

May 17, 1848. Of these days of observation, however, six are incomplete, viz., May 17, 19, 20, 23, 24, 30; and another day (May 27) appears, from the Dublin observations, to have been a day of considerable magnetic disturbance. Omitting these, as unsuited to furnish true mean results, the means of the remaining days are as follow. The *positive* numbers indicate currents proceeding *towards* Derby, and the negative, currents in the contrary direction:—

TABLE II.—*Mean observed Values of the Intensity of the Currents, traversing the Wires uniting Derby and Rugby, and Derby and Birmingham, respectively.*

Hour.	Derby and Rugby.				Derby and Birmingham.			
	A.M.		P.M.		A.M.		P.M.	
1	− 1·4	0·3	− 5·0	− 5·1	0·2	1·5	− 9·1	− 8·5
2	2·5		− 5·5		2·9		− 7·7	
3	1·6	1·7	− 2·7	− 3·3	0·9	1·3	− 7·4	− 7·4
4	1·1		− 2·4		0·7		− 7·2	
5	0·5	1·2	− 1·8	− 2·3	0·6	1·2	− 3·6	− 5·1
6	2·7		− 3·2		2·8		− 6·3	
7	3·1	3·0	− 0·6	− 1·1	3·9	4·1	− 4·5	− 4·7
8	3·1		− 0·2		5·9		− 3·4	
9	2·4	1·8	0·4	0·2	4·2	3·4	− 0·8	− 1·7
10	− 0·9		0·1		− 0·6		− 1·7	
11	− 4·3	− 3·6	0·4	0·6	− 7·2	− 5·8	0·3	0·4
12	− 5·1		1·7		− 8·1		2·8	

It will be observed that the changes indicated by these numbers are very systematic. In the wire connecting Derby and Birmingham the current flows *southwards* from 10 A.M. to 10 P.M. inclusive, and *northwards* during the remaining hours. In the wire connecting Derby and Rugby, the *southward* current lasts from 10 A.M. to 8 P.M. inclusive, and it is *northward* (with a single exception) during the remaining hours. There are, however, as might be expected in so short a series, some irregularities in the course of the changes. In order to lessen these, and at the same time to confine the results to such as are comparable with the preceding, I have given (in the alternate columns of the Table) the means corresponding to the alternate hours, commencing at 1 A.M., computed by the formula

$$\tfrac{1}{4}(a + 2b + c).$$

The numbers so obtained are projected into curves in the diagram (Plate I.), having been previously multiplied by constant coefficients, in order to equalize the ranges with those of the computed results. The dotted lines, in both cases, are the corresponding projections of the calculated results. The agreement between these two sets of curves is probably as great as could be expected in the results of so short a series of

observations; and we seem, therefore, entitled to conclude that the diurnal movements of the two horizontal magnetometers are accounted for by electric currents traversing the upper strata of the earth.

There is one point of difference, to which it important to draw attention. It will be seen that the *calculated* curves are, for the most part, *above the observed.* The reason of this will be evident upon a little consideration. The *zero* from which the calculated results are measured is the *mean of the day;* whereas that of the observed results is the *true zero,* corresponding to the absence of all current. Now, the chief deflections of the galvanometer needle (as appears from the latter curves) are those in which the sun is above the horizon; and the *zero line,* consequently, divides the area of the diurnal curve unequally, being considerably nearer to the night observations than to those of the day. If the calculated curves be displaced by a corresponding amount, their agreement with the observed will be much closer.

The difference here noted is one of considerable theoretical importance. Magnetometric observations furnish merely *differential* results, the magnitude and the sign of which have reference solely to an *arbitrary zero.* We are accordingly ignorant even of the relative values of the effects, and are unable to compare them with their physical causes, whether real or supposed. In these respects the galvanometric observations have the advantage. In them *positive* and *negative* are physically distinguished by the *direction* of the currents; and this, as well as the absence of all currents, is indicated by the instrument itself. The results, therefore, furnish the measures of the forces by which they are produced.

The next, and most important, step in this inquiry will be to assign the physical cause of these phenomena. The existence of electric currents traversing the earth's crust has hitherto been maintained as an *hypothesis,* on account of its supposed adequacy to explain the terrestrial magnetic changes. Now, however, their existence is proved, not only to be a *fact,* but also a fact sufficient to explain the phenomena. It remains, therefore, only to ascertain their source; and it will be for those who deny that the sun operates by its *heat* in producing the phenomena of terrestrial magnetism, to assign to these currents a more probable origin.

Professor William K. Sullivan read the following paper, written by himself and Joseph P. O'Reilly, C.E.:—

On the Hydrocarbonates and Silicates of Zinc of the Province of Santander, Spain.

geological conditions under which the ores of zinc occur.

The district of country comprised by the province of Santander lies between the prolongation of the Pyrenees, which, under various names, traverses the north of Spain, and the Bay of Biscay—the mountains forming

its southern boundary, and the sea its northern. It adjoins the province of Biscay on the east, and that of Asturias on the west. The first range of the chain forming the southern boundary of the province, which at Puente Viesgo is only a few miles from the coast (four leagues from Santander, the chief town), is chiefly formed of mountain limestone. Upon this rock rest beds of red sandstone, and ochry clay, with accompanying gypsum; these are succeeded by shelly limestone, sandstone, and clay, irregular beds of limestone, and dolomite, some of which yield an excellent cement. Upon these rocks rest beds of shelly limestone, and of dolomite, the former containing abundance of a large species of ostrea, and of terebratulæ and ammonites. Above these, on the sea-coast, tertiary limestone and sandstones are found. The rocks which thus occur between the mountain limestone and the tertiary beds apparently represent the two lower groups of the triassic period—the bunter sandstone and the muschelkalk. For the moment this opinion is little more than a guess; but we hope to be able to establish the true relations of all those beds, when we have collected the materials for a memoir upon the geology of the entire district, with which we propose to occupy ourselves.

In the mountain limestone at Viesgo are found galena, blende, carbonate of zinc (Smithsonite), copper and iron pyrites, with here and there deposits of gypsum. The hot baths of Viesgo, Las Caldas, and Thermida, indicate the probable proximity of igneous rocks, or, at all events, the existence of conditions favourable to metamorphic action. Indeed, the limestone in the immediate vicinity of a lead lode which occurs in this rock is hardened into marble. The lodes occur generally not far from the line of junction of the limestone with the red sandstone. In the soft steatitic clay which is found in the lodes, abundance of doubly terminated crystals of clouded quartz are found. Small crystals of the same kind, imbedded in a paste of peroxide of manganese, likewise occur in the lodes. There is, indeed, everywhere in the district, evidence of the presence of large quantities of silica in solution, in former times. The vein stone is sulphate of barytes, or calcite; the latter is frequently found in large crystals, of the form of a scalenohedron (the metastatique of Haüy, d_2 of Levy and Dufrenoy, and S_3 of Zippe).

Ores of zinc likewise occur in the newer or triassic rocks. Their chief seat is the dolomite, which, if our surmise be correct, belongs to the muschelkalk, and suggests analogies with the zinc deposits of Wiesloch in Baden. The ores which occur are blende, often galeniferous, and carbonate (Smithsonite), the latter being most abundant. The lodes are usually vertical, traversing the dolomite nearly at right angles, and presenting generally merely the elements of a lode or vein, namely, a plane of fracture with some foreign matter interposed, which, as in the mountain limestone, is usually sulphate of barytes and calcite, the small rhombohedral crystals of the latter being in some places altered into sulphate of barytes. In some cases, as will be noticed presently, the calcite is replaced by carbonate of zinc, which forms beautiful pseu-

domorphites of the calcite in the form of scalenohedrons. At the mines which have been worked near Ciguenza, a village about five miles east of Santander, the thickness of the lode is variable, increasing at the points where ore, especially carbonate, occurs, to 1^m or 2^m, but diminishing to an inch where this mineral disappears, or is replaced by blende. Sometimes all ore disappears, so that the lode is only represented by a band of barytes, or calcite.

In the district just named, several lodes run east and west nearly parallel, and can be traced over a length of about 1000^m in the dolomite, beyond which, though doubtless they extend much further, it is difficult to trace them, in consequence of the nature of the ground. Some of the lodes consist of a rib of carbonate of zinc, sometimes galeniferous, of varying thickness, encased in very light friable ochry clay, looking like decomposed dolomite. In others, the ore consists of carbonate and blende, the latter forming the centre rib.

The carbonate of zinc, or Smithsonite, found in these lodes, is generally very cavernous, or rather what may be termed clinkery, the walls of the empty spaces being frequently lined with small crystals of the same mineral. The ore is usually yellowish-brown; it is also found as a yellowish-white compact mineral, resembling the dolomite in appearance, in very dense calcedony-like semi-translucent masses of a pale yellow colour, passing into white, the surfaces of which have a reniform structure, in stalactitic forms, and as a friable, and more or less compact earthy mineral, associated with blende. The blende from the higher ranges, such as the mountains of Europe, is comparatively free from iron, and is frequently found of a sulphur-yellow, or pale garnet-red colour, and beautifully transparent. This blende decomposes into pure white Smithsonite, which is sometimes compact and dense, and sometimes in friable earthy masses; when broken, some unaltered blende is often found in the centre of pieces of this kind of carbonate. An earthy pale buff-coloured dolomitic-looking carbonate of zinc, associated with earthy cinnabar, is found in the same locality; this is obviously derived from a less pure variety of blende, mixed with cinnabar, which occurs there. We also meet with a granular crystalline form of Smithsonite, of a pure white colour, or tinged with a pale lemon-yellow or rose.

The blende occurring in the limestone, and especially that in the dolomite, is ferruginous, and in some cases appears to decompose with great facility into Smithsonite.

When the blende from which the Smithsonite is derived is associated with galena, the latter is very commonly found unaltered in the carbonate of zinc. It appears, however, to have sometimes undergone decomposition; for crystals of carbonate are found abundantly in Smithsonite from Puente Viesgo, from the Venta mine near Comillas, and from the mines of Celis (three leagues south of San Vincente de la Barquera), and no doubt would be found in all galeniferous Smithsonite from the district. Specimens may often be found containing galena, blende, and carbonates of lead and zinc. The existence of lodes of pure white carbonate of lead, known to, and extensively worked by the

Romans in this part of Spain, seems to show that at some former epoch the decomposition of metallic sulphides, and the formation of carbonates, must have taken place under very favourable conditions. That the change still goes on, is perfectly shown by specimens of brown ferruginous blende from the mines of St. Felix and St. Lucita, near Comillas; in these specimens the decomposition of the blende into friable earthy carbonate has proceeded regularly from without inwards, most specimens still containing a nucleus of unaltered blende.

The calcedonous yellow and white Smithsonite already spoken of, and which is so abundantly found at the Merodio mines, near Comillas, in reniform and botryoïdal masses, must have been deposited from solution. This opinion is corroborated by the circumstance that, in the same mine, the calcite vein stone enclosing blende, has been in great part substituted by carbonate of zinc. One of the resulting pseudomorphites has the form of the scalenohedron, called by Haüy the *metastatique;* and although not quite half a complete form, the terminal edges, which are well defined, are nine centimetres long. It is a shell of from 3 to 5^{mm} thick of semi-translucent Smithsonite, which is partially filled up with a warty tufaceous mass of the same substance. The inner side of the shell, in the part not filled up, is covered with a number of small warts. Whenever one of these more or less hollow pyramids is unbroken, a small hole may be observed in the end, where it is broken off from the wall of the druse; through this the lime was removed, and the tufaceous zinc introduced. A similar hole may often be seen in large crystals of felspar, which have been decomposed in the inside, or in a tooth in the first stage of decay.

This association of compounds of iron with those of zinc is interesting, especially in connexion with the minerals which form the subject of this paper. In the capping of dolomite forming the south side of the valley of Ciguenza, which has been formed by the removal of the dolomite, and the laying bare of the underlying limestone by denudation, occur several lodes, to which allusion has been already made. One of these has been worked for galeniferous carbonate at a mine called "Emilia," while at another mine called "Vicenta," to the westward upon the same lode, the ore found was almost pure carbonate. Upon sinking a mine in one of the parallel lodes about 30^{m} north of the principal lode at Emilia, only iron ore similar in appearance to the calamine was found; at the depth of five or six metres this passed into pyrites, but blende was not found. The continuation of the same lode to the westward, near the mine Vicenta, gave, on the other hand, an earthy ore of iron mixed with blende, and at a greater depth pyrites,—the ore consisting at this point of a rib, one side of which was pyrites and the other blende. Still deeper the iron disappeared, and was replaced by carbonate of zinc, exactly as in the neighbouring part of the main lode.

It would thus appear that the iron ore is the result of the decomposition of pyrites. In this case, a large quantity of sulphuric acid must have been formed and removed, and must have contributed to the de-

composition of the associated blende, and perhaps to the formation of hydrocarbonate of zinc—a mineral which heretofore was known to occur only in small quantities, but which has been formed in very large quantities indeed in this district.

The hydrocarbonate of zinc is chiefly found in the limestone underlying the dolomite. The most remarkable deposit of it is that which occurs at a mine called Dolores, in the valley of Udias. As this deposit is interesting from several points of view, a description of the circumstances under which it occurs will, while offering several peculiar features, explain the general conditions under which all the similar deposits are found. The northern escarpment of this valley presents the following ascending succession of rocks :—

1. Red sandstone and clay beds, with accompanying gypsum.
2. Very shelly limestone.
3. Sandstone and beds of clay.
4. Irregular beds of limestone and dolomite,—the under bed producing a good hydraulic lime.
5. Shelly limestone, containing abundance of oyster-shells.
6. Dolomite.
7. Tertiary limestone.
8. Tertiary greenish sandstone.

There appears to be a fault in the direction of the axis of the valley through which a stream runs, which has produced a downthrow on the south, equal to the thickness of the upper beds of No. 1, and the whole thickness of Nos. 2 and 3 ; so that the bed of limestone producing hydraulic cement has been brought in contact with red sandstone of the northern side.

The dolomite contains yellowish-red Smithsonite, while the subjacent shelly limestone contains the hydrocarbonate associated with silicate of zinc. The ore is irregularly dispersed in the spaces between the planes of stratification, and in the vertical joints. The beds of limestone have only a very feeble dip,—not more than from 10° to 15°. The joints are very regular, and nearly vertical to the plane of bedding ; so that each bed is not unlike a great pavement, in which a block gives way, if not directly sustained by the subjacent bed ; hence, caverns are easily formed in such a rock. A shaft was sunk into this rock near its junction with the dolomite, and a depth of about 10^m to 12^m had been attained, when the workmen came upon an opening into such a cavern ; and on descending into it, they discovered some fossil bones upon the floor, among which were recognised some teeth of an elephant in an excellent state of preservation, and some broken antlers. This interesting circumstance led one of us (Mr. O'Reilly), in company with M. Javot, the head engineer of the mines, to visit the cavern. On descending into it, the visitors were struck by the appearance of the roof and floor ; from the former descended stalactites of various sizes, and of most fantastic forms,

the most common being that of an elongated inverted cone, like those met with in limestone caverns; many, however, presented the appearance and colour of white coral trees, and some, being composed of hydrocarbonate of zinc, were of the dazzling white colour peculiar to that mineral.

The floor was composed of one immense bed of white hydrocarbonate of zinc, of variable thickness, but in some places it was found to attain a thickness of 1^m 5,—the irregularity of the ground producing a corresponding irregularity in the surface of the bed. Traces of a stream were recognised, which during the rainy season traverses the cavern, and which, no doubt, contributed to the deposition of the hydrocarbonate of zinc. The floor was so white, that the visitors hesitated to tread upon it with their muddy boots. Here and there the floor was covered with the mineral in a granular form, and portions of it upon which water was continually falling felt soapy. The phenomena presented where the dropping occurs are very interesting, and differ materially from what are observed during the ordinary formation of stalagmites. The running water accumulated during a period of rain had apparently deposited gradually a thin layer of hydrocarbonate, the soft surface of which became exposed to the action of the water dropping from above, as soon as the supernatant water had drained away. The immediate consequence of the fall of the first drops was the formation of a cup-shaped cavity. The dropping water contained some silicate in solution, which immediately produced a gelatinous compound with the zinc of the floor. The splash of the drop upon the soft gelatinous matter threw small globules of it about. Similar little globules of soft hydrocarbonate, free from silica, appear to have also been formed in the same way. As the cup enlarged, several of these globules became enlarged by the gradual deposition of successive layers, and, remaining in the cup, got moved about, and had their surfaces polished whenever a rapid succession of drops fell. A rapid succession of drops, not accurately falling upon the same spot, seems to have detached fragments of the more or less soft mass, or floods of water may have carried broken fragments of the mineral into the cups; and being too large to be ground into round fragments, they wore into flat lenticular or irregular pebbles. The cups thus formed were filled up by the successive deposits of mineral matter which floods brought into the cavern. But while on the level floor the hydrocarbonate was deposited in successive laminæ, the cups became the moulds of concretions. In this way, probably: the cup got filled up with soft mineral; as the water drained off, drops began again to fall into the centre of the soft mass, by which a fresh cup was produced, and this again filled up, and so on; the final result being the production of a kind of flattened spheroidal concretion, with a slight indentation in the top. Sometimes the points from which the drops fell appear to have changed, so that no new cup was formed. In this case, the last deposited matter contracted on drying, and left a slight depression, with irregular lips, not unlike an opening bud. The change in the point from which the drops fell was often very slight, so that a new cup was formed close

to, but not directly over, the first one; or droppings took place at the same time from two points, so close as to produce twin cups.

The rounded particles formed by the droppings acted as the nuclei around which deposits took place, so that they often became enlarged from the size of a peppercorn to that of bullets, or larger. When a number of these got imbedded in the soft mineral mud, a pisolithic mass was formed. Some of the balls, however, contain so large a nucleus of the translucent opal-like compounds of silicate and carbonate of zinc, to be described further on, that we must suppose them to have been formed by the falling of large drops of water holding silicates in solution into a solution of hydrocarbonate of zinc.

The fossil bones lay on this floor, partially or wholly enveloped in the hydrocarbonate. The greater part of the collection has been transferred to some Spanish museum, so that, for the present, we cannot give any particular account of them. A few fragments, however, having fortunately come into our hands, an opportunity was afforded of making a chemical examination of them, with a view of determining how far a substitution of lime by zinc took place. The results will be found further on.

The under side of a piece of the floor, in which a bone completely enveloped in hydrocarbonate was partially buried, was composed of a kind of conglomerate of flattened, and more or less rounded, fragments of hydrocarbonate of zinc, evidently the result of the action of running wate They were, in fact, the pebbles of a stream upon which the bones rested, and which were cemented by hydrocarbonate, and then covered over, and the bones more or less buried in the successive layers of hydrocarbonate of zinc deposited in comparatively still water.

The hydrocarbonate of zinc is found in compact earthy masses of a pure white colour, or slightly coloured brown by organic matter, and more or less distinctly laminated, as a friable bergmehl-like sinter, as stalactites, concretionary nodules, pisolithic masses, &c. It is usually associated with silicate of zinc, which is found coating it in small crystals, or in layers composed of colourless translucent fibrous crystals. Sometimes these layers alternate with the hydrocarbonate; even when the fibrous silicate occurs in concretionary masses of considerable thickness, each layer appears to be separated by an extremely thin opaque parting of hydrocarbonate of zinc. Layers of hydrocarbonate are often found having the fibrous structure of the silicate, but containing no silica. They may possibly be the result of pseudomorphic action, and consequently to be regarded as pseudomorphic hydrocarbonate after fibrous hydrated silicate of zinc. This intimate association of hydrated silicate of zinc and hydrocarbonate of zinc extends much further than mere mechanical associations; for in the balls already mentioned we shall find examples of combinations of the two in various proportions, and even the pure fibrous silicate will be shown to contain carbonic acid.

The preceding observations indicate the chronological order in which the different kinds of zinc ores in the province of Santander have been

formed. The primitive ore was blende, associated generally with more or less pyrites; the decomposition of the blende produced the Smithsonite. Contemporaneously, as it appears, with the transformation of blende, water holding some salt, or perhaps several salts, of zinc in solution percolated through the joints, and between the planes of bedding of the limestone underlying the dolomite—chief seat of the Smithsonite—and deposited there, and in the caves formed in the limestone the masses of hydrocarbonates now found there. The proper discussion of the chemical changes by which these minerals have been formed, involves the solution of several chemical problems, such as the action of solutions of bicarbonates upon those of sulphate of zinc, the action of sulphate of protoxide of iron upon sulphide of zinc, &c. One of us has already begun the investigation of these problems. We may therefore defer until its completion any attempt to trace out the successive transformations by which the Smithsonite and hydrocarbonate were formed.

The occurrence of the bones partially buried in the hydrocarbonate of zinc forming the floor of the cavern above described, affords a test by which to determine the exact geological age of the deposits of hydrocarbonate, and consequently of the formation of the greater part of the Smithsonite. This test is the more valuable, because evidence showing the period of geological time to which the deposition of the contents of mineral veins belongs is very rare. There can be no doubt that the deposition of the greater part of the hydrocarbonate was contemporaneous with the existence of the species of animals to which the bones belonged. It is probable, therefore, that the deposition of that mineral in the cavern began during the pleistocene period, and has continued down to the present time. Until an opportunity is afforded of making an accurate examination of all the bones, this conclusion must, however, be looked upon as provisional.

Effect of the Zinc Solutions on the Fossil Bones.—Before passing to the discussion of the chemical composition of the hydrocarbonate of zinc and the associated silicates, it may be interesting to notice the effect which the solution of a salt of zinc has had upon the composition of the bones. Only a few of the bones found came into our possession, and they were chiefly fragments. Some were wholly enveloped in the white mineral, others only partially. Among the latter was a tibia, apparently belonging to some ruminating animal—probably a large-sized deer. This bone had lain on the floor, and was covered from time to time with water holding a salt of zinc in solution, whenever the cave was flooded. On one side was a partial stalagmitic coating, apparently produced by droppings from the roof. It was beautifully white; the dense part of the bone adhered strongly to the tongue, like burnt bone; it was, however, much more fragile, and friable. Even when kept for several days over oil of vitriol, it lost a considerable quantity of water, which appeared to be chemically combined with it. The cancellated tissue of this bone was beautifully preserved. A portion of this tissue was put for three or four days into acetic acid diluted with about twice its weight of water, in order to dissolve out the carbonates which it contained; this

process was repeated once with fresh acid, somewhat stronger, so as to insure the total removal of the carbonates. Sulphide of hydrogen in excess, added to the acid solution, gave a copious precipitate of sulphide of zinc; this was removed by filtration, and oxalate of ammonia added to the filtered solution, which threw down a precipitate of oxalate of lime. This shows either that the whole of the carbonate of lime was not removed from the bone during the action of the solution of zinc, or that new carbonate of lime had been formed from the phosphate by the substitution of oxide of zinc. The tissue treated with the acetic acid was washed repeatedly with distilled water, and boiled with it, in order to remove all traces of the acetates of zinc and lime, and then dissolved in hydrochloric acid. To this solution ammonia was added in excess, and it was then digested for some hours, so as to insure the re-solution of all the phosphate of zinc thrown down at first. On filtering, the phosphate of lime remained on the filter; the filtered liquid contained any zinc existing as phosphate; on adding sulphide of ammonium to the solution, a precipitate of sulphide of zinc was thrown down. The solution filtered from the precipitate of sulphide of zinc, treated with chloride of magnesium, gave a precipitate of ammonio-magnesian phosphate. On determining the amount of zinc in the precipitated sulphide in the usual way, and calculating the amount of phosphoric acid in the ammonio-magnesian phosphate, the results showed that the phosphoric acid and oxide of zinc were in the proportions to form the salt $3ZnO,PO_5$. In the air-dried bone, the amount of oxide of zinc as phosphate was 6·090 per cent., equivalent to 10·805 per cent. of $3ZnO,PO_5$. The amount of lime thus substituted by zinc appeared to vary according as the bone was completely enveloped or not, and according to the part of the bone examined. The solid part of a fragment of a small bone, completely enveloped by a coating of hydrocarbonate about 5^{mm} thick, contained a quantity of oxide of zinc equivalent to 16·98 per cent. of phosphate of zinc. A part of the carbonate of lime may have been derived from this substitution. Scarcely a trace of the organic matter of the bone had been preserved, but in those which were covered by layers of hydrocarbonate, the inside of the coating or shell of mineral, when removed from the bone, had always a yellowish-brown superficial colour, and bore an accurate imprint of the bone. When the inner layer of such a coating was dissolved slowly in moderately dilute acetic acid, brown membranaceous flocculi floated about, which were probably the remains of the periosteum. This would seem to show that the bones were not much decayed before they were enveloped in the hydrocarbonate of zinc, and consequently confirms the view that the formation of the upper layers, at least, of the hydrocarbonate of zinc in the cavern, was contemporaneous with the species of animals to which the bones belong.

Chemical Composition of the Hydrocarbonate of Zinc.—Analyses of the Spanish hydrocarbonate of zinc have been already published by MM. T. Petersen and E. Veit*, and by M. A. Terreil.† The former believe that

* Annal. d. Pharm. u. Chem. Bd. cviii. 48. † Compt. rend. t. xlix., p. 553.

it has not a constant composition. The mean of several analyses of a portion taken from the centre of a large piece gave,—

	Calculated.	Found.
ZnO,	73·021	73·1
CO_2,	14·838	15·1
HO,	12·140	11·8
	99·999	100·0

The calculated percentage is derived from the formula $8ZnO,3CO_2$, 6HO. Exposed to the air for three months, its composition was found to be :—

	Calculated.	Found.
ZnO,	75·277	74·73
CO_2,	13·597	13·81
HO,	11·124	11·45
	99·998	100·09

The calculated numbers are here derived from the formula 3ZnO, CO_2,2HO, which they assign to it.

The following are the results of an analysis of a ball of hydrocarbonate, made by M. Terreil :—

ZnO,	68·15
CO_2,	13·17
CaO,	1·60
Al_2O_3,Fe_2O_3,	0·80
HO,	12·40
Hygroscopic water,	3·13
Organic matter containing nitrogen,	traces
	99·25

This corresponds, according to him, to the formula $5ZnO, 2CO_2$, 3HO; but as part of the water is hygroscopic, he prefers the formula 3ZnO, CO_2,2HO. If we deduct the lime, alumina, iron, and hygroscopic water, and calculate the composition of the remainder in 100 parts, and also calculate the theoretical composition in 100 parts from the formula $3ZnO,Co_2$,2HO, we get the following numbers :—

	Calculated.	Found.
3ZnO*,	75·277	72·716
CO_2,	13·597	14·052
2HO,	11·124	13·230
	99·998	99·998

* Equivalent of Zinc = 32·6.

These numbers differ too much to warrant us in accepting the formula proposed by M. Terreil as the true one.

M. Terreil states, that even at 200° cent. hydrocarbonate of zinc loses only hygroscopic water; this statement appears singular, especially when we recollect the interesting results of M. Damour,* who found that even the zeolites, with the exception of analcime, possess the property of losing considerable quantities, and sometimes even the whole of their hydrated water, either when placed in a perfectly dry atmosphere, or when exposed to temperatures comprised between 40° cent., and incipient redness, and of again taking it up. The loss of water which hydrates sustain when heated, depends not only upon the temperature to which they are exposed, but likewise upon the relative facility with which the air in contact with them is changed, and upon the duration of the exposure. In order to test this point, the percentage of water and carbonic acid in a piece of perfectly white compact hydrocarbonate was determined by the loss which it sustained by ignition, in its air-dried state, after an hour's exposure to a temperature of 130° cent. in an oil-bath, and after an exposure of five or six hours to a temperature ranging between 150° to 180° cent., and with frequent exposure to the air. A similar experiment was tried with a fragment of pure white friable bergmehl-like hydrocarbonate. The following table contains the results of these experiments :—

	Compact Mineral.	Friable light Mineral.
Total HO, and CO_2 in air-dried mineral,	25·738	28·380
Loss in one hour at 130°,	2·041	3·151
Loss in six hours at 150° to 180°,	14·423	18·571

The following table represents the relative composition at each stage :—

	Compact Mineral.			Friable light Mineral.		
	Air-Dried.	Dried at 130°.	Dried at 150° to 180°.	Air-Dried.	Dried at 130°.	Dried at 150° to 180°.
ZnO,	74·262	75·809	88·898	71·620	76·121	92·302
CO_2, HO,	25·738	24·191	11·102	28·380	23·879	7·689
	100·000	100·000	100·000	100·000	100·000	100·000

These experiments show that not only does hydrocarbonate of zinc lose hydrated water at temperatures under 200°, but even a considerable quantity of carbonic acid. It is even probable, that in a current of hot air at a temperature of 180° cent., it would be fully decomposed. It may, however, be safely dried at the temperature of boiling water, or even as high as 120° cent., provided it be not too long exposed to the heat.

With the view of determining whether the composition of the hydrocarbonate is always constant, a large number of specimens, exhibiting

* Compt. rend. t. xliv. p. 975.

as great a variety of structure and origin as possible, were examined In some cases the sum of the water and carbonic acid was determined by ascertaining the loss by ignition; but in several cases every constituent was separately determined, and great care was especially taken in estimating the amount of carbonic acid. The following contains the description of the specimens, and the results of the analyses :—

I.—Compact indistinctly laminated mass, with its upper surface covered with ripple marks; colour, pure white, opaque; dull, earthy, but with a slightly conchoidal fracture, and fissile along the planes of deposition; somewhat brittle, streak shining. Hardness = 2. Specific gravity, 2·232, or 3·758 after it has become fully saturated with moisture. The piece examined was taken from the centre of the mass, which was twelve centimetres long, ten wide, and eight thick.

II.—Fragment taken from the exterior of the last-mentioned mass, which had been many months exposed to the air.

III.—Light, porous, friable mass, of a perfectly white colour, and not unlike some kinds of meerschaum, but much more friable, being easily reduced to powder between the fingers.

IV., V., VI.—Specimens of compact white hydrocarbonate, similar to I. and II.

VII.—Compact white hydrocarbonate, very distinctly laminated, and slightly discoloured from clay, &c., on the surfaces of the laminæ; formed part of the floor in which the bones were buried.

VIII.—Another specimen of light, friable sinter, similar to III., but having a faint rose-red tint.

IX.—Fragment of the hydrocarbonate encasing a piece of bone. Some of the layers, though perfectly opaque, had a fibrous structure, like silicate of zinc.

X.—Part of a lump of pure white compact hydrocarbonate, enclosed in translucent crystalline Smithsonite.

XI.—Part of a lump of pure white compact hydrocarbonate, intermixed with white transparent fibrous silicate of zinc.

XII.—External layer of a stalactite, having a distinctly fibrous structure, analogous to that of the silicate.

XIII.—Ball of white hydrocarbonate of zinc, one centimètre in diameter.

	I.		II.		III.	
Oxide of Zinc,	74·059		74·244		73·581	
Lime,	0·011		0·013		0·010	
Phosphate of iron,	0·008		0·005		0·003	
Alkalies in combination with silica,	0·003		—		—	
Carbonic acid,	14·934		14·893		14·980	
Hydrated water,	10·070	25·968	10·027	25·656	10·421	26·429
Hygroscopic water,	0·964		0·736		1·028	
Organic matter,	traces		traces		traces.	
	100·049		99·918		100·023	

	IV.	V.	VI.	VII.	VIII.
Oxide of zinc,	74·173	74·262	74·247	74·092	73·427
Carbonic acid, Hydrated water, Hygroscopic water,	25·827	25·738	25·753	25·908	26·573
	100·000	100·000	100·000	100·000	100·000

	IX.	X.	XI.	XII.	XIII.
Oxide of zinc,	74·232	74·284	74·391	74·437	74·480
Carbonic acid, Hydrated water, Hygroscopic water,	25·778	25·716	25·609	25·563	25·520
	100·000	100·000	100·000	100·000	100·000

So far as these results go, they prove that the change assumed by Messrs. Peterson and Veit to take place in the composition of the mineral by exposure to the air does not occur. It is probable that the mineral may have been when first formed more highly hydrated, and that, according as it hardened, in consequence of the gradual evaporation of the mechanically-adhering water, it likewise lost part of its hydrated water,—thereby giving rise to the formation of a sufficiently stable compound to remain unaltered in the air. We generally consider that hydrated gelatinous precipitates have the composition which the analyses of the bodies formed by throwing them upon filters, pressing and drying the filtered masses, give us; it is, however, very probable, that the moist gelatinous mass is a different hydrate from that which we get upon the dried filter. It is quite possible that all bodies capable of combining with water may do so in a great many proportions, some of which only possess the necessary degree of stability to enable us to isolate them—of this we have a striking example in the two, if not three, hydrates which common salt forms. We also know that in bodies which contain several equivalents of hydrated water, each equivalent may not always be held with the same amount of force. All the specimens examined by us were thoroughly air-dried, having been in a dry, warm room, during more than eight months, and had all consequently arrived at the stage of greatest stability, whatever may have been the original degree of hydration. It does not appear that any carbonic acid was lost.

If we consider the part of the water which is driven off in the water-bath as hygroscopic, the formula $8ZnO,3CO_2,5HO = 3\ (ZnO,CO_2) + 5\ (ZnO,HO)$, represents the composition of the Spanish hydrocarbonate. The following table, which contains the results of the analyses I., II., III., from which the hygroscopic water, lime, &c., have been deducted, shows the agreement between the composition calculated from this formula and that deduced from experiment:—

Calculated.			Found. I.			II.			III.		
$8ZnO$, 74·529			74·759			74·869			74·337		
$3CO_2$, 15·144	25·469		15·075	25·240		15·020	25·131		15.134	25·662	
$5HO$, 10·325			10·165			11·111			10·528		

When hot or cold solutions of sulphate of zinc and carbonate of soda or potash are mingled, a precipitate is thrown down, which was analysed by Schindler, and for which he proposed the formula $8ZnO,3CO_2,6HO$. This is also the formula which Messrs. Peterson and Veit deduced from their analyses of the part taken from the centre of the mass. If we considered the water driven off at 120° as part of the hydrated water, the composition of No. III. would to some extent agree with the formula—to some extent only, however, for the water, which in an air-dried specimen is more likely to be in excess, is too small. But as it is only the friable porous variety, which must contain most hygroscopic water, that agrees with this formula, while all the compact varieties differ materially from it, we could not, even if we had not positive evidence that part of the water is hygroscopic, adopt the formula of Schindler.

How are we to look upon those hydrocarbonates? Are they compounds of hydrated oxide of zinc and of carbonate of zinc, or are they basic carbonates combined with water? If the former, Schindler's formula should be written thus:—$[3\,(ZnO,CO_2) + 5\,(ZnO,HO)\,] + HO$; if the latter, $8ZnO,3CO_2 + 6HO$. In the former case the water performs two functions, and one equivalent must be held with much less force than the other five. It is probable that the most stable hydrate of oxide of zinc, is that represented by the formula ZnO,HO; accordingly we find that, in the majority of hydrocarbonates yet discovered, the sum of the equivalents of carbonic acid and water is equal to the number of equivalents of zinc. May it not be that the body examined by Schindler was not perfectly dry; and that its real composition was $3\,(ZnO, CO_2) + 5\,(ZnO,HO)$. In this case it was identical in composition with the Spanish hydrocarbonate.

With regard to the second formula of Messrs. Peterson and Veit, which assumes not merely a loss of hydrated water, but also of carbonic acid, we believe that their conclusion is founded upon an erroneous estimation of the carbonic acid. On looking to page 14, it will be found that the amount of oxide of zinc which they found is considerably below that calculated from their formula, while it is very little above that deduced from our formula—indeed, their analysis of the part exposed to the air for three months, so far from leading to the formula $3ZnO, CO_2,2HO$, fully confirms ours, as the following table, in which our analyses are contrasted with theirs, and with the theoretical composition deduced from our formula shows:—

Calculated.			I,			II.			III.			P. & V.	
$8ZnO$, 74·529			74·759			74·869			74·337			74·73	
$3CO_2$, 15·144	25·469		15·075	25·240		15·020	25·131		15·134	25·662		13·81	25·260
$5HO$, 10·325			10·165			11·111			10·528			11·45	

The original substance to which the name zinc bloom or zinc blüthe was given, and which consists of a species of efflorescence which forms on the walls of zinc mines, and upon the rubbish taken out of the workings, appears to be a different compound from that which we have been describing. Smithson first, I believe, analysed a specimen of this mineral in small mammiform patches from Bleiberg, in Carinthia. Another analysis of it was made by Dr. Carl Schnabel,* with a specimen which had effloresced upon the rubbish at Ramsbeck, in Westphalia, under the influence of strong sunshine. Similar efflorescences are found upon a curious blende, which occurs in globular and reniform masses, formed of concentric layers at the Venta, near Comillas, specimens of which we have analysed; and also upon some Smithsonite from the mines of Florida. These different specimens agree very well in composition, and may be represented by the formula $3ZNO,CO_2,3HO$. The white compound which forms upon the surface of metallic zinc when moistened, and exposed to the air, appears to belong to the same category, as the following table, containing the results of all the analyses, shows :—

	Calculated.		Venta.	Bleiberg (Smithson).		Ramsbeck.† (Schnabel).		Artificial Compound (Bonsdorff).	
$3ZnO$,	71·311		71·260	71·4		71·210		71·25	
CO_2,	12·880	68·687	28·740	13·5	28·6	13·677	28·790	14·19	28·750
$3HO$,	15·807			15·1		15·113		14·56	
	99·998		100·000	100·0		100.000		100·00	

In this formula the sum of the equivalents of carbonic acid and water exceed the number of equivalents of oxide of zinc, and consequently the objections urged against Schindler's formula apply here with equal force. We had not, however, enough of the mineral to determine the carbonic acid separately, or whether a portion of the water could be driven off at a lower temperature than the rest. It would be useless to discuss the matter further nntil the whole of the compounds of oxide of zinc with carbonic acid and water, obtained by precipitating salts of zinc by means of carbonates, by the rusting of zinc, &c., shall be re-examined. It is interesting, however, to find that the natural compounds obtained by precipitation and by efflorescence, exhibit exactly the same difference as the artificial ones, and, furthermore, that the corresponding natural and artificial bodies are identical in composition.

Messrs. Petersen and Veit give 3·52 as the specific gravity of the Spanish hydrocarbonate of zinc; while M. Terreil gives 2·042. The following observations will, we think, explain the discrepancy. A piece of No. I., when allowed to absorb water completely, was found to have the density 3·758; the quantity of water absorbed was 18·189 per cent. If we consider that before absorbing this quantity of water it had first displaced it, the specific gravity of the mineral, supposing it to have

* Pogg. Annal. cv. 144.

† We have deducted the foreign matters and hygroscopic water, and reduced the residue to the standard of 100 parts.

absorbed nothing, would therefore be 2·232. According to Smithson, the specific gravity of zinc bloom is 3·59.

CHEMICAL COMPOSITION OF THE SILICATES OF ZINC.

Pisolithic Amorphous Silicates.—We shall first speak of the pisolithic silicates, the formation of which is described at page 10. Some of these balls are opaque, and consist of beautifully concentric shells; but nearly all that we have examined contained a semi-translucent opal-like nucleus, often not bigger than a pin-head, but sometimes as large as the largest-sized peas; sometimes spheroidal balls, as large as beans, of this opalescent silicate, are found. These opalescent nuclei and balls are not, like the opaque ones, composed of concentric layers, but appear to be quite homogenous. The concentrical structure, as well as the opacity, may, perhaps, in some cases be explained as a process of drying, or dehydratation, and not as a successive growth; in favour of this view is the fact, that the opalescent nucleus has generally somewhat more water than the opaque external shell. In some cases this explanation does not certainly apply; for the nucleus has a different composition from the opaque shells, and the latter have all the appearance of having been successively formed about the former—the external surfaces of some of the shells having different lustres, for instance. The following are the results of the analyses of several of these balls:—

I.—Slightly spheroidal ball, not found as a nucleus, but may have been originally in a large ball; lustre resinous, inclining to vitreous; fracture conchoidal and shining; colour, milk-white; semi-translucent; brittle; sp. gravity, 3·694; not unlike opal, but not iridescent.

II.—A remarkably round ball, 6 to 7^{mm} in diameter, pure enamel-white; surface smooth, exactly like glazed porcelain, or fused white enamel; fracture like biscuit porcelain.

III.—Ball of about the same size as No. II., but having a dull surface; colour, enamel-white; fracture like biscuit porcelain.

IV.—A pea, 5^{mm} in diameter, taken from the centre of a large ball 10^{mm} in diameter; external surface smooth, like fused enamel; fracture like biscuit porcelain; colour, pure enamel-white; streak, white; hardness, 3·5; sp. gravity, 2·883. It contained in the centre a semi-translucent nucleus, about the size of a mustard-seed, of the density and other properties of No. III.

	I.	II.	III.	IV.
Oxide of zinc,	64·549	61·865	62·266	66·844
Silicic acid,	6·493	8·292	9·214	17·471
Carbonic acid,	11·246	11·301	10·101	4·637
Iron in combination with phosphoric acid,	0·003	0·002	0·003	0·002
Lime,	0·006	traces	0·001	traces.
Magnesia, Alkalies,	traces	traces	traces	traces.
Water,	17·672	18·624	19·362	10·834
	99.969	100·084	100·947	99·788

M. Terreil also examined one of these siliceous balls; it had the specific gravity 2·762, and appears to have been analogous to No. IV. in other respects. As he could not remove the carbonate by means of very dilute acetic acid without also decomposing the silicate, he concluded that the two were in chemical combination. The specimen he examined contained 12·92 per cent. of water, of which 5·16 per cent. was driven off between 100° and 200° per cent.; he accordingly reckons this part as hygroscopic water. Considering silica to be a teroxide, he assumes the formula $[ZnO,SiO_3, (ZnO,HO)^3]^2 + ZnO,CO_2$. This is a very complex formula, in which we have to assume the combination of silicate of zinc with hydrate of zinc, and the combination of this compound with anhydrous carbonate of zinc. We also believe that the carbonate is in combination with the silicate; but having had a greater variety of specimens to examine, we have, as we believe, arrived at a simpler expression of their composition. The following are the formulæ which we propose for the compounds examined by us:—

I.— $2\,ZnO,SiO_2 + 3\,(2\,ZnO,\,CO_2) + 9\,HO.$
II.— $2\,ZnO,SiO_2 + 2\,(2\,ZnO,\,CO_2) + 8\,HO.$
III.— $2\,(2\,ZnO,SiO_2) + 3\,(2\,ZnO,\,CO_2) + 14\,HO.$
IV.— $2\,(2\,ZnO,SiO_2) + 2\,ZnO,\,CO_2 + 4\,HO.$

The following table shows the accordance between the theoretical composition calculated from the formulæ, and the results found:—

I.

	Calculated.		Found.	
8 ZnO, . .	64·598	. . . . .	64·549	
SiO_2, . .	6·165	. . . . .	6·493	
3 CO_2, . .	13·126	29·235	12·246	28·918
9 HO, . .	16·109		16·672	
			99·960	

II.

	Calculated.		Found.	
6 ZnO, . .	62·365	. . . . .	61·865	
SiO, . .	7·936	. . . . .	8·292	
2 CO_2, . .	11·264	29·697	11·301	29·925
8 HO, . .	18·433		18·624	
			100·082	

III.

	Calculated.		Found.	
10 ZnO, . .	61·515	. . . . .	62·266	
2 SiO_2, . .	9·393	. . . . .	9·214	
3 CO_2, . .	10·000	29·090	10·101	29·463
14 HO, . .	19·090		19·362	
			100·943	

IV.

	Calculated.		Found.	
6 ZnO,	66·996		66·844	
2 SiO_2,	17·051		17·471	
CO_2,	6·056	15·956	4·637	15·471
4 HO,	9·900		10·834	
			99·786	

Nothing can be simpler than the connexion which these formulæ establish between the composition of the different balls. According to them, they are compounds of two bodies, which are already well known, and one of which abounds in the locality, namely, calamine or hydrated silicate of zinc, and a dicarbonate of zinc, which may be precipitated by sesquicarbonate of soda, from a solution of sulphate, and which has been obtained by Boussingault combined with water as $2(2ZnO,CO_2) + 3HO$; and by Schindler, $2ZnO,CO_2 + 2HO$. The brief description which we have given in the first part of this paper of the circumstances under which these minerals occur, is sufficient to show that all the conditions for the formation of such a dicarbonate in the presence of a solution of silicate of zinc coexist. If these formulæ be correct, dicarbonate of zinc and disilicate of zinc are isomorphous;* and these compounds are analogous to those formed by bisulphate of potash and bichromate of potash, sulphate of potash, and chromate of potash, and the nitrates of potash and silver; and, consequently, similar compounds may be formed in endless proportions. Perhaps some of the zinc ores from Wiesloch, analysed by C. Riegel,† may belong to this category; indeed, the affinity of silicate of zinc for carbonate of zinc, appears to be considerable. Almost every specimen of the former contains carbonic acid, even the transparent fibrous kinds.

Fibrous Hemimorphite, or Hydrated Disilicate of Zinc (*Calamine*).—After discovering the simple relationship of the formulæ of the balls containing different proportions of water, the idea at once suggested itself to us that the isomorphism of the disilicate and dicarbonate might explain the want of atomic relation of the water, which is almost invariably observed in all the specimens of calamine that have hitherto been analysed. In order to test this hypothesis, we analysed a specimen of perfectly colourless (and in small pieces transparent), fibrous, hydrated silicate of zinc, which is associated with the hydrocarbonate from Dolores mine. This specimen was found to contain carbonic acid, as will be seen by the following table:—

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* See the paper "On the Action of Heat upon Silicates of Zinc," *infra*, for an account of some curious phenomena which appear to corroborate this view in a very remarkable manner.

† Archiv. d. Pharm. (2) Bd. lviii., p. 29, quoted by Bischoff—Lehrbuch der Chemischen Geologie 2ter Bd. p. 1883.

Oxide of zinc, ...	67·792
Silicic acid, ...	23·424
Carbonic acid, ...	1·421
Water, ...	7·263
	99·900

If we look upon the carbonic acid as existing in a compound 2 ZnO, CO_2,HO, that is in a corresponding degree of hydration to that in which silicate of zinc is found, the proportions in which the silicate and carbonate in the mineral will be found to be, in 100 parts:—

$2ZnO,SiO_2,HO$, . . .	92·702
$2ZnO,CO_2$,Ho, . . .	7·298
	100·000

7·298 of this hydrocarbonate would contain:—

ZnO, ...	5·296
CO_2, ...	1·421
HO, ...	0·581
	7·298

If we deduct these numbers from those given above in the table of the results of the analysis of the mineral, we shall get the following proportions, which represent the quantities of oxide of zinc and water which belong to the silicate, as distinguished from those which belong to the carbonate:—

ZnO, ...	62·596
SiO_2, ...	23·424
HO, ...	6·682
	92·702

Or in 100 parts, and compared with the composition of silicate of zinc calculated from the formula $2ZnO,SiO_2,HO$:—

	Calculated from the Formula.	Calculated from the Analysis.
2ZnO, . .	67·213	67·523
SiO_2, . .	25·409	25·268
HO, . .	7·377	7·207
	99·99	99·998

The ratio between the number of equivalents of silicate and carbonate deducible from the preceding calculations is about 11 : 1; so that the pure white, fibrous silicate may be classed in the same category as the siliceous balls, and the formula $11(2ZnO,SiO_2,HO) + Zn_2O_2CO_2,HO$, assigned to it. In this case we have distributed the water between the

two constituent compounds; but we have not done so in the former, as it is probable that the water exists in two conditions—as basic water, and as saline water. Until we shall have further evidence on this point, however, we prefer writing the formulæ of the balls as above.

This power of combining in endless proportions appears to us not only to show that hemimorphite and dicarbonate of zinc are truly isomorphic, but that the isomorphism of carbon and silicon extends to carbonic and silicic acids, and thus adds an additional support to the view that silicic acid is a deutoxide.

Globular Radiated Hydrated Disilicate of Zinc.—Among the minerals which were procured at the mines of Florida, was a very peculiar variety of silicate of zinc. It consisted of an irregular mass, sometimes distinctly botryoïdal, of globular silicate,—the largest of the globules being about a centimètre in diameter. Externally the globules were covered with asperities, which were the ends of crystals disposed in a radiated acicular form. The fracture of a globule showed the cleavage planes of these crystals, arranged in a stellated form, and inclined to each other. These cleavage planes were large, and appeared to be $\infty P \infty$, parallel to which the cleavage is complete. Colour, yellowish-brown; the fresh surfaces being studded with a number of extremely small black points. The cleavage planes had a mother-of-pearl lustre, which soon tarnished, and became dull; sp. gr. 3·267. When freshly fractured, and a perfectly undecomposed fragment examined, its hardness was nearly = 5. The mineral decomposed into a brownish-yellow, ochry substance with remarkable facility. Its composition was found to be:—

Oxide of zinc, ...	62·195
Silicic acid, ...	24·883
Sesqui-oxide of iron, . . .	5·182
Lime, ...	trace.
Water, ... ,	7·121
	99·381

If we deduct the oxide of iron, and calculate the proportions in 100 parts of the oxide of zinc, silica, and water, alone, and compare the results with the theoretical composition deduced from the formula $2\,ZnO, SiO_2, HO$, we shall find that the silica and water are too high in the experimental results, and consequently the oxide of zinc too low. In what state is the sesquioxide of iron in this mineral? Is it in combination, or merely mixed mechanically with it? The property which silicate of zinc has of dissolving in a solution of caustic potash, suggested itself at once as a means of answering this question. On treating the mineral in the state of fine powder with a solution of potash in the cold during several days, the whole of the silicate of zinc was dissolved, and a reddish-brown powder was left; the composition of which may be represented by the formula $2Fe_2O_3, SiO_2, HO$. This is exactly the silicate of iron, which is found in Glauber's iron-tree, obtained by

putting a piece of dried protochloride, sesquichloride, or protosulphate of iron, in a solution of silicate of potash:—

$$3(2Fe_2O_3SiO_2) + 2(KO,CO_2).$$

This would, in all probability, be the silicate formed by the mutual decomposition of an alkaline silicate and sulphate, or bicarbonate of iron.

The great facility with which this mineral decomposes and behaves in acids, and its peculiarities generally, would seem to show that the silicates of zinc and iron are in some sort of combination, and not simply intermixed. If from the whole we deduct not merely the oxide of iron, but also the amount of silica and water combined with it, the remainder will contain oxide of zinc, silica, and water, in the proportions represented by the formula $2ZnO,SiO_2,HO$.

Perhaps many other minerals containing peroxide of iron, &c., would present us with a like phenomenon, if we could dissolve one constituent like the silicate of zinc. There are, no doubt, many cases where foreign substances cannot be considered to be merely mechanically mixed in a mineral, and yet cannot be held to replace some constituent isomorphically, which may be explained in this way. Indeed, it is probable, that many of the so-called isomorphic replacements are in reality such compounds, held by a very feeble affinity, but which, unlike the one here in question, cannot be dissected.

The Rev. Samuel Haughton, M.A., F.R.S., Fellow of Trinity College, Dublin, read the following paper:—

On a Graphical Mode of Calculating the Tidal Drift of a Vessel in the Irish Sea or English Channel. (Plate II.)

The change of level in the surface of tidal water, between two given hours, may be graphically calculated by the method given by Mr. Airy in his Treatise on Tides and Waves. Let a circle be described whose radius is *half* the Range of Tide, and painted on a vertical wall; the tide, in its rise and fall, will cover and uncover equal arcs of this circle in equal times. If this circle be divided like the dial of a clock, XII. and VI. corresponding to the top and bottom of the vertical diameter, and tidal hours be used, the rise or fall of the water may be easily calculated.

In calculating the Drift produced by the Tidal Stream, we are not given the total drift in six tidal hours, which would correspond to the Range of the Tide; but we have instead the maximum velocity of the Tidal Current at half-flood and half-ebb.

The following construction will enable us easily to calculate the Tidal Drift between two given hours:—

Let a circle be described whose radius is double *the maximum rate of stream, and let this circle be divided into Tidal Hours; from the two given*

hours let fall perpendiculars on the diameter joining XII. *and* VI. : *the intercept between the feet of these perpendiculars, measured on the scale of the diameter, is the Tidal Drift required.*

This construction, which is rapidly made in practice, will, I believe, be found of great value to masters of vessels entering or clearing the Irish Sea and English Channel. It may be thus proved :—

Let v denote the velocity of the Tidal Stream.
,, a ,, maximum velocity of the same.
,, t ,, time measured in Tidal Hours, from XII. o'clock, on the tidal dial.
,, $n = \frac{2\pi}{T}$,
,, T = twelve tidal hours ($12^h\ 24^m = 744^m$).

Then

$$v = a \sin nt, \tag{1}$$

therefore

$$ds = a \sin nt\, dt,$$

$$s = -\frac{a}{n} \cos nt + \text{const.},$$

$$0 = -\frac{a}{n} \cdot 1 + \text{const.};$$

and, finally,

$$s = \frac{a}{n}(1 - \cos nt). \tag{2}$$

This is the Tidal Drift, measured from the commencement of the Ebb. It is evidently proportional to the versed sine of the Tidal Hour; and therefore the construction is proved, provided we can show that the radius of the Tidal Clock is *double* the maximum rate of the stream.

Calling H the Tidal Hour, we have

$$s = \frac{a}{n}(1 - \cos H),$$

$$= \frac{12^h \cdot 4a}{2\pi}(1 - \cos H),$$

$$= 1{\cdot}973a\,(1 - \cos H);$$

and, taking this between any two Tidal Hours, we have

$$s - s' = \text{Tidal Drift} = 1{\cdot}973a\,(\cos H' - \cos H). \tag{3}$$

For practical purposes, 1·973 is so nearly equal to 2, that the circle whose radius is *double* the maximum velocity a, will answer for the graphical calculation.

As an example of the use of the construction I have given, let us take the case of the mail-steamer from Kingstown to Holyhead, at 7 P.M. this evening.

This steamer leaves Kingstown at $7^h\ 25^m$ Greenwich time, and expects to arrive at Holyhead at $11^h\ 25^m$. The High Water at the Head of the Tide to-night will take place at $6^h\ 42^m$ Greenwich time. Therefore the Tidal Hours of the steamer's departure and arrival are—

Departure from Kingstown, ...	XII·43^m
Arrival at Holyhead, ...	IV·43

Taking the maximum rate of stream between Kingstown and Holyhead at 3 knots per hour, and making the construction I have pointed out on the circle of 6 knots radius, we find that the Ebb Tide will drift the steamer 7·8 knots to the southward of Holyhead Harbour, unless a correction be applied in steering. (Mr. Haughton here exhibited a Tidal Card, by means of which the rise or fall, and the tidal drift, could be calculated for any case in a few moments.) (Vide Plate II.)

This is nearly the greatest amount of Tidal Drift that the Kingstown and Holyhead steamers are subject to. Their greatest drift is 8·16 knots, which will occur to the South, when their times of departure and arrival are I. and V. by the Tidal Clock; and 8·16 knots to the North, when their hours of departure and arrival are VII. and XI. by the tide. There is, therefore, in this four hours' run, which is made at the rate of 16 miles per hour, a possibility of the steamer finding herself, if she neglect the Tidal Stream, 9 miles to the north or to the south of Holyhead or Kingstown. In a fog, when the passage is delayed, it has sometimes happened that these steamers have found themselves off Bray or Dalkey Sound, when they supposed they were close to the mouth of Kingstown Harbour. The Tidal Stream in the Irish Sea is greatly modified by the wind, which, if northerly, will cause the Ebb Tide to carry out more water than its proper share past the Tuskar entrance; and, *vice versâ*, the wind, if southerly, will aid the Ebb Tide through the North Channel, and seriously embarrass vessels beating to the southward.

This complication of the tides caused by the wind has not yet received the amount of attention its importance merits; and it is well expressed in the following statement, which I have received from Mr. J. Bowling, Master, R. N., in command of H. M. tender, "Badger," whose long experience in the Channel entitles his opinion to much weight:—

"*H. M. Ship Badger, June 12th*, 1861.

"It has occurred to me that there was a point of some importance in direct connexion with the subject of the tides, namely, the great difference which must exist between the strength of the succeeding flood and ebb-tides, with strong prevailing winds up or down channel.

"Take, for instance, from the Saltee Islands to Holyhead, within which bounds it is a well-known fact, that the tides rise much higher, and continue to flow much longer with strong winds up channel, than

under ordinary circumstances; the result is, that the agent that forces the South-coming tide up checks that from the North, in the same proportion, both as to rise and duration. The equilibrium being destroyed, the stronger current from the South overruns its natural bounds (between Morecambe Bay and Carlingford), whereby a large proportion of the water which enters by the South escapes by the North Channel, giving additional velocity to the succeeding ebb thereof, and reducing the force of the South in a corresponding ratio.

"Continuing to speak of the South Channel, which is the great highway to and from Liverpool, and the other large commercial ports in the St. George's Channel, let us imagine a vessel between Holyhead and the Irish Banks being caught in thick weather, with strong winds up-channel; let us suppose her to be for two or three days (as is often the case) without being able to ascertain her position; a fair wind springs up; the master, after making due allowance for all things to the best of his judgment, shapes a course to clear the Tuskar; but I am sorry to say that they, in too many cases, find themselves on shore, or escaping by a miracle from Arklow, Blackwater, or some of the other numerous banks above the Tuskar.

"I have been for the last twenty-six or twenty-seven years, from time to time, cruising in the Irish and English Channels, and have had ample opportunity, in all kinds of weather, of studying the effects of the tidal currents, and my experience has led me to believe the above to be correct.

"I have, particularly for the last nearly six years that I have been on this station, made it my business to question masters of vessels (and particularly those who had the misfortune to get on shore), upon the point above set forth, but have never met one who appeared to bestow a thought on the possibility of the water escaping by any other than the channel by which it entered; but all have admitted the force and justice of my argument, and most were ready to attribute their misfortune to some such unforeseen circumstance.

"I may add, that it is a well-known fact, that all vessels brought up by the banks imagined themselves to have been much further to the southward than where they had found themselves.

"These remarks are equally applicable to the English Channel, as well as to winds from the opposite direction.

"J. Bowling,
"*Second Master in command.*"

The Secretary of the Academy having announced the presentation of the remainder of the documents belonging to the Antiquarian Department of the Ordnance Survey of Ireland, it was

Resolved,—That the Academy gratefully acknowledge the receipt of 35 MS. volumes of the Irish Ordnance Survey collection, supplemental to the 103 volumes presented on the 30th November, 1860, by authority of the Right Hon. the Secretary of State for War; and hereby present their special thanks to Sir Henry James, R. E., Superintendent of the

Ordnance Survey, and to Captain Wilkinson, for this further most valuable donation; again expressing their sense of the importance of the services rendered to the History and Antiquities of Ireland by Major-General Sir Thomas A. Larcom, under whose superintendence the plan of collecting materials for the illustration of our ancient Topography was organized, and successfully carried into effect.

The Librarian having announced a donation by the Master of the Rolls of England of the Series of Calendars of the State Papers and of Historical Publications lately issued under his direction, it was

Resolved,—That the thanks of the Academy are due, and are hereby returned, to the Right Hon. the Master of the Rolls of England, for his very valuable and acceptable grant to our Library of the Series of Calendars of the State Paper collection, and the Series of Historical Publications issued under his Honor's superintendence.

The Academy then adjourned.

STATED GENERAL MEETING.—Saturday, November 30, 1861.

The Very Rev. Charles Graves, D. D., President, in the Chair.

The President having inquired whether there was any business to be transacted, the Secretary reported that there was no matter for the formal consideration of the Academy.

The Rev. Dr. Reeves read the following Memoir of Stephen White:—

Father John Colgan had been for several years labouring in the compilation of his great work on the ancient worthies of Ireland, and had two-thirds of his task done, when the letter, with the carriage of which, for the hearing of the Academy, I have been honoured, was written to him by his venerable and respected countryman, Stephen White. Among the many distinguished Irishmen whose spirits were stirred up within them at the wholesale attempt made by Dempster and his Scotch contemporaries to affix the historical label Scotia, without even a duplicate, to their portion of Britain, and transfer to its annals all the celebrity of ancient Ireland, almost the earliest,* and certainly the most accomplished, was the writer of this letter. He it was who opened that rich mine of Irish literature on the Continent, which has ever since yielded such valuable returns, and still continues unexhausted; and by his disinterested exertions, less enterprising labourers at, or nearer, home, not only were made

* In Messingham's Florilegium, published in 1624, we find the name of *Stephanus Vitus* as a reference upon the true application of the name Scotia. Tractat. Præambularis (last page but two). Opposite White's account of the Reichenau MS. of St. Columba's Life, in the Ussher MS. is written in Ussher's hand the date 1621, 31 Maii. See the Irish Archæol. and Celtic Society's edition of Adamnan's Columba, Preface, p. xxxviii. From the following letter we learn that he commenced his pursuits in Irish antiquities about the year 1611.

acquainted with the treasures preserved in foreign libraries, but from time to time received at his hands the substantial produce of his diligence, in the form of accurate copies of Irish manuscripts, accompanied by critical emendations and historical inquiries, amply sufficient to superadd to his credit as a painstaking scribe, the distinction of a sound thinker, and an erudite scholar.* Abroad, as well as at home, his merits were acknowledged. Raderus, the historian of "Bavaria Sancta," in testimony of his acquirements, designated him *Polyhistor;*† and so well did the name fit him, that it was caught up by his countrymen, and a title so honourably borne in former ages, was confirmed to him by the united suffrages of fellow-citizens and foreigners.‡ The learned Gretser§ was willing to receive suggestions from, and John Bollandus to be under obligations to him. While Professor of Theology at Dilingen, Dorbbene's manuscript of Adamnan's Life of St. Columba was brought to him from Reichenau;¶ and there, with his own pen, he made the careful transcript which furnished Archbishop Ussher with his Various Readings,** supplied Colgan with a text,†† and provided for the Bollandists of a succeeding generation one of the most valuable items in their great depository.‡‡

Literary collectors are often narrow-minded, and the creatures of jealousy and suspicion; but from such weaknesses this good and generous man was perfectly free. Coupled with an insatiable thirst for know-

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* Ussher, in reference to Marcellinus' Life of St. Suidbert, observes:—"Sed virum illum sagacissimum fugit, subdititium esse Marcellinum istum: cui a Stephano Vito, viro antiquitatum, non Hiberniæ solum suæ sed aliarum etiam gentium scientissimo, ita larva est detracta." Brit. Ec. Antiqq., cap. xii., Works, vol. v., p. 458.

Sigebertus Gemblacensis, an. cccxciv. S. Patricius Scotus in Hibernia cum suis sororibus venditur. "Ubi tamen Scotis legendum, Stephani Viti conjectura est haudquaquam aspernanda." Ibid, cap. xvi., vol. vi., p. 377.

"Et cum Hibernis, ut et Anglis, ıepen ferrum denotet, et ıeppan nomen inde deductum quasi Ferreolum; hunc eundem esse Stephanus Vitus existimat." Ibid, p. 541.

† "Stephanus Vitus gente Ibernus Soc. N. Theologus et simul polyhistor."—Raderi Bavaria Sancta, tom. iii., p. 75.

‡ Ward corrects some erroneous readings in the Basil edition of Marianus Scotus' Chronicle by emendations, "apud doctissimum polyhistorem Stephanum Vitum sacræ Theologiæ Doctorem, ex suæ Societatis Jesu Codicibus MSS." Rumoldus, p. 110.

"Ad hæc addo Doctoris Stephani Viti Polyhistoris testimonium," etc. *Ibid,* p. 254. See notes †† in this page, and note †, p. 34.

§ Observv. in Philippum de Divis Eystettensibus, Cap. 9, p. 198.

¶ "Stephanus Vitus lectori. Nuper ex cœnobio Benedictinorum in Suevia celeberrimo Augia Dives dicto, vulgo Reichenaw, allatus est ad me Dilingam vetustissimus codex membranaceus," etc. See the Irish Archæol. and Celtic Society's edition of Adamnan's Columba, p. xxxviii., note *g.*

** Ussher refers to this copy in his Ecc. Brit. Antiq. Works, vols. iv., 456, vi., pp. 245, 523, 526, 527, 530, 541. His manuscript of White's collation is still extant. See reference in preceding note.

†† "Hanc nobis vitam communicavit R. P. Stephanus Vitus Societatis Jesu, vir patriarum presertim sitientissimus, et omnium scientissimus antiquitatum; et hinc a diversis jam Polyhistor appellatus; sua manu descriptam, ex pervetusto codice MS. Monasterii Augiæ Divitis in Germania." Colgan, Trias Thaum., p. 372 *a.*

‡‡ Acta Sanctorum, Junii, tom. ii., p. 197. This article was edited by Francis Baert, 1690.

ledge regarding the history of his country—the cravings of which made such an impression on Colgan's mind that he thrice alludes to it, and on two different occasions calls him *patriarum antiquitatum sitientissimus**—there was a total freedom from selfishness. He sought the honour of his country, not of himself; and was satisfied that the fruits of his labours, if only made to redound to the credit of loved Ireland, should pass into other hands, and under their names be employed in their several projects, and at their discretion. Thus, in the Benedictine library of Keysersheym, in Switzerland, he copied the life of St. Colman, the patron saint of Austria, for Hugh Ward.† At the monastery of St. Magnus, in Ratisbon, he found the life of St. Erhard, of that city, and sent a transcript to Ussher.‡ To this prelate, so opposed to him in matters of polemical controversy, he made acceptable communications regarding St. Brigid,§ and St. Columba;‖ and that this literary generosity was duly felt, while his qualities of head and heart were appreciated, appears not only from the Primate's public acknowledgments,¶ but from the very interesting glimpse at private life which the following letter affords.

To Colgan he transmitted a life of St. Patrick, which he copied from an ancient manuscript at Biburg, in Bavaria;** from St. Magnus's, at Ratisbon, he sent him Ultan's Life of St. Brigid;†† and from Dilingen, as I have already observed, he sent him the text for the Life of St. Columba. To his untiring generosity Fleming, also, was indebted for two contributions for his *Collectanea* of Columbanus's writings.‡‡

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* See note ††, p. 30, *supra*, and note †† on this page. See also the extract from Colgan's Preface, at p. 32, *infra*.

† "Vita S. Colmanni, quam sua manu exaratam e Cæsariensi Benedictinorum in Suevia cœnobii Codice MS. nobis transmisit R. P. Stephanus Vitus Doctor S. Theologiæ, et historiarum eruditissimus." Vardæi Rumoldus, p. 236.

‡ Ita Conradus a Monte Puellarum Canonicus Ratisbonensis, in vita S. Erhardi, quam ex codice MS. monasterii S. Magni Ratisbonæ a se descriptam communicavit mihi Stephanus Vitus." Ussher, Ec. Brit. Antiqq., cap. 16, vol. vi., p. 269.

§ "Ex bibliotheca Cassinensi et Constantini Cajetani abbatis deprompta communicavit nobis Stephanus Vitus." *Ibid.* p. 274, note *t*.

‖ See the references in note **, p, 30, *supra*.

¶ See the three immediately preceding notes. "Id anonymus vita ipsius scriptor ex Adamnano fusius explicat: quod, quoniam ex edito Adamnani opere desideratur, ut a Stephano Vito humanissime communicatum accepimus, lectori hic integrum proponendum censuimus." Ussher, ut supra, p. 466.

** "Hanc nobis, ex membranis vetustis Biburgensibus in Bavaria descriptam, communicavit vir doctissimus, et patriarum antiquitatum zelosissimus investigator, P. Stephanus Vitus Societatis Jesu." Colgan, Trias Thaum., p. 29 *b*.

†† Tertia Vita S. Brigidæ, Authore S. Vltano, descripta per Rev. Patrem Stephanum Vitum, Soc. Jesu. "P. Stephanus Vitus concivis noster, vir patriarum antiquitatum scientissimus et sitientissimus." *Ibid*, p. 542 *a*.

‡‡ "Exemplar quo utimur, mihi exhibuit, cum Epistola et Sermone S. Columbani memoratis, R. Pater Stephanus Vitus Societat. Jesu, Sac. Theologiæ Doctor, et Professor emeritus, antiquitatum suæ gentis Hibernicæ studiosissimus inquisitor (Patri Mattheo Radero in sua Bavaria Sancta, ob uberem et accuratam rerum tam domesticarum, quam externarum peritiam, merito dictus Polyhistor)." Collectanea Sacra, p. 3.

Meanwhile, the literary materials which Stephen White had accumulated were not unemployed by himself; and there is sufficient evidence to prove that he not only meditated, but completed some historical works on his favourite subjects. Of these, however, only one has descended to our day, namely, his *Apologia pro Hibernia adversus Cambri Calumnias;* which Mr. Bindon discovered among the Irish manuscripts in the Franciscan collection at Brussels, as stated by him in his valuable communication to the Academy in 1847.* This work, even in its imperfect condition, is sufficient to justify the opinion which our forefathers entertained of the learning and ability of the writer. Had he been less generous, he might have been more desirous of literary fame; but he seems to have been unconcerned as to the doer, provided the work was done; and when, at the close of his life, a combined effort was made by the ecclesiastics of his church to put his manuscript to the press,† even this project failed, and the literary character of Stephen White had still to rest on the testimonies of his contemporaries.‡ It was reserved for a clergyman of our own times, after the lapse of two centuries, to give publicity to the work.§

Stephen White attained a very advanced age, and, as the letter to be read demonstrates, preserved his literary ardour unabated. He was living in the June of 1645, when Colgan published the first volume of his *Acta Sanctorum;* and with that author's touching reference to the kindness, learning, accuracy, and declining years of his friend, I shall close these prefatory remarks, and proceed with my friend Count Charles MacDonnell's interesting communication:—"Non præteribo tamen, quod excidere minime debuit, devotissimum in concivium Sanctorum honore et cultu promovendo studium R. P. Stephani Viti Societatis Jesu, Viri de Patria bene meriti, et omnis generis antiquitatum scientia laudati, sed sacrarum, præsertim suæ gentis et Patriæ siti laudabilioris; qui nobis S. Columbæ Abbatis Authore S. Adamnano, S. Brigidæ Virginis Authore S. Vltano, et multa alia Sanctorum gesta, alibi, ea fide et integritate, haud facile reperienda, communicavit ex suo promptuario, sacræ et reconditæ antiquitatis fœcundo; quod utinam prælo, quo maturum et dignum est, prius donet, quam ipse cœlo, quo meritis et ætate maturus est, et Sanctorum conturbio, ad quod anhelat, meritis exigentibus, redonetur."‖

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* Printed in the Proceedings, vol. iii., pp. 493-496.

† See Mr. Bindon's extract from Robert Nugent's Letter to F. Charles Langri, in the Proceedings, vol. iii., p. 496.

‡ Dr. John Lynch, the author of Cambrensis Eversus, had the use of White's manuscript, and no doubt derived much information and many suggestions from it. Cambr. Evers. vol. i., p. 95, vol. ii., p. 232, (Reprint); where, see Editor's notes.

§ Apologia pro Hibernia adversus Cambri Calumnias, etc., Auctore Stephano Vito, nunc primum edita cura Matthæi Kelly, in Collegio S. Patricii apud Maynooth, Professoris. Dublinii, 1849.

‖ Acta Sanctorum Hiberniæ, Præfatio ad Lectorem [p. 7].

Letter of Father Stephen Whyte, S. J., to Father John Colgan, O.S.F.; Dublin, 31st January, 1640; *new style. Copied from the original in the Irish Franciscan Convent of S. Isidore, Rome, October*, 1853; *by Charles, Count MacDonnell, K. S. J. J.*

"I found the original of the following letter on a mouldering and nearly decayed half-sheet of paper, in the Archive Chamber of the Irish Franciscan Convent of St. Isidore, in Rome. It appears to me to be a document of much interest in many respects; and not least for the account that it gives of the literary labours of its writer, of whom Ussher speaks as a man of exquisite learning in the antiquities of his own and other countries. It is eminently worthy of being saved from oblivion; and I venture to offer it for the printed Proceedings of the Academy, as the safest and speediest means of securing it from the fate that menaces the perishing original."

"I. H. S.

"Reverende in Christo Pater Johannes Colgane,

"Pax Christi.

"Ternas ad me datas accepi, ac tardius quam optassem. Quarum primas anni 1638, 4 Octob. primum, post longas moras et latibula, vidi anno sequente, Augusto mense exeunte. Secundas, anni 1639, 4 Septemb. aperui post, sub finem Novemb. Tertias, 9 Octob. datas legi 2 Decemb. Vides, mi R. Pater, necessitatis fuisse, non voluntatis meæ vel rusticitatis, quod non citius responderim ad tuas tot, sane mihi gratissimas, quod a gratissimo, et universæ Genti nostræ; cui gratulor eam nunc obtigisse fælicitatem, ut Te tantis a Deo dotibus instructo, invenerit in paucis, gloriæ suæ publicum Procuratorem diligentissimum, Promotorem aptissimum, Preconem peritissimum. Macte animo, et fæliciter cœptis insiste constanter, et perge alacriter: nam tui magni laboris (quem Patriæ dulcis amor levabit multum) manet merces magna nimis Deus, cætera adjicientur Tibi, memoria Tui in benedictione æternitura apud bonos omnes Gentis nostræ, quamdiu cum Posteris superstes Ipsa. Atque utinam corpore mihi tecum esse præsenti liceret, qui sum animo, ut communicatis consiliis et humeris majorem Dei in primis gloriam, deinde carissimæ nobis Iberniæ, Scotiæ majoris, læto indefessoque labore promoveremus uterque. Interim dum non datur ut ambo simul simus, ambo locis disjunctis laboremus ut valemus, et in scopum Nobilem illum collimemus. Quod ego equidem quantacumque laborem hic inopiâ (quæ nostratium est sacrarum Antiquitatum magna est suppellectilis librariæ, meliorisque notæ) non desino ætate gravis, pro viribus, tametsi non tam pro meo voto laborare.

"Certè, mihi semper cum die ad hanc usque ab annis retro ferè 29, creverat amor, ardentiorque conatus pro loci, temporis, negociorum opportunitate, ex atris antiquitatum aliquot, dispersisque per terras antris postliminio in solem educere *Gesta Dei per Ibernos*, Scotos veteres, *Iber-*

niæ Sanctorum Insulæ indigenas, vitæ sanctitudine, literarum optimarum famâ, rerum præclarè in bellis in Pace gestarum, quondam ubique domi forisque claros.

"Quod ejusmodi gesta aliquot, testibus exceptione majoribus probata, ex officinâ Typographicâ non hactenus palam prodierint in conspectum Gentium, prohibuerunt maximè penuria pecuniarum (quod etiam Tu merito de hiis edendis conquireris) quæ merces esset Typographorum. Duo parabam volumina justæ molis. Alterum *Scoto-Caledonica Cornix deplumanda ab avibus Orbis*, inscriptum. Alterum, equalis aut majoris molis priore, quod et pluris facio, quod prius præferthanc epigraphen: *Commentarii et Defensio historiarum Venerabilis Bedæ*, Anglo-Saxonis Antiqui contra novos Anglo-Saxones hæreticos aliquot, et alios bona fide errantes Catholicos domesticos exterosque, cum multis nuper Scoto-Albanis Dempstero, Camerario, Hectore Boëto, ejusque epitomaste Leslæo, Joanne Majore, Buchanano, sociisque, Historias *Venerabilis* indigne tractantibus, torquentibus, et variâ arte malâ corrumpentibus. In priore Volumine, per quinque libros distributo, non solum ex instituto, et methodicè pseudo-historias, Nomenclaturas etc., Scotalbanorum refuto claris argumentis, sed insuper hæc sub oculis cujusvis lectoris non cæci propono demonstroque in primis, per prima Christianorum sæcula Novem exacta, et ulterius, nullam sub sole regionem *nisi Hiberniam* nostram, nomine, (proprio aut communi) *Scotia* notatam fuisse, ab ullis eorundem sæculorum authoribus, domesticis aut externis, seu Christianis seu Ethnicis. Deinde, primum non nisi post illa tempora, aut fortassis etiam post exordia sæculi undecimi,* cœpisse nomen Scotia (quod semper ante et ubique terrarum erat proprium ac synonymum cum Iberniâ nostrâ), sensimque fieri *commune* vocabulum duabus regionibus Iberniæ nostræ, et Albaniæ seu Caledoniæ: quo nomine Albaniæ seu Caledoniæ vel Regni Scotorum Britanniæ, non notabatur illis sæclis nisi terrarum Tractus ille vel Plaga omnis, quæ ad Aquilonarem ripam fluminum Alcluit seu Cluddæ, et Guidi seu Fortheæ,† (hodie decurrentium juxta urbes Glasco et Edinburgum) jacet, porrectaque versùs Septentrionalia ad usque Oceanum Deucaledonicum. Præterea, nomen Scotia commune duobus Regnis illis, durâsse in suâ communitate apud authores tam domi quam foris, ad usque Christianorum sæculum saltem 14 vel 15, et ulterius.

"Ad hæc, primam omnium ab orbe condito, Coloniam Scotorum

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* Ussher agrees with White. Brit. Ec. Antiqq. cap. 16, Works, vol. vi., p. 280; and so the Scotch writer, Pinkerton, Enquiry, vol. ii., p. 223. Marianus Scotus, an Irishman, towards the close of the eleventh century, calls Malcolm, at 1034, Donnehad, at 1040, and Mac Bethad, at 1050, *Rex Scotiæ*. (Pertz, Monumenta Germ. Hist. Scriptor., tom. v., pp. 555, 557, 558.) From which we may conclude that this application of the term had already come into general acceptation; a process, probably, requiring the greater part of a century. The poem on the battle of Brunanburg in the Saxon Chronicle, at 937, calls the North Britons *Sceotta*, or Scots. Monument. Hist. Brit., p. 384.—See Chalmers' Caledonia, vol. i., p. 339.

† The only other known authority, beside Bede, which mentions *Giudi* in connexion with the Frith of Forth, is the Tract on the Mothers of the Saints of Ireland, ascribed to Ængus the Culdee.

Iberniæ, trajicientem inde ad stabiles in Albania sedes figendas (in Albania, inquam, ejusve ullis regiunculis; nam aliter se res habet de exordiis Scotorum Iberniæ degentium in parvis insulis Hebridum,)* fuisse quam post mortem S. Columbæ-Killi nostratis, et aliquot annis post exactum sæculum Christianorum sextum,† duxerat Christianus religione Vir Nobilis Vltoniensis et Regulus Ditionis Dalriada dictæ in eâdem Vltoniâ,‡ vocatusque Edan sive Aidanus, filius Gabriani seu Gaurani. Et quamvis tam ipse Aidanus cum suâ coloniâ quam eorum posteri incolentes Albaniæ angulum illum qui hodie audit Argil, aut Argathelia, per aliquot annos ipsorum habitationis ibidem, vocarentur Scoti-Britanniæ; tamen neque tunc, neque multis sæculis post Regiuncula Argil aut alia ulla Albaniæ pars induerat Scotia nomen, aut communitatem nominis ejusdem cum Iberniâ nostrâ: sed, ut dixi, nunquam ab ullis Authoribus antiquis et florentibus ante sæculum decimum vel undecimum, Scotiæ appellatio (sive ut propria, sive ut communis) indita Albaniæ, audita fuit.

"Inter alia in tuis ad me literis, petis a me, 1° ut *Selectorum* meorum (sic benevolè vocas) quæ in Germania et alibi collegeram, saltem Breviarium ad te mittam. Respondeo, me, quantum memini, nihil fere habuisse selectorum illorum, quod non dederim describendum duobus nostratibus Vestri Ordinis S. Francisci, quorum alter R. P. *Patricius Fleming* (post factus, ut credo, Martyr a Suecis hæreticis in Bohemiâ§) qui cum socio multis diebus et hebdomadibus degebat in eadem Vrbe mecum Metis in Lotharingia anno Christi 1627 vel 1628. Ac descripta omnia, redux inde tulit secum Lovanium, ubi R. V^a, ut credo, inveniet, nisi jampridem fortasse invenerit. 2° petis, ut etiam ad te mittam *Catalogum Vitarum Sanctorum* nostratium, quas vidisse me ais in Bibliothecâ D. Jacobi Ussheri, Archiepiscopi Primatis Protestantium Iberniæ. Respondeo, me vocatum et ter coram convenisse per multas horas illum D. Ussherum (qui et humanissime me excepit et sine fuco mecum candideque egit, et abs se officiosissime me dimisit, et sæpius coram et per literas præterea me invitavit in Domum suam non ad convivium modò (quod renui modestè) sed etiam ad cuncta Domus suæ, etiam

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* *Gall-Gaeidhel*, or Stranger-Irish, is the term generally used in Irish records to denote the inhabitants of these Isles. Galloway also derives its name from this combination.

† White falls into a serious error here. The year 506 is that which is assigned by the best authorities for the settlement of the Irish colony in South-western Scotland.—See Adamnan's Columba (Irish Archæol. and Celtic Soc.), p. 433.

‡ Here again is a manifest blunder of White. Aidan was regulus of the British Dalriada, and had no jurisdiction over the Irish territory of that name. He died in 606. See p. 436 of the work last cited.

§ Fleming was just settled as President of the Irish College at Prague, when Bohemia was invaded by the Elector of Saxony, and Fleming was obliged to fly. In his flight, he and his companion, Matthew Hoar, were attacked by seven peasants near the village of Beneschow, and beaten to death.—See the narrative in the Collectanea, p. xii., and Colgan's Acta SS., Præfatio ad Lectorem.—See also an abstract in the Ulster Journal of Archæology, vol. i., p. 255, where there is a notice of this writer and of his work.

selectissimam Bibliothecam (revera maximi pretii etc.) et vidisse tum Catalogum illum tum vitas ipsas latine in manuscriptis,* Sanctorum nostratium, fusè narratarum, et extra Bibliothecam D. Ussheri, vidi plures alios alibi in Ibernia non Catalogos tantum, sed etiam plura prolixius MS^ta^ exemplaria Sanctorum nostratium.† Sed, quod mirabere forsan (et tamen esse verum, ipse sum expertus) nullum, aut omnino vix ullius momenti vel fidei etc. vidi in his MS^tis^, vitam Sanctorum nostratium, nisi ipsorum eorundem quos nominatim et ordine Alphabetico, Tu, mi R. Pater, exprimis in Catalogo tuo, quem ad me misisti: in quo etiam tuo legi nomina Sanctorum et vitas ipsorum aliquas abs me nunquam visas.

"3° petis, ut laborem in procurando per me, per amicos etc., describi, mittique ad Te Catalogum omnium et singularum Iberniæ Diocesium, Ecclesiarum, Sanctuariorum priscorum, etc. Respondeo, me, quoad potui, laborasse, ut Catalogus duarum Dicœcesium Waterfordiensis et Lismorensis (in quâ istâ Lismorensi natus sum)‡, quem ad te mittit R^mus^ Patricius Episcopus Lismorensis et Waterfordiensis,§ ad te mitteretur correctior et emendatior in quibusdam de quibus me consuluit idem R^mus^ mihi in paucis carus et familiaris. Ac vix quidem absolveram emendare nonnulla menda quæ irrepserant in istum Catalogum, quando coram in colloquium incideram cum Carissimo mihi et familiari admodum R. P. Joanne Barnevallo, Provinciali Vestri Ordinis Minorum in Iberniâ, quem monui de Vestris ad me missis literis et de Catalogis Ecclesiarum etc. Tum Pater Provincialis mihi dixit, se sedulo et sæpe commendasse curæ et procurationi multorum ex suis Religiosis ad hanc rem idoneis, ut ubique per Iberniam per se, per amicos, aliisve viis bonis, incumberent in hanc rem de colligendis Catalogis et mittendis ad Reverentiam Vestram. Quibus ego auditis, illico abjeci ulteriorem laborandi in eodem opere curam tanquam minime necessariam.

"Spero me hactenus ad ea omnia majoris momenti respondisse tuarum literarum trium, quæ mihi crearunt quantam vix verbis explicare satis

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* In the Ussher Collection in the library of Trinity College, there is a vellum MS. of Latin lives of Irish Saints; E. 3, 11. The fuller and more valuable MS. in Primate Marsh's Library, v. 3, 4, formerly belonged to Abp. Ussher.—See Preface to Adamnan's Columba (Ir. Archæol. and Celtic Soc.) p. xxvi.

† The principal collection of Latin lives of Irish Saints, from which Colgan drew, were the *Codex Kilkenniensis*, *Codex Salmanticensis*, (now in Brussels), and the *Liber Insulæ Omnium Sanctorum*. To them may be added the *Codex Armachanus*, from which Fleming printed his lives of SS. Comgall, Mochaemhoc, and Molua.

‡ His birth-place is indicated in the title of his Apologia, where he is called *Clonmelliensis*. Clonmel is in the diocese of Lismore. Thomas White, a Jesuit of Clonmel, was the first Rector of the Irish College at Salamanca.—Harris' Ware's Works, vol. ii., p. 256.

§ Patrick Comerford, of the Order of Hermits of St. Augustin, was consecrated Bishop of Waterford and Lismore, in 1629.—*C. MacD.* Colgan acknowledges this Prelate's services in the following words: "Ut constat elencho Ecclesiarum Dicœcesis Lismorensis, quem nuper ad nos vir humanissimus, multiplicis eruditionis virtutumque laude clarus, D. Patricius Comerford, Episcopus Lismorensis, magna industria collectum, transmisit." Acta Sanctorum Hib., p. 555 *a*, note 2.

possim, lætitiam de tuis conatibus, diligentiâ, progressu, etc. de gloriâ non vanâ Gentis nostræ priscâ et Sanctorum ejus; præsertim verò arridet mihi illud tuum ꝼeıleꞃıȯe.* Quam vellem, ut istud et cætera tua non lucem modo aspicerent citò, sed etiam ut brevi manibus omnium Europæorum tenerentur, et oculis aspicerentur!

"Quod priusquam fiat, moneo Té primùm, et amicè de quibusdam. Unum est, Vitas Sanctorum Catalogi tui ad me *Albei*, *Declani*, *Geraldi de Majo*† scatere (si quales illorum habes vitas, sint eædem cum lectis abs me hîc) scatere fabellis improbabilibus, etiam adversantibus non solùm passim scriptis, traditis, creditis, de S. Patricio Apostolo nostro,‡ ejusque legatione Romam, indeque in Iberniam, sed contrariis insuper et Romanis Martyrologiis veteri et recentiori; et clarè pugnantibus cum indubiæ fidei dictis SS. Prosperi Aquitani, et Bedæ Venerabilis etc. ut ad oculum dedi demonstratum aliquando.

"Moneo deinde, quod magni rem momenti arbitrer, et viam expeditissimam ad fidem derogandam omnibus Adversariis nostris Demstero, Camerario, Boëto, Majori, Buchanano etc., nempe, ut omnibus et singulis nostratibus scriptoribus tibi notis, tam domesticis quam externis tecum presentibus et absentibus, sæcularibus aut religiosis, Dominicanis, Augustinianis, etc., suadeas opportune, ut nullam ullius argumenti (seu Grammatici seu Philosophici, vel Theologici, Historici, etc.) typis mandari sinant, aut exire in lucem publicam, nisi in frontispic. ferat hunc vel similem Titulum: R. P. N. N. natione Iberni, seu Scoti Veteris etc.; nam, assidua commemoratio *Scoti Veteris* in libris cujuscumque argumenti dispersis per Europam, ejusque Academias, non modo Adversariis nostris creabit indignationem quamvis injustam; sed etiam creabit in exteris passim lectoribus, saltem curiositatem inquirendi (et qui quærit inveniet) de Scotis Veteribus, de Recentioribus Scotis Albanis; et de injuriâ immani, multiplicique Scotalbanorum nuperorum cum Demstero, Hectore Boëto etc., negantium in sole veritatis, Ibernos nostros, olim notatos ubique terrarum, nomine Scotorum, et Iberniam nostram fuisse notam quondam, passimque per Europam sub nomine (etiam synonimo proprioque) Scotia, Scotia Insula, Scotia Major, Scotia Ulterior, etc.

"Denique moneo, vel potius precor, ut descriptum ad me mittas, quod legisse me memini (Metis in Lotharingia) cum mecum esset R. P. Patricius Fleming, Martyr, in manibus ejusdem, et quasdam Epistolas S. Columbani nostratis Abbatis Luxoviensis, tum ad Bonifacium Papam Romanum, tum datas per modum Apologiæ suæ ad Episcopos Concilii

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* By ꝼeıleꞃıȯe or ꝼeılıꞃe he denotes Colgan's great work of the Acta Sanctorum, then in hands.

† The Life of St. Gerald of Mayo is the only one of these three which Colgan published. That of Declan was afterwards printed by the Bollandists (Acta SS. Julii, tom. v, pp. 590–608), while that of St. Ailbhe remains in manuscript only. The Life of St. Geraldus, as printed by Colgan, at March 13, is full of anachronisms, which the editor notices; but he does not advert to the censure here passed upon it by his learned correspondent. See Acta Sanctorum Hiberniæ, pp. 599–606.

‡ On the Patrician heterodoxy of the Lives of SS. Ailbhe and Declan, see Ussher, Brit. Eccl. Antiq., cap. 16, Works, vol. vi., pp. 332–348.

Matisconensis in Galliâ, ubi illum reprehenderant et respondere jusserant de præposterâ suâ observatione Ritûs Paschalis temporis, qui diversus erat et adversans ritui canonico Romanæ Ecclesiæ.* Aiebat etiam P. Patricius Martyr, se selecta quædam habuisse de rebus nostratibus, ex singulari quodam et abs se viso descriptoque cum esset ipse Ratisbonæ in Bavaria. O utinam selecta ista legissem!

"Atque hic scribendi jam finem coactus facio quod revera diebus hisce, et multis præteritis, etiam mensibus, occuper in expediendis intricatis conscientiæ casibus (assidue accidentibus), et componendis dissidiis nunc istorum, nunc illorum etc. Vale fælix, mi Pater, et jure tuo adversùm me utere, qui præsto semper ero pro viribus et opportunitate ad gratificandum Tibi, quem cum omnibus Vestris amanter saluto, Deoque commendo, quem ut mihi sit Ipse semper propitius, Oro et oretis.

"Dublinii, 31 Janu., 1640, stylo Romano.

"R^æ. V^æ.

"Servus in Christo,

"Stephanus Vitus, e Societate Jesu."

(Endorsed in a more recent hand on the original letter,)

"Pretiosa Epistola insignis Antiquarii P. Stephani Whyte Soc. Jesu, ad P. Colganum."

The thanks of the Academy were returned to Count Mac Donnell.

Rev. Dr. Lloyd read a paper, in continuation, "On Earth-Currents and their Laws."

The Rev. Samuel Haughton presented the Original MS. Draft of the Observed and Calculated Diurnal Tides of the Coast of Ireland for the year 1850–51, contained in 34 Tables.

The Rev. William Reeves, D. D., presented an Index, in MS., of the seven published volumes of the Proceedings of the Academy, prepared by himself.

The marked thanks of the Academy were presented to the several donors.

The Academy then adjourned.

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* St. Columbanus' *Sermones* and *Epistolæ* were copied by Fleming from manuscripts in Columbanus' monastery of Bobio. These, together with the opuscula of this illustrious Father of the Irish Church, and a valuable body of illustrative matter, were prepared for the press by Fleming, and eventually published by Thomas Sirinus, or O'Sherrin, in small folio, Lovanii, 1667.

MONDAY, DECEMBER 9, 1861.

The Very Rev. Charles Graves, D. D., President, in the Chair.

W. H. Hardinge, Esq., read the following paper :—

On Manuscript Mapped Townland Surveys in Ireland of a Public Character, from their introduction to 23rd October, 1641.

Mr. President and Gentlemen of the Royal Irish Academy,—The information which my paper of this evening aims at communicating on the subject of MS. mapped townland surveys in Ireland of a public character, is a simple statement of facts and occurrences, many of which, from whatever cause, have escaped historic notice; and yet they strike me as meriting, even at this advanced period of literature and time, to be drawn from their long repose in the public archives of the kingdom, clothed in unpretending though suitable attire, and presented to this Academy, and society at large, for consideration, if not instruction.

The popularly received notion is, that our earliest MS. mapped surveys, of lands admeasured by scale and chain, are those known as the Down Survey collection, compiled between 1654 and 1659,—as to a part, under the sole able geometrical and strong common sense guidance of Doctor William (afterwards Sir William) Petty, the ancestor of the present noble house of Lansdowne; and as to another part, under the joint responsibility of the Doctor and Benjamin Worseley; and as to the residue, under said Doctor and Vincent Gookin, said Worseley and Gookin being the then surveyors and escheators-general of the Commonwealth of England.

I am not ignorant that Howard, in his "Irish Exchequer," published in 1776, represents Strafford's survey of 1639 as being the earliest; but other than what the term survey conveys, he gives no intimation of maps having flowed from it; and every lawyer and well-informed person knows that ancient surveys taken by juries before the provincial escheators were descriptive only, and without any such accompaniment. These surveys, also called extents and inquisitions, were returned "*virtute brevis*" into Chancery, and "*virtute officii*" into Chancery or the Exchequer.

I am also aware that Leland, in the first chapter of his fifth book on Irish History, refers to Strafford's inquisitions, finding the title of the crown to Connaught, and the Byrne's country in Wicklow; but neither does this writer appear to have been aware that mapped townland surveys followed close on the inquisitions.

Strafford's letters and despatches, published by Knowles, in 1740, lead us nearer to the truth, as in more than one of this collection, "Raven and his thirty surveyors, and the slowness of the work," are spoken of; but they do not further satisfy as to the nature of the work, or that it was brought to a successful issue. But the most mysterious circumstance in reference to that important survey is, that when Stone, the surveyor and escheator-general of the crown, in whose office and

custody the record of it was deposited and preserved before the lamentable fire of 1711, made his report of the destructive effects of that fire upon the muniments in his department to the Lord Lieutenant and Privy Council of the day, although in general terms he states that Strafford's survey was totally consumed, he does not describe in what it consisted,—thus imposing the unprofitable and unpleasing task of filling in the picture upon the industry or imagination of inquirers of after times.

To supply such omissions, to clear up all doubts and discrepancies, and satisfy every reasonable mind that Strafford's survey comprehended maps, and yet was not, as Howard alleges, the earliest survey, or even townland survey, I have entered upon my present task, and trust to carry it to a close briefly, clearly, and conclusively, and with as little of weariness to my indulgent hearers as may be practicable, considering that it is the condensed evidence of the record relics of nearly four centuries. But, feeling that such a task cannot be concluded within the limit of time conceded to those having the privilege of addressing the Academy, I have divided the subject into two papers, the first of which, now in hand, carries the narrative down to the memorable historic era of the Great Rebellion, which broke out in this kingdom on the 23rd of October, 1641.

It seems not inappropriate to the introduction of the subject to state briefly what my record experience teaches me to have been very ancient, if not the most ancient geographical divisions of Ireland, and the changes which time and circumstances effected in these divisions. There is a full, carefully prepared, and apparently authentic account of the ancient territorial divisions of Ireland, prefacing two very solemn records of the reign of Queen Elizabeth. One of these records contains the indentures of composition made between the crown and the lords spiritual and temporal, chieftains, freeholders, and others of the province of Connaught, and of some counties in Munster. The other is a book of survey of the great and small county of Limerick. Both were compiled to secure a certain and perpetual land revenue to the crown of England; and for this purpose it was necessary to ascertain with precision the numbers of plowlands or quarters in the several divisions of Connaught and some parts of Munster, and the number of acres in the several divisions of the great and small county Limerick. It was not, therefore, an act of chance, choice, or caprice, the preparation of the account of the ancient territorial divisions of Ireland which prefaces these records. It was a solemn duty upon a solemn occasion, and for a solemn purpose, and I therefore think myself justified in proposing this account as trustworthy and reliable.

These records point to and name five great divisions, namely, the kingdoms of Leinster, Ulster, Munster, Connaught, and the comparatively small, though rich, central territory of Meath. Irish scholars and antiquaries may possibly be enabled to decide whether this territory, so conveniently placed relatively to the four surrounding kingdoms, was not originally set apart and appropriated as the appanage of that king

who might be elected for the time being, and from time to time, monarch of Ireland. We can appreciate such supremacy as essential to provide for unity of action in affairs of state, equally affecting the general interest; and if this be so, the attaching Meath to the supreme ecclesiastical jurisdiction, although lying so distant from Armagh diocese proper, is quite intelligible. I am sustained in this view of Meath territory, by an ancient MS. preserved in the British Museum, entitled, "an abbreviate of the getting of Ireland and of the decaye of the same," compiled by Laurence Nowel, Dean of Lichfield, who died in 1576, which states, "that the chief of the kings, called the monarch, kept the county of Methe with himself *ad mensam, i. e.* for the maintenance of his more honorable diet."

Four of these kingdoms continue unchanged in name, though not in outline, Meath having merged in Leinster; and at some unascertained periods, after the conquest of 1172, England, imitating Roman imperial precedent, named them provinces.

The kingdoms were divided into cantreds, of which there was a gross total of 184; and these cantreds, being subjected to some changes, were anglicised into baronies or hundreds, and are now represented by the increased ordnance survey number of 267, which includes cities, counties of cities, and towns.

The cantreds were composed of towns, also called betaghtowns, after a ratio of thirty to each, producing a resulting total of 5,520 betaghtowns in the kingdom. This particular territorial division has disappeared, and nothing resembling it remains, and I am unable to state when or under what circumstances the extinction took place.

The towns or betaghtowns were divided into plowlands, otherwise called ballyboes, carucates, or quarters, at a ratio of eight to each town, producing by arithmetical computation a gross total for the entire kingdom of 44,160; and each of these plowlands was estimated to contain 120 acres of arable land, over and above pasture, hills, rivers, woods, wastes, and bogs. It was at this point of the territorial divisional scale that the Irish standard of measure, if such it can be called, governing the plowland and all superior divisions, was fixed.

These 44,160 plowlands are now represented by something beyond 60,000 townlands, as same are delineated upon the Ordnance Survey, a most valuable, elegant, and nearly perfect picture of our native land, and which does such infinite credit to the corps of Royal Engineers, who produced and have charge of it. The excess of the number of townlands over plowlands is, as I apprehend, easily accounted for. So long as proprietorship was regulated by the ancient stringent laws of ancestral descent and entail, the names, number, and bounds of betaghtowns remained unaffected; but necessity frequently found opportunity to break through and evade these laws, and by degrees forced into the market, if I may so express myself, a very considerable portion of the surface of the country. This created new proprietors, who not unfrequently attached new names to their lands; and as time and changes

of this nature progressed, the betaghtowns multiplied, and their areas diminished, until at the present time we find them represented on the Ordnance Survey as before expressed. And it seems to me that, notwithstanding that survey, these 60,000 townlands must, from the same causes, continue to increase, unless the legislature enforce the adoption of its description as a requisite, necessary, and indispensable measure to entitle parties to the benefits of registration of deeds and other instruments affecting lands, tenements, and other hereditaments.

The plowlands, for farming and other practical purposes of life, were subdivided into cartrons and a multitude of small and unequal portions, in like manner as the townlands are now into farms, fields, and tenements, which, as their area was and is ever varying to accommodate ever-varying circumstances and tastes, are not made the subject of mapped expression; and it appears to me that it would be unwise as well as useless so to delineate them, unless their bounds were as fixed and changeless as those of the townlands of which they are integral parts; and to such an attending contingency I do not apprehend that proprietors or occupiers would silently submit.

Counties or shires are of purely English introduction. I cannot find their parallel in ancient Irish divisions. Not one of them existed before 1172; and almost all of them were created by or under the authority of act of parliament between 1543, when the territory of Meath was divided into two shires, and 1715, when the counties of Tipperary and Cross Tipperary were united into one county.

The account which the records in my own power thus enable me to supply of the territorial divisions of Ireland, corresponds marvellously with a yet more ancient representation of them, as communicated by the Rev. W. Reeves, D. D., in an interesting and valuable paper read by him, before this Academy, on the evening of Monday, the 22nd of April last.

His 185 tricha-ceds represent my 184 cantreds.

His 5560 bailebiatachs represent my 5520 towns or betaghtowns.

His 66,600 seisreachs represent my 44,160 plowlands.

And his scale of contents is fixed, as is mine, at this latter division, which determines the measure of all others in the ascending line.

The difference, and it is a material one, between the two statements, is the number of seisreachs in the ballybetagh which Doctor Reeves makes 12, and the number of plowlands in the town, which my authority makes 8; the arithmetical differential deduction from this discrepancy is 22,440 seisreachs or plowlands, equivalent to 2,692,800 arable acres of land over and above their appurtenant pasture, hills, rivers, woods, wastes, and bogs. The Dean of Lichfield's MS. abbreviate before referred to, makes a betaghtown to contain 960 arable acres over and above its appurtenances; and this exactly tallies with my record authorities, which give 8, not 12 plowlands, to each such town. But the Dean's manuscript differs from the Doctor's authorities and mine as to the gross number of these towns in the kingdom, which he makes 5920, being an excess of 400, equivalent to 384,000 acres of arable land with their appurtenances.

His summary of the kingdom is as follows, viz. :—

In Leinster, . .	31	cantreds	equivalent to	930	bailebetaghs.
In Ulster, . .	35	,,	,,	1,050	,,
In Desmond, . .	35	,,	,,	1,050	,,
In Thomond, . .	35	,,	,,	1,050	,,
In Midth, . .	18	,,	,,	540	,,
In Connaught, .	35	,,	,,	900	,,
In the Brennies, .	13	,,	,,	400	,,
Total,	202		Total,	5,920	

The Abbreviate states that these divisions were made before the conquest in 1172.

I consider it only right to point out these discrepancies, in the expectation that my friend Dr. Reeves, who was first in the field, may investigate all the authorities, trace the origin of the error, and on some future occasion explain and correct it before the Academy.

There is another division of the island, which, although ancient, is not so much so as those I have particularized; and yet, as the offspring of Christianity, merits special distinction. It is the allotment into parishes and dioceses. These formations were intended, and through a long period used, for purely ecclesiastical purposes. Their increase and spread, which were gradual, denote the slow, though sure, development of our common religion. Parishes are now used for civil as well as ecclesiastical purposes; and their area as to surface and population are strikingly different.

But to return, after this long territorial divisional digression, to townland MS. mapped surveys, it is manifest from all the charters and grants by the crown of England that have fallen under my observation, from an early period to late in the reign of Elizabeth, as well as from the inquisitions taken before the escheators of Leinster, Ulster, Munster, and Connaught, and returned as before observed into the courts of Chancery and Exchequer, that no townland survey admeasurement by chain and scale, and consequently no plot or mapped expression thereof, was made or even thought of. Territories and lands were conquered, seized upon, escheated, and passed away by grant *in globo*; they were won with, and measured and defended by, the sword.

There exist, no doubt, as the Library of Trinity College, Dublin, the State Paper Office, the British Museum, and other like English record depositories, testify, many MS. charts and sketches of kingdoms, provinces, bays, forts, encampments, battles, and other features representing strength, attack, and defence,—the rough industrious evidences of military precaution, foresight, and skill; but I do not consider these curious and not uninteresting remains of the olden time applicable to, or falling within the scope of, a memoir intended only to exhibit the origin and progress of townland surveys in Ireland.

And now arises an important question, which, solved aright, at once discloses the cause and reason of the introduction of land surveying into this country; and that question is, What was the apparent necessity for such surveys?

The fact is, and history declares it, that the crown of England, which had all the responsibility and charge of the conquest, as well as the after expenses for the support and maintenance of an Irish executive government, being in the distance, was induced to pass away to its great and successful military leaders and civil supporters the territorial and other valuable fruits which from time to time had been won; and that too without the reservation of anything like suitable crown rents to aid in the payment of said Irish government charge and expenses. And so recently as the year 1546, the Academy will probably be surprised to hear, the entire revenue of this kingdom, from all sources, amounted to to barely £3000, a sum totally inadequate to defray the annual civil and military charges.

The possessions of the monasteries and other religious foundations, surrendered to and vested in the crown by various acts of parliament, in the reign of King Henry VIII., were disposed of by that monarch with greater regard to state interests, and the consequence was an increase of the revenue before stated by a sum of £6,800 per annum.

Under such circumstances, it is not surprising that Edward VI. should have considered it necessary to appoint a surveyor and escheator-general to take and retain in his office, for the perpetual information and protection of the crown, accurate surveys of all estates and interests remaining to it, as well as of all other that might afterwards fall in by escheat, forfeiture, or otherwise; and it is to this office, and nearly to this period, that the origin of manuscript townland plots or surveys are really attributable.

The creation grant of this office was by letters patent under the great seal of Ireland, dated 15th November, 2d Edward VI., and was passed to Walter Cowley, of the office of surveyor, appraiser, valuer, and escheator-general of all and singular crown honours, manors, lordships, messuages, lands, tenements, woods, possessions, revenues, and hereditaments within Ireland, together with an annual salary of one hundred pounds,—a very large amount of remuneration in those days. I subjoin the names of all persons appointed to said office, and dates of the respective grants, down to the 23rd October, 1641, the period at which the portion of my narrative communicated in this paper terminates, viz.:—

1. Walter Cowley,	To hold during pleasure,	15 Nov. 1548, 2 Edw. VI.
2. Edmund Sutton,	Without tenure,	19 Sept. 1551, 5 Edw. VI.
3. Michael Fitzwilliams,	To hold for life,	12 May, 1552, 6 Edw. VI.
4. Launcelot Alford,	To hold during pleasure,	16 Jan. 1572, 14 Eliz.
5. Sir Geoffry Fenton, Knt.	To hold for life,	10 Aug. 1591, 39 Eliz.
6. William Parsons, Gent.,	To hold during good behaviour,	26 Dec. 1602, 44 Eliz.
7. Francis Blundel,	In reversion for life,	18 Feb. 1609, 6 Jas. I.
8. William Parsons,	A reinstatement,	14 Feb. 1610, 7 Jas. I.
9. William Parsons and his brother Laurence,	To hold for life,	26 Mar. 1611, 9 Jas. I.
10. Sir William Parsons, Sir Adam Loftus, and Richard Parsons, son and heir to Sir William,	Upon surrender for life,	24 Dec. 1624, 26 Jas. I.

King Edward VI. and his immediate successors, Philip and Mary, came upon the stage and departed without an opportunity offering for the exercise of the conservative office of surveyor and escheator-general. It is true, that Queen Mary seized upon the countries of the O'Mores, O'Connors, and O'Dempsies, in Leinster, called Leix and Offaly, and created them by act of parliament into the King's and Queen's Counties, calling the principal towns after their own names; but I have not seen any evidence from which to conclude that mapped surveys were then made of these countries, either in gross or in detail. It was in the following reign of Queen Elizabeth, when Ulster and Munster burst into a flame by the rebellion of the earls of Tyrone and Desmond and their followers, and which resulted in their attainder and the vesting of their estates in the crown by sundry acts of parliament, that MS. mapped townland surveys were called into existence.

A variety of inquisitions of the lands forfeited in the counties of Cork, Kerry, Limerick, Tipperary, and Waterford, taken before the lord deputy and certain other commissioners, of whom Launcelot Alford, the surveyor and escheator-general was one, in the twenty-sixth, twenty-eighth, and twenty-ninth years of the reign of Queen Elizabeth, are in existence in the auditor-general's collection of records; but these inquisitions only describe the names and situations of the lands, without ascertaining quantities in acres or otherwise. So soon, however, as the Queen and her Council decided upon establishing, under certain conditions and limitations, a plantation of her English subjects upon these forfeited territories; and for that purpose determined to grant them out to undertakers, in scopes of twelve, ten, eight thousand, and a lesser number of English acres, it became indispensable to the interests of the crown, as well as to equity in the distribution of the lands amongst the undertakers, to have the area of each town accurately measured, ascertained, and laid down upon a plot or map.

Accordingly, I find a commission to that end, bearing date the 19th June, in the twenty-sixth year of the reign of Queen Elizabeth, accompanied by minute instructions from the ministers and lords of Her Majesty's Privy Council in England addressed to Sir Henry Wallop, Knt., under-treasurer of Ireland, and to other commissoiners there, of whom the auditor-general, and the surveyor and escheator-general were two; authorizing and requiring them to make special inquiry in relation to said forfeitures, to measure the demesnes, and to reduce acres to plowlands, according to the custom of the country, and to value the acres rateably according to perches.

The survey was completed in the year 1586, and must have been returned into England, as "The Plot from England for inhabiting and peopling Munster" was soon afterwards sent to the lord deputy. And, further, a very large proportion of the principal plantation grants were passed under the great seal of England almost simultaneously, based upon that survey, and which could not have been so passed unless the guiding information enabling the distribution had been on the spot.

The plantation grants passed under the great seals of England and

Ireland respectively, before the year 1599, distributed to the undertakers, in the counties before named, 295,379 arable acres, English measure, according to the statute of Winchester, as the record states, at annual crown rents, amounting in gross to £2,704 14*s.* 9*d.* of late Irish currency.

Having been permitted, by the kindness of the Rev. J. H. Todd, D.D., Senior Fellow of Trinity College, Dublin, the opportunity of inspecting, in the library of that college, a volume of curious and interesting maps and plans, ranging in date between 1557 and 1723, I found at folio 38 of the collection a manuscript map, entitled, "The Plot of Munster, by Francis Jobson," and dedicated to "The Honourable Lord Bourlay, Lord High Treasurer of England." In a long and expressive marginal note, Jobson sets out his services, stating "that he was three years in her majesty's service, surveying and measuring part of the lands escheated to the crown in Munster;" and further, "that Arthur Robinson and Lawson were employed on same survey." The map in question is genuine, and clearly a reduction by Jobson from the townland surveys, made in pursuance of the pre-recited commission, as a gift likely to be acceptable to Lord Burleigh.

From such accumulated evidence, I concluded that there must have been mapped surveys accompanying the inquisitions and books of survey; and that nothing less could satisfy the exigencies of the plantation—a work that was to be guided by a measure of land up to that time unknown in Ireland, and by a scale of crown rent imposition of three-pence per English arable acre.

Under these circumstances, I attended at Her Majesty's State Paper Office in London, early in the year 1860, and asked to be shown mapped surveys relating to lands in Ireland referable to the reign of Queen Elizabeth. This public department profess to have collected with care, arranged in order of time, and bound up in three volumes, their MS. mapped surveys relating to Ireland. The first of these volumes was placed before me. It contained the earliest mapped specimens, and embraced the period between 1558 and 1602. I did not discover among them the maps I was in search of; but I found there a manuscript map of the great and small county of Limerick of the year 1586—the very year of the survey—upon which, in a marginal note of contemporaneous handwriting, it is stated, "that all the lands in that county were accurately mapped on a scale of 16½ feet to the perch, agreeably to the statute of Winchester, the particulars whereof were distinguished by name and colour, and were all set down on the plot." After such a revelation and complete confirmation of the views I had arrived at from the records in my own official custody, I think it may fairly be concluded and conceded that MS. mapped surveys were taken at same period of all the Munster forfeitures adverted to; and, further, that these maps, if not destroyed, are somewhere stowed away in London record repositories, and that sooner or later they will see the light. Except as historical curiosities, and illustrative of the progress towards perfection since arrived

at in the art of surveying, I do not say that they would be useful. There survive few, if any, of the undertakers' grants which represent the title of present proprietors from the crown; but, should there be any such, the maps in question would to them possess a value beyond that suggested. These maps of large portions of Cork, Kerry, Limerick, Tipperary, and Waterford, I consider to have been the first public MS. mapped townland survey in Ireland.

The forfeitures of the Earl of Tyrone and his followers in Ulster were allowed to remain in the undisturbed possession and enjoyment of the former proprietors and possessors during the remainder of Queen Elizabeth's reign. This may have happened from the want of a sufficient military force to deal with two provinces, both decidedly hostile, at the same time ; or it might have arisen from the physical impossibility of simultaneously carrying out so comprehensive an undertaking as the projected English plantations involved. The fixed and undisguised design was to subject both provinces to plantation ; and as Queen Elizabeth had the merit of establishing the one, to King James, her successor, she bequeathed the responsibility of effecting that of the other.

Accordingly, I find that by letters patents, bearing date at Dublin, the 25th July, in the seventh year of the reign of King James I., accompanied by articles of instructions of survey, his said Majesty nominated and appointed Sir Arthur Chichester, Knt., Lord Deputy of Ireland; the Archbishops of Armagh and Dublin ; two other bishops ; Sir Thomas Ridgeway, Knt., Vice-Treasurer and Treasurer at War; the Marshal of the Army, William Parsons, surveyor and escheator-general ; and many other exalted state and legal functionaries, commissioners to survey all lands in Armagh, Coleraine and the Derry, Donegal, Fermanagh, Cavan, and Tyrone ; in the execution whereof the ecclesiastical lands were directed to be distinguished by themselves ; and the forfeited lands to be divided into proportions of ballyboes, quarters, and tates, with names and bounds ; and plots were directed to be made of each county, and the commissioners were to prick out the several proportions therein by name ; and the records, when completed, were directed to be transmitted to England in cases before Hallowmas, 1609, that the King might have time to resolve therefrom in the winter, and to signify his pleasure against the next spring.

There were two interests to be protected by, and exhibited on, the records of these survey proceedings, namely, those of the crown and the church. To define and set out the latter, inquisitions were taken and returned into Chancery for each respective county, most minutely describing the ecclesiastical, but not the escheated lands. I have no doubt that books of survey describing as minutely these lands were also taken and returned into the *ex-officio* custody of the surveyor-general, as William Parsons, who was then surveyor-general, furnished the auditor-general with a roll of these escheated lands in the year 1611, which remains in the proper custody at this day as a record of the fact. But the county inquisitions and survey books combined would not

satisfy the instructions which directed the commissioners to have plots of each county made, and have impressed thereon certain distinctive features, which no language, however clear or strong, could do. Besides, the term plot in connexion with the survey signifies a map, and that only. And, no doubt, as these maps were not returned into the office of the surveyor-general, they were, agreeably to the terms of their instructions, transmitted by the commissioners in cases into England, for the King's consideration and pleasure; and a further circumstance in confirmation of this conclusion is found in the fact, that the earliest and most extensive of the plantation grants were passed under the great seal of England in the year 1610.

As in the case of the maps of the first plantation, in the reign of Queen Elizabeth, I asked at the State Paper Office to be shown those of the counties enumerated of the year 1609,—when the second volume of maps relating to Ireland, embracing all the MS. specimens of the reign of King James I., was placed before me; and one of the first objects that attracted and fixed my attention on opening the volume was the survey I was in search of; I knew it at sight, and upon inspection found, that there were four county books, each vellum-bound, and illuminated with coats of arms after the fashion of the day, representing Armagh, Cavan, Fermanagh, and Tyrone, and containing separate maps of each barony in each respective county, within which were pricked out the several proportions of lands therein, and their subdivisions by name, as required by the articles of instruction annexed to the commission of survey.

These several subdivisions were, as appears to me, afterwards successively coloured off, to distinguish the townlands granted from those remaining undisposed of, and in the hands of the crown, until, by repeated processes of colouring of different hues to denote different grants or properties, all were distributed.

It is much to be regretted that the maps of Coleraine and Derry, and of Donegal, which would complete the six escheated counties, are not forthcoming. Yet I cannot but hope that they will be found, as they should be, reposing in some unexplored corner of Her Majesty's State Paper Office.

The subjoined copy of a letter accompanying the six (not the four) books of maps of the escheated counties when deposited in that office, most graphically, satisfactorily, and conclusively proves, that Thomas Ridgeway, under-treasurer of Ireland, and one of the commissioners named in the commission of survey, proceeded to London in the spring of 1610, and personally delivered them over to Lord Salisbury, treasurer of England, for the consideration and pleasure of the King, as the commissioners were directed to do.

The letter also suggests a very unsettled state of the north of Ireland at the time of the taking of the survey, which was carried out in the presence of a military force; and this, no doubt, was the reason that the marshal of the army was constituted one of the commissioners. The letter runs as follows, viz. :—

"May it please your L'

"The mapps of the 6 escheated Counties, besides the Derrye, being but now newly bound in 6 several bookes for his Majt^{ies} view and the light of the intended plantac̃on, I humbly send them herewithal unto yo^{r} Ho^{r} with the humble desire to receive some advice from yo^{r} L by Mr. Newton or otherwise, whether I shall sett downe in y^{e} plaine leafe at the fore front of each booke the contents of the same Shire in this very forme of the enclosed Sumary note of Calculation, Or ells leave it for a tyme unwritten to be afterward filled up according to such other forme as any alterac̃on upon the now course in hand may happen to produce. Also, I humbly present unto y^{r} Lp for y^{r} Hon^{rs} own use and perusal at y^{r} best pleasure I have a dozen lyke Bookes of my own which (imitation only) I extracted in the camp and at my house.

"Forbearing to fill up the very compliments and description or the other blanke leaffes with my notes, untill I receave some test from your L in generall, what will best sorte with the same mappes and wth y^{r} H^{rs} lykinge, whereupon all shall be performed accordingly, In brief and yet particularly wthin 3 or 4 days at fardest.

"The true copy of the L^{o} Dep^{s} remaining advizes concerning the plantation I have sythence y^{r} Lops vouchsafed admittance and audience yesterday (for which I rest humbly bound) selected and singled out from among other his Lops remembrances, both publyck and private (the latter importable at your Lops better leisure). The Heads and true state of all ells requirable of me by y^{r} Hon^{r} (This of the plantac̃on being the hoc age and first and principal part of my employment from Ireland hyther), I will not fail (God willing) even in ipso puncto sincerely and loudly to set downe and send about the midst of the next week for y^{r} Lopps perusall at y^{r} oune best times.

"My ever good God in Heaven continue and encrease to y^{r} L^{o} all honor, healthe, and happynesse even so forbearing y^{r} Hon^{r} furder trouble, I humbly et ever remaine,

"Y^{r} L^{s} wholly
"to dispose of,
"Th^{s} Ridgeway.

"From my
"Loging in y^{e} Strand,
"March 15^{h} 1609.

"I humbly present also to y^{r} L the Irish Conceived pedigrees of their Great Lordes.

"Endorsed,

"Maps, Escheated Counties, Irish Pedigrees, &c."

I have compared closely the maps of some of the baronies with our modern Ordnance maps; and although there exists, as I anticipated, from the great perfection to which the art of surveying has attained since 1609, when it was but in its infancy, considerable difference of configuration, and still more marked discrepancies in the names of denominations, yet the maps in such juxtaposition identify with tolerable accuracy the

past with present features and outlines; and where, as in the greater number of instances is the case, the title of present possessors grows out of, and is dependent upon, the plantation grants, although the greater portion of the names by which the townlands were granted have disappeared in the stream of time, sufficient identifying incidents remain to satisfy equity and common sense that certain names and features on the Ordnance maps are represented by certain other names and features laid down on the maps of 1609.

There is, however, one barony of the four escheated counties, the maps of which have turned up, that represents an appearance the very reverse of truth. It is the barony of Armagh: the lands on the right hand boundary of the map, and so internally to its centre, should be on the left; and, *contra*, the left arrangement should be on the right. In considering the cause of such displacement, it occurred to me that the outlines of the map, when originally traced, and before writing in the names of the townlands, might have been reversed, and that then the names were written into their reverse boundary outlines. And having tested this idea by an exactly similar counter-action, the true originally intended map came into view. The error is all the more unaccountable, as more than one-half of the barony is ecclesiastical property, in the defence and preservation of which the commission of survey included as commissioners *all* bishops having spiritual jurisdiction and charge within the six escheated counties.

The mistake would have proved of more consequence in any other barony than that of Armagh, as the entire property in the barony was (except a few ballyboes) vested in the Archbishop of Armagh, in right of his see; in the Crown, in right of the fort of Dungannon; and in Trinity College, in right of its grant under the great seal of England, dated at Westminster, the 29th August, in the eighth year of the reign of King James I. (1610).

The general utility of the maps may be exemplified by this plantation grant to the College. The grant passes the territory of Towaghy, but does not name the ballyboes or townlands of which it consisted; neither does the inquisition of the ecclesiastical lands in the county of Armagh before referred to;—the map of the barony *names* them all, and defines their respective outlines, and relative position to each other.

Any one present desirous of inspecting these maps, will have the opportunity of doing so at the close of the evening; and I would call the special attention of antiquarians to the frequent delineation on townlands of a rath or habitation tenement; but whether these represent the more ancient features of the counties, or were intended to mark out the places where buildings were to be raised by the undertakers, in pursuance of the articles of plantation, I am unable as yet to form an opinion.

These maps are very beautiful specimens of the art of phota-zincography—a name given by Colonel Sir Henry James, R. E. and K. C. B., to a process invented, I believe, by himself. They were executed by directions of the Lords Commissioners of Her Majesty's Treasury, under the

colonel's superintendence, at the Ordnance Survey establishment for England, at Southampton, for the use of the Landed Estates' Record Office, Dublin, where their practical utility and value are likely to be well and frequently tested. And I would here suggest to the Academy the desirableness of securing a copy of the maps for their library, which the Treasury might the more readily be disposed to grant, considering that it would be the gift of an original and curious national work of art to a proper representative national institution.

I have heard it whispered, Mr. President and Gentlemen, that in assuming the discovery of the MS. townland maps of the four escheated counties of Armagh, Cavan, Fermanagh, and Tyrone, and attributing to them the value and importance I have ventured to do, I have usurped the earlier claim to the discovery of another individual. My best answer to this shadowy rumour, as well as the most candid and fair way of enabling the Academy to judge of its truth, is to state the simple facts relating to the claim suggested, and in the very terms in which they were originally couched, which are these:—Under date of 23rd July, 1855, E. P. Shirley, Esq., published, in the "Ulster Archæological Journal," for 1856, a catalogue *in extenso* of the contents of the three volumes of State Paper Office maps relating to Ireland, to which I have already referred; and, amongst others, he enumerates the maps of the several baronies in each of the forementioned counties; and prefacing that enumeration, is a note in the words following:—

"The following maps were originally bound in vellum, and are imprest with the arms of Robert Cecil, Earl of Salisbury, being presented to his lordship by S^{r} Thomas Ridgeway, Treasurer of Ireland, in 1609."

The catalogue does not describe the maps as MS. maps, nor as townland maps, nor as maps of the escheated lands, nor does it in any way link them with the Royal Survey of 1609; and I am much mistaken if, from such a description, any person was led to suppose that they were townland maps of the four escheated counties they represent, much less that they were the *bonâ fide* MS. emanation of said Royal Commission of Survey. Indeed, such a conclusion from such premises would have been but a fortunate guess. And I do not think that Mr. Shirley himself was aware of the origin, nature, or value of the baronial maps he catalogued, and so communicated to the public. And in confirmation of this conclusion, I refer to an elaborate paper published some time after in this same "Archæological Journal" (vol. iv., p. 118), on the subject of ancient Irish surveys, which, with Mr. Shirley's catalogue before the author's eyes, passes over the valuable MS. townland survey of 1609, and draws into review a comparatively worthless one of a part of the north of Ireland, made by Norden, between 1609 and 1611. This silence of the author of that paper appears to me conclusive evidence, that in the north of Ireland at least, and where the information would be most valuable, they were unacquainted with the origin and nature of Mr. Shirley's baronial maps, until my discovery and published letter revealed both. And now I beg to pass away from this unpleasant, though not unchallenged explanation, to the subject of my own paper.

The first and second series of mapped townland surveys to which I have called the attention of the Academy, could not have been compiled without considerable cost; and were I enabled, which I am not, to lay my hands upon the public audited account of that cost, I have no doubt that it would abundantly confirm the conclusions which the evidence within my power led me to form on the subject. The amount, whatever it may have been, was not drawn out of the Irish exchequer. The revenue of this kingdom was insufficient for the ordinary demands upon it. The survey expenses, therefore, as well as those incidental to quelling the rebellions out of which those surveys sprung, were provided by, and accounted for, in England. And my object in calling attention to this not unimportant circumstance, is to suggest to other inquirers the prudence of searching for the account records in the proper London repositories; and with this observation I pass on to a third series of MS. mapped townland surveys.

When King Charles I., at a time of comparative quiescence, ascended the throne of England, the revenue of Ireland, although greatly in advance of what it had been, was barely sufficient to defray the very limited civil and military expenditure charged against it. In the year 1632, and just when Lord Wentworth, a personal friend and most zealous promoter of the King's interests, was appointed Lord Deputy, the aggregate amount of the revenue in round numbers was £53,300, and the expenditure £54,000. Every one who has studied the history of the period knows how assiduously, and with what a high hand, that nobleman set about and succeeded in raising the resources of the country, until in the year 1639 it reached £102,000; and certainly the increase, as I could easily prove, was altogether attributable to his clear and comprehensive mind.

One of his projects for the improvement of Irish finance was seizing into the hands of the Crown, under pretence of defective titles, the counties of Galway, Mayo, Sligo, and Roscommon, in Connaught; of Clare, Limerick, and part of Tipperary, in Munster; and of the Byrne's Country, Cosha, and Ranelagh, in Wicklow, in Leinster; with the intent of establishing and reaping therefrom the fruits of another,—a third plantation. This scheme, however, was ultimately defeated, as appears to me, through the great power and influence with the King of the then Earl of Clanrickard and St. Alban's, who inherited from his ancestors five baronies in the county of Galway alone.

A modification of Wentworth's idea was submitted to; and the great proprietors *de facto*, if not *de jure*, within the scopes of the proposed plantation, as well as all others there, were permitted to come in before commissioners appointed by the Crown for the remedy of defective titles, and compound by money payments for new grants of their several estates, rights, and interests, which swelled the revenue of the kingdom very considerably at that time. The extent of these grants may be estimated from the fact of the enrolments of them filling twenty-four closely written volumes of foolscap size and proportionate thickness.

The court of defective titles may have suggested the notion of the modern Landed Estates Court: the substantial difference between them consists in this, that whereas the letters patents were obtained on payment of a money consideration to the Crown, and protected the grantee and all deriving under him from Crown claims, the conveyance from the Landed Estates Court is attainable at the mere cost of the law expenses attendant upon the proceedings before it; and, the authority being parliamentary, the title conferred is good against the world.

The preparations preceding, and necessary to carry out Wentworth's design, had the effect of calling into existence commissions of survey, which resulted, agreeably to former precedents, in inquisitions finding the title of the Crown to the counties named. These inquisitions were returned into Chancery some time between 1637 and 1639. And as it was essential for the purposes of the proposed plantation to ascertain accurately the quantities and bounds of the several townlands, the surveyor-general was again called into action.

The books of survey and maps compiled in pursuance of these proceedings were returned into the office of the surveyor-general; and were all consumed, as stated by Stone, the then surveyor-general, in the calamitous fire of 1711. But, antecedently to that event, copies of the survey books, expressing the names of the denominations of lands, their quality, and contents, Irish plantation measure, and situation as to parish, barony, and county, together with the significant number of reference by which each might be referred to, and identified on the plot or map, were made out and returned by the surveyor-general to the commissioners for executing the act of settlement in the year 1661. The commissioners required such assistance to enable them to charge the King's quit-rents, imposed for a special purpose by the act, and also ultimately to distribute the lands themselves to the adventurers, soldiers, transplanted persons, and other legitimate claimants.

These books, after serving the purposes for which they were intended, as well as the decrees, certificates, and other record proceedings of the commissioners, were, by direction of section 1 of the Act of Explanation, 17 & 18 Car. II., and of clause 60 of the rules attached to and incorporated in the Act of Settlement, 14 & 15 Car. II., cap. 2, delivered up to the auditor-general about the year 1678, to remain as of record in his office, for perpetual preservation and public use; and they are now deposited in the Landed Estates Record Office, Dublin; and abundantly corroborate the statement I have made of Wentworth's, *alias Strafford's*, mapped townland survey. But that no doubt should be allowed to remain upon so important a point, I subjoin a statement in detail of payments made out of the Irish exchequer to an extent exceeding £9,000, which declares the names of the counties subjected to survey, and the nature of the records arising out of it. The inquisitions alone are not named; but, as they are in existence in Chancery, they tell their own tale. My object is to show that there were also books descriptive of the survey, and maps of the townlands described in the books:—

Account from Sub-Treasurer's Rolls of 1637–8,–9, *and* 1640.

CONNAUGHT.

	£	s.	d.
Paid Thomas Raven, for surveying and measuring Mayo, Galway, and the several counties of Connaught,	1,952	8	9
,, Captain Nicholas Pinnar, for surveying and measuring of Connaught Plantation,	1,226	9	0
,, Viscount Rannelagh and Sir F. Willoughby, for ditto,	800	0	0
,, Joseph Carter, for reducing the several original maps of Mayo and Galway,	56	0	0
,, Same persons, for tracing maps, Roscommon, Sligo, Mayo, Galway, and County Town of Galway,	33	6	8
,, Laurence Parsons, for engrossing original books of Roscommon, Sligo, and Mayo,	26	10	0
,, Thomas Waring and Thomas Ravenscroft, for transcribing books of Galway and Co. Town of Galway,	60	0	0
,, The Lord Deputy and other the Commissioners of Survey and attendants, Laurence Parsons, and others,	1,931	1	0
Total for Connaught,	6,085	15	5

MUNSTER.

Paid William Gilbert and twenty-two other surveyors and measurers of Co. Clare, Limerick, and Tipperary,	2,200	0	0
,, The Lord Deputy's journey,	700	0	0
Total for Munster,	2,900	0	0

LEINSTER.

Paid Captain Nicholas Pinnar and William Pinnock, for measuring the territories of Byrne's Country, Cosha, and Ranelagh, in the County Wicklow,	227	15	6
Gross Total,	9,213	10	11

This evidence clearly shows that there were paid for and compiled books of survey and plots or maps for the counties of Galway, and county of the town of Galway, Mayo, Roscommon, and Sligo, in Connaught; for the counties of Clare, Limerick, and a portion of Tipperary, in Munster; and for a portion of the county of Wicklow, in Leinster. And

I, in conclusion, express my conviction that many officially certified tracings of the maps and copies from the books of this survey, issued out of the surveyor-general's office before the lamentable and destructive fire of 1711, are yet in existence, and lying concealed amongst the title-deeds of ancient Irish landed proprietors. And I would urgently suggest to such, as well as to their solicitors, a search for and submission to my inspection of as many as may be found; when I will undertake, upon unexceptionable and contemporaneous evidence, to prove the genuineness of such as may be genuine; and thus give authenticity and weight to their documents of title, and at the same time additional testimony to what I have already advanced of plots or maps being accompaniments or fruits of Strafford's survey.

Professor William K. Sullivan read the following paper:—

On some curious Molecular Changes produced in Silicate of Zinc by the Application of Heat.

In a Paper which I read to the Academy on its first meeting this session, some curious pisolithic combinations of silicate and carbonate of zinc from Dolores mine, near Santander, in Spain, were described. Mention was also made of the presence of carbonic acid in the fibrous Smithsonite or hemi-morphite from the same locality. It was sought to account for this circumstance, as well as the variation in the amount of water, and its want of proportionality to the other constituents which are generally observed in the published analyses of silicate of zinc, by supposing that the carbonic acid existed as dicarbonate of zinc which was in combination with disilicate of zinc. This hypothesis involved the isomorphism of the silicate and carbonate, which were consequently considered to be capable of forming an indefinite number of compounds, like the similar salts of isomorphic bases or acids. For all these compounds the general formula $m(2ZnO,SiO_2) + n(2ZnO,CO_2) + p\,HO$, may be proposed.

A very curious molecular change, which I have found to be produced in all these compounds by the action of heat, appears to me to give a very unexpected support to the view regarding the constitution of the silicates just stated, and consequently to the isomorphism of silicic and carbonic acids, upon which it is primarily founded. When fragments of the pisolithic silicates were heated to drive off the hydrated water, they became of a bright lemon-colour, passing into orange; on cooling, the colour almost wholly faded. The phenomenon is just like what is observed with white oxide of zinc, except that the latter never yields so bright a yellow as the silicates do. The change appears to take place at a little above the temperature of melting lead; at a redness just visible at daylight, the colour of the fragments changes to green, which is sometimes of a deep verdigris-green. On removing the lamp for a moment from under the crucible containing the fragments, they suddenly became yellow. When the temperature was increased by means of a blowpipe, the colour again became yellow. On allowing the

crucible then to cool, the colour of the fragment changed successively from light yellow to verdigris-green, then to bright orange-yellow, which became paler as the cooling proceeded, until the fragments became nearly white. On being heated, the chromatic scale was reversed, so that the changes could be observed both during the heating and cooling. The changes took place very rapidly, with a kind of phosphorescent glow, which was very beautiful, and could be repeated apparently any number of times with the same fragments. The latter circumstance shows that the phenomenon can take place after the loss of the carbonic acid.

This remarkable molecular change is, perhaps, connected with the hemi-morphism to which the pyroelectric properties of the silicate of zinc are due; and as it is as well, if not better, seen in the specimens containing a very large excess of carbonate of zinc, it would appear that dicarbonate of zinc is likewise hemi-morphic. The circumstance that the change takes place as well after the decomposition of the carbonate, may be urged against this conclusion, it is true. I think, however, that the objection is only apparent. When the mineral is in fragments, the phenomenon is best seen; when reduced to very fine powder, it almost wholly disappears. Now, when fragments of a mineral containing carbonic acid are heated, the latter goes away, but the residue retains the original form; and as the pyroelectric properties are due to the relative position of the molecules, as long as the mineral retains its form these changes occur. This view is further corroborated by the circumstance that the silicate, which contains scarcely any carbonate, and which it is very difficult to reduce to a very fine powder, exhibits it better when powdered than the silicates containing very little silica, although the latter act better in fragments. The hydrocarbonate $3(ZnO,CO_2) + 5(ZnO,HO)$ which is described in the paper above quoted, and which is there considered to have a different composition from that in combination with the silicate of zinc, does not exhibit this chromatic phenomenon at all; and in the reniform masses consisting of alternate shells of silicate and the hydrocarbonate in question, so extremely thin that they can scarcely be distinguished by the eye, the separate layers may at once be recognised on heating some fragments, by the alternate lines of green and whitish-yellow, the former being the silicate, and the latter the hydrocarbonate.

Professor William K. Sullivan also read the following paper:—

On a new Hydrated Silicate of Potash, and on some of the Conditions under which the Reniform Structure in Minerals may be developed.

About two years ago I wanted a solution of silicate of potash for some experiments with which I was then engaged, and accordingly prepared it, by fusing a mixture of finely powdered vein quartz with about four times its weight of purified pearl-ash, in a Cornish crucible. The melted glass was poured out on a cold plate of iron, and when cold was broken into lumps, and put into a large glass jar about half full of water. On

being stirred about from time to time during a couple of days, the smaller fragments nearly all dissolved, while the larger lumps were only superficially acted upon. The solution thus formed, having been found strong enough for the purposes for which the silicate was prepared, was poured off, and fresh water poured upon the lumps, which were frequently stirred during two or three days, by which a second solution, but very much weaker than the first, was obtained. At this period my experiments were interrupted, and the jar containing the solution and the undissolved lumps was put away in a cupboard, where it remained undisturbed for nearly a year. I then found that some of the lumps still remained, to a great extent, undissolved; but a great number had softened into a pasty mass, in which were disseminated here and there the unsoftened lumps. The whole of this pasty gelatinous mass was not immediately derived from the softening of the lumps, as a part appeared to have been precipitated from the supernatant liquor, so that the uneven surface formed by the original pasty mass was filled up and partially covered over by a thin layer of gelatinous silica, like that formed by precipitating a solution of basic silicate by soluble carbonates, or by a solution of sal-ammoniac. Upon the top of this pasty mass, beautiful white warty concretions had formed, the whole being covered by about six inches of water. The borders of the warts were serrated, the serrations being produced by the projecting ends of fine prismatic needles. In every instance the warts formed over a lump of undissolved silicate, being largest where the lump came closest to the surface of the pasty mass.

The jar, tightly covered with writing-paper, was again laid aside, but in a place where it could be frequently examined. The warts gradually increased in number, each new one appearing to commence over a lump, or where the pasty mass was thickest and most granular, until at length they extended into a continuous snow-white crust. The positions of the warts in this crust were marked by raised prominences. The crust thus formed continued to increase in thickness, the fresh depositions appearing to begin, as at first, over the lumps, so that the raised prominences became more and more marked, until a distinct reniform structure was developed. While this growth was taking place, the water had gradually evaporated, until not more than an inch covered the crust, and the pasty mass had become quite gelatinous.

The supernatant liquor, which was a solution of carbonate of potash, containing only a mere trace of silica, was poured off, and the crust removed as carefully as possible. The latter was very fragile, the slightest pressure reducing it to a pulpy mass. The gelatinous mass upon which the crust rested had a yellowish colour; left in the jar, it gradually dried and cracked. Part of it, when dried, consisted of an opaque whitish-grey substance, mottled with pure white, which was very friable when dried for some minutes in a water-bath. Another part, however, was semi-translucent, hard, and very like some varieties of opal, and contained water even after having been exposed to dry air for several

months. A very hard semi-translucent fragment contained, when first removed from the jar, 23·27 per cent. of water, which would correspond to SiO_2HO; but after some months' exposure to dry air, it was reduced to 9·59 per cent., or $3SiO_2,HO$. In both cases the fragment still contained some carbonate of potash, so that no very accurate analysis of it could be made. The gelatinous precipitate formed by passing carbonic acid through soluble silicate of potash, even when exposed to the air in considerable mass until it became dry, yielded only an amorphous white anhydrous powder, or one containing only small and variable quantities of water. A hydrate containing 16·5 per cent. of water, and which may be represented by the formula $3SiO_2,2HO$ ($=SiO_3,HO$), appears, however, to have been obtained by dropping slowly hydrochloric acid into a solution of basic silicate of potash of moderate strength, and drying the gelatinous precipitate in a vacuum or in dry air. This hydrate consisted of a white powder; but M. Doveri obtained a similar hydrate in the crystalline state by precipitating a solution of silicate of copper dissolved in hydrochloric acid, by sulphide of hydrogen, and evaporating the perfectly limpid solution of silica over quick-lime in a vacuum. When the hydrate $3Si_2,2HO$ in the form of a white powder was exposed for some time to a temperature of 100° to 120° cent., it lost half its water, and formed a definite compound, represented by the formula $3SiO_2,HO$ ($=2SiO_3,HO$), that is, the same compound as that which was formed by the exposure of my hard semi-translucent silica for some months to dry air. The latter, to which I have above assigned the formula SiO_2,HO ($=2SiO_3,3HO$), has the same composition as the remarkable glassy hydrated silica obtained by Ebelman by exposing silicic ether to the slow action of moist air. So far as I am aware, the two hydrates which I have described are the only examples of definite hydrated silica having been obtained in the form of opal. A strong solution of silicate of potash put into a Briet's apparatus, charged in the ordinary way with bicarbonate of soda and tartaric acid, and left undisturbed for a few months, and then exposed to the air until it dried, was horny here and there. The quantity of water in many varieties of opal and hyalite is so small, that some mineralogists consider it not to be chemically combined in those minerals. In what state, then, is it? Hydrated water may be held with so feeble a force as to appear attached by cohesion. Mr. A. Gages, in a paper read before the British Association at Leeds, described an opaque siliceous skeleton which he obtained by the long continued action of acids upon a mineral, and which became transparent like hydrophane when plunged into water. The quantity of water necessary to effect this change appeared to be definite; the phenomenon was certainly an excellent example of mechanical cohesion passing into chemical. Opal, hyalite, &c., as well as the semi-translucent gummy hydrated silica just described, probably belong to the same category. The formation of some horny hydrated silica in the Briet's apparatus is interesting, as showing that time influences the combining power of water and silica. A similar influence appears to be exerted upon carbonic acid dissolved in water under pressure, because,

the longer it is subject to the pressure, the more slowly it appears to be evolved when the pressure is removed.

The gummy silica which adhered to the white crust was removed as carefully as possible while the crust was still moist; the latter was then placed upon dry filtering paper, which was frequently renewed, so as to imbibe all the moisture. A portion was broken into small fragments, and laid upon dry filtering paper under a bell-glass along with a sulphuric acid desiccating dish filled with water. The air being always saturated with moisture, the carbonate of potash in the substance deliquesced, and was absorbed by the filtering paper. The operation was repeated until dry paper was no longer wetted by the crust. So completely was the carbonate of potash removed by this process, that even after an exposure of several months to the air under a large bell-glass, which was frequently lifted in order to allow the substance to be moved about on the paper, it only yielded a few minute bubbles of carbonic acid when treated with acid.

Thus dried it formed small porous lumps, which crushed between the fingers into a snow-white gritty crystalline powder, formed of extremely fine oblique prismatic needles. Heated in a crucible to a red heat, it lost water; heated in the blowpipe flame, it fused into a milky-looking glass, which under a very strong heat became transparent. Thus fused, it was scarcely acted upon by boiling oil of vitriol, even though boiled with it for some hours. In the hydrated state, it was decomposed by boiling concentrated hydrochloric acid, but only very slowly; it was readily attacked by oil of vitriol. For the purposes of analysis a small quantity of the powder, produced by crushing the lumps between paper, was shaken up with distilled water for some minutes, in order to remove as far as possible all traces of carbonate of potash, placed upon filtering paper, and repeatedly pressed, and then dried at a temperature of about 60° cent. in a current of air. The substance was decomposed by concentrated hydrochloric acid, and the silica and potash directly determined, the latter being weighed as chloride. The results of the analysis led to the formula $KO,5SiO_2,14HO$, as the following table shows:—

	Calculated.	Found.
KO, ...	14·381	14·410
SiO_2, ...	47·227	47·232
HO, ...	38·391	38·433
	100·000	100·075

A portion of the unbroken crust under which the filtering paper was changed only a few times, was left to dry gradually. As it did so, some carbonate of potash effloresced on it; this was derived from the mother-liquor, and not from the decomposition of the compound, as a portion of the latter left to dry for several months, and then well washed, had the same composition as that above given. During the drying the crust exfoliated into thin layers, which were often perfect shells wherever

there was a reniform prominence. In many of those shells a fibrous structure, could be distinctly traced,—the fibres appearing to converge as in globular minerals having a fibrous structure, such as wavelite, &c.

The formation of this hydrated silicate of potash may perhaps be attributed to two, or even three causes. Firstly, the carbonic acid of the air was gradually absorbed and combined with the potash of the basic silicate, by which gelatinous silicate was precipitated upon the lumps of undissolved silicate. Secondly, the lumps, in slowly dissolving, formed an almost concentrated solution of basic silicate in their neighbourhood; this solution produced a diffusive current, which slowly brought a portion of the solution of carbonate of potash from the surface, where it had continued to absorb more carbonic acid after the precipitation of the gelatinous silicate; this solution must therefore have contained some bicarbonate of potash, and on coming in contact with the solution of basic silicate, must have produced carbonate of potash, and a less basic silicate of potash, which, if rapidly formed, would be precipitated as a powder, but being very slowly formed, crystallized out in obedience to any direction impressed upon the molecules by the molecular forces in action in the solution and underlying mass. This change would of course take place more rapidly where the solution would be densest, that is, near the undissolved lumps, and hence the warty crystallizations would begin there. But a third cause may also aid in producing the latter result. We know that a glass rod, a piece of glass, or other object projecting from the bottom of a vessel containing a saline solution, will generally induce crystals to form upon it: a crystal of the salt in solution dropped into it will still more strikingly act in the same way. It may be, then, that the lumps acted as so many centres of cohesive force, which acted the more rapidly the nearer they were to the surface of contact of the pasty mass and supernatant liquor.

MONDAY, JANUARY 13, 1862.

The Very Rev. Charles Graves, D.D., President, in the Chair.

The President called the attention of the Academy to the great loss sustained by the Academy, in common with the public at large, by the lamented deaths of his Royal Highness the Prince Consort, Honorary Member of the Academy, John O'Donovan, LL. D., and the Rev. Robert Carmichael.

An Address to her Majesty the Queen on the occasion of the Prince Consort's death was read by the President, and unanimously adopted by the Academy; and the President was requested to transmit the same for presentation to her Majesty.

Rev. Robert G. Cather, LL. D., Percy Fitzgerald, Esq., and Henry W. Wilkie, Esq., were elected members of the Academy.

The Rev. Dr. Reeves read the first part of a paper "On the Round Tower of Lusk."

Mr. George V. Du Noyer read the following description of various objects of antiquarian interest presented by him to the Academy:—

Nos. 1, 2.—Views of a Cromlech, called "Leach an Seail" in the parish of Harristown, Welsh Mountains, near Kilmaganny, county of Kilkenny, from a sketch by Mr. Wyley, formerly of the Geological Survey of Ireland.

No. 3.—Remains of a rude stone-grave, or Kistvaen, on the south side of Carrickgollogan Mountain, county of Dublin, erroneously marked in the Ordnance map as "Cromlech."

No. 4.—Sketch of a boulder of granite, from Begern Island, in the harbour of Wexford; on which is rudely punched a simple cross, with bifurcated ends, the whole enclosed in a parallelogram. This is said to mark the grave of St. Iberius, whose death is recorded as having occurred on the 28th of April, A. D. 500. This is also from a sketch by Mr. Wyley.

No. 5.—A slab of granite, about 3 feet 10 inches above the ground, and close to the base of the round tower at Rathmichael old church, in the county of Dublin. On one side of the stone there are rudely punched two groups of four concentric circles each, connected by three lines. There may be a third group of circles beneath the level of the soil.

No. 6.—This represents another slab of granite, about 5 feet in length, now used as a tombstone in the graveyard of the old church of Tullow, county of Dublin. The small angular projection at either side, near the top of the stone, gives it a faint resemblance to a cross. The ornamentation on this slab is of the same character as on the former; but at either side of the stem connecting each of the groups of circles, there are a number of divergent parallel lines. The style of ornament on both these stones so closely resembles some of that seen at New Grange, in the county of Meath, and on some of our gold lunettes, that I do not think it unreasonable to suppose that these carvings were made in Pagan times, and the stones subsequently adapted to Christian uses.

Nos. 7, 8, 9.—Three views of a very singular bi-effigial tombstone, from the graveyard of Culdarragh on the Boe Island, in upper Lough Erne. This carving is of the rudest description, the size of the head of the male and female figure being out of all proportion, and the features of both brought out by raised flat narrow bands. The male head is distinguished by a forked and pointed beard of the *Saxon* type, and that the figure on the opposite side of the stone is that of a female is suggested by a waist-belt. The arms of both effigies are crossed on the chest, and more resemble flat bars than anything else. The top of the stone is cut away deeply, so as to form a marked separation between the heads. Without doubt, this is a work of considerable antiquity, and it appears to have been intended to mark the interment of two bodies in one grave.

No. 10.—View of the doorway of the round tower of St. Canice, Kilkenny. The lintel is formed of blocks of old red sandstone, the sides

of magnesian limestone, and the sill of the ordinary grey limestone of the district.

No. 11.—View of the round tower of Kilrea, in the county of Kilkenny: unlike most of such edifices, the doorway is not surmounted by a large window-loop,—this aperture, though present, being placed at the distance of many feet to the left-hand side as you enter the door. The upper portion of the tower has been remodelled, the conical roof removed, and a parapet formed over the original openings at the top of the tower. This tower stands on a square plinth of dry masonry, and measures 49½ feet in circumference at its base.

No. 12.—Doorway of the round tower of Kilrea. This doorway measures only 4 feet 7½ inches in height to the springing of the arch, and 2 feet 4 inches in width: it is formed of sandstone, and its sides are parallel. The head is semicircular, and cut out of one stone; around the entire doorway there is a flat raised band, 10½ inches broad.

No. 13.—Doorway of the old church of Kilbunny, near Pilltown, county Waterford. There is a quaintness and originality in this work, which stamp it as being of exceeding antiquity,—possibly of the tenth or eleventh century. The doorway, which has converging sides, measures about 6 feet in height to the springing of the arch, its head is semicircular, formed of nine stones, each of which is cut away superficially so as to form a deeply depressed zigzag moulding, surrounded by a flat band; the arch rests on a broad abacus, ornamented with massive beads. Directly over the arch a human head projects, in high relief, the forehead of which is cinctured by a flat band; the lower portion of the face is destroyed; on the northern side of the doorway, over the springing of the arch, there projects a rudely carved head of a nondescript monster, with a large mouth, having teeth and a curled-down snout; the corresponding side of the door is plain.

The outer angle of the northern jam of the doorway, just beneath the abacus, has been cut into to represent a human head, with beard and moustache; and on the opposite side, a ram's horn is carved in a similar manner: although the carvings appear in relief, no portion of them project beyond the surface of the stone.

No. 14.—This represents the head of what was once a very fine cross, carved out of granite, and lately discovered in a field to the east of the "Cathedral" of Glendalough. Its type is that of a cross radiating from a circle.

No. 15.—A small slab of mica-slate, carved so as to suggest the outline of a cross just appearing from beyond the outer circumference of a circle; also from Glendalough.

No. 16.—Small and rudely formed cross of the Maltese type, carved out of a slab of mica-slate; from Glendalough.

No. 17.—A small block of mica-slate, from Glendalough, carved into the form of a truncated cone, having a small oval hollow on the top, which, no doubt, was meant to receive the shaft of a cross.

No. 18.—A small mutilated cross, cut out of a flat slab of granite, and standing on a square plinth of granite, in the graveyard of the old

church of Kill-of-the-Grange, county of Dublin. The effect of a cross radiating from a circle is produced by four circular perforations ranged round the centre of an imaginary circle.

No. 19. This represents the head of a beautifully carved cross, from the graveyard of the old church of Kilkieran, near Pilltown, county of Kilkenny; here we have the effect of a cross radiating from a circle produced in the most skilful and effective manner.

No. 20.—The plinth and shaft of a most exquisitely decorated cross, from the same locality as the former; the chief ornamentations are the plait and the rope ornament.

No. 21.—This cross, which is of unique form, is also from Kilkieran; it is cut out of a single block of sandstone, and is 10 feet 6 inches high; it stands on a circular plinth. The cross arm is unusually short, and appears as if inserted into the shaft, which is completely surrounded by a rope-moulding; a portion of the lower face of the shaft is depressed in such a manner as to lead one to suppose that the space was intended to receive a tablet for an inscription or device.

Nos. 22, 23, 24, 25.—Four views of the plinth and a portion of the base of the shaft of a small cross, formed of red sandstone, from an ancient burying-ground, one mile south of Ballinamult, in the county of Waterford; these are drawn to the full size of the original. The ornament on the different sides of the plinth is either the simple plait or fret.

No, 26.—An Anglo-Norman tombstone, or lid of stone-coffin, from the graveyard of the Black Abbey at Kilkenny. The slab is ornamented with a simple long-shafted cross, which terminates in large trefoils; it bears on its surface the following inscription, in the Anglo-Norman character:—

Master Roberd de Sardelove git ici deu de saalme eit merci Pat$\bar{r}$, n$\bar{r}$, r,

No. 27.—Another and a similar tombstone from the same locality, but devoid of any inscription. From the shaft of the cross, just below the arms, there appears suspended a kite-shaped shield, on which three large rings are faintly traced. It is probable that these are but the sketch of an armorial bearing: if, however, we are to suppose the work complete, I know of no coat of arms more nearly resembling it than that of the family of Canteville or Cantwell.

No. 28.—A similar tombstone, also from the Black Abbey at Kilkenny; it is ornamented with a foliated cross only.

No. 29.—This sketch represents a rude stone-coffin, from the same locality as the three preceding tombstones; the ornament along its sides is in low relief, and badly executed, representing alternations of trefoil-headed arcades and square spaces enclosing rude quatrefoils; from the general style, I am led to think that it was executed on the spot by native stone-cutters, while the coffin-lids or tombstones may have been the work of accomplished Anglo-Norman sculptors, and were possibly *imported*. In a paper on female cross-legged effigies, which I contributed to the "Journal of the Archæologieal Institute," vol. 2, I had occasion

to make the same remark with regard to some stone-coffins and coffin-lids found at Cashel, in the county of Tipperary.

No. 30.—This represents a coffin-shaped tombstone, from the graveyard of Fethard church, in the county of Wexford; it bears along its bevelled edge the following inscription, in the Anglo-Norman character:—

Thomas de Angayne gist deu de sa alme eit merci. Amen.

No. 31.—Fragment of an Anglo-Norman tombstone, with foliated cross, and a portion of an inscription, from St. Canice' Cathedral, Kilkenny.

No. 32.—This sketch represents a tombstone of a very unusual type either in Ireland or England. It is decorated with a human head and bust, rising from beneath a richly foliated cross, which rests on the chest of the figure; the head is apparently that of a female; the stone is preserved in the cathedral of St. Canice, Kilkenny.

No. 33.—A tombstone similar in type to the former, and preserved in the graveyard of the old church of Bannow, county of Wexford. Here, however, we have the head and bust of a male and female figure, surmounted by an architectural canopy. The male head is armed with the cylindrical flat-banded helmet of the 13th century; the female head is bare, showing the hair tonsured over the forehead, and falling in looped-up curls over the ears, being bound round with a flat band. Along the shaft of the cross there is the following inscription, in black letter:—

Hic jacet Johannes Colfer qui obiit [no date]. *Orate pro Anna Siggin que obiit* [another blank space on which the date was never inserted], *quorum animabus proprietor deus. Amen.*

In the district of Bannow and Carrick, Colfer is the most common name; but Siggin, though recognised as that of one of the oldest families, is now extinct; the last of the name in the county was an itinerant horse-breaker, an old man much respected by the people, and who occasionally lived amongst them at free quarters.

No. 34.—View of the old house of the Siggin family, in the townland of Newtown, formerly Brandane, opposite to Bannow Island.

No. 35.—A mediæval tombstone, from the graveyard of Bannow old church.

No. 36.—View of the old church of Bannow, county of Wexford.

No. 37.—Doorway of Bannow old church, remarkable as being of precisely the same type and general form as that from the so-called "Cathedral" at Glendalough, which is supposed to be of the 7th century. As the date of Bannow church cannot be later than the 13th century, we can only suppose that its architect copied from the antique, unless his judgment led him to adopt the most simple and at the same time the strongest form of doorway possible,—that with a massive flat lintel, having an arch over it to relieve it of the weight of the superimposed masonry.

No. 38.—Plan of Bannow church, showing the Porches to the north and south doorways, which, however, are less ancient than the church itself, and may have been added to give greater security to the ecclesiastics or others who may have used the church as a place of refuge in troublesome times.

No. 39.—The lid of a stone-coffin, or perhaps a tombstone only, from the abbey of Gowran, in the county of Kilkenny; this is ornamented with the full-length figure of an ecclesiastic, carved in high relief; along the bevelled edge of the slab there is an inscription in the Anglo-Norman character, which commences with an invocation "in the name of God to pray for the soul of Julianus," somebody whose name commenced with the letters DVC; the remainder of the inscription is too faint to be deciphered.

No. 40.—The tombstone of Elenor, daughter of Pierce, the 8th Earl of Ormond, and wife of the Earl of Thomond, from the Cathedral of St. Canice, Kilkenny. I give this sketch as illustrating the practice of representing the emblems of the Passion on tombstones, in the 14th and 15th centuries.

No. 41.—The stone seat called St. Kieran's Chair, from the interior of the Cathedral of St. Canice, Kilkenny.

No. 42.—Coat of arms of Edward the 4th, carved on a stone which is inserted into the gable-wall of a house, close to the entrance of the graveyard of St. Canice, Kilkenny. The supporters to the shield, which is charged with three lions passant and three fleur de lis quartered, are a winged griffin and a greyhound, those of the Tudor family: the date of this carving must be between the years 1546 and 1553.

No. 43.—This sketch represents a covered well in the yard of an old house, called Wolf's-arch in the town of Kilkenny. In the entablature is the date 1604, with the following inscription in black letter:—

Orate pro animabus Johannis Rothe mercatoris et uxor ejus Rolæ Archer qui puteum hunc et heredificia fieri fecit.

In the wall adjoining the well on its right-hand side, is a stone bearing the arms of Rothe and Archer, with the date 1610. It would appear that the immortality to be acquired by the construction of a draw-well or drinking-fountain was known to and appreciated by the worthies of the 16th and 17th centuries.

The following nine illustrations from No. 44 to 52, inclusive, are of windows and loops from buildings of various ages.

No. 44.—One of the side-wall windows of the old church of Donaghmore, between Clonmel and Fethard, in the county of Tipperary. Twelfth century.

No. 45.—Window from the W. gable of the old church of Ownig, county of Kilkenny.

No. 46.—Window from the S. gable of the sacristy of Mullagh Abbey, county of Tipperary. Fifteenth century.

No. 47.—Loop from Ballycloughy Castle, county of Tipperary.

No. 48.—Another loop, from the same building.

No. 49.—Loop from Ormond's Castle, at Carrick-on-Suir, erected A. D. 1565.

No. 50.—Another loop, from the same castle.

No. 51.—A third loop-hole, from the same building.

No. 52.—Cruciform loop, from the same castle.

No. 53.—Sketch of the stone-roofed and castellated church of Taghmon, county of Westmeath.

No. 54.—Ground-plan of the same building.

No. 55.—Small Aumbrey from the east wall of Taghmon church, close to the east window.

No. 56.—Exterior view of one of the windows from Taghmon church, which from its general style would lead to the supposition that the church was erected in the latter part of the 15th, or beginning of the 16th century.

No. 57.—Plan of the church forming part of the ruins of Moymet Castle, in the county of Meath, near Trim, erected by Sir Lucas Dillon, who was Chief Baron of the Exchequer in the reign of Elizabeth. The only feature of interest in this ruin is the pulpit, which formed part of the original structure, and is placed in the south side-wall, near the commencement of the chancel.

No. 58.—Coloured drawings of two fibulæ of the bulla type. That marked A is formed of a very large lump of amber, pierced with a bronze pin. Fig. B. shows the perforation in the amber bushed with wood, to guard against the amber being cracked or broken by the action of the pin.

No. 59.—The first drawing on this sheet is that of a singularly beautiful fibula, the hoop of which is ornamented by a series of five flattish amber beads, alternating with bronze dirks arranged in groups of five; the termination of the hoop, where the pin catches, is flattened out in the form of the opercula of a mollusk, and is decorated by delicately engraved lines, which follow the curve of the flattened spire, having between them rows of zigzag punchings. This ornamentation is precisely similar to that on many of our gold torques. Fig. D. is a fibula of the same type as the former, but formed entirely of bronze; the hoop is engraved with a zigzag pattern, and the terminal opercula-shaped disk, at the catch for the pin, is ornamented with a series of two rows of small circles. On the pin of this fibula there are yet preserved four of the original rings which were attached to the cloak or garment intended to be fastened by it.

No. 60.—A singularly large bronze fibula of the type of the former, but much more rude in workmanship, and devoid of ornament. The terminal disk is oval, and remarkably large, measuring 6 by $4\frac{3}{4}$ inches across: from its massive character, I think this may have been applied to horse-trappings, or the hanging of heavy drapery.

No. 61.—This fibula is of the same type as the foregoing, but wants the terminal disk, which gives place to a long deep catch for the end of the pin. The hoop is ornamented with a rude herring-bone pattern.

No. 62.—Chessmen of walrhus tooth, representing a King, a Bishop, and a Pawn; these were found in the sands on the shore of one of the Orkney Islands, and are supposed to be of the 12th century. I give them to illustrate the form of the *sword* and the *pastoral* crook of the period. These singular relics have been described by Sir F. Madden, in the "Archælogia," vol. xxiv., p. 200. The objects represented in the five last sheets of illustrations are preserved in the British Museum.

No. 63.—This is an original drawing by my colleague, Mr. Foot, of an ornamented font in the old church of Aughtmama, near Oranmore, county of Clare. It represents a combat between two stags, and is in its way quite unique. *Vide* Portfolio.

The marked thanks of the Academy were voted to Mr. Du Noyer for this handsome and valuable donation.

The Secretary of the Academy read the following recommendation of the Council:—"That the sum of £30 be placed at the disposal of the Council for the purchase of antiquities during the current year;" and moved that the same be adopted by the Academy.

Whereupon it was moved and seconded, as an amendment:—"That the recommendation brought down from the Council be referred back to the Council for reconsideration, the amount proposed to be voted for the Museum being considerably less than ordinarily voted for many years back."

A division having been called for, the amendment was declared to be lost; and the original motion, being put, was declared to be carried, —13 members having voted for, and 6 against it.

Donations of books were presented, and thanks voted to the donors.

The Academy then adjourned.

MONDAY, JANUARY 27, 1862.

The Very Rev. Charles Graves, D. D., President, in the Chair.

Dr. Kinahan read the following—

Synopsis of the Species of the Families Crangonidæ and Galatheidæ which inhabit the seas around the British Isles.

(Plates III.–XV.)

Part I.

The *italicized* genera and species are not British.

Family—CRANGONIDÆ.

Carapax depressus, oculi superne aperti: Antenn. externæ filamento terminantes squamâ latâ basi præditæ. Ant. internæ ad basin dilatatæ, pedunculo brevi, duobus filis terminantes. Maxillipedes externi subpediformes. Chelipedes (pedes ambulatorii) paria quinque; par primum subcheliforme, par secundum didactylum, paria tertia ad quinta acuminata. Branchiæ paria septem. Genera: Crangon, Cheraphilus, Ægeon, *Nectocrangon*.

Genus I.

Crangon, Carapax lævis, dente gastrico mediane sæpius, et dente branchialo utrinque armatus, rostratus. Rostrum breve, pedunculo oculorum non superans. Somites (segmenta) abdominales superne læves. Telson (segmentum ultimum) superne planum. Chelipedes (pedes ambulatorii) par primum satis grande, subcheliforme, par secundum minutum, debile, pare primo longitudinem æquans didactylum. Paria tertia ad quinta acuminata. Species Cr. vulgaris, *Franciscorum, rubropunctatus.*

1. *Crangon vulgaris* (Fabricius sp.).

C. Rostro perbrevi, apice rotundato superne excavato, orbibus totùm circumciliatis. Carapace dentibus gastrico brachialibusque armato, Abdominis somitibus lævibus. Telson læve. Chelipedûm pare secundo, paribus primo tertioque æquante, meros dentato. (Syn. Cr. septemspinosa (Say.), Cancer Crangon (Seba)). In littoris Magnæ Britanniæ et Hiberniæ.

Subgenus Steiracrangon (mihi). Carapax ut *Crangon.* Somites abdominis ad 5tum supra læves sextus superne canaliculatus; telson supra sulcatum. Species St. *propinquus, nigricauda, affinis,* Allmanni.

2. *Crangon* (*Steiracrangon*), *Allmanni* (Kin.)

St. Rostro brevi, apice subrotundato superne excavato. Orbibus totum circumciliatis, carapace ut *Cr. vulgaris.* Abdominis somite sexto bicarinato, sulcato. Telson supra sulcato, somitibus aliis lævibus. Chelipedibus ut *Cr. vulgaris.* In profundis ad "Dublin" et "Belfast," Hiberniam, et ad "Shetland," Mag. Brit.

Genus II.

Cheraphilus (mihi), Pontophilus (Leach, non Risso nec De Haan).

Carapax carinatus rostratus, Rostrum triangulare. Abdominis somites carinati, sculptique; telson suprasulcatum. Chelipedes secundi quam primo aut tertio breviores. Sp. Ch. bispinosus, trispinosus, *intermedius, bidentatus, angusticauda,* Pattersonii, spinosus, *boreas, Capensis, nanus, munitus.*

1. *Cheraphilus bispinosus* (Westwood sp.).

Ch. Rostro brevi, apice rotundato supra sulcato. Orbe margine externo ciliato, carapace, regione gastricâ medianâ bidentatâ, lateribus minute nodosis. Abdominis somitibus quinto sextoque bicarinatis. Telson superne excavato. Chelipedûm pare secundo, dimidio tertii paris æquante. Synonyma *Pontophilus bispinosus* (West); *Crangon bispinosus* (Bell). In profundis ad "Dublin" et "Galway," Hibern. et. ad "Hastings," Mag. Brit.

2. *Cheraphilus trispinosus* (Hailstone sp.).

Ch. Rostro perbrevi apice rotundato superne excavato, Orbè paucibus ciliis fundo insitis. Carapace uno dente gastrico mediano et uno dente gastrico laterali solum armato; lateribus lævibus. Abdominis somite sexto, subcarinato, telson superne excavato. Chelipedûm pare secundo, tenui; quam primo tertiove, multo breviori. Syn. *Pontophilus trispinosus* (Hailst.); *Crangon trispinosus* (Bell). Ad "Dublin," Hibern. et ad "Hastings," &c., Mag. Brit.

3. *Ch. Patersonii* (Mihi).

Ch. Rostro brevi apice rotundato, superne excavato. Orbe margine externo ciliato. Carapace regione gastricâ medianâ tridentato subcarinatâ, regione gastricâ laterali lineis dentibus minutis, regione branchialâ unidentatâ. Abdominis somite quinto sculpto; somite sexto obsoletè bicarinato. Telson sulcato. Chelipedûm pare secundo dimidio parûm primi vel tertii æquante. Syn. (*Crangon Pattersonii* mihi olim). Ad "Belfast," Hib. et ad "Shetland," Mag. Brit.

4. *Cheraphilus spinosus* (Leach sp.).

Ch. Rostro, satis longo, tenui, apice acuto superne basin sulcato, orbe profundo. Carapace regione gastricâ quinque dentium seriebus longitudinaliter armatâ, regione branchiale serie dentium. Abdominis somitibus tertio, quartoque carinato. Somite quinto sculpto. Somite sexto, obsolète bicarinato, sulcato. Telson sulcato. Chelipedûm pare secundo, dimidio primi aut secundi æquante. Syn. *Pontophilus spinosus* (Leach); *Cr. spinosus* (Bell); *Crangon cataphractus* (Milne Edwards, in part:); *Ægeon loricatus* (Guerin). In profundis marium Hiberniæ et Magnæ Britanniæ.

Genus III.

Ægeon Risso (Crangon, Bell, Milne Edwards). Carapax percarinatus, rostrum truncatum aut bifidum. Abdominis somites dentati, sculpti, carinatique, telson sæpius suprasulcatum. Chelipedûm par secundum quam tertio aut primo brevius. Species, Æg. fasciatus, sculptus, *carinicauda*, *cataphractus*.

1. *Ægeon fasciatus* (Risso sp.).

Æg. Rostro satis longo, apice truncato, sulcato. Orbe sparse ciliato margine externâ. Carapacis regionibus, gastricâ medianâ dente armatâ, gastricis lateralibus sculptis, regionibus branchialibus unidentatis, abdominis somitibus lævibus. Telson sulcato. Chelipedum pare secundo, primo tertiove brevioribus. Syn. *Crangon fasciatus* (Risso, Bell, M. Edwards). Littoris Hiberniæ et Magnæ Britanniæ.

2. *Ægeon sculptus* (Bell sp.).

Æg. Rostro satis longo, apice bifido, profundè sulcato. Orbibus dense ciliatis. Carapace, quinquedentato carinato. Abdominis somitibus sculptis, tertio ad quintum etiam carinatis, sexto etiam bicarinato-sulcato. Telson profunde sulcato. Chelipedum pare secundo quam tertio, multo breviori. Syn. *Crangon sculptus* (Bell). Littoris Hiberniæ et Magnæ Britanniæ.

Genus IV.

Nectocrangon (Brandt.). Nondum in maribus Britannicis inventus. Syn. Argis (Kroyer) Crangon, (Owen). sp. *Nect. Lar.*

Homologies of Crangonidæ.—Plate III.

General References.—1, 2, &c., refer to the somites and their appendages, the ocular ring being counted the first; the coxæ are represented as attached to the somites. *cx*, coxa; *b*, basis; *i*, ischium; *m*, meros; *c*, carpus; *p*, propodos; *d*, dactylos; *g*, gastric region; *cd*, cardiac do.; *h*, hepatic do.; *br*, branchial do.; *f*, frontal do.; A, Abdomen; Kθ, Cephalothorax and it appendages; Md 4, lateral view of carapace; 1, first, or ocular segment; 3, olfactory antennal do.; 2, auditory antenna; 4, mandible; *md'''*, back view of carapace; Q, somites of mouth organs and their appendages; R, do. of ambulation; 10, 11, 12, first, second, and third chelipeds; those of 13–15 resemble 12; I, outline rostrum, C. vulgaris.—II. Ch. spinosus.—III. Ch. bispinosus.—IV. Æ. fasciatus.—V. Æ. sculptus.—VI. Ch. cataphractus.

Family—CRANGONIDÆ.

Carapace depressed; rostrum short, not articulated; eyes not concealed beneath carapace; external antennæ unifilamentous, furnished with a broad scale at their base; internal antennæ dilated at base, peduncle short, bifilamentous; external maxillipeds subpediform, flattened. Chelipeds, five pairs; first pair subcheliform, second didactyle; third to fifth pairs simple, acuminate. Branchiæ, seven on each side; antennæ inserted nearly on same line. Genera: Crangon, Cheraphilus, Ægeon.

Genus I.—Crangon.

Rostrum triangular, shorter than the eyes. Carapace: median gastric region armed with a single spiny tooth at most; branchial regions with a single tooth, not ridged; antennæ as *family*; abdomen smooth above; telson triangular, smooth above; orbits circular, sparsely pubescent: first pair chelipeds well developed; second pair as long as fifth; antennal scale large. British Species: Cr. vulgaris.

In addition, as minor characters, the following are nearly general:—Antennæ long—more than twice length of peduncle of antennæ. Second pair of chelipeds as long as third, which are moderately stout.

Species I.

Grey Shrimp.—Plate IV.

Crangon vulgaris. (Fabricius, not Owen or Dana.)

Astacus Crangon. Herbst. II., p. 57, t. xxix., fig. 3, 4; Penn. Brit. Zool., IV, t. xv., fig. 30; Müller, Zool. Dan., pl. civ., fig. 4–10.

Crangon vulgaris. Fabric., sup., 410; Lat. Crust., vi., p. 267, t. lv., f. 1, 2; Leach, Mal. Brit., t. xxxvii. B.; M. Edw. Crust., II., 341; Bell, Brit. Crust., p. 256, f.; White, Pop. Brit. Crust., p. 107, pl. viii., fig. 2; Guerin, Icon. R. A., t. 20, fig. 4. Kin.; Trans. Royal Irish Academy, vol. xxiv. p. 61.

Crangon septemspinosa. Say, Journal, Ac. Sc. Philadelph., I. 246; De Kay, Zool. New York, VI., p. 25, t. 8, f. 24.

Crangon vulgaris of Dana and of Owen is not this species, but Crangon nigricauda of Stimpson: it is found on the south and west coasts of America.

Rostrum (*r*), *very short, narrow, slightly rounded at apex, concave above; ocular notch, and sides of rostrum ciliated; carapace armed with one median gastric and two branchial teeth* (*one on each side*); *abdomen smooth, narrowed; telson triangular, smooth; second pair of chelipeds as long as the first or third;* 9, *external footjaw.*

Distribution:—Great Britain, all round the coast on sandy bottoms. Ireland, generally distributed. Europe, North seas, Mediterranean. America, North-east coast, Florida.

Subgenus Steiracrangon (Mihi), (*στειρα κραγον*).

Abdominal somites carinated, telson sulcated. British Species, St. Allmanni.

Species I.

Channelled-tailed Shrimp.—Plate IV.

Crangon (Steiracrangon) Allmanni (Mihi).

Cr. Allmanni. Kin., Proc. Nat. Hist. Soc., Dublin, vol. ii. Trans. R. I. A., vol. xxiv. p. 64, &c.; A. White Pop. Hist. Brit. Crust., 334.

Rostrum (*d*), *short, narrow; apex slightly rounded, hollowed above; ocular notch ciliated all round; carapace as* Cr. vulgaris; *sixth somite of abdomen bicarinated, sulcate; telson hollowed, triangular; other somites of abdomen smooth; second pair of chelipeds slender, equalling in length the first and the third pairs.*

a, 20th and 21st somites, with posterior pleopods; *b*, termination of telson; *c*, first cheliped. The spine on meros is not represented in the figure.

Distribution.—Great Britain, Shetland, Rev. A. M. Norman. Ireland, North-eastern coast, Belfast; East coast, Dublin.

Genus II.—Cheraphilus (Mihi), χερας φιλος.

(Pontophilus of Leach, abandoned by that author, and the name subsequently applied to genera of the Pandalidæ, by Risso and De Haan.)

Rostrum triangular, moderate; carapace carinate; gastric region armed with one or more carinæ; branchial region multicarinated; abdominal somites carinated and sculptured; telson sulcated above; first pair chelipeds robust, moderate in length; second shorter than first: antennæ as family; antennal scale short. British Species: Ch. bispinosus, trispinosus, Pattersonii, spinosus.

In addition may be noted, accessory scale of antennæ moderate, not twice length of peduncle of antennæ; second pair of chelipeds much shorter than third.

Species I.

Two-spined Shrimp.—Plate V.

Cheraphilus bispinosus (Westwood Sp.)

Pontophilus bispinosus. Westwood, Hailst., Mag. Nat. Hist., viii., p. 11, 13, f. 30.

Crangon bispinosus. Bell, Brit. Crust., p. 268; A. White, Pop. Hist. Brit. Crust., 111. Kin. Trans. R. I. A. vol. xxiv. p. 66.

Rostrum (*r*), *short, rounded at apex, somewhat narrowed, hollowed above; ocular notch broad, ciliated on outer edge only; carapace rounded above; median gastric region bidentate, the teeth connected by an obsoletely-notched carina; lateral gastric and branchial regions furnished with rows of small knobs; fifth and sixth abdominal somites bicarinated; telson elongate, hollowed above*; *second pair of chelipeds* (11) *half length of third.*

9, External maxilliped, terminal articulations; 10, First cheliped, with enlarged view of hairs on carpus. Figure four times size of life.

Distribution.—Great Britain, South coast, Hastings. Ireland, East Coast, Dublin; West Coast, Isles of Arran, Galway.

Species II.

Three-spined Shrimp.—Plate VI.

Cheraphilus trispinosus (Hailstone Sp.)

Pontophilus trispinosus. Hails., Mag. Nat. Hist., viii. p. 261, fig 25.
Crangon trispinosus. Bell, Brit. Crust., 265; A. White, Brit. Pop. Crust., 110; Kin. Proceed. Nat. Hist. Soc. Dub., vol. ii. Trans. R. I. A. vol. xxiv. p. 69.

Rostrum (*r*) *very short, moderately broad, rounded at the apex, hollowed above; ocular notch broad, shallow, sparingly ciliated at its base; carapace rounded above, armed with one median and two lateral gastric teeth, which are continuous with an obsolete raised ridge; branchial regions smooth; sixth abdominal somite obsoletely carinated; telson hollowed; remaining*

somites smooth; second pair of chelipeds slender, much shorter than first or third.

Figure four times life size.

Distribution.—Great Britain, South coast, Hastings; Weymouth. Ireland, East coast, Skerries, Dublin.

Species III.

Smooth-tailed Spinous Shrimp.—Plate VII.

Cheraphilus Pattersonii (Kin.)

Crangon Pattersonii. Kinahan, Proceedings Dubl. Nat. Hist. Soc., vol. ii., p. 130. Trans. R. I. A. vol xxiv. p. 71.

Rostrum (r) short, rounded at apex, narrowed, concave above; ocular notch narrowed, ciliated on outer border only; carapace rounded above; median gastric region with a row of three principal teeth, connected by an obsolete carina; lateral gastric with rows of minute teeth terminating in one principal tooth; one tooth on each branchial region: fifth abdominal somite sculptured; sixth obsoletely bicarinate; telson (t), sulcate, elongate; second pair chelipeds half length of first or of third,

Figure four times size of life.

Distribution:—Great Britain, North Coast, Shetland, Rev. A. M. Norman, *q, v.* Ireland, North-east coast, Belfast.

Species IV.

Spined Shrimp.—Plate VIII.

Cheraphilus spinosus (Leach Sp.).

Crangon spinosus. Leach, Linn. Trans., xi., p. 346; Lam. Hist. Nat. Ms. An. S. Vert. v., p. 202; Bell, Brit. Crust., p. 261; A. White, 108; Thompson, Nat. Hist. Ireland, v. iv., p. 392; Kin. Trans. R. I. A. vol. xxiv. p. 73.

Pontophilus. Leach, Mal. Brit., t. xxxvii. A.

Crangon cataphractus. M. Edwardes, Hist. de Crust., ii., p, 243 (excluding description of female, which refers to Ægeon cataphractus of present list, and Risso and Olivi, Cuv. R. A. (Croch.) t. 51, f. 3.)

Ægeon loricatus. Guerin, Exped. Morée, p. 33.

Rostrum (r) moderately long, narrow, and pointed, concave at the base; ocular notch narrow, deep, ciliated all round: carapace contracted, rounded above, armed with five longitudinal rows of teeth on the gastric region, and one on each branchial region; third and fourth abdominal somites carinated; fifth somite sculptured; sixth obsoletely bicarinate, sulcate; telson sulcate, elongate; second pair of chelipeds half length of first or of third.

10, First pair of chelipeds; 9, external footjaw.

Distribution.—Great Britain, reported from all the coasts, but this and former species are confounded by authors. Ireland, North-east coast, Belfast; South coast, Cork (?); West coast, Galway (?).

Genus III.—Ægeon (Risso).

Rostrum truncate, or bifid. Carapace: branchial and gastric regions highly carinate; abdominal somites toothed, carinated, and sculptured; telson generally sulcate; first pair chelipeds moderate, barely surpassing second in length; second pair slender; orbits rounded, densely hairy; antennæ as family; antennal scale short. British Species: Æg. fasciatus, sculptus.

In addition, the following are pretty general:—Antennal scale not twice as long as peduncle of antennæ; second pair of chelipeds stout, but much shorter than first or third.

Species I.

Banded Shrimp.—Plate IX.

Ægeon fasciatus (Risso Sp.).

Crangon fasciatus. Risso Crust. de Nice, t. iii., f. 5 (bad), p. 82; Hist. Eur. Mer. v., p. 64; M. Ed., Crust., ii., p. 342; Bell, Brit. Crust., p. 259; A. White, Pop. Hist. Brit. Crust., 187; Lucas, Exped. Alg., 38; W. Thomps., Nat. Hist. Ireland, iv., p. 390; Kin. Trans. R. I. A., vol. xxiv., p. 76.

Rostrum (r) moderate, broadly truncate at apex, deeply longitudinally sulcate; ocular notch broad, shallow, smooth, or very sparingly ciliate on outer edge only; median gastric region armed with a tooth; lateral gastric sculptured; branchial region with a short tooth; abdominal segments smooth; telson triangular, sulcate; second pair of chelipeds shorter than first or third.

10, First pair chelipeds. Figure twice and a half life size.

Distribution.—Great Britain, South coast. Ireland, North-eastern coast, Belfast; East coast, Dublin; West coast, Galway. Extra-Brittanic, Mediterranean.

Species II.

Sculptured Shrimp.—Plate IX.

Ægeon Sculptus (Bell Sp.)

Crangon sculptus. Bell. Brit. Crust., 263; A. White, Pop. Brit. Crust., 109: Kin. Trans. R. I. A., Vol. xxiv., p. 78.

Rostrum (r), moderate, bifid at apex, deeply concave above; ocular notch moderate, densely ciliated all round; carapace armed with five principal toothed carinæ; abdomen highly sculptured; third to fifth somites

carinate; sixth bicarinate, sulcate; telson triangular, deeply triangularly sulcate above; second pair of chelipeds (11), *much shorter than third.*

(9, external foot-jaw; 10, dactylos and propodos of first cheliped. Figure twice life size).

Distribution.—Great Britain, Eastern coast, Moray Frith; Southern coast; Western do. Ireland, North-east coast, Belfast; East coast, Dublin; Western coast, Galway.

Genus IV.—*Nectocrangon*, not British.

Part II.—GALATHEIDÆ.

Family—Galatheidæ.

Carapax depressus, rostratus. Antennæ exappendiculatæ, Antennæ internæ duobus filamentis, infra oculos insitæ. Antennæ externæ satis longum uno filamento. Chelipedum, par primum didactylum, paria, secundum ad quartum simplicia, acuminata, par quintum debile, didactylum. Maxillipedes externæ sulipediformes.

Abdomen depressus, somites, anteriores primus ad sextus in maribus appendiculati; in fœminis secundus ad sextus solum appendiculati.

Somitis, ultimus submembranaceus, sine appendice.

Genera, *Grimothea*, Galathea, Munida.

Genus I.—*Grimothea* (nondum in Britannicis maribus inventus).

Species—*Gr. Gregaria.*

Genus II.—Galathea.

Rostrum depressum, satis latum lateribus sæpius dentatis, Chelipedûm par primum satis latum, non elongatum; maxillepedes externi subpediformes elongati, angustique. Species:—Gal. squamifera, Andrewsii dispersa, nexa, strigosa, *cum multis aliis.*

1. *Galathea squamifera* (Fabricius).

G. Rostro brevi, tuberculis squamosis ciliatis superne velato, mediane sulcato; dente cylindrico terminante, marginibus fortiter denticulatis; chelipedûm pare primo lato, denticulatis tuberculis conferto; articulis, secundo, tertio, quartoque, externe fortiter denticulatis; maxillipedibus externis, cum ischio (articulo tertio) quam meros (articulo quarto) breviori. In littoris Magnæ Britanniæ et Hiberniæ.

2. *Galathea Andrewsii* (Kinahan).

G. Rostro brevi, squamosis tuberculis pilosis parce velato; chelipedûm pare primo (pedum par primum) elongato, rotundato, angusto, parce squamosè tuberculato, tuberculis sæpissime denticulatis; cheli-

pedûm paribus, 2do, tertioque externe dentatis, interne squamulatis maxillipedibus externis, cum ischio (articulo tertio), quam meros (articulo quarto) breviori. In littoris Magnæ Britanniæ et Hiberniæ passim.

3. *Galathea dispersa* (Spence Bate).

G. Rostro brevi, superne subplano, squamato, alteris ut *G. squamifera;* chelipedûm pare primo elongato, sub compresso, squamato, propodos parce dentato, carpo, et meros parce fortiter interne dentato; maxillipedibus externis cum meros quam ischio breviori. In littoris Magnæ Britanniæ. In littoris Hiberniæ ad "Belfast" et "Dublin."

4. *Galathea nexa* (Embleton).

G. Rostro brevi, superne lævi, subpiloso, mediane sulcato; dente cylindrico terminante, dimidio posteriori longitudinis suæ serrato; alteris, ut *Gal. squamifera;* chelipedûm pare primo globoso, satis lato, elongato, articulo sexto (propodos) externe dentato, supra parce tuberculato, villoso, articulis quinto, quartoque fortiter superne dentato; maxillipedibus externis cum meros (articulo quarto) quam ischio (articulo tertio), multo breviori. In littoris Magnæ Britanniæ. In littoris Hiberniæ ad "Belfast," "Dublin," et "Cork."

5. *Galathea strigosa* (Linnæus Sp.).

G. Rostro brevi, tuberculis squamosis pilosis superne consperso, mediane sulcato, deflexo; dente cylindrico terminante, marginibus fortiter dentatis; chelipedûm pare primo lato, fortiter omnino dentato; maxillipedibus externis cum ischio (articulo tertio), meros (articulo quarto), longitudinem æquante. Passim maribus Britannicis.

Genus III.—Munida (Leach).

Rostrum cylindricum acuminatum, angustum, tricuspe. Chelipedûm par primum elongatum, angustum; maxillipedes externes et cætera ut *Galathea.* Species—Mun. Bamfica, *subrugosa, Japonica.*

1. Munida Bamfica (Penn sp.). Chelipedûm pare primo, bis longitudinem corporis: somitibus abdominis secundo, tertioque, antero dentatis; primo, quarto, quinto, sextoque inermibus. Syn. *Galathea rugosa, Munida Rondeletii.*

Homologies of Galatheidæ.—Plate X.

General References.—*cx*, coxa; *b*, basis; *i*, ischium; *m*, meros; *c*, carpus; *p*, propodos; *d*, dactylos; *x*, accessory appendage; *z*, respiratory plate.

K*θ*, lower view of carapace, &c.; 1, ocular somite; 2, auditory antennal; 3, olfactory do.; 4, mandibular do, frontal portion; 6 ?, probably second maxillary.

1, eye and scale.
2, auditory antennæ (internal).
3, olfactory antennæ (external).
4, mandible.
5, first maxilla, with enlarged view of cutting edge.
6, second maxilla.
7, third maxilla.
8, internal maxilliped.
9, external maxilliped.
10, first cheliped.
11–13, second to fourth do.
14, fifth pair of chelipeds.
15, first pleopod, male.
16, second do. do.
17–19, third and fourth do.; the corresponding numerals on the right-hand side of the plate show the same limbs in the female. In 17–19, *c* has been inserted for *m*.
20, posterior pleopod.
md 4, carapace upper view; regions, *f*, frontal; *g*, gastric; *hh*, hepatic; *ca*, cardiac.

The figure below this shows the fifteenth to twenty-first somites, with attached coxa (*cx*).

Genus III.—Galathea.

Anterior chelipeds strong, equal, didactyle.
External maxillipeds elongate, subpediform; terminal joints narrow; carapace depressed, beaked.
Abdomen depressed; no spines on somites; six anterior abdominal somites appendiculate in male; appendages of first somite wanting in female.
Telson unappendiculate, submembranaceous.
Antennæ unappendiculate; external long; internal inserted beneath eye-stalks; peduncle elongate.
Eyes large, with a hairy scale (?).
Rostrum depressed, moderately broad.

Species I.

Scaly Spanish Lobster.—Plate XI.

Galathea squamifera (Leach).

Galathea squamifera. Leach, Mal. Pod. Brit., t. xxviii., A, excluding Fig. 2.
Cancer astacus squamifer. Montagu.

Gal. squamifera. Leach, Edinburgh Encyclopedia, vii., p. 393; Dictionnare des Sciences Naturelles, xviii., p. 51; M. Edwardes, Histoire Naturelles des Crustacès, ii., p. 275; Couch. Cornish Fauna, p. 77; Thompson, Natural History of Ireland, vol. iv., p. 385; Bell, British Crustacea, p. 197; White, Popular History British Crustacea, p. 87; Kinahan, Proceedings Natural History, Dublin, vol. ii., pp. 68, &c.; Report British Association, 1859; Proceedings Dublin University and Zoological Association, vol, i., p. 270; Zoologist, 3rd Series, 5775; Trans. R. I. A., vol. xxiv., p. 90.

(?) *Gal. glabra.* Risso, Crust. de Nice, 72; H. N. de l'Eur. Mer., v. 47.

Rostrum (r) short, covered with squamiform tubercles above, tubercles ciliated along margins; deeply depressed in median line, terminating in a cylindrical pointed tooth; four pointed teeth on lateral margins on each side, the posterior one much smaller than the others; first pair chelipeds broad, flattened, covered with squamiform dentated tubercles; dactylos moderate, not twisted; sides of propodos curved, outer margin toothed, two succeeding joints strongly toothed on outer edge; ischium (third joint) of external maxillipeds shorter than meros (fourth joint).

ra, rostrum, Galathea Andrewsii; 1, eye and scale; 1*a,* do. do., Galathea Andrewsii; 10″, sculptured frontal region, Galathea squamifera; 9*a,* external maxillipeds, Galathea Andrewsii; 14, fifth cheliped, Galathea squamifera.

The unnumbered figure represents the external maxilliped of Galathea squamifera.

Distribution.—Great Britain, North, Frith of Forth; Southern coast, general. Ireland, all round coasts. Europe, &c., France, Mediterranean, Nice.

Species II.

Slender-armed Spanish Lobster.—Plate XII. and Plate XI. figs. 1*a, ra,* and 9*a.*

Galathea Andrewsii (Kinahan).

Galathea Andrewsii. Kin., Proceedings Nat. Hist. Society, Dublin, vol. ii., p. 58, pl. xvi., fig. 8, and fig., p. 71; *ib.*, p. 47, as nexa, &c.; Zoologist, 3rd series, p. 5775, &c.; Trans. R. I. A., vol. xxiv., page 95; Stimpson, Prod., p. 76; Spence Bate, Proceedings Linn. Soc., vol. iii., p. 104.

Galathea squamifera. Leach (in part Junr.), Mal. Pod. Brit., p. xxvii., fig. 2.

Rostrum moderate, sparingly covered with elongated, squamiform tubercles above, depressed in the centre, terminating in a flat, pointed tooth, armed with four flattened teeth on each side, the last two of which are separated from the others. First pair of chelipeds elongate, narrowed, covered with a few squamiform tubercles, terminating in a few scattered

hairs, or ciliated. Sides of propodos sparingly dentate. Two succeeding pairs of chelipeds strongly dentate on outer margin and upper surface. Ischium of external maxillipeds shorter than meros.

Distribution.—Great Britain, North, Moray; South, Plymouth. Ireland, general. Extra-Britannic, Madeira, Algiers.

Species III.

Scaly-armed Spanish Lobster.—Plate XIII.

Galathea dispersa (Spence Bate).

Galathea dispersa. Spence Bate, Proceedings Linnæan Society, London, vol. iii., p. 3; Kinahan, Proceedings British Association, Report on Dublin Bay Dredging, 1860; Proc. Nat. Hist. Soc., Dublin, vol. iii., p. 49; Trans. Roy. Irish Ac., vol. xxiv., p. 99.

Rostrum (r) moderate, nearly plane above, squamate, terminating as a flattened tooth, and bearing four flattened teeth on each side. First pair of chelipeds elongate, somewhat flattened; dactylos narrowed; sides of propodos nearly parallel, minutely toothed on outer margin, squamate; two succeeding articulations sparingly strongly toothed on inner margin; internal antennæ barely surpassing tip of rostrum; ischium of external foot-jaws (9), *nearly double length of meros of same limb.*

1, eye; 10″, sculpture.

Distribution.—Great Britain, South coast. Ireland, northern coast, Belfast; Eastern coast, Dublin.

Species IV.

Smooth-beaked Spanish Lobster.—Plate XIV.

Galathea nexa (Embleton).

Galathea nexa. Embleton, Proceedings Berwickshire Club; Thompson, Annals of Natural History, p. 255; Natural History of Ireland, vol. iv., p. 385; Bell. Brit. Stalk-eyed Crust., 204; White, Pop. Hist. Brit. Crust., p. 88; Kinahan, Proceed. Nat. Hist. Soc., Dublin, vol. ii,, excluding p. 47, which refers to G. Andrewsii; Trans. Roy. Ir. Ac., vol. xxiv., p. 102; Spence Bate, Proceed. Linn. Soc., vol. iii., p. 3.

Rostrum (r), moderate, quite smooth above, covered with scattered hairs, depressed in the median line, terminating in a cylindrical tooth, which is serrated on its edge for its posterior half; borders of rostrum armed with two principal rounded teeth, and two secondary and smaller; first pair of chelipeds somewhat globose, moderately broad, elongate, twisted; sides of propodos parallel, toothed on outer margin, surface sparingly tuberculated, hairy; two succeeding joints strongly toothed on upper surface; internal antennæ surpassing rostrum; ischium ef external foot-jaw nearly double length of meros.

(9), external footjaw; (1), eye and scale; 10″, sculpture.

Distribution.—Great Britain, Northern coast, Eastern and Southern coasts. Ireland, Northern coast, Belfast; Eastern coast, Dublin; Southern coast, Cork.

Species V.

Spiny Spanish Lobster.—Plate XV.

Galathea Strigosa (Fabricius Sp.).

Cancer strigosus. Linnæus, Systema Naturæ, 1053; Herbst. ii., p. 50, t. xxvi.

Astacus strigosus. Pennant, British Zoology, iv., p. 24, t. xv.

Galathea strigosa. Fabr., Suppl. 414; Latreille, Genera Crustacès et Insectes, p. 49; Leach, Edin. Encycl., vii., p. 398; Edw. N. H. Crust., ii., p. 273; Bell, Brit. Crust., p. 200; White, Pop. Hist. Brit. Crust.; Kin., *loc. cit.*; Spence Bate; Couch; and most British authors.

Galathea spinifera. Leach, Mal. Pod. Brit. xxviii.

Rostrum (*r*), *short, deflected, clothed above with a few scattered hairy squamiform tubercles; depressed in median line, terminating in a cylindrical pointed tooth, its sides armed with three pointed teeth, and one minute tooth over inner border of orbit; first pair of chelipeds broad, all the articulations very spinous on their borders and superior surfaces; dactylos short; propodos clothed with squamiform tubercles, scattered among the toothed tubercles; meros of external maxillipeds* (9), *longer than ischium.*

(11), eye and scale; (10″), sculpture.

Distribution.—Great Britain, North, Moray Frith; South coast. Ireland, general. Extra-Britannic, Mediterranean.

The President made a communication on the arrangement of earthen raths,—commonly, though erroneously, known as Danish forts,—over the surface of Ireland; his observations having a special reference to the county of Kerry, and being illustrated by a map constructed on the one-inch Ordnance Survey, with the lines of collineation laid down according to the disposition of the forts.

The President signified his intention of making a further communication on the subject, illustrated by a map of the entire county of Kerry; and expressed a hope, that, as he would be unable to deal in like manner with the whole of Ireland, other members of the Academy would pursue the inquiry, and construct similar maps of other counties.

The Academy then adjourned.

MONDAY, FEBRUARY 10, 1862.

The Very Rev. Charles Graves, D. D., President, in the Chair.

It was Resolved,—That the Address of Condolence to her Majesty the Queen, adopted by the Academy on the 13th of January last, together with the following letter from Lieutenant-General Sir Thomas A. Larcom, be printed in the Proceedings:—

"*Dublin Castle, February* 3, 1862.

"Sir,—I am directed by the Lord Lieutenant to acquaint you, for the information of the members of the Royal Irish Academy, that a communication has been received from Secretary Sir George Grey, stating that their loyal and dutiful Address on the occasion of the death of His Royal Highness the Prince Consort has been laid before the Queen, and that Her Majesty was pleased to receive the Address very graciously.

"I am, Sir, your obedient servant,

"Thomas A. Larcom.

"*The Secretary to the Royal Irish Academy,*
"19, *Dawson-street.*"

"*To the Queen's Most Excellent Majesty.*

"We, your Majesty's dutiful and loyal subjects, the President and Members of the Royal Irish Academy, humbly approach your Majesty with the assurance of our devoted attachment to your throne and person; and desire to express our heartfelt sympathy in the grievous and sudden affliction which has befallen your Majesty, in the untimely death of His Royal Highness your Majesty's Consort.

"In common with all classes of your Majesty's subjects, we lament the irreparable loss which the nation has sustained in the decease of a Prince whose wisdom and energy have been, for the last twenty-years, directed to the promotion of every object conducive to the best interests of your people.

"But, associated as we are for the purpose of cultivating Literature and Science in Ireland, we have a special reason to deplore the death of one whose rare talent, extensive information, and mature judgment, were constantly employed in furthering the pursuits which learned societies are designed to foster.

"The Royal Irish Academy cannot forget that His Royal Highness was once pleased to honour it with a visit, and to express the satisfaction with which he regarded the growth of its collections, and the enlargement of its means of usefulness.

"We earnestly pray that your Majesty may be sustained by Divine comfort in this season of bitter trial; and that you may be spared through many years, to behold the abundant fruits of your late Consort's beneficient labours and to see the instructive example of his virtues redounding to the honour and prosperity of your great empire."

W. R. Wilde, Esq., V. P., read the following paper :—

On Antique Gold Ornaments found in Ireland prior to the Year 1747.

The learned antiquary and oriental traveller Richard Pococke, Bishop of Ossory in 1756, and afterwards of Meath in 1765, was the first, so far as I can learn, to make a collection of Irish antiquities. After his death in September, 1765, the majority of the articles from his museum came into the possession of the Rev. Mervyn Archdall, rector of Slane, his lordships' chaplain, and author of the "Monasticon Hibernicon;" and many of them were delineated for the Right Hon. W. Conyngham's projected atlas of Irish antiquities, by Gabriel Beranger. Several of these articles were engraved and published by General Vallancey, in his "Collectanea." The principal gold antiquities in the bishop's collection were sold in London after his death.

In 1757, his lordship communicated "an account of some antiquities found in Ireland" to the London Society of Antiquaries; and in 1773 it was published in the second volume of the "Archæologia," together with plates of twelve of these articles. In that paper, the bishop alludes to a communication made some years previously by "the late Mr. Simon of Dublin," which, it would appear, had not been printed, the Society of Antiquaries not having then issued any publication.

James Simon, a merchant of this city, is well known by his essay on Irish coins, which issued from the press in 1749, and which was not only the first systematic work on that subject in point of time, but is acknowledged to be one of the ablest contributions to numismatic science which had then appeared in the English language. In 1747, he communicated to the London Society of Antiquaries the account of Irish golden antiquities, to which Bishop Pococke alludes, in his article in the "Archæologia," and that paper, together with the drawings which accompanied it, having been recently discovered in their archives, I have obtained permission from that learned body to lay it before the Academy. It possesses considerable interest, not only from the circumstance of its having been the production of a distinguished Irish antiquary, but on account of its being, so far as we know, the first record of gold ornaments found in Ireland, and also because several of the articles specified therein belong to varieties of which there are now no examples known to exist.

The following communication has been carefully transcribed for me, by Mr. C. K. Watson, Secretary to the Society of Antiquaries. The accompanying woodcuts will assist to explain the author's meaning. The articles are reduced from the tracings upon Mr. Simon's paper.

"Our Vice-President Folkes communicated to the Society a letter to him, dated from Dublin, 26. May, 1747, with the draught of several pieces of antiquities :—

"'Hon^{D} Sir,—I had the honour to write to you lately, when I sent you impressions of some very curious Irish coins of Sitricus, Ethelred, and Edward the Fourth, which I hope came safe to your hands.

"'I herewith send you some rough drafts of several peices of Irish antiquities. I could not keep them long enough to employ a proper person to draw them, therefore was obliged to do it myself as best I could; yet I hope they will convey an idea of what they are intended to represent.

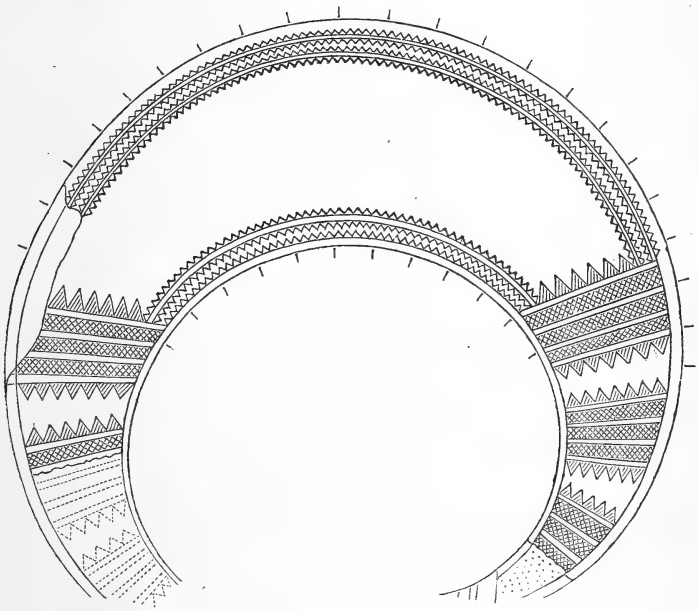

Fig. 1.

"'No. 1 is the draft of a very thin plate of gold in the possession of his Excellency my Lord Chancellour: his Lordship thinks that it was a breastplate, and told me that some of our Irish historians mention that a king of Ireland ordered his nobles to wear a gold breastplate, to distinguish them from the common people.* As his Lordship could not remember who the author is, I cannot give you the quotation; but my

* See Keating's "History of Ireland," p. 132. He says "that Mainheamhoin, Monarch of Ireland, ordained that the gentlemen of Ireland should wear a chain about their necks, to distinguish them from the populace; he also commanded helmets to be made, with the neck and forepieces of gold. These he designed as a reward for his soldiers, and bestowed them upon the most deserving of his army. His son Alderogdh was the first prince who introduced the wearing of gold rings in Ireland, which he bestowed upon persons of merit, that exercised in the knowledge of the arts and sciences, or were any other way particularly accomplished.—W. Norris, Sec., 1756."

humble opinion is that this plate was part of a crown of some of the Irish kings, and that two such plates twined together, the one before, the other behind, made the whole crown. These plates, I apprehend, were folded or plated as women's head-clothes now are, and formed those kind of rays seen on the heads of Irish coins, as you may observe on those of Sithricus and Ethelred; and that they were so plated appears from the creases of the folds still to be seen, where marked by outward strokes ı ı ı on the draft. This plate is broke at the places marked *a*, *b*, *c*, which I have supplied to represent it as I suppose it was when intire. It might perhaps have been the ornament worn by Irish queens on their head instead of a diadem, and called Asion or Asn, from the Irish ass'ain (plates). See 'Ware's Antiqu. per Harris,' plate 65. This plate weighs one ounce four pennyweight, and was found in the county of Clare."

[This lunula was creased or plaited when it came under the notice of Mr. Simon; but, as subsequent experience has shown, such plaitings did not form part of the original design. Had it been plaited, as Mr. Simon imagined, it could not have fitted either on the neck or head, and the ornamentation would have been useless. This article is not now in the possession of the Jocelyn family, the descendants of Lord Chancellor Newport. It is no longer known to exist.]

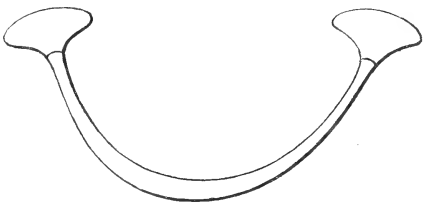

Fig. 4.

"'Nos. 2, 4, 5, 6, and 10, are instruments of gold of different shapes, though probably for the same use, and the more curious as it

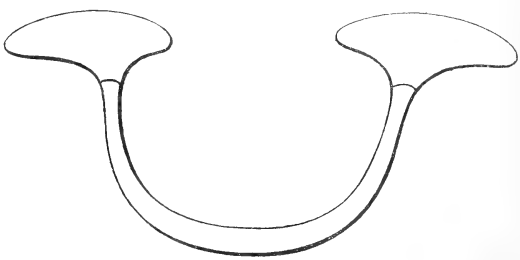

Fig. 6.

doth not appear that the cups at each end were soldered, but rather that the whole was made of a solid piece of gold, and very neatly done for such a barbarous age."

Figure 2, a large wide-spread fibula, with engraved handle, is manifestly that represented by Pocoke's Fig. 1, in the "Archæologia," pl. 3, and is therefore here omitted; it weighed 15 oz. Fig. 3 is the small fibula, No. 2, pl. 3, in the same article.

"'Nos. 3 and 5 were found in the county of Galway; 4, 6, and 10, on the borders between the counties of Louth and Meath, in digging some reclaimed grounds, which were formerly boggs. No. 2, the largest of this kind I ever saw, is composed of two oblong cups or calixes, one of each side; the outside of the cup being narrower than the inside, as you see at the little draft *b*. The cups are hollow as far as *a*, the rest is solid gold: at *c* it divides into three branches, which meet and joyn at *d*, as you see at No. 3. This instrument, No. 2, weighed 15 ounces. No. 5, found with it, weight [*sic*] but one ounce 4 pennyw^{t}: the ends, instead of being hollow like the other, are flat and oval. The others Nos. 4, 6, 10, have their cups hollow to the bottom *a*, *a*, *a*, *a*, *a*, *a*, the handles or rings being plain. What uses these instruments were applied to nobody can inform me. I believe they were used in the religious ceremonies of the Irish Druids or other heathen priests, for I cannot think they were used as ornaments. The places where they were found, in grounds that were formerly bogs, and which before the rain and waters had subsided there, were probably valleys, seem to point out that they were used by the Druids or pagan priests; many of the ancient altars or cromlech stones that have been discovered in this kingdom being in valleys, near some rivulet, as well as on high ground. I should be glad to have your opinions concerning these peices of antiquity. No. 4 I bought last week for my Lord Chancelour, the others were melted since.

Fig. 7.

"'No. 7 is an Irish Sgian, or knife, the Seva or Secespita, I think, used by the priests to kill the victims. It is of brass, and was found about two years agoe at Dungan hill, in the county of Meath; the blade at the broadest part is an inch $\frac{6}{10}$ over, and one foot $7\frac{1}{10}$ inches long: when found it was about $\frac{2}{3}$ of an inch longer, but was broken for a tryal, on suspition of its being gold. The present handle, *a*, is not the original one, which was destroyed by time. No. 8 was lately sent me from the county of Wicklow as a great curiosity—a small patera of brass, but I fear it is nothing else but a old spoon, altho it has not quite the shape of it. No 9 was sent me from the county of Clare; is of brass, was formerly gilt, and is very curiously enamelled; where the black figures are is a little white ground of enamel, and the little chequered squares are of blew and white mosaic work of enamel. It is hollow, and I suppose was the handle of an Irish Astas or spear. You'l be pleased to observe that all the drafts except the knife are ex-

Fig. 9.

actly of the bigness of the originals. If any of them are new to you, and are worth your notice, it will give me much pleasure. . . yr^{s} &c.,

(Signed) "'James Simon.

"'P. S.—No. 1 was found in the lands of Mr. James Commins, about 4 foot deep, in making a ditch near a place called Key's hole, in the west part of the county of Clare.

"'I have drawn these, that the Society may have a conception of them, over leafe.'"

The Rev. Samuel Haughton read the following paper:—

On the Dynamical Coefficients of Elasticity of Steel, Iron, Brass, Oak, and Teak.

All works on mechanics, with which I am acquainted, in solving the problem of the collision of bodies, assume that the momentum is preserved during the shock, and the *vis viva* lost, in such manner as to retain the constancy of the Coefficient of Elasticity, which is defined to be the ratio which the velocity of separation of two bodies after the shock bears to the velocity of approach before the shock. Some time ago, in making some calculations respecting armour-plated frigates, I found it necessary to use the Dynamical Coefficients of Elasticity of steel, iron, oak, and other substances, and made some experiments for the purpose of determining them. These experiments were made at the Kingstown Railway works, and consisted in dropping spherical balls ($2\frac{1}{4}$ in. diam.) of steel, iron, and brass upon levelled surfaces of steel, iron, oak, teak, &c., and measuring the height of the rebound. I hope at some future time to lay the results of these experiments in detail before the Academy; but at present I shall content myself with publishing the following Table, which contains the means of many experiments.

From this Table the remarkable fact appears, that the Dynamical Coefficient of Elasticity is not constant, but diminishes, according to some unknown law, as the velocity of the collision increases.

TABLE *of Values of* e^2, *the square of the Dynamical Coefficient of Elasticity, or of the ratio of the Velocity of Separation to the Velocity of Approach, of different bodies in collision.*

Substances.	Velocity of Approach.	Square of Dynamical Coefficient of Elasticity = e^2
Steel on Steel, ...	16 ft. per sec.	0·5208
	24 ,,	0·4462
Steel on Iron and Iron on Steel,*	16 ft. per sec.	0·2952
	24 ,,	0·2685
	32 ,,	0·2588
	40 ,,	0·2245
Steel on Oak, fibres horizontal, .	16 ,,	0·1172
	24 ,,	0·1157
	32 ,,	0·1041
	38·4 ,,	0·0933
Steel on Oak, fibres vertical, . .	32 ft. per sec.	0·0931
	38·4 ,,	0·0887
Steel on Teak, fibres horizontal, .	16 ft. per sec.	0·1719
	24 ,,	0·1666
	32 ,,	0·1562
	40 ,,	0·1379
Brass on Steel, ...	16 ft. per sec.	0·1380
	24 ,,	0·1134

MONDAY, FEBRUARY 24, 1862.

The VERY REV. CHARLES GRAVES, D. D., President, in the Chair.

THE Rev. Dr. Reeves exhibited and described drawings of some ancient sepulchral inscriptions found in the province of Ulster.

The episcopal seal of the Right Rev. Dr. William Fitzgerald, late Lord Bishop of Cork, Cloyne, and Ross, was presented to the Museum by his Lordship.

Thanks were voted to the donors.

* There was an absolute agreement in the results obtained by dropping steel on soft iron, and, *vice versâ*, soft iron on steel.

STATED MEETING.—SATURDAY, MARCH 15, 1862.

The VERY REV. CHARLES GRAVES, D. D., President, in the Chair.

The Secretary read the following—

REPORT OF THE COUNCIL.

SINCE the date of the last Report, the following papers have been printed in the transactions :—

1. Dr. J. R. Kinahan, "On the Britannic Species of Crangon and Galathea, with some remarks on the Homologies of these groups."

2. Dr. Lloyd, "On Earth Currents, and their Connexion with the Diurnal Changes of the Horizontal Magnetic Needle."

These two papers form the second part of Vol. xxiv.

Mr. Denis Crofton's paper, "On a Collation of a MS. of the Bhagavad Gîtâ," is nearly ready to be issued.

Many interesting papers have been read before the Academy, abstracts of which have already appeared, or will hereafter appear, in its Proceedings. We have received communications in Mathematics from Sir William Hamilton and Professor Haughton; in the sciences of observation and experiment, from Dr. Lloyd, Professor Haughton, Professor Hennessy, Professor Sullivan, and Dr. Kinahan; in Polite Literature and Antiquities, from the President, Dr. Todd, Dr. Reeves, Mr. Hardinge, Mr. Du Noyer, and (through Dr. Aquilla Smith) from Mr. Richard Sainthill.

During the past year, all the printed books and manuscripts in the Library have been carefully examined by the Librarian, various improvements made in their arrangement, and a catalogue completed, including every printed book in the library on the 31st of December, 1861; distinguishing the donations of Mrs. Moore, and those of the late W. E. Hudson, Esq. A catalogue has also been completed of the Academy's collection of pamphlets, with an index, which will much facilitate reference.

The library has received many valuable donations during the past year; among which should specially be mentioned thirty-five volumes of the Ordnance Antiquarian Collections, presented by the Government. The Master of the Rolls of England has also presented to the Academy a complete series of the Chronicles and Calendars published under his direction. The Council have been fortunate enough to acquire by purchase an excellent copy on vellum of the portions of the Book of Lismore, which were requisite to complete the transcript of the other portions of that volume made some years since for the Academy by Mr. Curry.

An index to Mr. Curry's Catalogue of the manuscripts has been compiled by Mr. D. H. Kelly, and presented by him to the library, where it will be found of very great use.

In order to make the manuscript collection really useful, not only to members of the Academy, but to Celtic scholars generally, it is most

desirable that Mr. Curry's Catalogue should be completed, and printed. No funds are at present available for the purpose; but the Council will keep the object in view, and hope to be able ere long to carry it into effect.

The Commissioners of Her Majesty's Treasury have been pleased to sanction the expenditure of £100 a year in the recovery of relics of antiquity through the instrumentality of the constabulary of the several counties; the articles thus acquired being deposited in the Museum of the Academy, and the value to be paid for them to the finders being fixed by the Committee of Antiquities. For this most important boon the Academy is much indebted to the exertions of Lord Talbot de Malahide, who brought the matter before the Council in 1859, and subsequently co-operated with the Committee of Antiquities in the preparation of the plan which the Government adopted.

The Committee of Antiquities have used all possible care and diligence in endeavouring to discharge the trust reposed in them, in a manner satisfactory both to the Government and to the depositors of articles of treasure-trove. Various objects of interest have already been obtained under this regulation, and a careful system of registration of all the articles thus acquired has been adopted by the Committee. A list of all the additions to the Museum during the past year, prepared from a detailed statement, furnished by Mr. Hardinge, forms the appendix to the present Report.

It was announced in the last Report, that the Government had provided six suitable cases for the custody of the gold articles. These articles have since been arranged by Mr. Wilde. We are also indebted to that gentleman for the continuation of his valuable labours in the preparation of the Catalogue of the Museum. The third part, comprising all the gold articles in the Museum, now lies on the table. This part consists of 100 pages, illustrated with 90 woodcuts, and contains descriptions of 309 objects. The Council have decided on presenting a copy of it gratuitously to each of the members.

The Catalogue of the silver and iron articles, the coins, and the ecclesiastical antiquities, still remains to be made; but the Council has not at present at its disposal any funds available for that purpose. The registration of the articles of silver and iron has been made, and three-fourths of the engravings necessary for illustrating the Catalogue of those articles have been executed.

During the past year there has been received from the sale of copies of Part I. of the Catalogue, a sum of £8 10*s.*; from the sale of Part II., £15 19*s.* 7*d.*, making a total of £24 9*s.* 7*d.*

We are indebted to the zeal and industry of the Rev. Dr. Reeves, Secretary of the Academy, for an accurate index to the first seven volumes of the Proceedings of the Academy, which will greatly facilitate reference to the communications contained in them. A copy of the charter, statutes, by-laws, and regulations of the Academy, carefully revised, and printed in a convenient form, is also ready, and will be supplied to the members.

The Treasurer reports that no change of importance has taken place in the financial condition of the Academy. The amount received from entrance fees, during the past year, was slightly in excess of the sum received during 1860-61. After defraying all charges and liabilities, a small balance remains to be carried over to the credit of the Academy for the next year.

The Academy laments, in common with the entire nation, the premature death of the most illustrious of its Honorary Members, the late Prince Consort, who was ever as zealous in promoting the interests of science and art, as he was qualified by nature and cultivation to appreciate the efforts of their votaries. The feelings of the Academy respecting this national loss have been expressed in the Address of Condolence, which it has been our melancholy duty to present to Her Most Gracious Majesty.

The Academy has lost by death during the past year thirteen Ordinary Members, viz. :—

William Armstrong, Esq., C. E.; elected 10th April, 1848.
Sir Matthew Barrington, Bart.; elected 9th January, 1837.
Henry C. Beauchamp, M. D.; elected 11th January, 1841.
David Brereton, M. D.; elected 14th February, 1853.
Rev. Robert Carmichael, M. A.; elected 12th February, 1855.
Sir William Cubitt, F. R. S., &c.; elected 30th November, 1833.
James W. Cusack, M. D.; elected 16th March, 1829.
Alfred Furlong, Esq.; elected 24th August, 1857.
Philip Jones, Esq.; elected 12th April, 1847.
James T. Mackay, LL. D.; elected 25th June, 1821.
Alexander Mac Ilveen, Esq.; elected 14th January, 1861.
John O'Donovan, LL. D.; elected 8th February, 1847.
Ven. Archdeacon Rowan; elected 28th May, 1832.

Four of these names occur in the history of the scientific, literary, or antiquarian labours of this Academy :—

1. The Rev. Robert Carmichael was elected a Fellow of Trinity College in 1852. He was the author of a treatise on the Calculus of Operations, published in 1855, which was favourably received in this country, and has been translated into German (Lubrock, Brunswick, 1857). He also edited the Rolls Sermons of Bishop Butler, with notes and observations. He contributed to our Proceedings two papers, viz. one "On Certain Methods in the Calculus of Finite Differences," the other "On the General Theory of the Integration of Non-Linear Partial Differential Equations."

2. Dr. James Townsend M'Kay, having first held the office of Assistant Botanist in Trinity College, was afterwards employed to form the present University Botanic Garden, of which he was appointed Curator. In 1806, he published, in the fifth volume of the Dublin Society's Transactions, a Catalogue of the Rare Plants of Ireland; and, in 1824, communicated to this Academy a full Catalogue, with habitats, of all the

Phanerogamous Plants and Ferns then ascertained to be natives of Ireland. This catalogue contained the results of twenty years' observations during numerous excursions to almost every part of the island. It was followed, in 1836, by the "Flora Hibernica," the work on which Dr. M'Kay's fame as a botanist will principally rest. In recognition of this work, and of the services rendered by him to Irish botany and horticulture, the University conferred on him the honorary degree of LL. D. His name is associated with those of two Irish plants, the *Erica Mackayi* (Hook), and the *Fucus Mackayi* (Turn.), and a genus of Acanthaceæ (Mackaya) has been dedicated to him.

3. Dr. John O'Donovan had acquired a European reputation by his profound knowledge of the Celtic language and historical monuments of Ireland. He was the author of the only scientific and really valuable work on Irish grammar, which had been produced before the "Grammatica Celtica" of Zeuss. He edited for the Irish Archæological and Celtic Societies several ancient documents, preserved among the MSS. of this Academy, of Trinity College, Dublin, and of the Burgundian Library at Brussels. His greatest work was the edition, with a translation, and an immense body of illustrative annotations, of the "Annals of the Four Masters." This has been pronounced by competent authorities to be the most important contribution which has yet been made to the early history of Ireland. During the last years of his life Dr. O'Donovan was occupied, in conjunction with Mr. Eugene Curry, in preparing for the press, under the superintendence of a Royal Commission, the ancient legal institutes of Ireland, known as the Brehon Laws. The loss sustained by Celtic literature in the death of this distinguished scholar may justly be described as irreparable. The University of Dublin had recognised his eminent merit by conferring on him an honorary degree of Doctor of Laws, and the Royal Academy of Berlin elected him one of its Honorary Members; the Royal Irish Academy, in 1848, awarded him a Cunningham Gold Medal.

4. The Venerable Arthur B. Rowan, Archdeacon of Ardfert, was author of a volume entitled "Lake Lore; or, an Antiquarian Guide to some of the Ruins and Recollections of Killarney" (1853); "Vita Beati Franconis," being an edition, with an English version, of a curious metrical biography in mediæval Latin (1858); "Brief Memorials of the Case and Conduct of Trinity College, 1686–1688" (1858); a collection of poems, published under the title of "Spare Minutes of a Minister;" a tract on the Old Countess of Desmond, and other writings. He contributed to our Proceedings a paper "On an Ogham Monument found on the site of the first Battle recorded as having been fought by the Milesians in Ireland."

Sixteen Members have been elected during the past year, viz.:—

1. G. W. Abraham, Esq.
2. Hon. Judge Berwick.
3. Rev. W. S. Burnside, D. D.
4. Rev. R. G. Cather.
5. P. Fitzgerald, Esq.
6. Alfred Hudson, M.D.
7. Richard Hartley, Esq.
8. John Hatchell, Esq.

9. H. T. T. Maunsell, M. D.
10. George Nixon, M.D.
11. Rev. Thaddeus O'Mahony.
12. W. T. Sargeant, Esq.
13. J. S. Sloane, Esq., C. E.
14. Rev. Henry Joy Tombe.
15. Joseph Wilson, Esq.
16. Henry Wilkie, Esq.

No Honorary Members have been elected.

It was Resolved,—That the Report of the Council now read be received and adopted.

APPENDIX TO REPORT.

A return of the additions to the Museum, made during the year ending the March 15, 1862:—

Presentations.—By W. R. Wilde, Esq., a bronze jug, pin, and dagger; by H. Christy, Esq., three flakes of flint; by J. Nicholson, Esq., a flint crucible; by Dr. H. Hudson, a statuette; by Lord G. A. Hill, a lump of bog butter.

Purchases.—From A. Sproule, Esq., a belt-plate, a monogram, a saddle-pommel, a shield-boss, two walloon boxes, all of brass; a spear of bronze; an ecclesiastical bell, a crucifixion, two pipe packers, and a large knife, all of iron; an ornament of flint, and two fragments of tombstones, and portions of jars. From H. Lewis, a bell-head of copper, three axes, a celt, a dagger, three hatchets and a palstave of bronze. From James O'Donnel, two bronze bosses, a double ring of bronze, four flint arrow-heads, a stone whorl, and portion of jar, a smoking pipe, a cinerary urn, and a ring of coal. From Peter O'Connell, a bronze dagger-blade. From Mr. Campbell, a bronze dish. From Charles Haliday, the Soiscel Molaise. From T. Cullen, plaster casts of a gold boss, a celt and handle, a gold fibula, a bronze rapier.

Purchases made under treasure-trove regulations:—In gold, three armillæ, a ball, a circle, three coins, three flat discs, a bar, a fragment of ribbed plate, and two tongues; in silver, forty-eight silver coins; a brass coin; a copper coin; in bronze, an armlet, fragment of arrow-head, three celts, a pin, a ring, and a spear; in iron, a bit; in stone, an amulet, and an ornament; in amber, ninety-three beads; in bone, a comb, eleven fibulæ, and a pin. Giving a total of additions to the museum of 235 articles within the year ending March 15, 1862.

His Excellency the Lord Lieutenant having arrived, the President proceeded to deliver the following Address, before presenting the Cunningham Medals, recently awarded by the Council:—

THE PRESIDENT'S ADDRESS.

GENTLEMEN,—One of the most important prerogatives and duties belonging to the Council of this Academy is the award of medals to the successful cultivators of those scientific and literary pursuits for the promotion of which the Academy was founded. We are now assembled for the purpose of carrying into effect resolutions adopted by the Council with reference to this matter towards the close of the past year; and to give greater solemnity to our proceedings, the representative of the Queen has been pleased to honour our meeting with his presence. He thus adds a fresh proof to the many which he has given of his own earnest sympathy with men of letters. He thus, I believe, exactly reflects the feeling and co-operates with the action of our gracious Sovereign. If Her Majesty is no longer supported by the counsel and aided by the services of her lamented Consort, we know that she is animated by that strenuous desire to promote the interests of learning which he never lost an opportunity of manifesting. Under our present Sovereign, and under our present Viceroy, the maxim "*Honos alit artes*" will not be lost sight of.

I will now proceed, Gentlemen, with your permission, to notice the several works for which the Council has resolved to confer Cunningham Medals.

A Cunningham Medal has been awarded to the Rev. Humphrey Lloyd D. D., for his original and important researches in Physical Optics, Magnetism, and Meteorology. Every member of the Royal Irish Academy will readily admit the high claims of Dr. Lloyd to any honour which we can confer. We all feel, too, that these claims are founded, not only on the scientific eminence which he has so justly attained, but also on the fact that so large a portion of his discoveries have been given to the world through the medium of our Transactions and Proceedings. The first gave him a claim which the whole scientific world would be ready to endorse; the second gives to this claim a new and peculiar force as regards ourselves. And, although the medal which I am about to present to Dr. Lloyd has been conferred on him professedly for memoirs recently published in our Transactions, I am sure that I do not misinterpret the feeling of the Council in saying that, when they resolved to confer it, their thoughts took a wider range, and that they desired thereby to testify their sense of the claims, accumulated during a long period, which Dr. Lloyd possesses on the scientific world generally, and more especially on the Royal Irish Academy. And you will not think that I misemploy your time, if I venture to transgress the period to which, in the adjudication of these medals, we are in strictness limited, and briefly to notice some of his earlier contributions to physical science. Let me select, as perhaps the most important of these, the experimental proof of the phenomenon of conical refraction. The history of this discovery must be ever memorable in the annals of science. It

is one of the rare instances of a successful theoretic prediction. You know that the ordinary course of scientific discovery is, that a phenomenon is first observed, and then accounted for. The experimentalist establishes its reality, and then the theorist endeavours to reduce it under a general law. Thus Kepler discovered that the planetary orbits are in fact elliptical, before Newton established the mechanical principles on which the form depends. The laws of reflexion and refraction were known as facts before Newton and Huygens endeavoured to reduce them under the more general laws of mechanics. But in the case of conical refraction, this order was reversed. The mathematical genius of Sir William Hamilton enabled him to predict this phenomenon as a consequence of Fresnel's theory, before the experimental skill of Dr. Lloyd established its reality. Sir William Hamilton saw that the rule by which Fresnel determined the course of the two rays into which a single incident ray is divided by crystalline refraction, appeared to fail under certain circumstances. With a certain disposition of the incident light, he found that not two, but an infinite number of directions might be found satisfying the laws of Fresnel, and from this indefiniteness he rightly inferred that light would actually pass along each of these directions; and that therefore, instead of emerging in two rays, the light would emerge in a hollow cone. With another disposition of the incident ray, he inferred, by similar reasoning, that the light would emerge in a cylinder. The establishment of the reality of these phenomena by Dr. Lloyd must be regarded as a great triumph of experimental skill. The difficulties attending such an investigation can, of course, be fully appreciated only by those who have been engaged in similar labours; but there is in these experiments one peculiar source of difficulty, which will be intelligible to every one—it is this, that they do not admit of approximation. Generally speaking, in conducting an experiment, if the adjustment of the apparatus be nearly, though not mathematically exact, the phenomenon produced will be nearly, though not exactly, that which we are seeking; and the more nearly we approximate to perfect accuracy of adjustment, the more nearly will the phenomenon actually produced approximate to that which is required. And therefore, in ordinary experiments, an indifferent observer, though he will not perfectly succeed, will not wholly fail. He will make an approximation to the truth—an approximation which, with increasing skill and greater attention, he will gradually render more and more close. With conical refraction it is not so. That phenomenon admits of no degrees. If the adjustment be not mathematically accurate, the phenomenon is not produced, *nor any thing like it*. The smallest deviation from the proper disposition of the incident light will cause the cone or cylinder to disappear, and to be replaced by the two rays which are seen under ordinary circumstances. Every one can understand the difficulty of even conducting such an experiment as this when the means of doing so have been already devised and put into the hands of the observer—a difficulty, indeed, so great, that observers have been found to deny the reality of the phenomenon.

But to devise the means by which the phenomenon might be produced, and, unassisted, to bring the experiment to a successful conclusion,—of all this, it is not too much to say, that it required in the observer the possession of experimental skill and genius of the highest order. Nor was Dr. Lloyd content with the mere exhibition of the phenomenon of conical refraction; he also examined carefully the elementary rays of which the emergent cone is composed, and succeeded in establishing experimentally the simple and elegant law by which the position of the planes of polarization of these rays is regulated. Passing now from optics to magnetism, we find that Dr. Lloyd's labours have been perseveringly and successfully directed to the improvement of the methods by which the intensity of the earth's magnetic force is measured. In a communication read before the Academy as far back as 1843, and printed in the twenty-first volume of our Transactions, he has pointed out a mode of reducing the error attending the determination of this quantity, by the ordinary method, to less than one-fifth of its amount. Adopting Biot's law of magnetic distribution, he has determined a relation between the lengths of the magnets employed, which not only simplifies the calculation, but also effects the above-mentioned important reduction in the error resulting from that observation. He has also, by a series of direct experiments, verified the accuracy of the method adopted, and thus incidentally given an important confirmation of the truth of the law of magnetic distribution which had been assumed. The same subject is resumed in a paper read before the Academy in the year 1858, in which Dr. Lloyd points out a fatal imperfection attending the ordinary mode of calculating the intensity of the earth's magnetic force, rendering that method quite inapplicable in high magnetic latitudes. The method proposed by Dr. Lloyd is wholly free from this imperfection; and, besides, requires for its application only the use of the dip circle—a vast advantage to the travelling observer, inasmuch as it reduces to the smallest possible number the instruments which he is compelled to carry with him.

Doctor Lloyd,—The medal which I have now the honour of presenting to you is a very inadequate token of the respect with which the Council of this Academy regards your labours in the various departments of physical science. Combining an exact knowledge of theoretical principles with a refined tact and ingenuity in experimental processes, you have devised methods of observation, the use of which has greatly facilitated the accumulation of the means of future discovery. You have employed these methods with diligence and success, in the accurate determination of quantities which it was most important to measure. You have also pointed out sources of error in received methods of observation. Your colleagues here look forward with a lively interest to the prosecution of those researches in terrestrial magnetism, of which you have recently communicated accounts to the Academy. Though these discoveries belong to a period later than that within

which you produced the memoirs for which this medal has been specially awarded, I feel that I am justified in referring to them as the results of the same well-trained sagacity which has characterized the whole series of your scientific achievements.

A Cunningham Medal has been awarded to Mr. Robert Mallet, for his researches in the theory of earthquakes. Prior to the year 1846, no true science of earthquakes existed; seismology, as a branch of terrestrial physics, has been since created. Mitchel, Dolomieu, Bylandt, Humboldt, and Darwin, the very latest writers on the subject, prior to 1846, all show that they had no clear conception either of the intimate mechanism, or of the connexion and order of events in earthquakes. The only *true hints* that had been given respecting them were those furnished, in little more than a sentence, by Dr. Young and Gay Lussac, "that they were of the nature of vibrations in solids." No adequate ideas had been formed of the character and limits of those vibrations, which were vaguely talked of as vorticose. In February, 1846, Mr. R. Mallet's paper on "the Dynamics of Earthquakes" was read to the Royal Irish Academy, and published in vol. xxi., p. 1, of its Transactions. In this paper he fixed upon an immutable basis the real nature of earthquake phenomena, and for the first time showed that the three great classes of phenomena,—1. Shocks; 2. Sounds; 3. Great sea-waves,—were all reducible to a common origin, formed parts of a connected train, and were explicable on admitted laws. This paper also for the first time explained the true nature of the movements that had been called vorticose, and viewed as the proofs of circular movements. Mr. R. Mallet proved that they were due to rectilinear motions. He also pointed out in this paper the important uses that might be made of earthquakes, as an instrument of discovering the depth beneath the earth's surface of the origin of the shocks,—hence of the volcanic foci,—and even of ascertaining ultimately the nature, as well as the temperature, of the formations within our earth, to a depth more profound than can be reached by any other mode of examination, or reached directly at all. He also showed that by seismologic means we may acquire some knowledge of the rock and other formations constituting the beds of the great oceans. This paper brought the subject of earthquakes in a prominent manner before the notice of geologists and physicists; and in 1849–50, Mr. R. Mallet drew up, at the desire of the British Association, a first report on the facts of earthquake phenomena, which, like his subsequent reports, four in all, was published in its Transactions. In this first report, he collected, classified, and drew inductive conclusions from all the important facts then known and published as to earthquakes, and pointed out how they co-ordinate with his first views of 1846. In the same year, he also designed the first completely self-registering Seismometer proposed, and published a description of it in our Transactions. In the three papers to which I have referred he pointed out, amongst other things, the importance of experimentally determining the velocity of movement of earthquake-waves, and

proposed to experiment upon the actual transit velocity of artificial shocks, obtained by the explosion of gunpowder; and aided by the funds of the British Association, he in 1849–50 completed a train of experiments by which he determined the transit wave-time of shock for wet sand as the lowest limit, and for solid granite as the highest amongst known cosmical media. The results, received at first with much surprise, in consequence of the low velocities of transit found, fully coincided with the author's theoretic views of 1846, and have since been amply confirmed, and shown to be accordant with the low velocities of natural shocks, as measured by Schmidt, Nöggerath, Mr. R. Mallet, and others. These experiments form the subject of his second British Association report of 1851. In his first report, Mr. R. Mallet had pointed out the importance of collecting into one great catalogue, and fully discussing in relation to space and time, &c., all recorded earthquakes, with a view to evolve any secular laws, if such existed. This laborious work he undertook with the efficient help of his eldest son, Dr. John William Mallet, now Professor of Chemistry at the University of Alabama; and between the years 1852 and 1858, they completed together the British Association earthquake-catalogue, embracing more than 6000 earthquakes, which form the subject of Mr. R. Mallet's third and fourth British Association Reports. In the fourth Report, he has discussed fully, and year by year, this mass of the statistical facts of earthquakes, extending from the earliest times of history to that date. The discussion of the facts evolved these amongst the most striking results:—1. That earthquakes are not truly secular phenomena in time; 2. That in modern times, when observations are best and most numerous, although the whole train of phenomena over time is irregular or non-secular, still there has been a decided preponderance of earthquakes occurring at intervals of from forty to fifty years, and that these periods of maxima occur *about the middle and the last decade of each century*. Mr. R. Mallet ventured to predict the recurrence of such a group of earthquakes for the then coming years, 1850, 1860, or thereabouts, and his prediction has been fully borne out. In the time-discussion, also, he showed that at present some part or other of the earth is subject to at least one great earthquake every nine months. 3. In the discussion as to distribution over the earth's surface, he pointed out for the first time that earthquakes follow the great lines of mountain chains and elevations, forming what he has denominated Seismic Bands, the whole of which he has laid down upon the Mercator Seismographic map of the world published by the British Association. The important and pregnant relations that this great fact possesses with respect to our future knowledge of volcanic action, were in some measure pointed out in this Report: their important bearing cannot be in this respect overestimated. Between the period of publication of his first and second British Association Reports, Mr. Mallet had, at the request of Sir John Herschell, drawn up for the Admiralty Manual the article on earthquakes and the methods of observing them, which he further improved in the second edition of that work. This article has been translated into

French by Mons. Perrey, by desire of the Government of France; and into German by M. Jeittels, of the Imperial Gymnasium of Kaschau in Hungary, and of the Imp. Acad. of Sciences, Vienna; and prior to the breaking out of the war was about being republished, with large additions by the author, by the Smithsonian Institution of America, which offered to circulate at its expense a vast number of copies over the world of science. Prior to the completion of the discussion of the British Association Catalogue, Mr. R. Mallet proposed to the Royal Society and to the British Association, conjointly to undertake further experiments on the propagation of artificial earthquake shocks in stratified rock, by taking advantage of the great blasting operations going on at Holyhead. Aided by the funds of both bodies, he has completed these experiments, extending over a period of about four years, and last year reported to the Royal Society and to the Association. His results will appear in the forthcoming volume of the Philosophical Transactions, and also in the next British Assocation Report. They confirm his previous observationss in sand and granite, &c., and comprise also some new and important results; amongst the rest this, which is new to science—that the rate of propagation of an earthquake shock is faster in the same medium as the originating impulse is more powerful—a fact full of import as respects natural earthquakes, and curiously confirming some of the theoretic views of Mr. Earnshaw. In December, 1857, occurred the great earthquake of Naples. Mr. R. Mallet represented to the Royal Society the importance of observing its effects; and with the partial aid, and by the desire of that body, he proceeded to the scene of the disaster, and under circumstances of some difficulty and inconvenience, applied new methods devised by him for the investigation of the direction and velocity of the shock. In the mathematical part of these inquiries he acknowledges the important aid he has derived from the skill of our fellow-academician, Professor Haughton, Professor of Geology, Trinity College, Dublin. Mr. Mallet's report on this expedition and investigation is now in the press, and will be published in about six weeks. It was read to the Royal Society in 1860, and an abstract of its contents has been published in the Proceedings of that body. The author fully succeeded in accomplishing what he set out with attempting, namely, to find within the shaken country, by mathematical or mechanical appeal to the objects shaken down or disturbed, both the spot on the surface vertically above the point whence the shock itself originated, and also the depth of this point or focus beneath the surface. And he has shown that, in this instance, the focus was about nine and a half geographical miles deep. He has been able to estimate both the shape and the size of the subterranean cavity forming the focus, and to deduce many interesting and valuable conclusions as to the temperature, pressure, work consumed in the shock, &c. The velocity of the wave-particle in shock he has proved to be very small, not more than twelve to eighteen feet per second, thus co-ordinating with the low velocity of transit before ascertained. Amongst other deductions of general interest, based upon strict mechanical laws, is the probability that the depth of focus of no earthquake exceeds about thirty geographical

miles; and as the earthquake focus is, in fact, also the volcanic one, that volcanic action within our planet is at present limited to about that depth. Mr. Mallet has shown that Seismology is capable of being used as an instrument of cosmical discovery; and he has also shown that its importance is far greater in this respect than in any of the relations of earthquakes to superficial geological changes produced or induced by shock.

Mr. Mallet,—I have much pleasure in presenting to you the medal awarded to you by the Council of the Royal Irish Academy for your researches on the Theory of Earthquakes. To you, I believe, is due the credit of having been the first to disentangle and explain the complicated phenomena of these terrible visitations. You have measured the velocity of the waves of vibration propagated through the various solid materials of the earth-crust; you have marked the sound-wave of air, carrying with it the announcement of the catastrophe; you have followed the course of those tremendous breakers which have rolled in upon the trembling shores even at vast distances from the points where the ocean-bed has been agitated by subterraneous commotion. Profiting by the indications furnished by riven walls and overthrown pillars, you have succeeded in pointing out the *locus* of the centres of earthquake disturbance. These researches of yours place within our reach a new *organon* of cosmical inquiry—a method supplying information respecting the temperature and structure of the earth-crust at distances unapproachable by any other known mode of observation. We can hardly desire for you enlarged opportunities of applying your theory, and testing the self-registering instruments which you have devised; but we earnestly hope that the development of these and other investigations in which you are engaged may still further redound to your own credit and that of this Academy.

A Cunningham Medal has been awarded to Mr. Whitley Stokes, for his work on Irish Glosses, edited for the Irish Archæological Society. The work for which this medal is conferred on Mr. Stokes is an edition of a Mediæval tract on Latin declension, with examples explained in Irish. The value of the tract itself lies in the large number of Irish words (about 1100) which are annexed as glosses to the Latin vocables, exemplifying the different declensions; many of these words are unregistered in our dictionaries; of others the meaning has hitherto been guessed at rather than known. The publication of the tract, even without any commentary upon it, would have been a useful contribution towards the production of that Irish dictionary, the want of which is so much complained of. Mr. Stokes, however, has added copious annotations on the Irish words, pointing out the relationship in which they stand to cognate words in other Indo-European languages. In executing this part of his task, he has instituted comparisons which throw much light upon the etymology of words and names in other languages, as well as the Irish. I might cite many examples to show how interesting these

comparisons are; but it is enough to say here, and I think it can be truly said, that this volume contains the largest store of trustworthy comparisons of Welsh, Irish, Gælic, Cornish, and Breton words with one another, and of the different Celtic forms, with Sanskrit, Zend, Greek, Latin, Gothic, Anglo-Saxon, English, and Old High German, that has hitherto been published. But the philologist is no longer satisfied with finding a similarity between roots in different languages; he compares the structure of inflected words, and finds that common principles of formation run through the different members of a great family of languages. In this department of comparative philology Mr. Stokes has made discoveries, the merit of which has been recognised. In his commentary on the Irish Glosses, he has introduced considerable improvements in the declensional paradigms, and made a great advance in the analysis of declension. To the theory of the verb he has contributed important observations. He has, for instance, shown Schleicher's explanation of the relative form of the Irish verb to be inaccurate. He has also established the existence of a class of reduplicating roots. Such steps as these entitle him to the credit of being not only a successful scholar, but a worthy successor of Zeuss. I believe it was the "Grammatica Celtica" of Caspar Zeuss which inspired him with an interest in this branch of learning. The analytical power manifested in that work convinced him that it was possible to carry on Celtic researches in a philosophic spirit, and to establish principles of Irish philology and ethnology on a sure historical basis. Having completely mastered Zeuss' comprehensive work—a task by no means an easy one—he commenced a methodical search for the oldest grammatical forms, so precious to the philologist. In this labour he had the good fortune to receive help and encouragement from the late Dr. O'Donovan and Professor O'Curry, who opened to him many of the deepest and richest sources of information. But their aid would have availed him but little, if he had not been gifted with a remarkable linguistic faculty, and a most persevering industry. Conceiving that, in order to trace the development of the Irish language, the student should begin by examining the most ancient documents, he applied himself systematically to the work of copying the most remarkable of them with extreme accuracy. He thus amassed so rich a collection of specimens of the Irish language anterior to the eleventh century, that he has qualified himself to undertake the printing of Cormac's celebrated Glossary, long reputed the very touchstone of Irish philological learning. Whilst the Irish has ever been the primary and final object of all his philological researches, he has not confined his views to it. He has made himself familiar with the principles of Bopp's science of comparative philology, and has applied them to the other members of the Celtic family of languages. He has mastered the Cornish, a dialect obscured by corrupt spelling and ill-defined grammatical forms. Of this dialect he has printed a specimen, the miracle-play of our Lord's Passion, with a translation and grammatical notes. Neither did he omit, like most Irish and Welsh philologists, that essential guarantee of success, the acquisition of the sister-dialect. He has to a considerable degree mastered the Welsh.

Of this he has given proof in his critical edition of the earliest specimens of Welsh, taken from Cambridge and Oxford MSS. His collection of the old Welsh Glosses is more complete than that made by Zeuss, as it contains newly-discovered glosses from the MS. of Juvencus at Cambridge. I have entered into these details for the purpose of showing that Mr. Stokes' learning is of a solid kind. He has not amused himself, nor will he mislead his readers, by fanciful conjectures. The work which he has executed, and for which the medal of the Academy has been awarded to him, is a substantial contribution to Celtic philology. It will also secure to its author an honourable place in the estimation of those who understand, as he does, that every contribution to a more accurate knowledge of the Irish language is ultimately a contribution to Irish history. "For this," "as he says himself, "can never be written until trustworthy versions are produced of all the surviving chronicles, laws, romances, and poetry of ancient Celtic Ireland. Moreover, immediate results of high historical importance may be obtained by comparison of the words and forms of the Irish with those of the other Indo-European languages. Chronicles may, and often do, lie; laws may have been the work of a despot, and fail to correspond with the ethical ideas of the people for whom they were made; romances may misrepresent the manners and morals of their readers and hearers; and poetry may not be the genuine outcome of the popular imaginative faculty. But the evidence given by words and forms is conclusive—evidence of the habitat, and intellectual attainments, the social condition of the Aryan family before the Celtic sisters journeyed to the West—evidence of the period at which this pilgrimage took place as compared with the dates of the respective migrations of their kindred—evidence of the connexions existing between the Celts and other Indo-Europeans after the separation of languages."

Dr. Stokes,—I am sure that every member of the Academy shares in the regret which I felt, when I was informed that his engagements rendered it impossible for your son to attend here to-night to receive the medal awarded to him by the Council. I place it in your hands—you will convey it to him, along with the assurance of our respect and good wishes. In the midst of professional pursuits carried on with diligence and success, he has found time to signalize himself by rendering important services to Irish philology. Having prepared himself for his task by a course of well-ordered study, he has produced a work remarkable alike for the diligence with which he has collected his materials, and the skill with which he has arranged them. He has brought together the largest collection that has yet been published of Celtic words, illustrated by the light of comparative philology. And, improving upon the teaching of Zeuss, he has been able to carry our insight into the system of Celtic declension to the farthest point which it has yet reached.

A Cunningham Medal has been awarded to Mr. John T. Gilbert for his "History of the City of Dublin." In undertaking this history, Mr. Gilbert

engaged in a task, the interest of which was equalled by its difficulty. In general, the historian derives help, in the execution of his work, from the labours of writers who have preceded him. Though they may have left omissions to be supplied, and mistakes to be corrected, they have, at least, furnished a mass of authentic matter, the possession of which places him in a position more advantageous than that of writers who have to construct their narratives out of the crude materials gathered from primary sources, annals, laws, charters, and the incidental notices preserved in ancient documents and monuments of various kinds. But Mr. Gilbert owes nothing to earlier histories of Dublin. The first work on the subject was the imperfect attempt of Harris, published, in a small volume, most inaccurately, after his death, in 1766. On this it would be unfair to pronounce a severe criticism. The design of the author had been left very incomplete, and the office of attempting to fill the outline which he had traced was committed to an incompetent compiler So limited in extent was this small history of the city of Dublin, that but four pages of it were devoted to the description of St. Patrick's Cathedral and eighteen churches. The entire of Harris's imperfect and inaccurate little work was appropriated and reprinted *verbatim*, without any acknowledgment, in 1818, at London, by Whitelaw and Walsh, whose compilation is full of the most absurd errors. Some of the materials of their work were avowedly gathered from unsubstantiated oral communications, others were taken from printed guide-books of no authority. For instance, the Annals of Dublin, from 1704, the period at which Harris ended, were reprinted without alteration from the concluding pages of a Dublin Almanac. Without exposing ourselves to the reproach of an undue civic vanity, we may assert that Dublin deserved to be made the subject of a history more elaborate and more authentic than the works of either Harris or Whitelaw and Walsh. The metropolis of Ireland possesses trustworthy annals which reach back for more than a thousand years, and has been the scene on which most famous men, Irish, Danes, Anglo-Normans, and English, have played their parts. A writer conscious of the dignity of his subject, and anxious to do it justice, would feel that very extensive researches should be made previous to commencing a history of Dublin. He would see the necessity of examining every printed book, pamphlet, or tract referring to events connected with the history of the city. He would understand the importance of investigating the charters and deeds of its churches, guilds, and corporations, together with the manuscripts in the libraries of Trinity College and the British Museum, the archives of the State Paper Office, and the unpublished records of the Law Courts of Dublin; he would also make himself familiar with its streets, its public buildings, and its monuments. It is because Mr. Gilbert has given proofs of having used diligence and judgment in the collection of his materials from a vast variety of recondite sources, that his work has secured the approval of those who think that scientific accuracy is an essential element of literary excellence. Excluding uncertain or unverified statements, and abstaining from conjectures, he has founded his history solely on documentary evi-

dence, the elaborately minute references to which, at the end of each volume, attest his industry and good faith. The writer of a work constructed on the plan of Mr. Gilbert's History of Dublin, has occasion to display the most diversified information and research. He touches upon the general political history of the country in past centuries; he introduces biographical notices of distinguished men; he records and localizes interesting events in the history of religion, letters, science, and art. In each of these departments the reader will find in Mr. Gilbert's history new and precise information, not to be met with elsewhere in print. As illustrating the wide range of subjects treated of under their respective localities, I may cite the account of the Tribe of Mac Gillamocholmog (vol. i., p. 230), traced through unpublished Gaelic and Anglo-Irish records from the remote origin of the family to its extinction in the fifteenth century; while, as a specimen of the work in a totally different department, I may refer to the history of Crow-street Theatre, as giving the only accurate details hitherto published of that once-noted establishment, verified by original documents never before printed, from the autograph of Richard Brinsley Sheridan, and other dramatic celebrities. Mr. Gilbert has interwoven in his work numerous original biographies of eminent natives of Dublin. He has supplied notices of painters, engravers, and medallists, with catalogues of their works, never before collected, and not to be found even in books specially treating of these subjects. He has given us a history of the Parliament of Ireland and the Parliament House; he has recorded the origin and progress of the Royal Dublin Society, the College of Physicians, and the Royal Irish Academy; he has also introduced notices of remarkable literary works published in Dublin, with information respecting their authors. A complete analysis of Mr. Gilbert's volumes would bring into view other interesting classes of subjects which I have left unmentioned; but my enumeration of the topics treated of in the work is sufficiently ample to show that it embraces a most extensive field. To combine such multifarious details into a narrative attractive to a general reader, and at the same time satisfactory to the historical inquirer, seeking precise and authentic information, was not an easy task. Mr. Gilbert is acknowledged to have succeeded eminently in attaining this twofold object. He has produced a work which has been, and will continue to be, read with interest, and referred to as an authority, not only by partial friends and brother Academicians, but by all who may, in our own time or in future generations, study the history and antiquities of the city of Dublin.

Mr. Gilbert,—I present to you the medal which the Council of the Royal Irish Academy has awarded to you as the author of a scholar-like work on the History of Dublin. You have removed from Ireland the national reproach of having no history of its metropolis. The volumes which you have produced furnish accurate and copious information on the history of every part of the city of which they treat. Let me express the hope that the sympathy in your labours shown by this Academy will encourage you to continue them. To the exertions made

by you and our late President, Dr. Todd, as secretaries of the Irish Archæological and Celtic Society, it is mainly owing that the latter body has been, for many years past, enabled to continue its labours in publishing various works of the utmost importance on the history of Ireland. You have proved your zeal in the cause of Irish history; you are acquainted with its sources and its materials. We have, therefore, good reason to indulge the hope that you will supply some of its many and acknowledged wants.

His Excellency the Lord Lieutenant then made the following remarks:—

Mr. President and Gentlemen,—I feel sure that I shall command the unanimous assent of the assembly which I have the honour to address, in submitting to them a proposal for requesting the Very Rev. the Dean of the Chapel Royal to permit the able, interesting, and instructive Addresses which he has just delivered to be printed. It would be at once beside the purpose, and beyond my power, to travel again over the ground which has been so fully and luminously explored by him. Most of all should I shrink from entering upon the domain of Dr. Lloyd's researches and discoveries. Of a truth, indeed—

> Ne has possim naturæ accedere partes,
> Frigidus obstiterit circum præcordia sanguis.

It is not possible, I will only say, to hear or think of Dr. Lloyd without being reminded that even the severest studies and loftiest flights of science seem in his case to be almost effaced by the modest grace and unassuming virtues of his demeanour, character, and life. With respect to Mr. Mallet, whom I think the Rev. President next touched upon, he seems to be to the earthquake something of what Dr. Franklin was to the lightning. But though he has been himself able to detect and track its footsteps, I fear he will not be equally enabled to arrest or to intercept its force. The President has eloquently remarked that Mr. Mallet has followed the course of those tremendous breakers which have rolled in upon the trembling shores, even at vast distances from the points where the ocean-bed had been agitated by subterranean commotions. Our language seems hardly big enough for such magnificent ideas; and if Homer had been alive, he would have called Mr. Mallet Γαιήοχος ενοσίγαιος. The President, I think, next touched upon Mr. Stokes; and I am sure our worthy President was quite in his element when he dilated on Irish philology; and most pleasant, indeed, it is to find the son of a father who has himself done so much to lighten suffering and prolong life, showing such a bright promise in the cultivation of those pursuits and humanities which so powerfully contribute to dignify and adorn it. I am sure we shall hail with pleasure the promising career of such a son of such a sire. With respect to Mr. Gilbert, I feel it most gratifying to have our attention directed to so full and accurate a history of the city in which most of the assembly whom I see before me are now living, in which I myself have spent many eventful, and, I will add,

[To face page 105.

PROFESSOR HAUGHTON'S TABLE OF EXCRETION OF UREA IN GRAINS, FOUNDED ON QUANTITY OF URINE AND SPECIFIC GRAVITY.

SPECIFIC GRAVITIES.

	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	
20	35	36	43	57	71	85	100	103	106	119	130	136	142	151	160	196	233	241	249	257	265	274	276	278	279	280	**20**
21	37	38	45	59	74	89	105	108	111	124	136	142	149	158	168	205	245	253	261	269	278	288	290	292	292	294	21
22	38	40	47	62	78	93	110	113	116	130	143	149	156	166	176	215	257	265	274	282	292	301	303	305	306	308	22
23	40	41	49	65	81	97	115	118	121	136	149	156	163	173	184	225	268	277	286	295	305	315	317	319	320	322	23
24	42	43	51	68	85	10	120	123	127	142	156	163	170	181	192	235	280	289	299	308	319	329	331	333	334	336	24
25	43	45	53	71	88	106	125	129	132	147	162	170	177	188	200	245	291	301	311	321	332	342	345	347	348	350	**25**
26	45	47	55	73	92	110	130	134	137	153	169	176	184	196	208	254	303	313	324	334	346	356	359	360	362	364	26
27	47	49	57	76	95	114	135	139	143	159	175	183	191	213	216	264	314	325	336	347	359	369	372	374	376	378	27
28	48	50	59	79	99	118	140	144	148	165	182	190	198	221	224	274	326	337	349	360	372	383	386	388	390	392	28
29	50	52	61	82	103	122	145	149	153	171	188	197	205	228	232	284	337	349	361	373	386	397	400	402	404	406	29
30	52	54	64	85	106	127	150	155	159	177	195	204	213	226	240	294	349	361	374	386	399	411	414	416	418	420	**30**
31	54	55	66	87	109	131	155	160	164	182	201	210	220	233	248	303	361	373	386	398	412	425	428	429	432	434	31
32	55	57	68	90	113	135	160	165	169	188	208	217	227	241	256	313	373	385	398	411	425	438	442	443	446	448	32
33	57	59	70	93	116	140	165	170	175	194	214	224	234	249	264	323	384	397	411	424	438	452	455	457	460	462	33
34	58	61	72	96	120	144	170	175	180	200	221	231	241	256	272	333	396	409	423	437	451	466	469	471	474	476	34
35	60	63	74	99	124	148	175	180	185	206	227	238	248	264	280	343	407	421	436	450	464	479	483	485	488	490	**35**
36	61	64	76	102	127	153	180	185	191	212	234	244	255	271	288	352	419	433	448	462	477	493	497	499	502	504	36
37	63	66	78	105	130	157	185	190	196	218	240	251	262	279	296	362	430	445	461	475	490	507	510	513	516	518	37
38	65	68	80	108	134	161	190	195	201	224	247	258	269	286	304	372	442	457	473	488	503	520	524	527	530	532	38
39	67	70	82	111	138	166	195	200	206	230	253	265	276	294	312	382	453	469	486	501	516	534	538	541	544	546	39
40	69	72	85	114	142	170	200	206	212	236	260	272	284	302	320	392	465	482	498	514	530	548	552	555	558	560	**40**
41	71	73	87	116	145	174	205	211	217	241	266	278	291	309	328	401	477	494	510	527	543	562	566	568	571	574	41
42	74	75	89	119	148	178	210	216	222	247	273	285	298	317	336	411	489	506	523	540	557	575	580	582	585	588	42
43	75	77	91	122	152	182	215	221	228	253	279	292	305	324	344	421	500	518	535	553	570	589	593	596	599	602	43
44	76	79	93	125	156	186	220	226	233	259	286	299	312	332	352	431	512	530	548	566	584	603	607	610	613	616	44
45	78	81	95	128	160	191	225	231	238	265	292	306	319	339	360	441	523	542	561	579	597	616	621	624	627	630	**45**
46	80	82	97	130	163	195	230	236	243	271	299	312	326	347	368	450	535	554	573	592	611	630	635	638	641	644	46
47	82	84	99	133	166	199	235	241	249	277	305	319	333	355	376	460	546	566	586	605	624	644	648	652	655	658	47
48	84	86	101	136	170	203	240	246	254	283	312	326	340	362	384	470	558	578	598	618	637	657	662	666	669	672	48
49	85	88	103	139	174	207	245	251	259	289	318	333	347	370	392	480	569	590	611	631	651	671	676	680	683	686	49
50	87	90	106	142	178	212	250	257	265	295	325	340	355	377	400	490	581	602	623	644	665	685	690	694	697	700	**50**
51	88	92	108	144	181	216	255	262	270	301	331	346	362	385	408	499	593	614	635	656	678	699	704	708	710	714	51
52	90	94	110	147	185	220	260	267	276	307	338	353	369	393	416	509	605	626	648	669	692	712	718	721	724	728	52
53	92	96	112	150	188	225	265	272	281	313	344	360	376	400	424	519	616	638	660	682	705	726	731	735	738	742	53
54	94	98	114	153	192	229	270	277	286	319	351	367	383	408	432	529	628	650	673	695	718	740	745	749	752	756	54
55	95	99	117	156	195	233	275	283	292	325	358	374	390	415	440	539	639	662	685	708	732	753	759	763	766	770	**55**
56	96	100	119	159	199	238	280	288	297	331	364	380	397	423	448	548	651	674	698	720	745	767	772	776	780	784	56
57	98	102	121	162	202	242	285	293	303	337	371	387	404	430	456	558	662	686	710	733	758	781	786	790	794	798	57
58	100	104	123	165	206	246	290	298	308	343	377	394	411	438	464	568	674	698	723	746	772	794	800	804	808	812	58
59	102	106	125	168	209	251	295	303	314	349	384	401	418	445	472	578	685	710	735	759	785	808	814	818	822	836	59
60	104	108	128	171	213	255	300	309	319	355	391	408	426	453	480	588	697	722	748	772	798	822	828	832	836	840	**60**
61	106	109	130	173	216	259	305	314	324	360	397	414	433	460	488	597	708	734	760	784	811	836	842	845	850	854	61
62	108	110	132	176	220	263	310	319	329	366	404	421	440	468	496	607	719	746	772	797	824	849	856	859	864	868	62
63	109	112	134	179	223	267	315	324	335	372	410	428	447	475	504	617	730	758	785	810	838	863	869	873	878	882	63
64	110	114	136	182	227	271	320	329	340	378	417	435	454	483	512	627	742	770	797	823	851	877	883	887	892	896	64
65	112	116	138	185	230	276	325	335	345	384	423	442	461	490	520	637	754	782	810	836	864	890	897	901	906	910	**65**
66	114	118	140	187	234	280	330	340	351	390	431	448	468	498	528	646	766	794	822	849	877	904	911	915	920	924	66
67	115	120	142	190	237	284	335	345	356	396	437	455	475	505	536	656	778	806	835	862	891	918	925	929	934	938	67
68	116	122	144	193	240	288	340	350	361	402	443	462	482	513	544	666	790	818	847	875	904	931	939	943	948	952	68
69	118	124	146	196	244	292	345	355	367	408	449	469	489	520	552	676	802	830	860	888	917	945	953	957	962	966	69
70	120	126	149	199	248	297	350	361	372	414	456	476	497	528	560	686	814	843	872	901	930	959	966	971	976	980	**70**
71	121	127	151	201	251	301	355	366	377	419	462	482	504	536	568	695	826	855	884	913	943	973	980	984	990	994	71
72	122	128	153	204	255	305	360	371	382	425	469	489	511	544	576	705	838	867	896	926	956	986	994	998	1004	1008	72
73	124	130	155	207	258	310	365	376	388	431	475	496	518	551	584	715	849	879	909	939	969	1000	1007	1012	1018	1022	73
74	126	132	157	210	262	314	370	381	393	437	482	503	525	558	592	725	861	891	921	951	982	1014	1021	1026	1032	1036	74
75	128	134	159	213	266	318	375	386	398	443	488	510	532	566	600	735	872	903	934	964	995	1027	1035	1040	1046	1050	**75**
76	130	136	161	216	269	323	380	391	404	449	495	516	539	573	608	745	884	915	946	977	1008	1041	1049	1054	1060	1064	76
77	132	138	163	219	273	327	385	396	409	455	501	523	546	581	616	755	895	927	959	989	1021	1055	1062	1068	1074	1078	77
78	134	140	165	222	276	331	390	401	414	461	508	530	553	588	624	765	907	939	971	1002	1034	1068	1076	1082	1088	1092	78
79	136	142	167	225	280	336	395	406	420	467	514	537	560	596	632	775	918	941	984	1015	1047	1082	1990	1096	1102	1106	79
80	139	144	170	228	284	340	400	412	425	473	521	544	568	604	640	785	930	964	996	1028	1060	1096	1104	1110	1116	1120	**80**
	1003	**1004**	**1005**	**1006**	**1007**	**1008**	**1009**	**1010**	**1011**	**1012**	**1013**	**1014**	**1015**	**1016**	**1017**	**1018**	**1019**	**1020**	**1021**	**1022**	**1023**	**1024**	**1025**	**1026**	**1027**	**1028**	

SPECIFIC GRAVITIES.

FLUID OUNCES.

FLUID OUNCES.

happy years. I anticipate great additional interest to the walks, or rides, or drives which I may happen to take, by having it in my power to learn more of those objects of antique association, or of historic record, by which the capital and its delightful environs are so copiously studded. I only feel warranted in saying, further, that the pleasure with which I find myself amongst the members of this dignified Society is greatly enhanced on this occasion by our being met under the presidency of the Very Rev. Dean, in whom, besides his special adaptation for the immediate studies and pursuits which belong to this Institution, I have found, by competent experience, as complete a proficiency in all the branches of polished learning, in all the amenities of social intercourse, in true kindness and liberality of judgment, and in the benevolence and consistency of the whole Christian character. I beg to conclude by moving that the Addresses to which we have listened to-night may be printed.

The Rev. Samuel Haughton, M. A., F. R. S., Fellow of Trinity College, Dublin, read the following paper:—

Account of Experiments to determine the Velocities of Rifle Bullets commonly used.

The following experiments were made for the purpose of ascertaining the reason of the alleged inferiority of the belted spherical bullet, used with the two-grooved rifle, as compared with elongated bullets of different kinds. The guns compared are the following:—

1. A two-grooved rifle,—length, 31·50 inches; diameter, 0·66 inch; one turn in 4 feet.
2. The regulation Minié rifle,—length, 39 inches; diameter, 0·69 inch.
3. Police carbine,—length, 28·75 inches; diameter, 0·66 inch.

With these guns were used the following bullets:—

Two-grooved Rifle.—1. A Minié bullet, provided with two projections corresponding to the grooves of the rifle, without 'culots,' weight 697 grs.; 2. A sugarloaf bullet, fired point foremost, weight 669·75 grs.; 3. A belted spherical bullet, weight 482 grs.

Minié Rifle.—The Regulation Minié bullet, with 'culot,' weight 744 grs.

Carbine.—Spherical bullet, weight 391 grs.

The method employed to determine the velocity of the bullets was Robins' ballistic pendulum; and the same quantity of the best gunpowder (40 grs.) was employed with each gun and bullet.

For the erection of the pendulum, and most efficient assistance afforded in the conduct of the experiments, I am indebted to Mr. Joseph Harris, of the firm of Trulock and Son, Dawson-street, Dublin, without whose aid I should have been unable to bring these experiments to a successful issue.

I shall first give the details of the experiments, and then mention the principal deductions which may be obtained from them.

The formula used in calculating the velocity is the following :*—

$$v = \frac{gTa}{\pi fc} \times nb, \qquad (1)$$

where v = velocity of bullet in feet per second.
T = time of oscillation of pendulum.
a = distance of centre of gravity from axis of suspension.
π = ratio of circumference of a circle to its diameter.
f = distance from axis of gun attached to pendulum to axis of suspension.
c = distance from axis of suspension to point of attachment of tape, by which the recoil is measured.
n = ratio of weight of pendulum to weight of bullet.
b = chord of arc of recoil, measured by tape.

The two-grooved rifle barrel being firmly strapped with iron plates to the pendulum, the constants of the pendulum were carefully determined, and were as follows :—

g = 32·195 ft. π = 3·14159 Weight of pend. = 36·75 lbs.
T = 1·29 sec. f = 75·25 in.
a = 57·39 in. c = 78·25 in.

From these data we obtain (1)

$$v = 0{\cdot}12894 \times nb. \qquad (2)$$

The following Tables contain the results of the experiments made on the recoil of the two-grooved rifle with the three bullets already described :—

TABLE I.—*Minié Bullet.*

No.	n.	b.	v.
		In.	Ft.
1.	369	17·50	833
2.	. .	18·25	869
3.	. .	17·25	821
4.	. .	18·50	881
5.	. .	18·00	857
6.	. .	17·25	821

Mean velocity = 847 feet per second.

Mean quantity of motion, measured in avoirdupois pounds, moving through 1 foot per second = 84·33 lbs.

Mean quantity of Work = 1109 lbs. lifted one foot.

* Poisson, "Traité de Méchanique," vol. ii., p. 119.

TABLE II.—*Sugarloaf Bullet.*

No.	*n.*	*b.*	*v.*
		In.	Ft.
1.	384	17·50	866·2
2.	. .	17·00	841·5
3.	. .	17·37	859·8
4.	. .	17·75	878·6
5.	. .	17·62	872·3

Mean velocity = 863·7 feet.
Mean quantity of motion = 82·63 lbs.
Mean quantity of Work = 1108 lbs. lifted one foot.

TABLE III.—*Belted Bullet.*

No.	*n.*	*b.*	*v.*
		In.	Ft.
1.	533	14·75	1013·3
2.	. .	15·37	1055·9
3.	. .	14·75	1013·3
4.	. .	15·12	1038·7
5.	. .	14·37	987·2

Mean velocity = 1021·68.
Mean quantity of motion = 70·39 lbs.
Mean quantity of Work = 1116 lbs. lifted one foot.

The Minié regulation-rifle barrel having been attached to the pendulum, formula (1) was calculated with the following constants, and the results are given in Table IV.

The carbine barrel was then attached to the pendulum, and the recoil observed. The results are contained in Table V.

g = 32·195 feet. Weight of pend. and Minié barrel = 56·50 lbs.
T = 1·29 sec. Weight of pend. and carbine barrel = 55·25 lbs.
a = 61·75 in.
π = 3·14159.
f = 74 in.
c = 77 in.

From these constants we find

$$v = 0{\cdot}14326 \times nb. \qquad (3)$$

TABLE IV.—*Minié Regulation Rifle.*

No.	*n.*	*b.*	*v.*
		In.	Ft.
1.	531	12·25	931·90
2.	.	11·50	874·85
3.	. .	12·12	922·39
4.	. .	12·12	922·39
5.	. .	11·75	893·86

Mean velocity = 909·08 feet.
Mean quantity of motion = 96·63 lbs.
Mean quantity of Work = 1364 lbs. lifted one foot.

TABLE V.—*Carbine.*

No.	*n.*	*b.*	*v.*
		In.	Ft.
1.	989	9·00	1275·21
2.	. .	9·12	1292·92
3.	. .	8·75	1239·78
4.	. .	8·62	1222·07

Mean velocity = 1257·49 feet.
Mean quantity of motion = 70·24 lbs.
Mean quantity of Work = 1371 lbs. lifted one foot.

If we assume that the force developed by the explosion of the powder, diminished by the friction of the barrel, is constant, it is easy to deduce the following expression for the velocity :—

$$v = Q \times \sqrt{\frac{s}{m}}, \qquad (4)$$

in which Q denotes a constant depending on the quantity of powder and diameter of the rifle, s the length of the barrel, and m the weight of the bullet.

Taking the velocity of the belted bullet, 1021·7 feet, as our datum, and calculating the velocities of the others from (4), we find

TABLE VI.—*Theoretical and observed Velocities.*

	Calculated.	Observed.	Difference.
	Ft.	Ft.	Ft.
Minié bullet in 2-grooved rifle,	849·0	847·0	+ 2·0
Sugarloaf, ...	866·8	863·7	+ 3·1
Regulation Minié, ...	915·0	909·08	+ 5·92
Carbine bullet, ...	1083·7	1257·49	−173·79

The agreement of these results is very striking in the case of the rifles, and proves the truth of equation (4); and the disagreement in the case of the carbine proves, as might be expected, that the force of the powder is greater in the smooth bore than in the rifle. From the preceding results, we may assert, with confidence, that the velocity with which a bullet is propelled from a rifle by a given charge of powder depends mainly on the *weight of the bullet* and the *length of the barrel*,

varying *inversely* as the square root of the former, and *directly* as the square root of the latter.*

The following experiments were made to ascertain the resistance of the air to bullets of different figures and weights. The bullets were fired at 80 feet distance, from the two-groove rifle into the pendulum, and the velocities calculated from formula (1).

The constants of the pendulum were—

g = 32·195 feet. π = 3·14159.
T = 1·29 sec. c = 77 in.
a = 60 in. Weight of pend. after Exprs. = 51·20 lbs.

TABLE VII.—*Minié Bullet at* 80 *Feet.*

No.	*n.*	*b.*	*f.*	*v.*
		In.	In.	Ft.
1.	501	11·75	72·50	836·42
2.	502	11·87	71·00	864·54
3.	503	11·12	72·00	800·25
4.	504	11·00	69·00	827·68
5.	505	11·25	71·00	824·28
6.	507	11·37	69·00	860·61

Mean velocity = 835·62 feet.
Mean quantity of motion = 83·22 lbs.
Mean quantity of Work = 1080 lbs. lifted one foot.

TABLE VIII.—*Sugarloaf Bullet at* 80 *Feet.*

No.	*n.*	*b.*	*f.*	*v.*
		In.	In.	Ft.
1.	516	11·50	71·00	860·95
2.	517	11·37	71·00	852 87
3.	518	11·25	71·00	845·50
4.	519	10·62	67·75	838·05
5.	520	11·12	69·00	863·27

Mean velocity = 852·13 feet.
Mean quantity of motion = 81·53 lbs.
Mean quantity of Work = 1079 lbs. lifted one foot.

* The former of these laws was proved by Mr. Hutton to hold for smooth-bore guns of large size, but the latter did not hold true for his experiments. I suppose the reason it is nearer the truth in rifles is on account of the increased friction in the latter.

TABLE IX.—*Belted Bullet at* 80 *Feet.*

No.	*n.*	*b.*	*f.*	*v.*
		In.	In.	Ft.
1.	731	8·62	71·00	912·13
2.	732	8·25	69·00	901·58
3.	734	8·62	69·00	944·59
4.	735	7·62	66·00	874·15
5.	736	7·75	67·00	876·99

Mean velocity = 901·88 feet.
Mean quantity of motion = 62·23 lbs.
Mean quantity of Work = 869·7 lbs. lifted one foot.

Collecting the preceding results into one Table, we obtain—

TABLE X.

	Velocity at Muzzle.	Velocity at 80 Feet.	Quantity of Motion at Muzzle.	Quantity of Motion at 80 Feet.	Quantity of Work at Muzzle.	Quantity of Work at 80 Feet.
	ft.	ft.	lbs.	lbs.	ft. lbs.	ft. lbs.
Minié bullet (two-grooved), ...	847	835·62	84·33	83·22	1109	1080
Minié bullet (regulation), ...	909·08	. . .	96·63	. . .	1364	. . .
Sugarloaf bullet, . . .	863·7	852·13	82·63	81·53	1108	1079
Belted bullet, ...	1021·68	901·88	70·39	62·23	1116	869·7
Carbine bullet, . . .	1257·49	. . .	70·24	. . .	1371	. . .

From this Table it appears—

1st. That the quantity of motion communicated by a given quantity of powder to the Minié bullet, discharged from the regulation rifle, is greater than the quantity of motion possessed by any of the other bullets; this result being due partly to the greater weight of the bullet, and partly to the greater length of the rifle.

2nd. That the quantity of motion communicated to the belted bullet, discharged from the two-grooved or Brunswick rifle, is less than that possessed by the other rifle bullets, this result being due to the lesser weight of the belted bullet.

3rd. That the quantity of motion communicated to the carbine bullet is equal to that possessed by the belted rifle bullet, although the carbine is shorter and its bullet lighter; this result being due to the greater friction of the bullet in the rifled barrel.

4th. That in traversing 80 feet of still air, the quantity of motion of the Minié bullet is diminished by $\frac{1}{76}$th; of the sugarloaf bullet by $\frac{1}{75}$th; and of the belted bullet by $\frac{1}{86}$th,—the remarkable inferiority of the belted bullet being principally due to its shape, which appears to have been contrived so as to cause the maximum amount of resistance to its passage through the air.

5th. That the large stock of Brunswick two-grooved rifles constructed for the use of the British rifle service, might be made as useful as the regulation Minié rifles, by adapting to them a bullet of the proper weight, shaped like the Minié bullet, provided with two projections at the side to fit the grooves of the rifle, and used with or without the iron 'culot' of the French bullets.

The length of barrel of the Brunswick rifle is 30 inches, and the size of bore is 0·704 inch. Calculating from these data the weight of the ball which should be used with this rifle in order to produce the same quantity of motion as in the Minié regulation rifle, I find it to be 967 grs., or $7\frac{1}{4}$ balls to the pound. If Minié balls of this weight were constructed to suit the bore of the Brunswick rifle, and provided with projections or wings to fit the grooves, they would be as efficient as the regulation rifles of 39 inches in length.

6th. That the quantity of Work depends only on the gun and powder; being the same for the Minié bullet, the sugarloaf bullet, and the belted bullet, when fired from the same rifle, with the same charge of powder; and of the guns examined, being greatest for the carbine and Minié regulation rifle.

7th. That in traversing the same distance in air, the two elongated bullets suffered equally in quantity of Work; and much less than the belted bullet, which lost most Work. As the penetrating power of a bullet depends on the quantity of Work it contains, and on its shape, we can see in the last result a reason for the extraordinary and persistent power of penetration, at long ranges, which has been observed to reside in the Minié and conical rifle bullets.

In penetrating 80 ft. of still air:—

The Minié ball lost . . . 29 ft. lbs. of work, or $\frac{1}{38{\cdot}24}$th of initial Work.

The conical ball lost . . . 29 ft. lbs. of work, or $\frac{1}{38{\cdot}21}$th ,,

The belted ball lost . . . 246 ft. lbs. of work, or $\frac{1}{4{\cdot}53}$rd ,,

although the amount of Work residing in the three balls was practically the same at the muzzle of the rifle, and equal to 1111 ft. lbs.

8th. I have found from carefully conducted experiments, that a half-inch cylindrical, flat-headed, steel bolt, will penetrate the best Staffordshire crown plate, $\frac{5}{16}$ inch in thickness, if it be given 720 foot-pounds of Work.

The amount of Work in the rifle bullets just described is much greater than this, which may be taken as a unit of penetrating Work; and there is no reason why these balls should not penetrate iron plates of this thickness, if they were made of steel, instead of lead.

By the courtesy of the Ordnance Select Committee, I am enabled to compare with the preceding results obtained from small arms the more important results obtained, during the last year, from experiments made on heavy ordnance with Navez's electro-ballistic apparatus. I select the following from the velocities obtained with smooth-bore and rifled ordnance.

TABLE XI.—*Smooth-bore and Rifled Ordnance.*

	Nature of Ordnance.	Charge.	Projectile.		Initial Velocity.	Velocity at 90 Feet.
			Nature.	Weight.		
		lbs. ozs.		lbs. ozs.	ft. per sec.	ft. per sec.
I.	68-pr. 95 cwt., . . .	16 0	R. shot,	66 4	1579·0	1553·3
II.	,, ,, . . .	,, ,,	Nav. shot,	51 8	1809·9	1769·4
III.	,, ,, . . .	,, ,,	Com. shot,	49 14	1790·7	1750·3
IV.	12-pr. 18 cwt., . . .	4 0	Sol. shot,	12 10½	1769·8	1718·6
V.	12-pr. Armstrong, . .	1 8	S. shell,	11·75 lb.	1242·8	1233·2
VI.	20-pr. Armstrong, Land service, .	2 8	Shot,	21·20 ,,	1114·3	1107·2
VII.	20-pr. Armstrong, Sea service, .	2 8	Shot,	21·20 ,,	997·5	991·4
VIII.	40-pr. Armstrong, Land service, .	5 0	Shot,	41·50 ,,	1134·1	1128·2
IX.	100-pr. Armstrong, . .	12 0	Shot,	111·6 ,,	1124·7	1120 0
X.	100-pr. Armstrong, . .	12 0	C. shell,	103·8 ,,	1166·1	1161·4

From the preceding Table I have calculated the following results:—

TABLE XII.—*Work of Projectiles from Smooth-bore and Rifled Ordnance.*

	Ordnance.	Work at Muzzle.	Work at 90 Feet.	Difference.
I.	68-pr. R. shot, . . .	1145 tons lifted 1 ft.	1108 ft. tons.	37 ft. tons, or $\frac{1}{30·95}$
II.	,, Nav. shot, . .	1170 ,, ,,	1118 ,,	52 ,, $\frac{1}{22·50}$
III.	,, Com. shot, . .	1109 ,, ,,	1060 ,,	49 ,, $\frac{1}{22·63}$
IV.	12-pr. Sol. shot, . .	274·8 ,, ,,	259·8 ,,	15 ,, $\frac{1}{18·32}$
V.	,, Armstrong, S. shell, .	125·8 ,, ,,	123·9 ,,	1·9 ,, $\frac{1}{66·2}$
VI.	20-pr. Armstrong, Land-service shot, .	182·5 ,, ,,	180·2 ,,	2·3 ,, $\frac{1}{79·3}$
VII.	,, Armstrong, Sea-service shot, .	146·2 ,, ,,	144·4 ,,	1·8 ,, $\frac{1}{81·2}$
VIII.	40-pr. Armstrong, Land-service shot, .	370·0 ,, ,,	366·2 ,,	3·8 ,, $\frac{1}{97·4}$
IX.	100-pr. Armstrong shot, .	978·6 ,, ,,	970·4 ,,	8·2 ,, $\frac{1}{119·3}$
X.	,, Armstrong C. shell, .	978·4 ,, ,,	970·6 ,,	7·8 ,, $\frac{1}{125·4}$

APPENDIX A.—*Abstract showing the Mean Initial Velocities of various Service and Experimental Projectiles, determined by Captain Andrew Noble, R. A., under direction of the Ordnance Select Committee, by means of Navez's Electro-Ballistic Apparatus.*

Nature of Ordnance.	No. of Rounds.	Charge.	Projectile. Nature.	Weight.	Diam.	Velocity at 30 Yards.	Initial Velocity.	REMARKS.
		lbs. oz.		lbs. oz.	in.	ft.	ft.	
10-in. gun, 87 cwt.	10	12 0	Hol. shot,	88 5	9·84	1270·4	1292·3	Experiments to ascertain the initial velocity of projectiles fired with Service charges from Service guns.
,, ,,	5	8 0	Martin's shell,	117 0	9·84	930·1	940·6	
68-pr., 95 cwt. .	12	16 0	R. shot,	66 4	7·91	1553·3	1579·0	
,, ,, . .	7	16 0	Nav. sh.,	51 8	7·91	1769·4	1809·9	
,, ,, . .	9	16 0	Com. sh.,	49 14	7·91	1750·3	1790·7	
,, ,, . .	5	10 0	Martin's shell,	60 0	7·84	1287·6	1308·5	
8-in. gun, 65 cwt.	5	10 0	Com. sh. Hol. sh.	46 0	7·85	1455·0	1487·9	
,, ,, . .	5	10 0	Com. sh.,	49 14	7·85	1434·6	1464·4	
,, ,, . .	5	10 0	Martin's shell,	51 8	7·92	1475·8	1506·4	
32-pr., 58 cwt. .	10	10 0	Solid shot,	31 6	6·17	1653·7	1690·0	
,, ,, . .	11	8 0	,,	31 6	6·17	1584·7	1618·7	
,, ,, . .	11	6 0	,,	31 6	6·17	1418·8	1447·5	
24-pr., 50 cwt. .	11	8 0	,,	23 8	5·60	1679·5	1720·5	
18-pr., 57 cwt. .	12	6 0	,,	17 11	5·09	1646·8	1690·6	
12-pr., 18 cwt. .	10	4 0	,,	12 10½	4·52	1718·6	1769·8	
9-*pr. brass, smooth,* 13½ *cwt.* . . .	4	0 14	*R. shot,*	9 5	4.08	At 25 yds. 1011.2	1101.6	
,, ,, .	3	1 8	,,	9 5	4.08	1310.9 At 30 yds.	1444.0	
9-pr., 13 cwt., .	10	2 8	Solid shot,	9 5¾	4·10	1563·9	1613·7	
6-pr., 6 cwt., . .	10	1 8	,,	6 3¾	3·57	1435·3	1484·5	
12-pr. hr., 6½ cwt.,	10	1 4	Com. sh.,	8 12	4·55	1124·2	1163·4	
24-pr. hr., 12 cwt.,	10	2 8	,,	16 11½	5·595	1218·0	1252·7	
Wall piece, . .	8	drs. 8	Shot,	0 5¼	0·935	1134·8	1167·6	

Nature of Ordnance.	No. of Rounds.	Charge.	Projectile. Nature.	Weight.	Diam.	Velocity at 30 Yards.	Initial Velocity.	REMARKS.
		drs.		gr.	in.	ft.	ft.	
Enfield rifle, . .	3	2·5	Ser. ball,	530	0·55	1188·7	1272·8	Experiments to ascertain the initial velocity of projectiles fired with Service charges from Service guns.
		lbs. oz.		lbs. oz.				
6-pr. A., 3½ cwt.,	15	0 12	Seg. sh.,	6 0	2·585	937·5	946·4	
12-pr. A., 8½ cwt.,	10	1 8	,,	11 9	3·084	1180·9	1190·2	
12-pr. A., 8½ cwt.,	21	1 8	,,	10 14½	3·084	1187 5	1197·4	Preliminary experiments with 12-pr. Armstrong gun.
,, ,, .	11	1 8	,,	11 13	3·083	1181·5	1190·6	Experiments to ascertain the initial velocity of the 12-pr. Armstrong projectile in function of the weight of the shot.
,, ,, .	5	1 8	,,	11 9	3·083	1195·4	1204·8	
,, ,, .	6	1 8	,,	11 5	3·084	1190·8	1200·4	
,, ,, .	7	1 8	,,	11 1	3·083	1205·6	1215·6	
,, ,, .	11	1 8	,,	11 13	3·084	1164·5	1173·4	
,, ,, .	11	1 8	,,	11 5	3·084	1192·9	1202·5	
,, ,, .	10	1 8	,,	10 13	3·084	1209·8	1220·1	
,, ,, .	10	1 4	,,	11 9	3·084	1055·3	1063·1	Experiments to ascertain the initial velocity of the 12-pr. Armstrong projectile in function of the weight of the charge.
,, ,, .	10	1 6	,,	11 9	3·085	1092·4	1100·7	
,, ,, .	10	1 8	,,	11 9	3·084	1180·9	1190·2	
,, ,, .	10	1 10	,,	11 9	3·084	1224·8	1234·6	
,, ,, .	10	1 12	,,	11 9	3·084	1262·0	1272·2	
,, ,, .	10	0 14	,,	11 9	3·084	803·8	809·2	Experiments to ascertain the initial velocity of the 12-pr. Armstrong projectile in function of the weight of the charge (2nd series).
,, ,, .	10	1 0	,,	11 9	3·084	863·9	870·0	
,, ,, .	10	1 2	,,	11 9	3·084	924·6	931·1	
,, ,, .	10	1 4	,,	11 9	3·084	997·8	1005·1	
,, ,, .	10	1 6	,,	11 9	3·084	1050·2	1058·0	
,, ,, .	10	1 8	,,	11 9	3·084	1106·4	1114·8	
,, ,, .	10	1 10	,,	11 9	3·084	1178·0	1187·3	
,, ,, .	5	1 8	,,	11 9	3·080	1184·1	1193·4	Low gauge; bore washed.
,, ,, .	6	1 8	,,	11 9	3·085	1177·2	1186·5	High gauge do.
,, ,, .	11	1 8	,,	11 9	3·080	1184·1	1193·4	Low gauge; lubricating wads.
,, ,, .	8	1 8	,,	11 9	3·085	1187·8	1197·1	High gauge; do.
,, ,, .	15	1 8	,,	11 9	3·072	1154·2	1163·2	Experiments to ascertain the difference between the initial velocities of high and low gauge 12-pr. Armstrong projectiles, and also the effect of lubricating wads.
,, ,, .	14	1 8	,,	11 9	3·085	1157·1	1166·1	G. pattern shell; lubricat[g] wads.
,, ,, .	13	1 8	,,	11 9	3·085	1142·0	1150·8	Service shell; do.
,, ,, .	10	1 8	,,	11 9	3·072	1140·6	1149·4	Do. bore washed. / G. pattern shell no wads.

Experiments to ascertain the difference between the initial velocities of old and new pattern 12-pr. A. shells, with or without lubricat'g wads.

Nature of Ordnance.	No. of Rounds.	Charge.	Projectile. Nature.	Weight.	Diam.	Velocity at 30 Yards.	Initial Velocity.	REMARKS.
		lbs. oz.		lbs. oz.	in.	ft.	ft.	
12-pr. A., 8½ cwt.,	7	1 2	Seg. sh.	9 0	3·074	1130·0	1141·2	Experiments to ascertain the initial velocity of a 9 lb. shell fired with a charge of 1 lb. 2 oz. from a 12-pr. gun.
,, ,,	5	1 8	,,	9 0	3·074	1322·2	1336·3	Experiments to ascertain the initial velocity of projectiles fired from a 12-pr. Armstrong gun in function of the weight of the projectile.
,, ,,	6	1 8	,,	11 9	3·084	1227·4	1237·2	
,, ,,	6	1 8	,,	24 6	3·084	853·9	856·7	
,, ,,	6	1 8	,,	35 14	3·084	720·0	721·5	
,, ,,	5	1 8	,,	47 13	3·084	613·9	614·8	
32-pr. rifled shunt gun, 59 cwt.	4	5 8	Pl. shells,	54·0	6·35	1215·7	1224·5	Experiments to ascertain the initial velocity of a projectile fired from a rifled, and of one of the same weight and form fired from a smooth-bored gun.
,, ,,	3	5 8	,,	54·0	6·35	1122·1	1136·3	
32-pr., 59 cwt., smooth,	8	5 8	,,	54·0	6·35	1187·4	1201·7	
32-pr. rifled shunt gun,	4	5 8		54·0	6·35	1054·6	1061·7	Cartridge, 12 in. long.
,,	3	5 8		54·0	6·35	1076·8	1084·2	,, 9 ,,
,,	1	5 8		54·0	6·35	1102·2	1109·8	,, 8 ,,
,,	1	5 8		54·0	6·35	1114·5	1122·3	,, 7½ ,,
,,	2	5 8		54·0	6·35	1187·9	1196·4	,, 6 ,,
								Experiments to ascertain the initial velocities of projectiles fired from a 32-pr. rifled shunt gun, with charges made up in cartridges of various lengths.
12-pr. A., 6 cwt.,	8	1 6		11 9	3·074	1103·4	1111·8	Experiments to ascertain the initial velocity of a 12-pr. Armstrong shell fired from a 12-pr. gun of 6 cwt.
12-pr. A., 8½ cwt.,	4	1 8		11 9	3·074	1238·3	1248·2*	Experiments to ascertain the effect of diminishing the lead on the base of the 12-pr. Armstrong projectile.
,, ,,	2	1 8		11 9	3·010	1200·2	1209·7†	
,, ,,	2	1 8		11 9	3·010	1163·7	1172·8‡	
,, ,,	2	1 8		11 9	3·010	1089·6	1097·9§	

* Shell fired under normal circumstances.

† Same shell, lead reduced to the same diameter as the gun with the exception of a ring 0·25 inch broad at the base of the original dimensions.

‡ Shell reduced throughout to the diameter of the bore of the gun.

§ Same as last, but a different description of powder employed.

(Signed) ANDREW NOBLE.

APPENDIX B.—*Abstract showing the Results of Experiments with Armstrong Guns, carried on at Shoeburyness, with Navez's Electro-Ballistic Apparatus, by Lieut. W. H. Noble, R. A., under the direction of the Ordnance Select Committee; September and October*, 1861.

Nature of Gun.	No. of Gun.	Calibre in Inches.	Length of Bore in Calibres.	No. of Rounds.	Charge.	Projectile.			Velocity at 30 Yards from Muzzle.	Initial Velocity.	REMARKS.
						Nature.	Weight.	Diameter.			
					lbs. oz.		lbs.	inches.			
12-pr., ...	8	3·00	24·5	28	1 8	S. shell,	11·75	3·074	1233·2	1242·8	Three rounds, fired with every gun for comparison.
20-pr., Land Service, .	40	3·75	22·4	5	2 8	Shot,	21·2	3·836	1107·2	1114·3	
20-pr., Land Service, shortened 6 in., .	27	3·75	20·8	6	2 8	,,	21·2	3·836	1098·4	1105·4	6 in. were blown off the muzzle of this gun at practice.
20-pr., Sea Service, .	13	3·75	14·4	5	2 8	,,	21·2	3·836	991·4	997·5	
40-pr., Land Service, .	35	4·75	22·4	5	5 0	,,	41·5	4·836	1158·2	1164·4	
40-pr., shortened, . .	136	4·75	17·6	5	5 0	,,	41·5	4·836	1128·2	1134·1	
100-pr. howitzer, . .	—	7·00	10·6	6	9 0	C. shell,	103·8	7·088	949·4	953·4	
100-pr., ...	91	7·00	14·2	6	12 0	Shot,	111·6	7·088	1120·0	1124·7	
,, .	91	7·00	—	6	12 0	C. shell,	103·8	7·088	1161·4	1166·1	

Powder.

L.G.R. / A4 29 5 61

Lot 333.

KO,NO_5, . .	75·35
S, . .	10·28
C, . .	13·82
Moisture, . .	0·35
	100·0

All the Guns were fired with Service charges and the Service wad. The first rounds were neglected in taking a mean, as the velocity was found to be much greater after the gun had been lubricated.

WILLIAM H. NOBLE, Lieut. R. A.

Woolwich, October 23, 1861.

The ballots for the annual election of President, Council, and Officers, having been scrutinized in the face of the Academy, the President reported that the following gentlemen were duly elected :—

PRESIDENT.—The Very Rev. Dean Graves, D. D.

COUNCIL.—Rev. George Salmon, D. D.; Rev. Samuel Haughton, M. A.; Rev. J. H. Jellett, M. A.; Robt. W. Smith, M. D.; Rev. H. Lloyd, D.D.; William K. Sullivan, M. D.; and Robert M'Donnell, M. D.: on the Committee of Science.

Rev. Samuel Butcher, D.D.; Rev. Joseph Carson, D. D.; John F. Waller, LL.D.; John Kells Ingram, LL. D.; Digby P. Starkey, Esq.; John Anster, LL. D.; and the Right Hon. Joseph Napier, LL. D.: on the Committee of Polite Literature.

John T. Gilbert, Esq.; Rev. William Reeves, D. D.; Eugene Curry, Esq.; William R. Wilde, Esq.; George Petrie, LL. D.; W. H. Hardinge, Esq.; and the Right Hon. Lord Talbot de Malahide: on the Committee of Antiquities.

TREASURER.—Rev. Joseph Carson, D.D.

SECRETARY OF THE ACADEMY.—Rev. William Reeves, D. D.

SECRETARY OF THE COUNCIL.—John Kells Ingram, LL. D.

SECRETARY OF FOREIGN CORRESPONDENCE.—Rev. Samuel Butcher, D. D.

LIBRARIAN.—John T. Gilbert, Esq.

CLERK, ASSISTANT LIBRARIAN, AND CURATOR OF THE MUSEUM.—Edward Clibborn, Esq.

MONDAY, APRIL 14, 1862.

The VERY REV. CHARLES GRAVES, D. D., President, in the Chair.

Andrew Armstrong, Esq.; John Campbell, Esq., M. B.; John Stratford Kirwan, Esq.; and George Porte, Esq., C.E.; were elected members of the Academy.

Mr. J. T. GILBERT, on the part of R. R. MADDEN, Esq., read the following paper :—

ON CERTAIN CROMLECHS IN NORTHERN AFRICA.

(Plate XVI.)

IN the month of December, 1861, while sojourning in Algiers, the existence in that colony of some ancient Pagan monuments of supposed Druidical origin was brought to my knowledge by a brief notice of them in the "Revue Africaine," for Nov., 1861 (No. 30, p. 38)—an archæological journal of considerable merit, published in Algiers, under the direction of the President of the "Societé Historique Algerienne," Monsieur Berbrugger, an eminent antiquarian and oriental scholar. Referring to the

locality named El-Kalaa, M. Berbrugger says,—"Leaving the village of Cheragas, we come to a road which leads to Guyotville, by the communal district called Bainen, where the Druidical monuments are to be found of El-Kalaa, of which I have given a description in a memoir addressed to the Governor-general, the 22nd February, 1856 (numbered 14), and which will be soon published in the 'Revue Africaine'" (but which I have to add never has been published). The writer further adds, that in the vicinity of Guyotville is the district of Haouche Khodja-Biri, and on the left of it is the Koubba de Sidi-Khelef. Shaw, the English traveller, he continues, states that he saw from this place certain tombs surmounted by a large stone, in each of which tombs three human bodies might be placed. Shaw's account, M. Belbrugger remarks, applies very probably to the *Dolmens* of El-Kalaa.

The precise words of Shaw, in his "Travels in Barbary and the Levant," fol., 1738, p. 67, in reference to these monuments, are the following:—"We meet with several pieces of Roman workmanship between Seedy Ferje and Algiers; and near the tomb of Seedy Hallef, another Marabout, we fall in with a number of graves covered with large flat stones, each of them big enough to receive two or three bodies."

I regret to say, Shaw's reference to "the graves" he saw in this locality, which I have no doubt are "the Druidical monuments" or "Dolmens" noticed by M. Belbrugger, is quite as unsatisfactory as the notice of these monuments by the latter gentleman. Nor did a personal interview with him make any addition to my information respecting the Druidical monuments noticed by him, beyond the facts that they were in every respect identical with the rude Pagan monuments, designated Druids' altars, or sepulchral stones of Druidical origin, existing in Brittany, and that the number of them existing at Bainen long after the French occupation of Algeria could not be under *one hundred and fifty*; but that a colonist, a French farmer, who had obtained from the government a grant of the land on which these monuments stood, had destroyed all of them with the exception of thirteen, which were then in a perfect state of preservation.

I set out to visit these remains, accompanied by my son, Dr. T. M. Madden, the day following this interview. Although the distance from Algiers to Bainen is only about thirteen miles (in a westerly direction), after leaving Cheragas the road is so bad, and so many *detours* have to be made after much rain, that the journey in a caleche with three horses, takes nearly three hours and a half, and the distance of it may be set down at sixteen or seventeen miles. To give a more distinct idea of the situation of those monuments, I may state they exist rather more than halfway between Algiers and Sidi Ferruch, where the French army disembarked in 1830, and about one mile and a half inland to the south from the village of Guyotville, formerly named Ain-Benian on the coast.

On our arrival at the place where the monuments designated *Dolmens*, of supposed Druidical origin, exist, we proceeded to the house of the colonist, Monsieur Mareschal, who is the proprietor of the lands, the

locality of which is named Bainen. He conducted us to an eminence not far distant from the house, situated on a table-land about 650 feet above the level of the sea (the neighbouring town of Cheragas is 198 metres, or about 616 feet, above the sea). There, to my great astonishment, I found thirteen cromlechs, in all important respects identical with our Irish monuments of that name, within an area certainly not extending above a quarter of a mile in any direction; and within a range of about double that distance, I discovered the remains of twenty of those monuments recently demolished or partially destroyed; and in a wider range of view that the proprietor pointed out to me, clearly defined, and within the limits of his own lands, he showed me the several localities where upwards of *one hundred and eighty* more of these Dolmens, as he alleged, were in existence when he took possession of the land, but where they exist no more; for with the sanction of the government, and as it was stipulated in the terms of the concession obtained by him, *he was allowed by the authorities to demolish all these monuments, and to appropriate the materials to building purposes, and the making and repairing of paths and roads, with the exception of thirteen.* The latter number, he said, the authorities obliged him to leave on the ground and to preserve. So much for the march of civilization in a French colony, and the military administration of a country recently rescued from a *regime* of barbarism.

The existing monuments (Dolmens as they are termed) are generally in a direction (though not exactly so) north and south, the apex or uplifted end that tapers towards a point, in most of them, being to the south or south-east. The covering slab of unhewn rock rests in a slanting direction on supporters likewise of unwrought stone of various numbers, set up on their edge. The inclination of the covering slab varies considerably, but it is quite obvious in all. There were no appearances of grooved channels on the face of any of them; round one, the remains were still distinguishable of a circle of upright stones. The proprietor of the ground informed me there were several of those circles of stone; but they had been broken down and removed by him, along with the Dolmens they surrounded, when he cleared the land.

On the surface of the ground, within the space covered by the great slanting mass of superincumbent stone, in several of these monuments there are fragments of human bones, and evidences in the soil of excavations having been recently made there. The present proprietor informed me he had excavated several, and found urns of various sizes of baked clay, some containing fragments of bone, others ashes and small pieces of bones mixed with clay. He had found in them also beads and bracelets, several implements of bronze, but of the nature of these it was impossible to get any intelligible or reliable account. He had sent these objects, he said, and the urns found with them, to a friend in Algiers, to deposit in the Museum, but they had never reached their destination there. He possessed, at the time of my visit, only one small urn, which he had recently found in one of the demolished Dolmens; and this, with

some fragments of bones, evidently of great antiquity, both of human beings and of animals, I purchased from him.*

Surrounding the Dolmen still existing, where many fragments of very ancient bones are lying within the space covered by the great sloping cover, the proprietor says there existed a circle of stones much smaller than those which are the side supporters of this monument. The remains of some of the stones of this circle are still to be seen, not above two feet from the soil in which they are imbedded. The covering slab of one of the largest of the existing Dolmens is nine feet and a half in length, and the same in breadth at the base. It has three supporters on each side. The height of the space at the entrance between the great sloping covering stone is four feet and a half high. The thickness of the great slab at the base is eighteen inches.

I regret that my state of health did not allow me to make more extensive researches, and to give more ample and exact details of measurements and positions. Enough, I trust, has been done in this statement of my observations on the spot where these monuments exist, to show the identity of the monuments designated Dolmens, with our cromlechs.†

I may observe, that after visiting those African monuments I addressed a letter to M. Belbrugger, the principal editor of the "Revue Africaine," and president of the Societè Historique Algerienne, expressing my astonishment as a foreigner—not considering myself privileged to

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* With respect to the urns above referred to, I may observe that the following notice of objects of antiquity found in those monuments, at Ain Benain, is given in the Catalogue of the Musée of Antiquities of Algiers, entitled "Livret Explicatif." Par A. Berbrugger. At page 86 :—

"Ain-Benian (Guyotville).

"222. Hachétte celtique, en pierre noire polie
"Trouvée dans les sépultures celtiques d'El Kalaa, dans le Baïnen.
"222. (Bis) Hachétte, semblable à la précédente et de même origine.
"221. Cinq daras de flêche en silex.
"Même provenance que devant.
"220. Couteau en silex.
"Même provenance que devant.
"219. Hachétte celtique en jade, trouvée dans les dolmen d'El Kalaa.
"Vendu par M. Godard ainsi que les objets précédents de même provenance.
"231. Fragments de crânes humains, trouvés en Mai, 1857, dans les dolmen d'El Kalaa, et donnés par M. Matelat, juge au tribunal civil d'Alger.
"160. Objets trouvés par le colon Marchal dans les dolmen du Baïnen, à El Kalaa :—
"1°. Quatre petits vases gaulois en terre,
"2°. Deux bracelets en bronze.
"3°. Divers fragments en cuivre et en plomb.
"4°. Deux petites fibules en bronze.
"5°. Un crâne hummaine et unâchoir."

† The etymology of the term *Dolmen* is thus given by the learned author of "L'Archeologie Chretienne," in the "Vocabulaire des Mots Techniques" of that work (5ieme ed. 8vo, Tours, 1854, p. 358):—"*Dolmen* monument Druidique qu'on pense generalement avoir servi d'Autel; *Dol*, table, *Maen*, *Men*, pierre."

use the word indignation — at the destruction of those monuments with the express sanction of the ruling powers of the colony—monuments which had survived the ravages of time and war probably for more than two thousand years, and all the barbarism of the various tribes and races of Mauritania and Numidia, that have sojourned in, or swept over those regions of northern Africa for many hundreds of years past. M. Belbrugger made me no reply, being, perhaps, fortunately ignorant of the reprisals that might be made on any complaints like mine against the barbarisms of civilization in a French possession in respect to modes of dealing with monuments of antiquity of great value and historical interest.

The preceding notice, I believe, is the first given in our country to British archæologists of cromlechs existing in Africa. Of their existence in Palestine they have a knowledge from the following description of such monuments in the travels of Captains Irby and Mangles:—

"On the banks of the Jordan, at the foot of the mountain, we observed some very singular, interesting, and certainly very ancient tombs, composed of great rough stones, resembling what is called Kit's Coty House (a well-known cromlech in Kent). They are built of two long side stones, with one at each end, and a small door in front, mostly facing the north: this door was of stone. All were of rough stones, apparently not hewn, but found in flat fragments, many of which are found about the spot in huge flakes. Over the whole was laid an immense flat piece, projecting both at the sides and ends. What rendered these tombs the more remarkable was, that the interior was not long enough for a body, being only five feet. This is occasioned by both the front and back stones being considerably within the ends of the side ones. There are about twenty-seven of these tombs, very irregularly situated."

The authors designate these monuments, "oriental tombs."

But who were the Africans of that region, in the vicinity of the ancient Icosium (the supposed site of which is Algiers), by whom such numerous monuments of the highest antiquity, and so entirely identical with our cromlechs, were erected? What notices are to be found in our ancient annals of any relations of the early inhabitants of this country with those of Africa?

In Keating's "Complete History of Ireland," translated from the Irish by Haliday, 8vo. Dub. 1811, we find (vol. i. chapters 6, 7, 8, and 9), several references to "African pirates," sometimes denominated Fomorians, who, within a period of three hundred years after the flood, had arrived in Ireland, eventually became masters of all the colonized portion of the island, and were, after a short time of domination, expelled by new invaders.

In the second section of chapter 2, we are told that "Ireland was an uninhabited desert for the space of three hundred years (after the flood), until Paralon (the Partholanus of other writers), son of Shara, son of Sru, son of Esru, son of Frament, son of Fahaght, son of Magog, son of Japhet, came to take possession of it." . . . "This induces me to

think," adds Keating, "that it was two-and-twenty years before Abraham was born that Paralon came into Ireland, and in the year of the world 1978." . . . .

Then we are told that Paralon, who was accompanied by his family and a thousand soldiers, "began his journey from Migdonia in the middle of Greece," and established his colony at Inish Samer, near Errie.

"Some authors," says Keating, "mention another colonization of Ireland (previous to that of Paralon), namely, by Keecol, son of Nil, son of Garv, son of Uamor, whose mother was Lot-Luavna, and they lived two hundred years by fishing and fowling. Upon the arrival of Paralon in Ireland, a great battle was fought between them at Moy Lhha, when Keecol fell, and the pirates were destroyed by Paralon. The place where Keecol landed with his followers was Inver Downan; his fleet consisted of six ships, in each of which were fifty men and fifty women." . . . .

"The reason," we are told, "why Paralon came to Ireland was because he slew his father and mother in hopes of obtaining the government from his brother, after which base murder he fled to Ireland; but the Lord sent a plague, which, in the short space of one week, carried off nine thousand of his posterity at the hill of Howth."

Paralon, we are informed, "died in the old plains of Moynalta of Howth, and was buried there." . . . "The death of Paralon happened about thirty years after his arrival in Ireland. This event took place, as some antiquaries affirm, in the year of the world 2628, although I am induced to believe, from what has been said before, that there were only 1986 years from the creation of the world to the decease of Paralon."—Keating, vol. i. page 171.

In chapter vii. vol. i. p. 179, we are informed Ireland was without inhabitants for thirty years after the extinction of the colony, till Nevvy, the Nemedius of other writers, came to Ireland with his people from Scythia, by the Euxine Sea, with a fleet of thirty-four transports, with thirty men in each. Some years after his arrival, we are told, "Nevvy built two royal mansions in Ireland—the fort of Kinneh, in Hy-Nellan, and the fort of Kimbæh, in Shevny. The four sons of Madan Thickneck (Munreamhair), of the Fomorians, reared fort Kinneh in one day. Their names were Bog, Rovog, Ruvney, and Rodan; and Nevvy (Nemedius), slew them the next morning in Derrylee, lest they should resolve on destroying the fort again, and there he buried them."—*Ib.* vol. i. p. 179.

The battles fought by Nevvy with the Fomorians, we are told, ended in their subjugation. Keating then gives the following account of the latter:—

"These were navigators of the race of Cham, who, sailing from Africa, fled to the Islands of the West of Europe toward the descendants of Shem, and to make a settlement for themselves; fearing these would enslave them, in vengeance for the curse pronounced by Noah against Cham their ancestor, for they thought by making a settlement remote from them to be secure from their oppression. On this account they

came to Ireland, and were vanquished by Nevvy in three battles, viz., the battle of Slievbloom, the battle of Rossfræhan, in Conacht, wherein fell Gonn and Gannan the two leaders of the Fomorians; and the battle of Murvolg, in Dalriada, or Ruta, where Starn, son of Nevvy, fell by Coning, son of Fævar, in Lehidlactmoy; he also fought the battle of Cnavross, in Leinster, where there was slaughter of the Irish, led on by Nevvy's own son Arthur, born to him in Ireland, and by Ivcon, son of Starn, son of Nevvy.

"After this Nevvy died of a plague in the island of Nevvy's grave, in Leehan's county, in Munster, now called the Island of Barrymore, and with him two thousand of his people, men and women.

"After Nevvy's death, great tyranny and oppression was exercised over his followers in Ireland by the Fomorians, in vengeance of those defeats by Nevvy, which we have just related."—*Ib.* vol. i. p. 179.

The Fomorians of Morc and Coning, of Tory Island (or, as some call it, Tor Conuing), in the north of Ireland, entirely subdued the old inhabitants, and made them tributaries. The Fomorian conquerors, having fitted out several ships, and collected large bodies of soldiers, began to oppress the unfortunate Nemedians, obliging them at a fixed period every year to pay a heavy tribute, and to deliver up not only contributions of cattle and produce, but even of their children.

The mode of levying and collecting contributions, described by Keating, might serve for an account of the same system of imposing and enforcing tribute in many parts of Northern Africa in much later times. The Nemedians, at length, unable to bear the rapacity of their tyrants, made a vigorous and nearly successful effort to drive them out of the country.

"These people," says Keating, "were denominated Fomorians, i. e. sea robbers or pirates; for the term signifies powerful at sea, or seafaring men."—*Ib.* vol. i. p. 181.

The Nemedians at length made a formidable resistance, were successful for some time, and in their turn oppressed the Fomorians.

On the news of the disasters sustained by the latter reaching their countrymen in Africa, as it would appear, the latter fitted out a fleet, set sail from an African port, and landed on the Irish coast. How strongly is the reader of the wars of Grenada reminded of the several expeditions attempted or undertaken in Northern Africa for the relief of the Moors in the various settlements on the shores of Andalusia!

The fleet from Africa, of sixty sail, with a numerous force, arrived on the northern coast of Ireland. Another fierce battle was fought, in which the Nemedians were entirely defeated. Most of the survivors of this colony contrived to escape from the country; and the remnant of them, who were left in servitude, continued to exist in this miserable state till the arrival of the Firbolg invaders in Ireland, 216 years after Nemedius first arrived upon the coast.*

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* Keating, vol i. p. 187.

So far my notice of the African pirates has been from Keating's History. I must now refer to the Annals of the "The Four Masters," edited by our lamented and illustrious associate, O'Donovan, for some details additional to those of Keating, and in some respects at variance with them.

Thus we are informed, in the Annals:—

"From the deluge until Parthalon took possession of Ireland, 278 years, and the age of the world when he arrived in it, 2520." . . .

"The age of the world, 2530. In this year the first battle was fought in Ireland, i. e. Cical Grigenchosach, son of Coll, son of Garbh, of the Fomorians, and his mother, came into Ireland eight hundred in number, so that a battle was fought between them (and Parthalon's people) at Sleamhnai-Maighe-Ithe, where the Fomorians were defeated by Parthalon, so that they were all slain. This is called the battle of Magh-Ithe."

Then, in the age of the world, 2550, we are told Parthalon died.

Under date, Anno Mundi, 2820, the destruction of the remnant of the colony of Parthalon is mentioned, and the fact of their having passed three hundred years in Ireland. Then, we are told "Ireland was thirty years waste till Neimhidh's arrival."

"Age of the world, 2850, Neimhidh came to Ireland." . . . .

Subsequently to 2859, A. M., but the precise year not specified, three battles of Neimhidh with the Fomorians, and his victories over the latter, are recorded. Then the death of Neimhidh, of a plague, with three thousand of his followers, is recounted; and next, in the year of the world, 3066, we are told:—

"The demolition took place of the tower of Conainn (on Tory Island, off the county of Donegal), by the race of Neimhidh against Conainn, son of Fæbhar, and the Fomorians in general, in revenge for all the oppression they had inflicted upon them (the race of Nemhidh), as is evident from the chronicle which is called Leabhar-Gabhala; and they nearly all mutually fell by each other; thirty persons alone of the race of Neimhidh escaped to different quarters of the world, and they came back to Ireland some time afterwards as Firbolgs. Two hundred and sixteen years Neimhidh and his race remained in Ireland. After this Ireland was a wilderness for a period of two hundred years."

"The age of the world, 3260. The Firbolgs took possession of Ireland at the end of this year."

Thus far for the references in the Annals of "The Four Masters" to the Fomorians.

The Abbé M'Geoghegan, in his "Histoire d'Irelande," names the victors and oppressors of the Nemedians, "the Fomorians, or Fomhoraigs." But of their former marauding pursuits and African descent he makes no mention, neither do the authors of the "Annals of Ireland."

O'Halloran, in his "History of Ireland" (4to, 1778, vol. i. p. 3), referring to the arrival in Ireland of Parthalon and his colony from

Greece, in the year of the world 1956, as the "Book of Invasions" states, 278 years after the flood (O'Flaherty makes the period 35 years later), says :—

"The Book of Conquests mentions, but as an affair not authenticated, that before the arrival of Parthalon, Ireland was possessed by a colony from Africa, under the command of Ciocall, between whom and the newcomers a bloody battle was fought, in which the Africans were cut off."

Again, at page 4, the same author, referring to the arrival of the Neimhedians, or the second colony in Ireland, says—"An African colony had been settled in the north, long before the arrival of the Neimhedians, who were far from being so barbarous as represented." And then the author makes mention of their skill in constructing large edifices, and of the different battles of the Fomharaigh with the Neimhedians, and of the final discomfiture of the latter—though, as we are told, "they fought against the Africans with a resolution equal to the desperateness of their affairs. In this battle Conuing, the son of Faobhar, the African chief, with most of his troops, were slain, and their principal garrison, Tor Conuing, levelled to the ground; soon after which, More, the son of Dela, who had been absent with his fleet, endeavouring to land in this northern quarter (an island in the present Tir Connell), was opposed by the Neimhedians, but after a bloody conflict these last were defeated with great slaughter—such as escaped the sword perishing in the water."

The remainder of O'Halloran's account of the African pirates corresponds mainly with that of Keating. Of the destiny of the Fomorians, after the landing in Ireland of the Belgæ or Firbolgs, the third colony of adventurers, nothing is said, and evidently nothing was known by either O'Halloran or Keating; nor do we derive any information on this subject from the compilers of "The Annals of the Four Masters."

It is in vain to look for the name of any tribe in Africa resembling even that of the Fomorians in the works of the ancient geographers and historians—in those of Strabo, Pomponius Mela, Ptolomæus, Scylax, Herodotus, Diodorus, Pliny, Solinus, and Orosius. But no argument against their existence can be relied on by those who bear in mind the extraordinary transmutations which names of ancient nations, tribes, and countries have undergone in the course of ages, and who bear in mind how the names of the same peoples and regions are differently rendered in the works of the most celebrated geographers and historians of antiquity.

It is not for me to enter into any disquisition in this paper on the origin, structure, or uses of those ancient monuments we designate cromlechs, and the French, Dolmens, which I believe to be identical with those I have lately seen in Northern Africa. But the purpose of this notice makes it necessary to call attention, very briefly, to the leading points in the accounts that have been given of those monuments, and the views entertained of their origin and purpose by eminent archæologists in those countries.

In Grose's "Antiq. of Ireland" (vol. i. p. 17, Introd.), a description is given of two cromlechs of gigantic proportions, one at Tobinstown, Co. of Carlow. "The west end (is said to be) sustained on two upright pillars, somewhat round but irregular, each eight feet high, terminated behind by a broad flat stone set on the edge, eight feet high, and nine broad, making a portico (an open space more properly) of six feet wide, and four deep. This is covered by the cromlech or large sloping stone, twenty-three feet long, eighteen broad at the upper end over the open space between the two front supporters, and six at the lower or back part, where it rests on small stones about a foot high. Its thickness at the upper end is four feet, and at the lower two. The under surface is plain and even, but the upper convex. The upper part has a large channel, from which branches off a number of smaller ones; to some they appear natural, to others artificial for sacrificial purposes. The sides are enclosed and supported by several upright anomalous stones from three to six feet high, making a room eighteen feet long; eight at the upper or west end, and five broad at the opposite one, and from two to eight feet high, perfectly secure against every inconvenience of weather."

The other cromlech at Brownstown, Co. Carlow, referred to by Grose, "consists of an immense rock stone raised on an edge from its native bed, and supported on the east by three pillars. At a distance is another pillar by itself, nearly round, and five feet high. The dimensions of the supporters and covering stones, are as follows:—

	Feet.	Inches.
Height of the three supporters, ...	5	8
Thickness of the upper end of the covering-stone, .	4	6
Breadth of the same, ...	18	9
Length of the same, ...	19	0
Length of the outside, ...	23	4

Solid contents in feet 1280, weighing nearly eighty-nine tons, five hundreds, making an angle with the horizon of 34°. Such are the accounts which I have received of these curious monuments, from my learned and ingenious friend, Mr. William Beauford, of Athy." Among the existing African monuments identical with our cromlechs, there are none at all approaching to the dimensions of those referred to by Grose.

A cromlech in Louth, in the parish of Ballymascanlan, is described in Wright's Louthiana, the covering stone of which has three supporters, and measures twelve feet in length, by six feet in width. By the inhabitants it is called the Giant's load. The African monuments seen by me approach more in their dimensions to those of the one above described by Wright, than those referred to by Grose.

Cromlechs in Ireland, Cornwall, Anglesey, the Isle of Man, several parts of England, in Brittany, Normandy, in Denmark specially, some near Holstein, have common characteristics. They are rude monuments of unwrought massive blocks of stone, the supporters of the large superincumbent horizontal covering unhewn stone almost invariably laid

in a slanting direction, being indeterminate in number. Human remains, and urns with ashes and fragments of bones, have been so frequently found beneath the area of those monuments, that the opinion in all countries where they exist seems to be well established that they were used for sepulchral purposes, though not exclusively for them. The author of the "Mona Antiqua Restaurata" observes, that cromlechs, although perhaps often connected with the commemoration of the distinguished dead, were not themselves solely intended as sepulchres, but rather, in such instances, for altars of oblation and sacrifice, in conjunction with the former purpose.

In support of his opinion, he might have referred to observations on Druidical rites of ancient writers of great note. Tacitus, describing an attack of the Romans upon Mona, says that the British Druids "held it right to smear their altars with the blood of their captives, and to consult the will of the gods by the quivering of human flesh."

Diodorus, speaking of the Druids of Gaul, says:—"Pouring out a libation upon a man as a victim, they smite him with a sword upon the breast, in the part near the diaphragm; and on his falling who has been thus smitten, both from the manner of his falling, and from the convulsions of his limbs, and still more from the manner of the flowing of his blood, they presage what will come to pass."

King, the British archæologist, in his observations on the uses of cromlechs, and in particular of those of the cromlech called Kit's Coty House, maintains that these monuments were erected for the purpose of human sacrifice; that the great stone scaffold was raised just high enough for such a purpose, and no higher; and that these altars were so constructed and situated as to enable a multitude of people to see any sacrificial rite performed on them.

In regard, moreover, to cromlechs of very large dimensions, of which many specimens are to be seen in Ireland, as well as in Cornwall, Mr. King offers a remark, which is ingenious, if not entirely satisfactory. From the conspicuous site in which such fabrics are usually placed, and from the readiness with which the flow of blood might be traced on a slab of stone, large and sloping as is the covering stone of these cromlechs, he supposes that they were the altars on which human victims were sacrificed in attempts at divination. If Mr. King referred to some rare instances of cromlechs in which some traces are to be seen (apparently) of grooved channels in their horizontal covering stone in its longest direction, his observation would be less likely to be disputed.

No such grooved channel, I may observe, exists in any of those cromlechs visited by me in Northern Africa.

In confirmation of some of the views expressed in preceding observations, reference is made by Rowlands, Wright, and King, to the passage in the 24th chap., 26th verse, of the Book of Joshua in relation to the covenant made with the people of Shechem:—"And Joshua wrote these words in the book of the law of God, and took a great stone and set it up there under an oak that was by the sanctuary of the Lord."

In the Book of Ezekiel, vi. 13, we find still more striking allusions

to practices similar to those which have been ascribed to the idolatrous Druids:—"Then shall ye know that I am the Lord, when their slain men shall be among their idols round about their altars, upon every high hill in all the tops of the mountains, and under every green tree, and under every thick oak, the place where they did offer sweet savour to all their idols."

Again, in Hosea, iv. 13, we read of the idolatrous practices of the people of Israel:—"They sacrifice upon the tops of the mountains, and burn incense upon the hills, under oaks, and poplars, and elms, because the shadow thereof is good."

The custom of setting up on end over graves masses of unwrought stone, as memorials of the dead, may be presumed to be referred to in Genesis, xxxv. 20, in relation to Rachel's burial on the way to Ephrath:—"And Jacob set a pillar upon her grave: that is the pillar of Rachel's grave unto this day."

The practice of frequenting places set apart chiefly for religious uses, for public convocations and assemblages for dispensing justice, is supposed to be referred to in the following passage in 1 Samuel, vii. 16, 17:—"And he (Samuel) went from year to year in circuit to Bethel, and Gilgal, and Mizpeh, and judged Israel in all those places. And his return was to Ramah: for there was his house: and there he judged Israel, and there he built an altar unto the Lord."

Wright, in his "Louthiana," 4to, 1748, lib. iii. p. 7, observes that the Irish Druids, whose works we trace over some parts of Ulster, and also in Leinster, undoubtedly had analogous rites and doctrines with some of the patriarchal tribes of the east. It was customary with the Druids of idolatrous usages, not only to live, but likewise to be buried, in the recesses of groves, and on the shady tops of hills; and they were not only the chief places of resort on public festivals and for certain ceremonies, but were used for places of public worship and sepulchral purposes, for the remains of eminently privileged and distinguished personages.

Wright elsewhere, refuting the opinion of some archæologists that the cromlechs were solely or mainly used as altars for religious rites, says:—"I apprehend it will manifestly appear from what follows that they (cromlechs) were all erected over graves, and are no other than tombstones or sepulchral monuments raised to the memory of the most eminent men of those times. I could never bring myself to believe, from their vast heights and unevenness at top, that they could be designed purposely for altars, and especially as they seemed to be placed on so precarious a foundation. Having but three supports, if any one of them should be disturbed, the incumbent load must inevitably fall, and crush every thing in its way, which a fourth would have prevented from any such accident, and have rendered the whole together much more permanent and lasting."—"Louthiana," Book iii. p. 11.

The reason given in support of Wright's opinion in favour of the exclusive use of cromlechs for sepulchral purposes is of little value, independently of the notable error into which he has fallen in his

statement of the covering stone of these monuments having only three supports.

In Brittany they are indefinite in number, extending from three to seven, nine, or even more. Rowlands describes those of Anglesey as indeterminate in number, and, I may add, the same observation applies to those of Northern Africa.

The Rev. Henry Rowlands, in his "Mona Antiqua Resturata," 4to, 1723, p. 47, derives the name cromlech from the Hebrew *Cœrœum-lech* or *Cœrem-luach*, a consecrated stone, which signifies an altar, and which signification is adduced in support of a theory of Mr. Rowlands', namely, that the first use and purpose of those monuments, erected in the East by the early descendants of Noah, and raised in every country they came to as they proceeded in peopling the earth, were connected with the service of true religion; but afterwards that such altars whereon had been offered the first-fruits of the earth to the true God were turned away to Pagan uses, and made to serve for oblations and sacrifices to false gods. But the author subsequently qualifies his opinion, and says:—"I deny not but there may be some probability of truth in them (the traditions existing of those monuments being sepulchres of renowned warriors or persons of great eminence interred in those places), and yet consistent enough with what I have said of them; for they might be both sepulchres and altars—I mean those of latter erection,—because, when the great ones of the first ages fell, those who were eminent among the people for some extraordinary qualities and virtues, their enamoured posterity continued their veneration to them to their very graves, over which they erected some of those altars or cromlechs, on which, when their true religion faltered, and became depraved and corrupted, they might make oblations and offer sacrifices to their departed ghosts. From this practice, it is likely, grew the apotheosis of the first heroes, and from thence the gross idolatries of the Gentiles."

The author, at page 214, proceeds to show that cromlechs are types and reproductions of the most ancient monuments in the world; for in the Sacred Scripture it is said that as soon as Noah and his family came out of the ark, they built an altar unto the Lord. And to build (the Hebrew word equivalent to *ædificare* in the original), imports the erection of raising stones, one upon another; and this signification of the word is somewhat exegetically amplified in another place, viz., Haggai, ch. ii., v. 15, where such a construction is expressed by the Hebrew words employed, literally rendered, "Stone laid on a stone." And, further, the author argues, that altars of stones so erected of masses of rude unhewn rock, such as those early altars must have been necessarily at that period, were such as our cromlechs are at this day. Moreover, he observes, "It is presumptive also that they then had a strict precept for such structures, if that precept, 'Thou shalt not build an altar of hewn stones,' be (as a great part of the chapter is) a repetition of the old original law which the patriarchs before them in all probability strictly observed, and other nations, probably after their example, as strictly followed; by which it will appear that our cromlechs are but

the remaining effects of that ancient law and custom of not striking a tool upon the stones of their altars, but to build them up of the rudest lumps and slivers of stones they could meet with, which law we may well conclude to have prevailed likewise in these countries, and that these mentioned monuments of ours are some of the remains of that ancient institution and custom."*

I may observe that Mr. Rowlands, at page 214 of his first essay, modifies the derivation of the term cromlech, which he gave at page 47, as from the Hebrew words *Cæræm-luath*, a devoted stone or altar. In the second essay, he observes—"The name cromlech may seem to be no other than a corrupt pronouncing of an original Hebrew name, *chemar-luach*, a burning or sacrificing stone or table; or, perhaps more likely, as I before intimated from (the Hebrew words) *chærum-luch*, or *luach*, i. e. a consecrated stone, or devoted stone or altar." But the orthography even of the latter words is different from that of the Hebrew words first referred to by the author.

Brewer, in his "Beauties of Ireland" (8vo. 1825, vol. i., p. 87, Introd.), derives the term cromlech "from the words *crom*, bent, and *leac*, a flag or stone."

I am indebted to a better authority than either of the above-named writers, the most eminent of living Irish scholars, Eugene Curry, for the following observations on the derivation of the term cromlech:—

"The compound term, cromlech, is not an Irish formation, though the component parts are Irish slightly corrupted in the second part. The words are *crom*—stooped, sloped, or inclined; and *leac* (not lech) pronounced *lack*, a flag or rock with a flat level surface.

"There is no such compound word, nor with such a signification as it now has, to be found in the proper Irish language.

"I believe the term was first formed by Bishop Owen, of Wales, about A. D. 1600, in translating the English Bible into Welsh, and was applied by him to rocks or cliffs which shelved forward, so as to leave clefts, or rather sheltered recesses, for foxes and other wild animals to seek shelter in. I speak from memory in relation to the latter part of the subject, but as an authority in relation to the first."

This slight notice of an interesting subject, I venture to hope, may call the attention of some eminent archæologists to the numerous monuments identical with our cromlechs existing in Northern Africa, capable of examining them with all due scientific knowledge and familiarity with investigations of this kind.

And in conclusion I would venture to suggest, that in comparing the monuments of a primeval antiquity—the supposed cromlechs of other countries—with those existing in our own land, it should be borne in mind that the genuine and unfailing characteristics of those last-mentioned monuments are the following:—The supporters and the covering slab of them are invariably of unhewn stone; the covering unwrought

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* Mona Antiqua, p. 214.

slab has, or originally had, some inclination (lengthways) in it; the supporters are rude blocks of stone, set on end, apart, seldom found forming a continuous closed surface, either at the sides or end.*

EXPLANATION OF PLATE XVI.

Fig. 1.—Small African sepulchral urn—one-third of size of object, found beneath a cromlech at Bainen, near Algiers,—of the rudest form, fabric, and material, and without any ornamentation; referred to in preceding notice of cromlechs in Northern Africa.

Fig. 2.—Small Celtic sepulchral urn, one-third of size of object, found in a cemetery *Gaulois*, at Molineaux, near Rouen (described by the Abbé Cochet, at page 11 of the "Sepultures Gauloises et Normandes," 8vo., Par. 1857), of same size and quality as the one found under the cromlech at Algiers, and likewise without ornamentation.

Fig. 3.—Large Irish sepulchral urn, one-fourth the size of object, with a quantity of bones, all broken into small fragments, partially calcined, found on the Altmore property of Edward Litton, Esq., Master in Chancery, on the summit of the Cappagh mountain, parish of Pomeroy, county of Tyrone, beneath a cairn, at an elevation above the sea of 946 feet, in a square, stone-built chamber, closed externally by a huge block of stone; within which chamber the above-mentioned urn, some ashes, burnt bones, and charcoal, were discovered; but no weapons or ornaments of any kind. This urn—unquestionably of the most remote antiquity—was presented by Master Litton to R. R. Madden.

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* Since the preceding notice of certain cromlechs in the vicinity of Algiers was read before the Royal Irish Academy, on the 14th of April, 1862, my attention was called to an elaborate article on "British Remains at Dartmoor," by Sir J. Gardiner Wilkinson, published in the "Journal of the British Archæological Association" of March 31, 1862. In that article Sir J. G. Wilkinson refers cursorily to the cromlechs in the vicinity of Algiers, recently visited by me, and described in my paper on those monuments, read before the Royal Irish Academy. Sir J. G. Wilkinson's reference to them is contained in the following passage:—

"And about twelve miles from Algiers, on the plateau of Bainam, is a great assemblage of cromlechs."

In several other parts of Africa, monuments of an analogous character are referred to by Sir J. G. Wilkinson as having been "described by Mr. Rhind, in his interesting Memoir on Ortholitic Remains in Africa" ("Archæologia," vol. xxxix.)—a work, I may observe, at the date of this note (June 10, 1862), not yet received in Ireland. "Mr. Rhind," observes Sir J. G. Wilkinson, "has enumerated the following:—A stone circle near Tangiers, and other rude megaliths in Morocco; and in Algeria, near Zebdon, to the south of Tlemecen, a cromlech at Tiaret, 100 miles from the sea, the capstone of which measures 65 feet by 26 feet, and 9½ feet in thickness, raised 40 feet from the ground, with steps cut to ascend it, and three basins or square troughs cut upon its upper surface, the largest 3 feet on each side, and communicating with each other by channels 4 inches broad, and of less depth than the basins. Some long stones are in the neighbourhood still standing; and about twelve miles from Algiers, on the plateau of Bainam, is a great assemblage of cromlechs; and near Djelfa several tombs, composed of four slabs, covered by one or two others, each surrounded by a single or double circle of rude stone, about nine inches long, in which district a stone celt has been found; at Sigus, near to Con-

The Rev. Dr. Reeves read the following paper:—

On the Island of Sanda.

The little island of Sanda, lying some three miles off the southern coast of Cantyre, is about four miles in circumference. The Mull of Cantyre, which is situate on its west, is the point where Scotland is nearest to Ireland, being only eleven miles and a half distant from Tor Head, in the county of Antrim.* It formerly belonged to the parish of Kilblane; but, together with it, and Kilcolmkill, is now comprehended in the parochial union of Southend. This being the route by which the early Scotic immigration from Ireland passed over to Alba, the whole district is strongly impressed with social and ecclesiastical features of an Irish character. The language always bore the name of the colonists, and the term *Erse* of the modern day is only a modification of it.† The traditional associations of the people all looked westward, and the titles of nearly all the adjacent parishes are commemorative of illustrious worthies of the Irish church.‡ Kilcolmkill, Kilblane, Kilkivan, Kilchenzie, Kilkerran, Kilmarow, and Kilcalmonel, bear the impress of St. Columba's, St. Blaan's, St. Kevin's, St. Cainnech's, St. Kieran's, St. Maolrubha's, and St. Colman-elo's veneration. We may expect, therefore, to find in the historical scrap which has been handed down to us regarding the island of Sanda sufficient matter to interest an Irishman, and render its notice a suitable subject for the consideration of the Academy.

The received name of the island is of Norse origin; but the Irish name is *Abhuinn*, of which *Aven*, as it is known among the Highlanders, is merely a variety. Fordun, in the fifteenth century, calls it *Insula Awyn*;§ Dean Monro, at the close of the sixteenth, *Avoyn*;‖ while George Buchanan latinizes it *Avona*, which he interprets "portuosa," as if a deflexion of "haven."¶

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stantine, are other tombs, and in the same province some megaliths (*dolmens*); in Kabylia, one or more cromlechs, and others in the regency of Tunis; and in the Zengur district, Dr. Barth speaks of a trilithon 10 feet high, with a lintel 6 feet 6 inches in length."—See "Journal of Archæological Society," March 31, 1862, p. 43.

* New Statistical Account of Scotland," vol. vii., pt. 2, p. 414.

† See Adamnan's "Columba" (Irish Archæol. and Celtic Soc.), p. xxxix.

‡ The coutrast between the parochial nomenclature on the east and west sides of Scotland is very striking. On the east, the names are for the most part secular, and derived from the Pictish age; on the west, they are generally ecclesiastical in their origin, combining with the prefix *Kill* the name of some commemorated Irish saint.

§ "Insula Awyn, ubi cella sancti Adamnani, ibique pro transgressoribus refugium." Scotichron., lib. ii. cap. 10 (vol. i. p. 45, ed. Goodall).

‖ "Before the south poynt of the promontory of Kyntyre, lyes be ane myle of sea, ane iyle neire ane myle lange, callit the iyle Avoyn, quhilk iyle is obtained that name fra the armies of Denmark, quhilkis armies callit it in their leid Havin. It is inhabit and manurit, and guid for shipps to lay one ankers."—Description of Western Isles, 1594.

¶ Hist. Scot., lib. i. cap. 35. See Extracta e Var. Chron. Scot., p. 9; Orig. Paroch. Scotiæ, vol. ii. pt. 1, p. 9, and pt. 2, p. 820; Old Statist. Acct. of Scotland, vol. iii. p. 366

An Irish Franciscan, called Father Edmund Mac Cana, one of the Clanbrassil Mac Canns, visited the spot in the early part of the seventeenth century; and the interesting tract which records his experience is preserved in manuscript, together with a topographical memoir of parts of the counties of Antrim and Down, in the Irish collection of the Burgundian Library at Brussels. It was kindly copied for me, in 1851, by our late associate, Mr. Charles Mac Donnell, and I am thus enabled to submit it to your consideration on the present occasion: —

"*Insulæ Sandæ, seu Avoniæ, Hibernice* Abhuinn, *brevis descriptio, R. P. fratris Edmundi Mac Cana.*

"Insula Sanda est in oceano Scotico ad occasum, uno milliari a Kentiriæ continenti sejuncta; complectitur in circuitu unum magnum milliare. Solum jucundum, fructuum ac frugum, si coleretur, ferax. In ea est ædicula S. Ninniano sacra, ad cujus cœnobium in Galvidia tota insula spectat.* Conjunctum huic ædiculæ est ossarium sive sepulchretum quatuordecim filiorum sanctissimi viri Senchaniі† Hiberni, sanctitate illustrium, saxeo murulo septum, in quo sunt septem‡ grandia et polita saxa, quibus sanctissima corpora teguntur; in quorum medio erat obeliscus, altior hominis statura (ut mihi jam suggerit memoria). Nemo mortalium impune ingreditur illum murulum. Lepidum est quod mihi retulerunt insulani: gallinam, id loci ingressam, ova peperisse et exclusisse; pullos, cum jam præ ætate egredi poterant, omnes intortis collis insigni spectaculo processisse. Retulit mihi etiam grandior natu insulanorum, et ferme omnium pater, hoc prodigium quod subscribo. Ængussius Mac Donellus,§ Kentiriæ ac insulæ Ilæ dinasta (quem ipse jam olim vidi) ingressus est aliquando insulam, multa comitante caterva, inter quos etiam fuit præcipua Kentiriæ juventus. Cum forte dinasta ac cæteri nobiles de rebus seriis tractarent, juventus, ut solet, se pilæ ac clavarum ludo exercebat; pila vi clavæ impulsa, priusquam ab adversa manu juvenum excipi posset, altius in sacrum sepulchretum volavit. Juvenis, memor loci religionis, injecit tantum alterum pedum et manuum, ad extrahendam pilam. Ab incolis reprehenditur quod sacri loci majestatem violaverit, idque criminis eum impune minime laturum denunciant. Ille lusum nihilominus cum sociis persequitur. Exacto lusu, ac appetente nocte, in hospitium se recipit, ad focum sedet;

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* St. Ninian's church, Candida Casa, now Whithorn, in Galloway.

† Senchan is a well-known Irish name. We find it in Adamnan, in the form *Senchanus*. The Irish calendars commemorate, at the 23rd of June, Clann Shencain, 'The Sons of Senchan,' who are probably the fourteen here alluded to.

‡ The combinations of *seven* are very frequent in Irish hagiology. There is a long list of groups of seven bishops in the Leabhar Breac. An ancient cemetery in Tory Island, off the coast of Donegal, is called *The Muresher*, i. e. mop reipeap, 'great six,' a well-known term denoting seven. A discussion of this frequent application of the term *seven* to churches, saints, and periods in Irish tradition, would form the subject of a very interesting paper.

§ Concerning the Mac Donnells of Sanda, see New Statist. Acct. of Scotland, vol. vii., pt. 2, p. 525.

cooriuntur statim ingentes dolores in toto pede quem in sepulchreto intulit. Insulani significant divinam esse ultionem læsæ religionis. Intumuit mirum in modum pes, adeo inflatus divina ultione ut equi magnitudinem exæquaret. Sub mediam noctem juvenis expirat. Omnes Deum laudant, sancta corpora deinceps religiosius venerantur. Hinc discendum quantam habeat rationem et curam sanctorum suorum Deus optimus maximus, quorum sacrilegam irrisionem et contemptum impius Calvinus, novus evangelista, orbi intulit, aut potius intrusit. Magnum hoc miraculum excitavit in animis spectatorum, et ex ipsis audientium, etiam a nostra religione aversorum, sanctorum hominum reverentiam.

"In illa insula fuit repertum brachium sancti Ultani,* quod, thecæ argenteæ inclusum, ante hoc bellum† religiose servabatur a viro generoso ex inclyta Mac Donellorum familia.

"Fons est ibi non procul a sacello perennis aquæ, miraculis, ut insulani et multi ex continenti mihi dixere, nobilis. Frequentabatur quidem meo tempore ab accolis circumquaque, maxime ab iis in quorum animis aliquæ reliquiæ priscæ religionis residebant. Sunt multa alia mira et jucunda quæ homines mihi fide dignissimi de hoc loco retulerunt, quorum mihi et memoria non suppetit, et tempore excludor.

"Illis sacris cineribus hoc quod sequitur rude epitaphium cum ibi essem posui; atque ad illud sacrum sepulchretum tertio sacris misteriis cum magna animi mei recreatione sum operatus.

"Corpora bis septem, tota veneranda per orbem,
Senchanii natûm Sanda beata tenet.‡
Doctorum divumque parens, Hibernia quondam
Quos genuit Sanctos, Scotica terra tegit.
Scotia dicta minor, multis celebrata trophæis,§
Matris in amplexu, pignora cara tenet.
Sanda tibi cedit, veterum celebrata camœnis
Bettiginum gazæ, ripa beata Tagi.
Hos igitur sacros cineres devotus adora,
Quisquis in Hebrigenum littora tuta venis."

In this interesting narrative we perceive how vividly local traditions were preserved two centuries ago, and we observe a lamentable falling off when we compare with it the whole amount of legendary or other information which could be collected concerning this spot by the most intelligent and pains-taking visiters of modern times.

A writer in the "New Statistical Account of Scotland," the minister of the parish, thus sums up his knowledge of the place:—"In the

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* This is probably the silver-enshrined arm, commonly called St. Patrick's, which is now in the possession of the Right Rev. Bishop Denvir. See Reeves's Adamnan's Columba, p. lxvii.

† The war alluded to was probably the rebellion of 1641, and the Keeper mentioned seems to have been resident in Ireland.

‡ Instead of the first two lines are added the following:—

"Corpora bis septem, septem conduntur in urnis,
Ut natu gemini sic videantur humo."

§ An interlineation reads, "genuit quæ Scotia major."

island of Sanda are situated the ruins of a chapel, dedicated to St. Ninian, together with two crosses of very rude design. In this burying-ground, there is a superstitious story, universally believed, respecting an alder tree growing over the reputed grave of the saint, over which should any one walk, even by chance, he is doomed to die before a year expire. Like the former repositaries of the dead, this burying-ground also shows every mark of neglect, being unenclosed; the grave-stones are broken and defaced, and betoken that want of affection and respect for the dead which is cherished by the rudest nations."*

Mr. Howson, an English traveller, in reference to the spot, states that the chapel is called Kilmashenaghan, from a St. Shenaghan, who is said to have been appointed by St. Columba to the charge of Kilcolmkill.†

The latest visiter, the accurate and indefatigable Mr. Thomas Muir, sums up the result of his observations in these words:—"The island itself is very picturesque, but besides a greatly ruinated chapel, thirty-three feet in length, and two crosses, nearly seven feet in height, contains nothing that is very interesting."‡

How painfully does the imagination of the Celt contrast with his practice! The fate of the little cemetery of Sanda is but a type of the prevailing condition of our most venerated sanctuaries. The mind paints horrors, and the tongue relates the calamities, of the desecrator, and yet no effort is made to stay the desolating hand of time, or take common precaution against the injuries of trespass and dilapidation. The patron saint is invested with imaginary dignity, yet his cemetery is exposed to dishonour; sanctity is supposed to reside in the spot, yet utter neglect is the only practical testimony which is borne to the persuasion; and while the foot or hand of him who would disturb a sod, or remove a stone, is considered an accursed limb, the beast of the field is allowed to range at pleasure within the hallowed precincts, and make a rubbing-post of a monumental pillar,—the velvet sward its bed by day, and the enclosure of the chapel its shelter by night, the trodden, miry receptacle of its nocturnal filth.

The Secretary of the Council read the Resolution passed by the Council on the 7th of April, 1862, recommending that certain articles in the Museum, and such others as it may be thought desirable to lend, be forwarded for exhibition in the South Kensington Museum, and moved that it be adopted by the Academy.

Whereupon it was moved, as an amendment, by the Rev. William Reeves, D. D., and seconded by Dr. R. R. Madden,—That the consideration of the recommendation of the Council be deferred until the Stated Meeting in November.

A division having taken place, it appeared that there were 16 votes for, and 25 against the amendment.

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* Written Nov. 1843. "New Stat. Acct.," vol. vii., pt. 2, p. 429.

† "Transact. of the Cambridge Camden Soc.," p. 80.

‡ "Old Church Architecture of Scotland" (Edinb. 1861), p. 125.

F. J. Sidney, LL. D., then moved, and J. F. Waller, LL. D., seconded, the following amendment:—That such articles as it may be thought by the Council desirable to lend be forwarded for exhibition in the Museum, South Kensington, London, belonging to the Science and Art Department of the Committee of Council on Education, during the forthcoming International Exhibition of 1862.

A division having taken place, it appeared that there were 24 votes for, and but 7 against, the amendment, which was accordingly declared by the President to be carried.

The Lord Chief Baron then moved, and the Rev Professor Jellett seconded, as an addition to the amendment:—That, in executing the amendment which has been now passed, the Council have due regard to the safety of the articles selected for transmission to London, and the means to be adopted for their transmission, and for their secure custody there. This motion, having been put by the President, was adopted.

MONDAY, APRIL 28, 1862.

The Very Rev. Charles Graves, D. D., President, in the Chair.

Mr. F. J. Foot read a paper "On the Botanical Peculiarities of the Burren District, county of Clare."

The Rev. H. Lloyd, D. D., D. C. L., read the following paper:—

On Earth-currents in connexion with Magnetic Disturbances.

In a paper recently communicated to the Academy, the author showed that the regular diurnal changes of the horizontal component of the earth's magnetic force are due to electric currents traversing the earth's crust, these currents operating as disturbing forces, which cause the magnets to deviate from their mean positions according to known laws. This relation being once established, the diurnal laws of the Earth-currents may be inferred from their effects. It was thus ascertained that the azimuth and the intensity of the currents varied throughout the day, according to certain laws depending upon the hour-angle of the sun. At different parts of the globe these laws were found to exhibit certain well-marked features in common; while their differences were accounted for, in many instances, by the geographical and physical characters of the region in which they occur. The author now proceeds to extend the same inquiry to the currents which produce the *magnetic disturbances*.

It has been shown, by the labours of Kreil, Sabine, and others, that the disturbances of the magnetic elements are subject to periodical laws, depending upon the hour, which are constant for a given place, and for a given season of the year. The sums of the changes produced by these disturbances, at each hour of observation, have been calculated by General Sabine for three of the British Colonial Observatories. The corresponding quantities have been deduced by Dr. Lamont, for Munich; by Mr. Broun, for Makerstoun, in Scotland; and by the author, for Dublin.

We possess, in addition to the foregoing, similar results at Lake Athabasca, in British North America, deduced by Colonel Lefroy from observations made by himself, and which, although derived from a shorter series of observations, are of the highest scientific value. For these places, therefore, it only remains to combine the results of the declination and horizontal intensity, by the method which has been already applied to the regular changes of the same elements.

The result of this calculation, applied to the Dublin observations, shows that the direction of the *disturbance-current* at that place observes a mean law, not very dissimilar to that which governs the regular diurnal current. Its azimuth rotates, during the day, in the same direction as the sun, its direction pointing almost exactly to the luminary. The direction is *east* about 5 A. M.; *south*, about noon; and *west*, at 6 P. M. The current is *easterly* from 9 P. M. to 9 A. M., inclusive, and *westerly* during the remainder of the 24 hours. The mean azimuth of the easterly current, measured from the north eastward, is 40° 15′; that of the westerly is 230° 18′. If the mean directions of the easterly and westerly currents be assumed to be in the same right line, the mean azimuths will be N. 45° E., and S. 45° W. This result agrees, in a very remarkable manner, with those obtained by Mr. Barlow and Mr. Walker from the direct measures of the intensity of the Earth-currents, as observed on days of disturbance in several of the telegraphic lines of England; and the agreement must be regarded as an additional proof of the dependence of the magnetic changes upon Earth-currents.

The phenomena at Makerstoun are very similar to those at Dublin; and the epochs of the passage of the current through the cardinal points are nearly the same.

At Toronto, in Canada, the current is *wholly easterly*, the mean azimuth being 81° 25′. On the other hand, at Athabasca, the current is *easterly* from 12 P. M. to 6 A. M., inclusive, and *westerly* during the remainder of the 24 hours; the sums of the easterly and westerly changes for the entire day balance one another, the easterly currents being as much greater in magnitude as they are less in duration. The mean azimuths are 110° 18′ and 290° 56′.

At St. Helena the direction of the current is *easterly* throughout the day, the mean azimuth being 70° 53′. The direction is singularly constant, the greatest deviation from the mean being only 10°. The phenomena at the Cape of Good Hope closely resemble those at St. Helena, The direction of the current is *easterly* at every hour, excepting 5 A. M., when there is a slight westerly movement. The mean azimuth is 77° 54′.

It thus appears that at some places—as in the British Islands—the mean direction of the disturbance current *rotates* through the entire compass in the course of the day; while at others—as Munich, Toronto, St. Helena, and the Cape of Good Hope—it is *easterly throughout the day*. While, therefore, there is a periodicity in the easterly and westerly currents depending on the hour, we are obliged to infer that there is, at the same time, some cause *constantly* operating which tends to produce an *easterly current*.

The *mean azimuth* of this current appears to be connected with the *magnetic meridian* of the place, to which it is nearly perpendicular. This will appear from the following Table of the mean azimuths of the disturbance-currents at the northern stations, measured from the astronomical and from the magnetical meridians, respectively:—

Places.	Az. (Astron.)	Az. (Magn.)
Dublin, ...	45°	72°
Makerstoun, . . .	51	76
Munich, ...	52·5	69
Toronto, ...	81·5	83
Athabasca, ...	110	81

The mean azimuth (magnetic) for the five stations is E. 14° N. The mean azimuth of the two stations in the Southern hemisphere is E. 11° S., deviating nearly as much to the *south*, as that of the northern stations deviates in the opposite direction. It thus appears that while the principal current is *eastward* in both hemispheres, there is also a *meridional* current tending northward in the Northern hemisphere, and southward in the Southern. Its intensity is between one-fourth and one-fifth of that of the other component.

These results are wholly at variance with the hypothesis imagined by M. de la Rive in explanation of the phenomena of magnetic disturbances, according to which the disturbance-current flows from north to south only.*

The diurnal changes of the *intensity* of the disturbance-currents present features equally marked. In order to perceive them clearly, it may be convenient to examine separately the meridional currents, and those at right angles to the magnetic meridian.

The meridional currents are developed chiefly at the European stations, and at Toronto, in Canada: at Athabasca, and at the southern stations, they are comparatively small. The *northerly* maximum occurs at Toronto at 9 P. M., at Munich at 10 P. M., and at Dublin at 11 P.M. Its epoch at Makerstoun is between 9 P. M. and 11 P. M. The *southerly* maximum occurs at 8 A. M., very nearly, at the four stations. Thus the epochs are nearly at the *same hours of local time*, notwithstanding the differences of longitude.

A similar result appears from an examination of the currents at right angles to the magnetic meridian. Thus, in the northern hemisphere, the *easterly* maximum occurs between 2 A. M. and 4 A. M., and the *westerly* maximum (or easterly minimum) between 3 P. M. and 5 P. M. The two epochs are precisely the same at Makerstoun and at Toronto, places which differ more than five hours in longitude.

* The discrepancy of M. de la Rive's hypothesis with the phenomena of the Earth-currents, as observed in the British Islands, has been already pointed out by Mr. Walker. It is even more marked at other parts of the globe.

The corresponding epochs for the two stations in the southern hemisphere in like manner agree with one another. The *easterly maximum* occurs between 6 P. M. and 7 P. M. at St. Helena and the Cape of Good Hope, and the easterly *minimum* between 5 A. M. and 6 A. M. It is deserving of remark that these epochs do not differ considerably from those of the *opposite* movements in the northern hemisphere, the *easterly* extreme in the one corresponding nearly with the *westerly* extreme in the other. A similar opposition in the phenomena of the *regular* diurnal change in the two hemispheres was pointed out by the author on a former occasion, and there seems good reason to suppose that the two facts are physically related.

It appears, then, that the principal epochs of the disturbance-currents depend, in their mean values, upon the sun's hour-angle, and are independent of the longitude of the place at which they occur.

The foregoing relations, in the phenomena of the disturbance-currents, or in those of their effects, appear to be of a very general nature, and such as to afford a distinct basis for physical theory. The author hoped to resume the subject upon a future occasion.

MONDAY, MAY 12, 1862.

The Very Rev. Charles Graves, D. D., President, in the Chair.

Resolved, on the recommendation of the Council,—That the sum of £50 be placed at the disposal of the Council for the purchase of antiquities, and for the arrangement of the Museum.

Captain Meadows Taylor, by permission of the Academy, read a paper "On the Cromlechs and other Antiquarian Remains in the Deccan."

The Secretary of the Academy read the following paper by Lieutenant J. Haughton, R. A. :—

On the Difference between Rain-Fall and Evaporation at St. Helena in 1860.

The following observations were made, at the request of the Rev. Professor Haughton, in the island of St. Helena, under the following conditions: —

The *evaporation gauge* consisted of a cylindrical glass vessel, 9 inches high, and 4·85 inches wide. The level of the water was read off, and brought to the zero (at the middle of the vessel) every Sunday morning, at 10.45 A.M. The gauge was placed on the exposed roof of a house, 15 feet high, and was open on all sides to rain, wind, and sun. It was at the leeward side of the island, the wind blowing almost always S.E. The gauge was exactly 700 feet above the sea-level.

In the year (of fifty-two weeks) commencing 12th February, 1860, and ending 10th February, 1861, the total excess of evaporation over rain-fall was 81·42 inches; and in no single week did the rain-fall exceed the evaporation.

ST. HELENA.—February, 1860.

Day.	Height of Water in Inches.	Wind.	Prevailing Clouds.	REMARKS.
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12	. .	S. E.	K	Bright sunshine; sky half clear.
13	. .	,,	K. N.	Intermittent sunshine, with heavy showers.
14	. .	,,	N.	Ditto, and light rain.
15	. .	,,	K.	Bright sunshine all day.
16	. .	,,	C.	Ditto.
17	. .	,,	K.	Ditto.
18	. .	,,	K.	Ditto, but heavy shower at sunset.
19	− 1·75	,,	K. S.	Bright sunshine nearly all day; rain in afternoon.
20	. .	,,	K.	Ditto, ditto.
21	. .	,,	K. N.	Ditto, ditto.
22	. .	,,	K. S.	Intermittent sunshine, shower in afternoon, and heavy showers at night.
23	. .	,,	K.	Bright sunshine; heavy showers at night.
24	. .	,,	. .	Ditto, ditto.
25	. .	,,	. .	Ditto.
26	− 2·50	N. N. W.	. .	Ditto; very littte wind.
27	. .	S. E.	K.	Ditto.
28	. .	,,	K.	Intermittent sunshine; continued rain in morning.
29	. .	,,	K.	Ditto.
	− 4·25			

ST. HELENA.—MARCH, 1860.

Day.	Height of Water in Inches.	Wind.	Prevailing Clouds.	REMARKS.
	− 4·25			
1	. .	S. E.	None.	Bright sunshine all day.
2	. .	,,	N.	Continued rain before 9 A.M. ; bright sunshine afterwards.
3	. .	,,	None.	Bright sunshine.
4	− 1·95	,,	N.	Rain for an hour at noon ; bright sunshine rest of day.
5	. .	,,	K.	Intermittent sunshine.
6	. .	,,	K. N.	Ditto.
7	. .	,,	K.	Sky obscured nearly all day.
8	. .	,,	K. N.	Bright sunshine.
9	. .	,,	K.	Sky obscured nearly all day.
10	. .	,,	K.	Intermittent sunshine.
11	− 2·15	,,	K. N.	Light showers.
12	. .	,,	K. N.	Intermittent sunshine.
13	. .	,,	K. N.	Ditto.
14	. .	,,	K. N.	Ditto.
15	. .	,,	K.	Bright sunshine all day.
16	. .	,,	K.	Intermittent sunshine.
17	. .	,,	K.	Sky obscured.
18	− 2·05	,,	K.	Intermittent sunshine.
19	. .	,,	K.	Ditto.
20	. .	,,	K. N.	Ditto ; showers at night.
21	. .	,,	K. N.	Ditto, and light rain.
22	. .	,,	K. N.	Ditto, ditto.
23	. .	N.	K. S.	Very calm ; intermittent sunshine.
24	. .	S. E.	K. N.	Intermittent sunshine, and light rain.
25	− 1·60	W.	K.	Calm ; intermittent sunshine.
26	. .	S. E.	K.	Intermittent sunshine.
27	. .	,,	K.	Ditto.
28	. .	,,	K.	Bright sunshine.
29	. .	,,	K.	Ditto.
30	. .	,,	K. C.	Ditto.
31	. .	,,	K. N.	Ditto, and heavy showers ; strong wind.
	− 12·00			

ST. HELENA.—April, 1860.

Day.	Height of Water in Inches.	Wind.	Prevailing Clouds.	REMARKS.
	− 12·00			
1	− 1·95	S. E.	. .	Intermittent sunshine, and rain.
2	. .	,,	K. N.	Frequent showers.
3	. .	,,	N.	Ditto; sky obscured.
4	. .	,,	. .	Light rain nearly all day.
5	. .	,,	K. N.	Intermittent sunshine, and light rain.
6	. .	,,	,,	Intermittent sunshine.
7	. .	,,	K.	Ditto.
8	− 1·45	E.	,,	Ditto.
9	. .	S. E.	None.	Bright sunshine.
10	. .	,,	,,	Ditto.
11	. .	,,	S.	Bright sunshine; hardly any cloud.
12	. .	,,	None.	Bright sunshine.
13	. .	,,	,,	Ditto.
14	. .	,,	C.	Ditto; hardly any cloud.
15	− 2·15	,,	K.	Ditto.
16	. .	,,	,,	Ditto.
17	. .	,,	C. K.	Ditto.
18	. .	,,	K. C. S.	Intermittent sunshine.
19	. .	,,	K.	Bright sunshine.
20	. .	,,	C. K.	Ditto.
21	. .	W. N. W.	S. K.	Intermittent sunshine; very little wind.
22	− 2·00	S. E.	None.	Strong wind.
23	. .	,,	N.	Bright sunshine.
24	. .	,,	K. S.	Ditto, and strong wind.
25	. .	,,	N. K.	Intermittent sunshine, and light rain; gale and small whirlwinds.
26	. .	,,	N. K. S.	Intermittent sunshine; rain at night.
27	. .	,,	N. K.	Intermittent sunshine.
28	. .	,,	N.	Light rain all day; very heavy rain in country.
29	− 1·60	,,	N. S.	Rain nearly all day.
30	. .	,,	K.	Bright sunshine.
	− 21·15			

ST. HELENA.—May, 1860.

Day.	Height of Water in Inches.	Wind.	Prevailing Clouds.	REMARKS.
	− 21·15			
1	. .	S. E.	K.	Intermittent sunshine.
2	. .	,,	?	Covered sky; light showers.
3	. .	,,	K.	Intermittent sunshine, and a few showers.
4	. .	,,	?	Rain nearly all day.
5	. .	,,	S. K. N.	Intermittent sunshine; rain at night.
6	− 0·80	,,	K. N.	Ditto, and rain.
7	. .	,,	,,	Ditto.
8	. .	,,	,,	Ditto, and strong wind.
9	. .	,,	K.	Ditto.
10	. .	,,	K. S.	Bright sunshine.
11	. .	,,	K.	Intermittent sunshine.
12	. .	,,	,,	Ditto, and rain at night.
13	− 1·75	,,	,,	Ditto.
14	. .	,,	K. N. S.	Ditto.
15	. .	,,	K. N.	Ditto.
16	. .	,,	,,	Ditto.
17	. .	,,	,,	Ditto, and a little rain.
18	. .	,,	,,	Ditto, ditto.
19	. .	,,	S. K.	Ditto.
20	− 1·70	,,	K. N. S.	Ditto, and rain.
21	. .	,,	K. N.	Heavy rain in the morning and night.
22	. .	,,	N.	Light rain nearly all day.
23	. .	,,	K.	Intermittent sunshine.
24	. .	,,	K. N.	Ditto, and rain in afternoon.
25	. .	,,	K. S.	Ditto.
26	. .	,,	?	Covered sky.
27	− 1·05	,,	K. S.	Intermittent sunshine.
28	. .	,,	,,	Ditto.
29	. .	,,	?	Light rain nearly all day; strong wind; sky covered by day, clear at night.
30	. .	,,	K. N.	Light rain nearly all day.
31	. .	,,	,,	Ditto.
	− 26·45			

ST. HELENA.—JUNE, 1860.

Day.	Height of Water in Inches.	Wind.	Prevailing Clouds.	REMARKS.
	− 26·45			
1	..	S. E.	N.	Light rain nearly all day.
2	..	,,	K.	Bright sunshine.
3	− 1·12	,,	,,	Ditto.
4	..	,,	K. S.	Ditto.
5	..	,,	,,	Bright sunshine; calm.
6	..	,,	K. C.	Ditto, ditto.
7	..	,,	K.	Ditto, ditto.
8	..	,,	C. K.	Bright sunshine.
9	..	,,	K.	Ditto.
10	− 1·40	,,	K. S.	Ditto.
11	..	,,	,,	Ditto.
12	..	,,	K.	Intermittent sunshine, and light rain.
13	..	,,	K. S.	Ditto, ditto.
14	..	,,	K.	Ditto, ditto.
15	..	,,	,,	Ditto.
16	..	,,	,,	Ditto, and strong wind.
17	− 1·85	,,	?	Covered sky; strong wind; rain all afternoon.
18	..	,,	?	Ditto, ditto.
19	..	,,	K.	Intermittent sunshine.
20	..	,,	,,	Bright sunshine.
21	..	,,	K. N.	Light rain in the morning, and bright sun in afternoon; calm.
22	..	,,	K.	Bright sunshine.
23	..	,,	,,	Ditto.
24	− 1·65	,,	?	Covered sky; calm.
25	..	,,	?	Ditto; a shower in evening.
26	..	,,	?	Intermittent sunshine, and light rain.
27	..	,,	C. N.	Bright sunshine and a few showers.
28	..	,,	?	Covered sky.
29	..	,,	None.	Bright sunshine.
30	..	,,	,,	Ditto.
	− 32·47			

ST. HELENA.—JULY, 1860.

Day.	Height of Water in Inches.	Wind.	Prevailing Clouds.	REMARKS.
	− 32·47			
1	− 1·45	S. E.	?	Sky covered by day; strong wind.
2	..	,,	K.	Bright sunshine.
3	..	,,	K. N.	Intermittent sunshine in morning; heavy rain in afternoon and evening.
4	..	,,	K. C. N.	Intermittent sunshine, and heavy showers.
5	..	,,	?	Rain nearly all day.
6	..	,,	?	Ditto.
7	..	,,	?	Intermittent sunshine, and rain.
8	− 0·65	,,	?	Light rain nearly all day.
9	..	,,	?	Sky covered; some showers of light rain.
10	..	,,	?	Ditto, ditto.
11	..	,,	?	Sky covered.
12	..	,,	?	Sky covered, and light rain nearly all day.
13	..	,,	?	Sky covered, and a little rain.
14	..	,,	K. S.	Intermittent sunshine.
15	− 1·15	,,	?	Sky covered.
16	..	,,	K.	Intermittent sunshine.
17	..	,,	,,	Ditto.
18	..	,,	K. C.	Ditto.
19	..	,,	K. S.	Bright sunshine.
20	..	,,	K. N.	Intermittent sunshine.
21	..	,,	,,	Ditto; calm.
22	− 1·40	,,	None.	Bright sunshine; calm.
23	..	,,	K.	Ditto.
24	..	,,	K. S.	Bright sunshine; calm.
25	..	N. E.	S.	Ditto, do.
26	..	N. N. E.	?	Light rain nearly all day.
27	..	S. E.	K.	Intermittent sunshine; fresh breeze.
28	..	,,	,,	Ditto, and light rain.
29	− 1·15	,,	?	Strong wind; covered sky; light showers.
30	..	,,	?	Intermittent sunshine, and light rain; very strong wind.
31	..	,,	K. N.	Intermittent sunshine, and light rain.
	− 38·27			

ST. HELENA.—AUGUST, 1860.

Day.	Height of Water in Inches.	Wind.	Prevailing Clouds.	REMARKS.
	− 38·27			
1	. .	N.	None.	Bright sunshine.
2	. .	N.	,,	Ditto; light wind.
3	. .	S. E.	K. C.	Ditto.
4	. .	,,	K.	Intermittent sunshine; strong wind.
5	− 1·40	,,	10	Covered sky; light showers; very strong wind.
6	. .	,,	,,	Light rain nearly all day; very strong wind.
7	. .	,,	,,	Ditto, ditto.
8	. .	,,	K. N.	Intermittent sunshine, and light rain.
9	. .	,,	,,	Ditto, ditto.
10	. .	,,	10	
11	. .	,,	?	Intermittent sunshine, and a little rain.
12	− 1·15	,,	10	Calm.
13	. .	N.	K.	Bright sunshine; very calm.
14	. .	S. E.	,,	Intermittent sunshine; calm.
15	. .	,,	,,	Ditto.
16	. .	,,	,,	Ditto.
17	. .	,,	10	
18	. .	,,	,,	A little rain.
19	− 1·20	N.	K. N.	Intermittent sunshine, and light rain; light wind.
20	. .	S. E.	K. N.	Bright sunshine.
21	. .	N. N. W.	K.	Ditto.
22	. .	S. E.	,,	Ditto.
23	. .	,,	K. C. N.	Intermittent sunshine, and light rain.
24	. .	,,	K. N.	Ditto, ditto.
25	. .	,,	10	Light rain.
26	− 1·15	,,	K. N.	Intermittent sunshine, and rain.
27	. .	,,	,,	Intermittent sunshine; rain at night.
28	. .	,,	K. C. N. S.	Ditto, ditto.
29	. .	,,	K. N.	Intermittent sunshine, and light rain.
30	. .	,,	10	Some light rain.
31	. .	,,	K. N.	Intermittent sunshine, and a little rain.
	− 43·17			

ST. HELENA.—September, 1860.

Day.	Height of Water in Inches.	Wind.	Prevailing Clouds.	REMARKS.
	− 43·17			
1	..	S. E.	K. N.	Intermittent sunshine, and some light rain.
2	− 1·20	,,	10	Showers of light rain.
3	..	,,	K. N.	Intermittent sunshine, and much rain at night.
4	..	,,	K. S.	Bright sunshine.
5	..	,,	K.	Intermittent sunshine, and a little rain.
6	..	,,	,,	Ditto, ditto.
7	..	,,	K. N.	Intermittent sunshine, and rain; strong wind.
8	..	,,	?	Light showers all day; strong wind.
9	− 1·05	,,	N.	Intermittent sunshine, and rain; showers all day, at intervals of ten minutes.
10	..	,,	K. N.	Intermittent sunshine, and little rain.
11	..	,,	K.	Intermittent sunshine.
12	..	,,	,,	Ditto.
13	..	N. N. W.	None.	Calm.
14	..	N. W.	K.	Bright sunshine; very light wind.
15	..	N.N.W. & E. N. E.	,,	Bright sunshine by day; rain and overcast sky at night.
16	− 1·50	S. E.	,,	Bright sunshine; rain at night.
17	..	,,	10	Very strong wind; rain.
18	..	,,	K. N.	Ditto, ditto.
19	..	,,	10	Strong wind.
20	..	,,	?	Intermittent sunshine.
21	..	,,	10	
22	..	,,	,,	Very strong wind.
23	− 1·40	,,	?	Ditto; intermittent sunshine; rain in afternoon, and at night.
24	..	,,	10	Light rain for greater part of day and night.
25	..	,,	,,	Much light rain; strong wind.
26	..	,,	,,	Ditto, ditto.
27	..	,,	K. C.	Intermittent sunshine, and a little rain; sky clear at night.
28	..	,,	K. 10	Intermittent sunshine; strong wind.
29	..	,,	K. N.	Bright sunshine; a little rain.
30	− 1·60	,,	?	Intermittent sunshine, and light rain.
	− 49·92			

LADDER HILL, ST. HELENA.—October, 1860.

Day.	Height of Water in Inches.	Wind.	Prevailing Clouds.	REMARKS.
	− 49·92			
1	..	N. E.	0	Calm.
2	..	,,	,,	Do.
3	..	S. E.	,,	Light rain nearly all day.
4	..	,,	K.	Bright sunshine.
5	..	,,	0	Light rain during greater part of day.
6	..	,,	,,	A little rain.
7	− 1·60	,,	?	Intermittent sunshine.
8	..	N. N. W.	None.	Bright sunshine; light wind.
9	..	S. E.	,,	Ditto; thin mist on peaks; wind light at Ladder Hill, but very strong on hills.
10	..	,,	K.	Intermittent sunshine; little rain.
11	..	,,	0	Light rain all day.
12	..	,,	,,	Ditto.
13	..	,,	,,	Light rain nearly all day.
14	− 1·35	,,	?	Intermittent sunshine, and light rain.
15	..	,,	,,	Ditto, ditto.
16	..	,,	0	Light intermittent showers.
17	..	,,	?	Intermittent sunshine, and light rain.
18	..	,,	K.	Intermittent sunshine.
19	..	,,	,,	Ditto.
20	..	,,	,,	Ditto, and a little rain.
21	− 1·35	N. W.	?	Intermittent sunshine in mg.; light rain in aft'n.
22	..	S. E.	0	
23	..	,,	,,	A little rain.
24	..	,,	?	Intermittent sunshine, and a little rain.
25	..	,,	,,	Ditto, ditto.
26	..	,,	,,	Ditto, ditto.
27	..	,,	,,	Ditto, ditto.
28	− 1·45	,,	0	Intermittent showers.
29	..	,,	,,	Ditto.
30	..	,,	,,	Ditto.
31	..	,,	?	Intermittent sunshine, and light rain.
	− 55·67			

LADDER-HILL, ST. HELENA.—November, 1860.

Day.	Height of Water in Inches.	Wind.	Prevailing Clouds.	REMARKS.
	− 55·67			
1	..	S. E.	Overcast.	Light showers.
2	..	,,	,,	Ditto.
3	..	,,	,,	Ditto.
4	− 1·15	,,	?	Light showers, and faint sunshine.
5	..	,,	Overcast.	Intermittent showers.
6	..	,,	,,	
7	..	,,	K. S.	Intermittent sunshine.
8	..	S.	K.	Ditto.
9	..	S. E.	K. C.	Ditto.
10	..	,,	C. K. N.	Ditto; very strong whirlwind, 10 ft. diam.
11	− 1·45	,,	K. N.	Ditto; dense fog on hills.
12	..	,,	K.	Ditto, and overcast sky.
13	..	,,	?	Ditto, and light rain.
14	..	,,	K. S.	Ditto, and dense fog on hills.
15	..	,,	K N.	Bright sunshine.
16	..	,,	K., and overcast.	Intermittent sunshine.
17	..	,,	Overcast.	Light rain, and fog on hills; faint sunshine.
18	− 1·70	,,	K. S.	Intermittent sunshine.
19	..	,,	?	Ditto.
20	..	,,	?	Ditto, and fog on hills.
21	..	,,	?	Ditto, ditto.
22	..	,,	?	Ditto, ditto.
23	..	,,	Overcast.	Fog.
24	..	,,	?	Intermittent showers of light rain.
25	− 1·65	,,	?	Intermittent sunshine, and light rain.
26	..	,,	K. U.	Ditto, ditto.
27	..	,,	,,	Ditto, ditto.
28	..	,,	,,	Ditto, ditto.
29	..	,,	K. S. N.	Ditto.
30	..	,,	?	Ditto, ditto.
	− 61·62			

LADDER-HILL, ST. HELENA.—December, 1860.

Day.	Height of Water in Inches.	Wind.	Prevailing Clouds.	REMARKS.
	− 61·62			
1	..	S. E.	C. K.	Bright sunshine.
2	− 1·65	,,	K. S.	Ditto.
3	..	,,	K.	Ditto.
4	..	,,	K. U.	Ditto.
5	..	,,	?	Intermittent sunshine, and light rain.
6	..	,,	Overcast.	Ditto.
7	..	,,	K. N. S.	Faint sunshine; much light rain in country; a little at Ladder Hill.
8	..	,,	?	Bright sunshine.
9	− 1·65	,,	?	Intermittent sunshine, and showers of rain.
10	..	,,	K. S.	Bright sunshine.
11	..	,,	,,	Ditto.
12	..	,,	?	Bright sunshine till three, then a sultry mist.
13	..	,,	..	Small round clouds, crowded together; sultry mist in country, supposed to be destructive of
14	..	,,	Overcast.	Light rain. [the life of plants.
15	..	,,	?	Light rain, and faint sunshine.
16	− 1·35	,,	Overcast.	Light showers.
17	..	,,	,,	Light showers; large rollers at sea.
18	..	,,	K. S.	Ditto, and intermit. sun; large rollers at sea.
19	..	,,	Overcast.	Light rain.
20	..	,,	,,	Ditto.
21	..	,,	,,	Ditto.
22	..	,,	,,	Ditto.
23	− 1·00	,,	?	Intermittent sunshine, and a little rain.
24	..	,,	K. S.	Ditto, ditto.
25	..	,,	K. N.	Ditto, ditto.
26	..	,,	,,	Ditto, ditto.
27	..	,,	,,	Ditto.
28	..	,,	K S.	Ditto; large rollers.
29	..	E.	K. C.	Bright sunshine; cirri radiating from a point N.N.E. on horizon.
30	− 1·75	S. E.	None.	Bright sunshine.
31	..		C.	Ditto.
	− 69·02			

LADDER-HILL, ST. HELENA.—JANUARY, 1861.

Day.	Height of Water in Inches.	Wind.	Prevailing Clouds.	REMARKS.
	− 69·02			
1	..	S. E.	C.	Bright sunshine.
2	..	,,	C. K.	Ditto.
3	..	,,	Overcast.	Faint sunshine.
4	..	,,	K.	Intermittent sunshine.
5	..	,,	,,	Bright sunshine.
6	− 1·95	,,	K. U.	Ditto; sultry mist on hills.
7	..	,,	N.	Intermittent sunshine; nimbus resting on sea.
8	..	,,	K.	Bright sunshine.
9	..	,,	,,	Ditto.
10	..	,,	,,	Intermittent sunshine.
11	.	,,	K. U.	Ditto; shower in morning.
12	..	,,	Overcast.	Faint sunshine.
13	− 1·70	,,	?	Intermittent sunshine, and overcast sky.
14	..	,,	K. C.	Bright sunshine.
15	..	,,	,,	Ditto.
16	..	,,	K. S.	Ditto.
17	..	,,	K.	Ditto.
18	..	,,	,,	Ditto; rain at night.
19	..	N. W.	Overcast.	Very light rain in morning; wind light.
20	− 1·85	W.	K. U.	Intermittent sunshine; wind light.
21	..	S. E.	K. S.	Ditto; sky clear at night.
22	..	,,	K.	Bright sunshine; a little rain at night.
23	..	,,	,,	Ditto.
24	..	,,	,,	Ditto.
25	..	,,	K. C.	Ditto; large rollers at sea.
26	..	,,	K.	Ditto. ditto.
27	− 2·25	,,	,,	Ditto, ditto.
28	..	,,	,,	Ditto.
29	..	,,	,,	Ditto.
30	..	,,	,,	Ditto.
31	..	,,	?	Intermittent sunshine; large rollers.
	− 76·77			

LADDER-HILL, ST. HELENA.—FEBRUARY, 1861.

Day.	Height of Water in Inches.	Wind.	Prevailing Clouds.	REMARKS.
	− 76·77			
1	. .	S. E.	Overcast.	Faint sunshine; large rollers.
2	. .	,,	K.	Bright sunshine; ditto.
3	− 2·40	,,	K. U.	Intermittent sunshine, and a little rain.
4	. .	,,	K. S.	Ditto; large rollers.
5	. .	,,	K. U.	Ditto; a little rain.
6	. .	,,	,,	Bright sunshine.
7	. .	,,	,,	Ditto.
8	. .	,,	,,	Ditto.
9	. .	,,	Overcast.	Intermittent sunshine.
10	− 2·25	,,	,,	Faint sunshine.
	− 81·42			
11				
12				
13				
14				
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18				
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28				

W. R. Wilde, Esq., on the part of the Rev. E. W. Barnwell, of Rathlin, presented three plaster casts of celts, and an original bronze socketed celt, from the neighbourhood of Cape Finisterre; he also exhibited some stone celts, found by that gentleman at Carnac, in Britanny. Mr. Wilde also presented an iron sword, found in the Boyne, on the part of Dr. Drew, of Drogheda; and a small copper ring, plated with gold, similar to No. 287 in Catalogue, Part III., p. 88.

The Rev. Dr. Reeves, on the part of the Rev. William Handcock, of Colehill House, presented to the Academy an original letter of Oliver Goldsmith, written to the donor's maternal grandfather, Robert Bryanton, Esq., of Ballymahon, dated London, August 14, 1758. He also, on behalf of the same gentleman, exhibited another letter from Oliver Goldsmith to Mr. Bryanton, written at an earlier date.

The thanks of the meeting were voted to the donors.

On the recommendation of Council, it was—

Resolved,—That the sum of £50 be placed at the disposal of the Council for the purchase of Antiquities, and for the arrangement of the Museum.

MONDAY, MAY 26, 1862.

The Very Rev. Charles Graves, D. D., President, in the Chair.

Robert M'Donnell, M. D., read a paper "On the Lateral Line in Fishes."

The Rev. Professor Haughton read the following paper:—

On the Rain-Fall and Evaporation in Dublin in the Year 1860.

The observations, of which the following Tables contain the results, were made in Dublin, on the roof of the Magnetical Observatory, with a cylindrical glass vessel, eight inches in diameter, freely exposed to both rain-fall and evaporation.

I have added the daily rain-fall, the direction of the wind, and the dew point, observed at 10 a. m. From these observations it appears that the evaporation exceeded the rain-fall during the first fifty weeks of the year by 1·62 inches; the rain-fall during that time having been 34·643 inches (to which was added during the last sixteen days of the year 1·239 inches—making a total rain-fall of 35·882 inches); and the evaporation during the fifty weeks amounted to 36·263 inches, leaving a balance in favour of evaporation of 1·62 inches.

During twenty-three weeks of the entire fifty weeks the rain-fall exceeded the evaporation by 11·40 inches; and during twenty-six weeks the evaporation exceeded the rain-fall by 13·02 inches, and in one week they were equal to each other.

DUBLIN MAGNETICAL OBSERVATORY, 1860.

JANUARY.					FEBRUARY.				
Day.	Rain, minus Evaporation.	Rain.	Direction of Wind.	Dew point.	Day.	Rain, minus Evaporation.	Rain.	Direction of Wind.	Dew point.
	Inche .	Inches.				Inches.	Inches.		
1	. .	·000	S. W.	. .	1	.	·001	N. W.	29·9°
2	. .	·014	S. W.	37·9°	2	. .	·002	W.	32·5
3	. .	·440	S. S. E.	49·0	3	. .	·001	S. W.	32·4
4	. .	·065	S. W.	41·7	4	+ 0·05	·001	S. W.	45·7
5	. .	·052	N. W.	38·5	5	. .	·020	S. W.	. .
6	. .	·200	N. W.	34·8	6	. .	·082	N. W.	32·5
7	+ 0·50	·002	W.	35·5	7	. .	·000	W.	40·3
8	. .	·164	S. W.	. .	8	. .	·160	N. W.	44·0
9	. .	·345	S. W.	42·2	9	. .	·004	N. W.	28·7
10	. .	·001	N. W.	31·5	10	. .	·001	N. W.	27·5
11	. .	·000	S. E.	31·4	11	+ 0·03	·103	W.	33·9
12	. .	·198	S. E.	44·3	12	. .	·002	E.	. .
13	. .	·048	S. E.	45·5	13	. .	·044	N. W.	27·2
14	+ 0·54	·005	S. E.	47·3	14	. .	·005	N.	28·5
15	. .	·015	S. E.	. .	15	. .	·013	W.	35·4
16	. .	·009	S. W.	34·9	16	. .	·001	N. N. W.	42·4
17	. .	·014	S. S. E.	36·1	17	. .	·000	N. N. W.	41·6
18	. .	·013	S. E.	38·8	18	− 0·23	·000	N. W.	37·5
19	. .	·366	S. W.	37·5	19	. .	·008	W.	. .
20	. .	·072	W.	38·0	20	. .	·011	W. N. W.	28·0
21	+ 0·40	·293	S. W.	37·0	21	. .	·001	W. N. W.	33·1
22	. .	·313	W. S. W.	. .	22	. .	·000	S. E.	32·2
23	. .	·007	S. W.	35·3	23	. .	·000	S. S. W.	43·7
24	. .	·052	W. S. W.	37·9	24	. .	·000	S.	42·1
25	. .	·120	W.	34·8	25	− 0·34	·000	S. S. W.	42·9
26	. .	·060	S. E.	35·0	26	. .	·018	S. S. W.	. .
27	. .	·988	N. W.	35·6	27	. .	·284	W. S. W.	32·5
28	+ 1·00	·002	N. W.	31·0	28	. .	·047	W.	35·7
29	. .	·036	S. W.	. .	29	. .	·029	S. W.	35·1
30	. .	·044	S. W.	44·5					
31	. .	·026	W.	30·8					
		3·964					0·838		

DUBLIN MAGNETICAL OBSERVATORY, 1860.

MARCH.					APRIL.				
Day.	Rain, minus Evaporation.	Rain.	Direction of Wind.	Dew point.	Day	Rain, minus Evaporation.	Rain.	Direction of Wind.	Dew Point.
	Inches.	Inches.				Inches.	Inches.		
1	. .	·001	S. S. W.	33·6°	1	. .	·100	S. W.	. .
2	. .	·015	S. W.	33·6	2	. .	·178	N. W.	35·9°
3	− 0·22	·001	S. W.	38·4	3	. .	·021	S. W.	39·8
4	. .	·109	N. W.	. .	4	. .	·020	S. E.	44·3
5	. .	·003	W. N. W.	36·8	5	. .	·027	N. E.	40·0
6	. .	·000	W. S. W.	45·1	6	. .	·002	N. N. E.	*Easter Holidays.*
7	. .	·073	N. E.	36·8	7	− 0·59	·000	S. W.	
8	. .	·001	E. N. E.	33·1	8	. .	·064	S. W.	
9	. .	·000	N. N. E.	37·5	9	. .	·226	N. W.	
10	− 0·18	·101	N. W.	35·6	10	. .	·001	N. W.	
11	. .	·000	S. S. W.	. .	11	. .	·000	S. S. E.	40·8
12	. .	·262	N. W.	37·1	12	. .	·568	S. E.	45·4
13	. .	·003	N. W.	34·2	13	. .	·275	N. N. W.	37·9
14	. .	·350	S. E.	36·0	14	+ 0·34	·001	E.	39·3
15	. .	·126	S. W.	41·7	15	. .	·000	E. S. E.	. .
16	. .	·086	S. W.	42·8	16	. .	·000	E.	45·7
17	+ 0·48	·090	S. W.	47·3	17	. .	·018	E.	40·7
18	. .	·010	S. W.	. .	18	. .	·000	N. E.	39·1
19	. .	·122	S. W.	43·7	19	. .	·000	N.	33·7
20	. .	·052	S. W.	43·5	20	. .	·000	N. N. E.	32·4
21	. .	·405	W. S. W.	38·0	21	− 1·05	·000	N. N. W.	32·4
22	. .	·038	W.	36·0	22	. .	·000	N. W.	. .
23	. .	·070	S.	44·2	23	. .	·182	N. W.	33·9
24	0·00	·174	W.	37·2	24	. .	·055	N.	38·2
25	. .	·140	N. W.	. .	25	. .	·001	N. E.	35·9
26	. .	·080	N.	34·6	26	. .	·000	E.	41·0
27	. .	·000	W.	42·6	27	. .	·000	E. S. E.	44·2
28	. .	·025	S. W.	49·6	28	− 0·74	·000	S. S. E.	47·3
29	. .	·142	S. W.	47·2	29	. .	·682	S. S. E.	. .
30	. .	·080	N.	46·4	30	. .	·204	S. S. W.	54·3
31	− 0·14	·011	S. S. E.	49·4					
		2·570					2·625		

DUBLIN MAGNETICAL OBSERVATORY, 1860.

MAY.					JUNE.				
Day.	Rain, minus Evaporation.	Rain.	Direction of Wind.	Dew Point.	Day	Rain, minus Evaporation.	Rain.	Direction of Wind.	Dew Point.
	Inches.	Inches.				Inches.	Inches.		
1	. .	·001	S. E.	51·5°	1	. .	·334	S. W.	56·0°
2	. .	·000	N. E.	43·0	2	+ 0·03	·011	N. E.	49·8
3	. .	·000	S. E.	48·0	3	. .	·671	N. W.	. .
4	. .	·000	S. E.	51·7	4	.	·081	W. S. W.	50 8
5	− 0·32	·000	S. E.	46·3	5	. .	·075	S. W.	52·2
6	. .	·000	S. E.	. .	6	. .	·107	S. S. W.	54·9
7	. .	·000	S. E.	46·9	7	. .	·470	S. W.	48·9
8	. .	·108	S. W.	52·6	8	. .	·005	S. W.	53·2
9	. .	·169	W.	38·9	9	+ 1·00	·291	S. W.	53·3
10	. .	·291	S. E.	44·2	10	. .	·265	W.	. .
11	. .	·094	S. S. E.	56·9	11	. .	·400	S. S. W.	53·7
12	− 0·36	·000	S. W.	56·9	12	. .	·590	S.	55·1
13	. .	·148	W. S. W.	. .	13	. .	·128	S. W.	49·7
14	. .	·000	E. S. E.	50·3	14	. .	·147	S.	49·0
15	. .	·007	S. S. W.	53·8	15	. .	·102	S. E.	51·0
16	. .	·328	W.	54·5	16	+ 0·63	·085	S. E.	54·1
17	. .	·325	S. W.	51·9	17	. .	·001	E.	. .
18	. .	·058	S. E.	52·6	18	. .	·000	W.	54·3
19	− 0·28	·016	S. S. W.	54·5	19	. .	·003	E.	54·1
20	. .	·000	S. S. W.	. .	20	. .	·061	N. E.	51·3
21	. .	·000	S. E.	57·5	21	. .	·002	W. N. W.	53·3
22	. .	·075	S. E.	58·9	22	. .	·102	S. E.	55·9
23	. .	·392	S. S. W.	56·4	23	− 0·70	·173	W. N. W.	50 4
24	. .	·223	W.	51·6	24	. .	·000	S. W.	. .
25	. .	·028	S.	55·0	25	. .	·266	N. W.	53·6
26	− 0·48	·033	W.	50·5	26	. .	·003	S. W.	51·8
27	. .	·024	S. W.	. .	27	. .	·059	S. W.	53·3
28	. .	·601	W. N. W.	39·9	28	. .	·002	S. W.	51·3
29	. .	·026	W. S. W.	44·2	29	. .	·145	N. W.	50·4
30	. .	·003	W.	43·5	30	− 1·03	·014	N. W.	48·8
31	. .	·169	E. S. E.	48·3					
		3·124					4·593		

DUBLIN MAGNETICAL OBSERVATORY, 1860.

Day.	JULY. Rain, minus Evaporation.	Rain.	Direction of Wind.	Dew Point.	Day.	AUGUST. Rain, minus Evaporation.	Rain.	Direction of Wind.	Dew Point.
	Inches.	Inches.				Inches.	Inches.		
1	. .	·000	N. W.	. .	1	. .	·000	N. W.	54·1°
2	. .	·000	N. W.	53·2°	2	. .	·048	N. W.	54·7
3	. .	·000	N. W.	57·7	3	. .	·333	N. W.	58·7
4	. .	·000	N. W.	55·5	4	− 0·53	·069	N. W.	54·5
5	. .	·000	N. W.	58·2	5	. .	·000	S.	. .
6	. .	·000	N. N. W.	53·8	6	. .	·215	N. E.	48·2
7	− 1·13	·000	N. W.	57·6	7	. .	·211	N. W.	49·9
8	. .	·001	E.	. .	8	. .	·117	N. W.	53·3
9	. .	·000	E. S. E.	56·1	9	. .	·061	N. W.	50·2
10	. .	·000	E. S. E.	58·3	10	. .	·000	S. S. W.	54·9
11	. .	·420	W.	61·5	11	− 0·53	·068	N. W.	53·1
12	. .	·016	S. W.	59·5	12	. .	·104	S.	. .
13	. .	·000	S. S. E	55·2	13	. .	·057	S. E.	51·1
14	− 0·66	·078	W. S. W.	57·7	14	. .	·000	N. E.	58·7
15	. .	·374	S. W.	. .	15	. .	·003	N. E.	60·0
16	. .	·008	N. W.	55·0	16	. .	1·302	S. E.	58·9
17	. .	·000	E. N. E.	56·3	17	. .	·136	N. W.	52·7
18	. .	·018	S. S. E.	56·8	18	+ 1·40	·535	N. W.	54·5
19	. .	·017	N. W.	55·4	19	. .	·003	S. W.	. .
20	. .	·082	N. W.	51·0	20	. .	·129	N. W.	54·7
21	+ 0·62	1·083	N. E.	54·3	21	. .	·001	N. W.	53·9
22	. .	·135	N. N. W.	. .	22	. .	·690	N. W.	55·1
23	. .	·007	N. W.	54·7	23	. .	·085	S. W.	52·6
24	. .	·143	N. N. W.	50·3	24	. .	·182	S. W.	54·7
25	. .	·001	N. N. W.	50·7	25	+ 0·40	·010	S. W.	51·8
26	. .	·000	N. W.	49·6	26	. .	·001	S. W.	. .
27	. .	·005	S. W.	58·3	27	. .	·000	N. W.	51·3
28	− 0·58	·035	N. W.	52·4	28	. .	·136	S. E.	56·2
29	.	·000	N. N. W.	. .	29	. .	·116	S.	51·0
30	. .	·001	W.	52·8	30	. .	·112	W.	51·2
31	. .	·007	N. N. W.	55·2	31	. .	·021	N. W.	51·1
		2·431					4·745		

DUBLIN MAGNETICAL OBSERVATORY, 1860.

SEPTEMBER.					OCTOBER.				
Day.	Rain, minus Evaporation.	Rain.	Direction of Wind.	Dew Point.	Day.	Rain, minus Evaporation.	Rain.	Direction of Wind.	Dew Point.
	Inches.	Inches.				Inches.	Inches.		
1	− 0·98	·001	N. W.	53·1°	1	. .	·002	N. W.	47·3°
2	. .	·273	N. W.	. .	2	. .	·003	N. W.	49·8
3	. .	·001	N. W.	50·5	3	. .	·007	N. W.	45·6
4	. .	·000	N. W.	53·5	4	. .	·008	N. W.	49·3
5	. .	·054	N. W.	55·9	5	. .	·024	N. W.	56·1
6	. .	·001	S. E.	61·4	6	− 0·66	·001	N. W.	56·1
7	. .	·006	S. E.	61·5	7	. .	·050	N. E.	. .
8	− 0·25	·008	N. W.	57·6	8	. .	·000	W.	43·4
9	. .	·003	N. E.	. .	9	. .	·008	W. N. W.	36·4
10	. .	·331	N. E.	46·4	10	. .	·276	S. W.	53·3
11	. .	·001	N. N. E.	46·4	11	. .	·159	W. S. W.	41·4
12	. .	·011	S. S. W.	49·6	12	. .	·000	S. W.	39·4
13	. .	·000	S. S. E.	49·4	13	− 0·13	·008	S. W.	46·8
14	. .	·154	S. W.	46·2	14	. .	·076	W. N. W.	. .
15	+ 0·14	·669	N. W.	49·7	15	. .	·020	S. W.	58·0
16	. .	·008	S.	. .	16	. .	·042	S. W.	43·4
17	. .	·253	N. W.	48·8	17	. .	·026	S. W.	45·0
18	. .	·001	S. W.	48·8	18	. .	·510	S. W.	51·3
19	. .	·219	S.	57·2	19	. .	·002	S. W.	51·3
20	. .	·091	S. S. W.	52·7	20	+ 0·11	·135	S. W.	44·9
21	. .	·005	S. S. W.	48·4	21	. .	·000	S.	. .
22	+ 0·20	·392	S. W.	48·4	22	. .	·019	S. S. W.	55·6
23	. .	·007	S. W.	. .	23	. .	·142	S. S. W.	53·1
24	. .	·020	W.	45·7	24	. .	·001	S.	51·1
25	. .	·002	W.	48·9	25	. .	·000	S. W.	52·0
26	. .	·000	S. E.	49·6	26	. .	·000	S.	52·7
27	. .	·128	E. N. E.	49·6	27	− 0·22	·148	N. W.	45·6
28	. .	·002	N.	44·1	28	. .	·166	N. N. W.	. .
29	− 0·47	·001	N.	47·3	29	. .	·220	N. E.	51·4
30	. .	·005	W.	. .	30	. .	·198	S. E.	55·5
31	. .				31	. .	·020	S. S. E.	50·5
		2·647					2·271		

DUBLIN MAGNETICAL OBSERVATORY, 1860.

NOVEMBER.					DECEMBER.				
Day.	Rain, minus Evaporation.	Rain.	Direction of Wind.	Dew Point.	Day.	Rain, minus Evaporation.	Rain.	Direction of Wind.	Dew Point.
	Inches.	Inches.				Inches.	Inches.		
1	. .	·004	S. E.	48·9°	1	+ 1·27	·365	S.	45·0°
2	. .	·001	S. E.	45·9	2	. .	·125	S. W.	. .
3	+ 0·35	·008	S. E.	44·4	3	. .	·350	S. E.	48·2
4	. .	·001	S. E.	. .	4	. .	·393	N. N. E.	45·7
5	. .	·000	S. E.	38·8	5	. .	·001	S. S. W.	41·1
6	. .	·000	S. E.	38·2	6	. .	·290	S. S. W.	48·0
7	. .	·000	S. E.	40·2	7	. .	·006	S. S. E.	45·1
8	. .	·000	S. E.	39·6	8	+ 1·20	·282	S. S. W.	44·3
9	. .	·128	E. S. E.	37·9	9	. .	·068	S. W.	. .
10	− 0·22	·162	S. E.	41·3	10	. .	·001	N. W.	41·0
11	. .	·492	E. N. E.	. .	11	. .	·011	N. W.	39·6
12	. .	·001	E. N. E.	40·9	12	. .	·008	N. W.	35·7
13	. .	·001	N. E.	40·0	13	. .	·017	N. W.	41·2
14	. .	·010	S.	42·6	14	. .	·001	S. S. E.	37·2
15	. .	·010	S. W.	39·0	15	+ 0·02	·014	N.	42·7
16	. .	·002	S. W.	37·2	16	. .	·000	N. W.	. .
17	+ 0·20*	·005	W. S. W.	28·8	17	. .	·017	N. W.	31·5
18	. .	·000	S. W.	. .	18	. .	·001	N. W.	28·0
19	. .	·001	S. S. W.	39·2	19	. .	·015	N. W.	25·4
20	. .	·072	S. S. E.	45·8	20	. .	·004	N. W.	24·7
21	. .	·349	S. S. W.	48·1	21	. .	·070	N. W.	25·9
22	. .	·002	S. W.	41·9	22	+ 0·50†	·130	N. W.	24·5
23	. .	·176	N. N. E.	42·3	23	. .	·000	N. W.	. .
24	+ 0·49	·070	N. E.	38·9	24	. .	·000	N. W.	22·7
25	. .	·005	E. S. E.	. .	25	. .	·000	N. E.	
26	. .	·127	N. E.	35·4	26	. .	·000	S. E.	
27	. .	·324	E. N. E.	37·8	27	. .	·087	S. S. E.	
28	. .	·200	S. E.	40·0	28	. .	·009	S. E.	
29	. .	·554	S. S. E.	46·7	29	‡	·700	S. E.	
30	. .	·198	S. E.	43·5	30	. .	·200	S. E.	
					31	. .	·006	S. E.	
		2·903					3·171		

Christmas.

* Three-tenths of an inch of ice. † Water all frozen.
‡ Glass receiver of rain-gauge burst, owing to a sudden thaw.

From this Table the following has been prepared, showing the amount of Evaporation and Rain-fall for each week during the year.

Evaporation and Rain-fall in Dublin, for each week of the year 1860.

Week.	Evaporation.	Rain-fall.	Week.	Evaporation.	Rain-fall.
	Inches.	Inches.		Inches.	Inches.
I. January 7	0·273	0·773	XXVI. June 30	1·519	0·489
II. „ 14	0·221	0·761	XXVII. July 7	1·130	0·000
III. „ 21	0·382	0·782	XXVIII. „ 14	1·175	0·515
IV. „ 28	0·542	1·542	XXIX. „ 21	0·962	1·582
V. February 4	0·061	0·111	XXX. „ 28	0·906	0·326
VI. „ 11	0·340	0·370	XXXI. August 4	0·988	0·458
VII. „ 18	0·295	0·065	XXXII. „ 11	1·202	0·672
VIII. „ 25	0·360	0·020	XXXIII. „ 18	0·737	2·137
IX. March 3	0·615	0·395	XXXIV. „ 25	0·700	1·100
X. „ 10	0·467	0·287	XXXV. September 1	1·367	0·387
XI. „ 17	0·437	0·917	XXXVI. „ 8	0·593	0·343
XII. „ 24	0·871	0·871	XXXVII. „ 15	1·029	1·169
XIII. „ 31	0·618	0·478	XXXVIII. „ 22	0·769	0·969
XIV. April 7	0·938	0·348	XXXIX. „ 29	0·630	0·160
XV. „ 14	0·795	1·135	XL. October 6	0·710	0·050
XVI. „ 21	1·068	0·018	XLI. „ 13	0·631	0·501
XVII. „ 28	0·978	0·238	XLII. „ 20	0·701	0·811
XVIII. May 5	1·207	0·887	XLIII. „ 27	0·530	0·310
XIX. „ 12	1·022	0·662	XLIV. November 3	0·267	0·617
XX. „ 19	1·162	0·882	XLV. „ 10	0·511	0·291
XXI. „ 26	1·231	0·751	XLVI. „ 17	0·321	0·521
XXII. June 2	1·143	1·173	XLVII. „ 24	0·180	0·670
XXIII. „ 9	0·700	1·700	XLVIII. December 1	0·503	1·773
XXIV. „ 16	1·087	1·717	XLIX. „ 8	0·247	1·447
XXV. „ 23	1·042	0·342	L. „ 15	0·100	0·120

In the diagram (Plate XVII.), I have laid down the curve of evaporation from this Table; the abscissæ being measured in weeks, and the ordinates in tenths of inches. It is clearly seen from the curve that the evaporation, unlike the rain-fall, depends directly on the sun's declination, reaching its maximum of 1·2 inches per week at the summer

solstice, and its minimum of 0·2 inches per week at the winter solstice. I have not been able to obtain returns of evaporation from other stations suitable for comparison with this; but I have no doubt that, if similar observations were made in other meteorological observatories, many results of the highest interest would be obtained. Among these results, the most important is the coefficient of evaporation of water depending on the latitude.

I was anxious, before publishing the foregoing results, to ascertain whether the vessel, being made of glass, influenced the result in any important respect, and therefore placed a cylindrical earthenware vessel, $17\frac{1}{2}$ inches in diameter, in the same place, on the 7th of March, 1861, pouring into it water to the depth of 10 inches. The following Table gives the depth of water in this vessel at various times during the year.

The final result for the entire year shows that the rain-fall exceeded the evaporation by 0·543 inches.

Large Cylindrical Rain and Evaporation Gauge ($17\frac{1}{2}$ *in. diam.*), *adjusted with* 10 *in. of Water for Zero Point, and placed on Roof of Magnetical Observatory March* 7, 1861.

Observed.	Inches.
April 5, 1861, ...	11·80
May, 4, 1861, ...	8·10
June, 8, 1861, ...	7·10
October 9, 1861, ...	11·20
November 23, 1861, ...	11·90
January 18, 1862, ...	11·90
March 8, 1862, ...	11·80
7	73·80
Evaporation nearly equal to Fall,	10·543

I also placed, March 1, 1861, a tapering earthenware vessel, whose section at rain (rain area) was $16\frac{1}{2}$ in., and at water level ($5\frac{1}{2}$ inches from bottom) was $13\frac{1}{2}$ inches.

The rain-fall-area in this case was therefore greater than the evaporation-area, in the proportion of $(16\frac{1}{2})^2$ to $(13\frac{1}{2})^2$; but there was also evaporation from the wetted conical surface. The result of fifty-three weeks' observation is given below.

Conical Rain and Evaporation Gauge, adjusted with 5½ inches of Water for Zero Point, and placed on Roof of Magnetical Observatory, March 1, 1861.

Observed.	Inches.
April 5, 1861, ...	8·65
May 4, 1861, ...	3·60
June 8, 1861, ...	3·00
October 9, 1861, ...	8·40
November 23, 1861, ...	8·05
January 18, 1862, ...	8·04
March 8, 1862, ...	7·90
7	47·64
	6·806

This result gives for the fifty-three weeks an excess of rain-fall over evaporation of 1·306 inches. But during the first week of exposure, March 1 to March 8, 1861, and which is not included in the record of the cylindrical gauge, 1·717 inches of rain fell; showing that, probably, an inch should be taken off the excess just given.

If this reasoning be correct, it would serve to show that the evaporation from the sloping side of the gauge compensated the diminished area of the water surface.

Observatory Rain Gauge.

Observed.	Rain.
March 1, 1861, ...	0·086
,, 2, ,, ...	0·214
,, 3, ,, ...	1·020
,, 4, ,, ...	0·125
,, 5, ,, ...	0·002
,, 6, ,, ...	0·040
,, 7, ,, ...	0·230
	1·717 in.

Appendix on the difference between Evaporation and Rain-Fall at Enniskillen.

The following observations were made by the Rev. William Steele, in the garden of the Royal School of Portora, near Enniskillen, by means of a cylindrical tinned vessel, 10 in. diameter, placed 10 ft. above the level of the ground, on the stump of a tree cut down for the purpose.

From the 15th of March, 1860, to the 17th of March, 1861, the rain-fall exceeded the evaporation during nine months, the exceptions being April, July, and September, during which months the evaporation exceeded the rain-fall by 2·67 inches; and during the remaining nine months of the year, the rain-fall exceeded the evaporation by 11·38 in., thus leaving a balance in favour of rain-fall of 8·71 inches in the entire year.

Examination of the Vessel of Water every Five Days, commencing Tuesday, March 15, 1860.

March	15,	0·00
„	20,	+ 0·20
„	25,	+ 0·60
„	30,	+ 0·15
		+ 0·95
April	4,	+ 0·15
„	9,	+ 0·15
„	14,	(Under repair.)
„	19,	− 0·45
„	29,	− 0·175
		− 0·32
May	14,	+ 0·40
„	19,	+ 0·925
„	24,	− 0·10
„	29,	+ 0·50
		+ 1·72
June	3,	+ 0·458
„	8,	+ 0·110
„	13,	+ 0·145
„	23,	+ 0·35
„	28,	+ 0·40
		+ 1·46
July	3,	− 0·30
„	8,	− 0·60
„	13,	− 0·20
„	18,	− 0·25
„	23,	− 0·10
„	28,	− 0·30
		− 1·75
August	2,	+ 0·15
„	6,	− 0·10
Carried forward,		+ 0·05

Brought forward,		+ 0·05
„	11,	+ 0·20
„	16,	+ 0·40
„	21,	+ 0·60
„	26,	+ 0·70
„	31,	− 0·10
		+ 1·85
September	5,	− 0·30
„	10,	− 0·25
„	15,	− 0·05
„	20,	+ 0·35
„	25,	− 0·10
„	30,	− 0·25
		− 0·60
October	5,	− 0·15
„	10,	+ 0·25
„	15,	+ 0·65
„	20,	+ 0·30
„	25,	+ 0·15
„	30,	+ 0·15
		+ 1·35
November	4,	− 0·25
„	9,	− 0·20
„	14,	+ 0·10
„	19,	+ 0·15
„	24,	+ 0·50
„	29,	+ 0·35
		+ 0·65
December	4,	+ 0·45
„	9,	+ 0·75
„	14,	− 0·35
(Frozen for a long time.)		
		+ 1·15

January	16,	− 0·10	March	2,	+ 0·35
,,	21,	− 0·10	,,	7,	+ 0·40
,,	26,	+ 0·15	,,	12,	+ 0·55
,,	31,	+ 0·25	,,	17,	+ 0·20
		+ 0·20	,,	22,	+ 0·45
			,,	27,	− 0·15
					+ 1·80
February	5,	+ 0·15			
,,	10,	− 0·25	April	1,	+ 0·50
,,	15,	+ 0·15	,,	6,	− 0·25
,,	20,	+ 0·55			
,,	25,	− 0·05			
		+ 0·55			

Mr. Edward Clibborn read a paper—

On the partial Combustion of Fluid Iron, described by Mandelslo in 1639; and of Solid Iron, now publicly practised in Dublin by means of a Cold Blast of Common Air.

The first process referred to in the title of this communication is described at p. 160 of the English version of Mandelslo's travels, published in London, in 1669. We there find that "They (*the Japanese*) have, among others, a particular invention for the melting of iron, without the using of fire, casting it into a tun done about on the inside with about half a foot of earth, where they keep it (*melting**) with continual blowing, and take it out by ladles full, to give it what form they please, much better and more artificially than the inhabitants of Liege are able to do." When these remarks were written in 1639, this city produced the best fabrics in iron then manufactured in Europe.

To a cursory reader this extract conveys the notion, that the Japanese, amongst other processes for working the metals, then unknown in Germany, were acquainted with one which enabled them to melt iron without the use of fire in any form. But a judicious person, acquainted with the iron manufacture, will perceive that the words, "*casting it* (the iron) *into a tun*" qualify the previous statement, "*without the using of fire;*" for they imply that the iron, having been previously melted by fire, was afterwards cast, in the liquid state, not into wooden flasks or boxes of various shapes and sizes, containing sand moulds, in which the melted iron would, under ordinary treatment, have been allowed to remain at rest, and cool, and harden into all sorts of shapes, with or without the impact of air, in the Japanese plan, on the contrary, was, "cast" into, or allowed to flow from a melting furnace into an open wooden "tun," or large tub, such as might have been used in a German brew-house about 230 years ago. This tun was lined internally, as he tells us, "with about half a foot of earth," or fire-clay, and not moulding sand. This clay, from its tenacity, was necessary to fit it for the purpose. It was not superficial or common earth, but a sort of fire-lute, not only capable of

* The context shows that this word is understood.

resisting the heat of the molten metal, but of insulating or hindering the progress of the heat towards the staves of the tun, so long as the blowing of the heated iron with cold air was continued.

Our author took it for granted, that his reader was able to fill up and complete his narrative, from his own knowledge of the iron manufacture, as practised in Europe at the time he wrote, and not leave it in its present imperfect state, which, to the ignorant and uninformed reader, appears to be inconsistent with itself, and utterly impracticable.

We are not told how hot the iron was before the blowing process commenced; or how much hotter it might have become under that process; or how long, or how many minutes it was continued; what test the Japanese iron-master adopted to enable him to know when the blowing process was completed, or when he might set the men to work with the ladles to pour the liquid iron into the moulds, or cast it into pigs or bars, or put it through some other process.

Enough is, however, explained to enable us to compare roughly the Japanese process with that proposed in 1856, by Mr. Bessemer, who then astonished many persons, who had hitherto been considered conversant with the management of liquid iron, by bringing forward a plan, as new, for blowing molten iron with atmospheric air, which plan, in all essentials, was so like the Japanese, that we may illustrate or explain the one by the other; and, perhaps, be led to infer that somehow the modern plan of blowing melted iron was really no more than a revival in Europe, in 1856, of the old plan which Mandelslo saw in Japan in 1639.

It is, however, possible, that Mr. Bessemer might have arrived at his process by other means; and this is the more likely, as the other process of blowing heated iron we have hereafter to call attention to, had been previously in use in England. In it we discover the application of the same principle to practice, but in a minor degree, both as to the quantity of iron operated on by the blast of cold air, and also in the inferiority of the temperature which is obtained by the blowing process.

It is very much to be regretted that Mandelslo's account of the Japanese method of blowing melted iron with cold air, and thereby heating it by partially burning it and its alloys, is so very imperfect; but with the aid of Mr. Bessemer's published plans, we can perfectly understand it. Mandelslo clearly gives the Japanese the ownership of the process he notices; and we can hardly think he would have done so, had he seen or heard of it in the East Indies, Tartary, or Persia, or of any similar process.

He, however, takes no notice of the comparative scarceness of iron in Japan, remarked by all modern visitors to that country, and of the extreme abundance of iron, and the great craft of smiths of all kinds in China, facts which our traveller was ignorant of, or leaves us to gather from other witnesses. He, however, tells us that the Japanese claim to have had from the earliest times a great intercourse with China. It hence follows that they might have obtained from China this curious process of blowing hot iron with cold air, and partially burning it and its alloys, and thereby improving its quality for general or special purposes;

though no traveller, that I know of, to China, or any other part of Asia, has distinctly noticed the process used in Japan, or any other like it, as involving the chemical principles which give it peculiarity and excellence.

I believe there is nothing recorded by any old or modern traveller to Japan, which will justify us in considering the Japanese, any more than the Chinese, the Hindoos, or other Asiatics, an inventive people. Latterly the Japanese have exhibited wonderful tact in picking up information in the arts and manufactures from the Europeans they have come in contact with; so it is quite within the limits of probability, that they got their "particular invention," as our traveller calls it, from the Chinese, or the parties they got their iron from originally, as very little is said to be found native in Japan.

If our argument be correct, the process may not be Japanese, but Chinese; and they may still use it in those districts where they reduce the iron from the ore, or purify it for ulterior operations. Their very tough iron clamps and wire may be made of blown iron. That the Chinese possess many metallurgic processes altogether unknown in Europe is beyond a doubt; and this one of blowing hot iron, and making it hotter with a cold blast of common air, may be one of them. But then it is not likely that the Chinese themselves invented the process, which appears to point to a method for reducing iron on a very small scale from the ore in an earthen crucible; which, we can imagine, was removed from the fire, and its contents, less the molten button at the bottom of it, blown aside or away, by the agency of a powerful circular bellows, used previously for urging the fire in which the earthen crucible was heated, and the iron reduced or melted.

Now this process, on a small scale, might lead at once to the blowing of hot iron on a large one, if it were found that the quality of the iron was much improved by it; or that the contents of one crucible might be kept hot, or made hotter by it, while the iron contents of other crucibles might be emptied into it, and all thoroughly blended into one mass, without the aid of another fire, or the labour and danger of lifting a full or heavy crucible from one place to another.

In practice the lining of the wooden tun with six inches of earth was like a great modern pot of clay, used for melting black bottle-glass, being neither more nor less than a gigantic crucible,* so constructed and dried that it would bear the heat without cracking, and for a sufficient time† confine it, till the blowing process was completed.

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* Though Mandelslo states nothing of the means adopted for preparing the earthen lining of the "tun," it is probable that it was not only air-dried, but that fire was used to dry it, and possibly to heat it, before the iron was cast into it.

† As we are not informed how the blast of cold air was applied, we cannot form a comparison of Mr. Bessemer's process, or give a reasonable guess as to the time the liquid iron was operated on. It seems as if the blast in the Japanese process was directed strongly downwards, and slightly divergent from the centre, so as to produce motion in the mass, and blow the scales or scoriæ produced to the side of the vessel.

As Mandelslo tells us nothing about the use of steam, or any contrivance for heating the air used in the blowing, the Japanese process may be considered as having been a simple exaggeration of the process we have ventured to indicate, as having been used by a central Asiatic people who, at a very early period, reduced iron in crucibles—a plan which is still used by those who in central Asia produce that kind of iron which is so much prized in Damascus for gun-barrels, and other purposes in which great toughness is desirable, and which iron is found almost always mixed more or less with striæ of steel.

If it were found that the quality of this iron, and that produced by the Japanese process described by Mandelslo, were the same, and that the central Asiatics at present blow the iron in the crucibles after it is reduced from the ore, our supposition as to the origin of the curious process described by Mandelslo might be considered established.

Though found in use in Japan on the large scale, in 1639 (possibly by Chinese traders or their agents there), it is extremely probable that it is very much older in other parts of Asia; and on the small scale, as above suggested, perhaps it is as old as any other metallurgic process now in use in Asia; for iron tools and weapons have been found in the very lowest strata of those numerous courses of clay, brickwork, and pottery, which have been cut through in all the recent explorations in the old sites of the cities, fortifications, temples, and palaces near the Tigris and Euphrates. In every instance, as in the excavations made by Captain Taylor,* iron things are at the bottom,—indicating in these regions, not a later but an earlier age, in certain parts of Asia, for iron than for copper, silver, gold, and tin, and their compounds; all of which appear to have been later productions, and originally derived by means of trade or war with other countries, where these metals were themselves native.

I have now to call attention to the second process noticed in the title to this paper. It is publicly practised in Dublin, by Mr. Buckley, in James's-street, who claims to be manufacturer of the best horse-shoe nails to Her Majesty. He informs me that he learned it from a man of the name of Inman, who belonged to the York Militia, and who left that regiment in Dublin above forty years ago,† when he secretly introduced this method for making horse-shoe nails into this city. In principle

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* See his paper on Cromlechs found in the Deccan, read to the Academy, on the 12th of May, 1862.

† Before this time horse-shoe nails were made of the best Swedish iron generally; but whether the nailers blew them with the common bellows before, or annealed them after fabrication, to soften them, I am not able to say. There were secrets known to certain blacksmiths who made these nails; but whether the cold blast was used in Ireland before Inman introduced it, I have not learned. A method for making horse-shoe nails, very barbarous, as it is exactly the same with the Caffre method of forging iron weapons, had been, before Inman's time, introduced into the county of Clare, from the county of Cork, by a person of the name of John Hoare, as has been explained to me by Mr. E. Curry, who describes Mr. Hoare to have been a great scholar and original genius. This process consisted in using two stones, instead of the steel-faced hammer and anvil, for making horse-shoe nails, it having been found that the stones abstracted less heat from the nail-rod

his process is exactly the same as the Japanese; but it is necessarily practised on a very small scale, the amount of iron operated on by the blowing process, at any time, being limited to so much as will form the point and shank of a horse-shoe nail.

My inquiries have failed to trace the history of this process or its antiquity in England; but I find it is now practised extensively at Wolverhampton, and in some other places; and I would be disposed to conclude that it had been very generally practised in England, probably by the gipsies,* long before Inman introduced it into Dublin, on account of the old belief or impression, which is certainly older than fifty years, that the barrels made for fowling-pieces and pistols from old horse-shoe nail iron were less likely to burst than those made out of any other denomination of European iron, and were as safe as the best barrels made of Damascus iron, or its Spanish imitations. Thus comparing or placing the horse-shoe nail iron on a par with the Damascus, which, in the East, where great attention was given to fire-arms, was considered the best. The real or supposed similitude in the quality of the best European and Asiatic irons, used for gun-barrels, would lead one to suspect that the irons they are made of had somehow gone through the same or an analogous process of being blown with cold air when hot, and been partially burned; and that this operation had given to all of them their peculiar toughness, due to a striated or filamentous structure, which obliterated the original crystalline arrangement of their particles, a change in the quality of the iron which is said to be effected by the Bessemer process of blowing the liquid metal with cold air.

It is this similitude in the organic structure of the iron of the barrels of guns made of horse-shoe nail iron, and of Damascus twisted iron, that leads me to infer that the Asiatic iron there used, though not procured in Japan, must have been cold blown, and partially burned when hot, like that tough iron we obtain from the welding together of bundles of horse-shoe nails made of cold-blown nail-rod iron.

In reducing the iron used in Damascus, the button found in the bottom of the crucible is said to be hammered into a small bar, which bar we may consider equivalent to a horse-shoe nail; but whether it is also blown in the process of hammering it out, or not, I am not able to say, though I would suspect it was, because the blowing would enable

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than the iron or steel tools, within the time necessary to fashion the nail. This process with the stones points to Africa for its origin; but the several processes of burning a portion of the iron we have to consider in this paper all point to central Asia, noticed by the prophet Jeremiah for the peculiarity or superiority of its northern iron or steel.

* If the process of blowing the heated nail-rod be Asiatic, its introduction into England may be due to the gipsies, who are iron-smiths by profession, and possibly, as their language indicates, from northern Asia, and probably inheritors of many secrets of the iron craft, and this one amongst others. It looks also as if the secret of the polarity of magnetic iron ore, or the loadstone and magnet, had been known also to the gipsies before its adoption for scientific purposes,—as some navigators objected to its use at all, on the score that it had been previously used by fortune-tellers and cheats for purposes of deception; and, as the gipsies led the way in this delusion, they may be the parties alluded to.

the operator to make it hold the heat for some time after it was removed from the crucible. In this case the continued blowing with the cold air would save the use of a forge fire, and a second heating of the scraps of iron, and thus economise trouble and expense in their manipulation.

I may now describe the process for burning iron partially, used by the makers of horse-shoe nails in Dublin and elsewhere. The nail-rod is heated in the common forge fire, like any other nail-rod iron; but, instead of being at once submitted to the action of the hammer, it is placed on the anvil so that the heated part of the iron rod overhangs its face on one side. In this position it is exposed for some seconds to a powerful and steady blast of cold air, obtained from a circular bellows, very Asiatic in its character and form. This bellows gives a much greater blast than that used for blowing the fire, due to the greater load placed upon it, which gives a pressure, at the least, of twenty-five pounds to the superficial foot. This may be increased by pressure from the hand of the nailer, who watches the burning of the iron till he thinks it has gone far enough, and then he places the burning iron on the face of the anvil, keeping it more or less in the blast while he hammers it hot. Thus it appears that the usual aphorisms, which apply to the making of nails in a hurry, do not refer to this process at all.

The heated nail-rod, instead of getting cold by the action of the blast, gets hotter and hotter, and burns partially, throwing off innumerable small sparks, which pass off in all directions, their courses not being influenced by the direction of the blast. Scales or small slags form on the hot iron, which are believed to consist chiefly of impurities in the nail-rod. At last the iron begins to melt, and would drop down like melted sealing-wax, if not removed from the direct influence of the blast, as described. By moving the iron more or less into the blast, the nailer is able to moderate and regulate the heat of the portion he is operating on; and this enables him to complete the point and shank of the horse-shoe nail hot, and before any crystallization of the iron begins or is completed, which it is by the hammering and hardening of the common nail when nearly cold. In theory, the nailer's process of blowing the iron of a horse-shoe nail is perfect, for it enables him to make the point and shank of the nail as soft and tough as he likes, while it allows him to make the head of it very hard, and thus withstand the friction to which it is exposed by its contact with the road.

The operation of making a horse-shoe nail by the cold blast process, beyond a doubt, gives the iron it is composed of some characters, both chemical and organic, very different to those possessed by the nail-rod previously. It clearly brings horse-shoe nail iron up to the Damascus standard, in many respects, and may place it above both the Japanese and Bessemer iron, prepared by the cold blast, as it is manipulated on a much smaller scale, and consequently is more completely exposed to the purifying action of the blast.

In the arts many applications of the nailer's cold blast process might be found, in cases where it would be expedient to keep iron hot without the immediate application of fuel. In rivet work it might be found most

valuable; and, with some contrivance for heating the blast, its uses may possibly be greatly extended in the manufacture of things made of iron, or of things made of other metals in contact with iron.

But these industrial considerations are out of place here, my object being to deduce scientific considerations from material facts, connected with mechanical art, which I have ventured to speculate on, with the view, if possible, of tracing the original development of a scientific principle, which, though hitherto applied in the arts only, may possibly be turned to account as a means by which we may obtain any amount of iron light, or light produced by the combustion of iron, *per se*, that we may want for scientific purposes.

Iron burned by the horse-shoe nail-maker's process, carried one step further, may be considered to be an aërolith at rest,—the air from the cylindrical bellows moving past it with the same velocity with which an aërolith in motion would, under ordinary circumstances, travel through the lower region of the atmosphere, and there, by friction, first become hot, and next, by impact with oxygen,* begin to burn its iron and nickel, like the heated nail-rod when exposed to the cold blast.

The partial combustion of the iron in the nailer's process, though it in theory, in some respects, resembles that produced by the burning of iron in oxygen gas, differs from it materially, and also from Bessemer's process, in the production of no large explosive sparks, which divert our attention from the iron actually burning. In our process the sparks are very minute, and the burning iron gives a very strong light, its intensity appearing to depend on the violence of the blast. We are thus supplied with a means of producing a large quantity of steady light by the combustion of iron for optical experiments. And as iron-wire may be mixed with other wire, and simple or compound wicks produced, made out of twisted hanks of wire of one or more kinds of metal, we have at our command a ready method for producing lights, which may be compared with light produced by the sun or meteoric bodies, in which there is reason to suspect the combustion of iron and other metallic substances.

So far as the material facts noticed in this paper are concerned, there is nothing actually new in it; yet I cannot find that any one has drawn the attention of opticians and physicists to the nailer's process of partially burning iron, or its analogies with the other processes noticed, and the means it puts at our command of burning iron by itself as a source of light.

Not having tried any experiments on the light produced by the nailer's process of burning iron, I am not prepared to say whether it offers any promise to the photographer; but, as highly heated iron is

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* The spark produced by a flint and steel is an example of the combustion of iron, first heated by pressure, and afterwards burnt by motion through the air. Its colour is different to that of iron burnt by the nailer's process, though the colour of that may change with the increase of the blast, and the proportional intensity of the light.

found to have great power in the development of marking ink, it is possible that it may possess for him some advantages over most other kinds of natural and artificial light.

As the progress of machinery is rapidly putting an end to the manufacture of hand-made nails, it is likely that horse-shoe nails will ere long be produced by other methods, and the two plans for making them here noticed be forgotten in the arts, and no memorial of them left beyond this passing scientific notice, should it find a place in the Proceedings of the Academy.

The Rev. S. Haughton, F. T. C. D., read the following paper, by Dr. Fleetwood Churchill, L. K. Q. C. P. I. and L. R. C. S. I., late Assistant Surgeon in her Majesty's Navy:—

On the Rain-Fall and Wind at Simon's Bay, Cape of Good Hope.

The following observations on the rain-fall and wind are offered as a contribution to our knowledge of the climate of the neighbourhood of the Cape of Good Hope. I have not given with them the observations I made on the barometer, and wet and dry bulb thermometers, as I believe that observations made with these instruments have already attracted the notice of meteorologists interested in the climate of the Cape.

My rain-gauge at Simon's-town is *twenty-one* feet from the ground. I was obliged to put it on the roof of my house, to get it clear of the bushes in the garden. The ground the house stands on is, at the outside, *fifty* feet above the sea.

The following Table gives the rain-fall in each month from June, 1859.

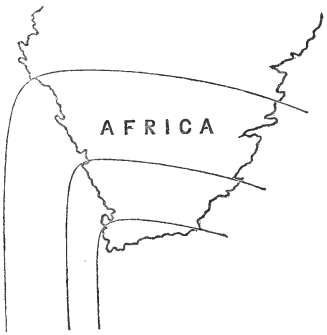
Table I.—*Rain-fall at Simon's Bay.*

	1859.	1860.	1861.	1862.
	inches.	inches.	inches.	inches.
January, ...	. .	0·62	0·59	0·53
February.	. .	1·58	0·10	
March, ...	. .	1·06	0·49	
April, ...	. .	1·23	1·82	
May, ...	. .	4·16	4·01	
June, ...	5·19	4·65	4·81	
July, ...	3·22	5·06	3·58	
August, ...	4·98	1·06	2·46	
September, ...	2·19	5·61	2·89	
October, ...	2·85	1·12	0·22	
November, ...	2·63	1·00	1·27	
December, ...	0·72	0·50	0·05	
Totals, ...		27·65	22·29	

The observations on the wind were made three times a day :—9 A. M., 1 P. M., 5 P. M.,—and represent the magnetic direction of the wind in the Bay, as taken from the direction of the ships and their flags with a ship's compass.

I have received, through the Rev. Professor Haughton, the following information from the Rev. Dr. Lloyd, as to the variation of the compass at Simon's Bay :—

"Simon's Bay is about thirty miles from Cape-Town, and nearly due south. The isogonal lines make a curious bend all along the west coast of Africa, thus—



"From Sabine's map for 1840, there appears to be an increase of 1′ of Declination for 4′ increase of S. Latitude. Hence it would follow that the West Declination at Simon's Bay is $6\frac{1}{2}$ minutes greater than at Cape-Town.

"The magnetic declination at *Cape-Town*, corresponding to the epoch September 1st, 1848, was 29° 14′.6 west. The mean change from year to year is, at present, + 0′.5 ; but it appears to be increasing."

From this statement it follows that, as the magnetic declination is diminishing, in 1860, the declination was at Simon's Bay 29° 15′ W.

I have given in Table II. both the direction and force of the wind; the latter estimated as miles per hour, according to Beaufort's scale, as well as I was able to apply it; and in Table III. I have given the direction and force of the wind referred to the 32 points of the magnetic compass, from which Table may be calculated the resultant frequency of wind, and the resultant wind of each month.

TABLE II.—*Direction and Force of Wind at Simonstown*, 1861.

JULY.	Direction.	Force. Miles per hour.	JULY.	Direction.	Force. Miles per hour.
1	N.	6	17	S. W.	4
	N.	6		S. S. E.	12
	N.	2		S. by E.	9
2	N.	6	18	W. N. W.	2
	N. W.	4		E. by N.	6
	N. W.	4		N.	6
3	S. E.	2	19	S. S. E.	4
	S. E.	2		E.	4
	S. E.	2		W.	4
4	N. by W.	2	20	N. N. W.	6
	N W.	4		N.	10
	N. W.	9		N. by W.	4
5	E.	6	21	N.	14
	E.	6		N. by W.	9
	N. by W.	4		N. W. by N.	4
6	—	—	22	N.	6
	N. E.	6		N. W. by N.	6
	E.	4		N. W. by W.	6
7	S. W.	6	23	N.	6
	S. E.	6		N. by E.	10
	S. E.	6		N. N. E.	6
8	S. E.	9	24	E. N. E.	4
	S.	4		—	—
	N. E.	4		S. E. by E.	4
9	—	—	25	S.	6
	E.	2		W. S. W.	6
	N. W.	4		W. N. W.	4
10	S. W.	6	26	N.	9
	W. by S.	9		N.	9
	S. by W.	6		N. by W.	6
11	S.	6	27	E. N. E.	4
	S.	15		E. by S.	2
	S.	9		S.	2
12	E.	2	28	S. S. E.	9
	S. S. E.	2		E. by S.	6
	S. E.	2		—	—
13	E.	4	29	E. N. E.	2
	W.	2		N. E. by E.	2
	—	0		N. N. E.	4
14	S. W.	9	30	N. E. by N.	10
	S. E.	20		N. N. W.	6
	S. E.	16		N. by W.	6
15	E. by S.	2	31	N. W. by W.	10
	E. by S.	2		N. N. W.	9
	N.	2		N. W. by W.	6
16	—	—			
	S.	9			
		—			

TABLE II.—*Continued.*

AUGUST.	Direction.	Force. Miles per hour.	AUGUST.	Direction.	Force. Miles per hour.
1	—	—	17	N. N. E.	10
	N. by W.	2		N. N. E.	12
	—	—		N.	9
2	N. by W.	9	18	N. E.	10
	N. N. E.	15		N. E. by E.	9
	N. N. E.	12		S. by E.	9
3	—	—	19	E.	2
	—	—		S. S. E.	9
	—	—		N. by W.	4
4	N. E. by E.	6	20	—	—
	W. by N.	9		—	—
	N. by W.	6		S. E.	2
5	N. N. E.	16	21	N. N. E.	15
	N. N. E.	13		N.	22
	N. N. W.	6		N.	19
6	N.	9	22	N. E. by N.	11
	N. N. W.	9		N.	11
	N. N. W.	6		N. by E.	9
7	E. S. E.	2	23	N. W. by N.	9
	N. by E.	6		—	—
	S. W.	6		W. by N.	9
8	S. by E.	18	24	N. W.	9
	S. E. by S.	17		S. W. by S.	9
	S. E. by S.	6		W. N. W.	6
9	E. by N.	4	25	N. N. E.	4
	E. S. E.	4		E. by N.	4
	—	—		S. S. W.	6
10	N. by E.	10	26	S. S. W.	10
	E. by N.	4		S. S. E.	15
	N.	2		S.	9
11	N. N. W.	10	27	S. E. by S.	15
	N. N. W.	6		S. by E.	18
	N. by W.	6		S. by E.	15
12	N. N. W.	6	28	S. E. by S.	10
	N. W. by N.	9		S. E. by S.	12
	N. N. W.	6		S. E. by S.	6
13	S. by E.	10	29	S. E. by S.	4
	S. E. by S.	9		S.	4
	S.	2		N.	2
14	S.	4	30	N. by W.	9
	S. E.	6		N. N. E.	16
	S. W.	4		N.	12
15	N.	9	31	N. W. by N.	9
	N.	9		W. S. W.	9
	W.	6		S. by E.	9
16	W. S. W.	6			
	N.	9			
	N. N. W.	6			

TABLE II.—*Continued.*

SEPT.	Direction.	Force. Miles per hour.	SEPT.	Direction.	Force. Miles per Hour.
1	S. S. E.	15	16	S. S. E.	15
	S. by E.	14		S. E. by S.	12
	S. by E.	21		S. S. E.	9
2	E. S. E.	6	17	S. S. W.	4
	S. E. by S.	9		S. W.	6
	—	—		S. S. W.	6
3	N. E. by E.	6	18	N. N. W.	6
	E. by S.	4		N. W. by N.	12
	W. by S.	9		W. N. W.	16
4	N.	13	19	N. E. by N.	9
	N. W.	18		N.	9
	N. by W.	9		N.	9
5	E.	2	20	N. N. W.	9
	—	—		N. W. by N.	9
	S. S. E.	6		N. W.	9
6	S. W. by S.	9	21	N. W. by N.	9
	S. E. by S.	10		S. W. by W.	11
	S. by E.	4		N. N. W.	9
7	S. by E.	9	22	W.	6
	S. E.	6		S. W. by S.	6
	S. E.	4		W. N. W.	6
8	N. by E.	9	23	N. by E.	12
	N. by W.	10		N.	13
	N. N. W.	9		N. by W.	11
9	S. S. E.	20	24	E. S. E.	4
	S. by E.	23		S.	9
	S. by E.	29		S. W.	6
10	S.	35	25	W.	6
	S. S. E.	36		W. by S.	9
	S. S. E.	35		S. W.	6
11	S. S. E.	32	26	N. E. by N.	10
	S. E. by S.	14		N.	21
	S. S. E.	12		N. by E.	19
12	N. N. E.	21	27	N. N. W.	32
	N. N. E.	30		N. W. by W.	30
	N. N. E.	9		—	—
13	S. S. E.	9	28	—	—
	S. by E.	12		N. by W.	10
	S. by E.	13		N. W.	9
14	N. W. by W.	9	29	N. N. E.	10
	N. W. by W.	9		N. by E.	15
	S. W.	9		N.	13
15	S. S. E.	6	30	S. S. W.	15
	S. by E.	12		S. by E.	20
	S. by E.	10		S. S. E.	11

TABLE II.—*Continued.*

OCTOBER.	Direction.	Force. Miles per hour.	OCTOBER.	Direction.	Force. Miles per hour.
1	S. E. by S.	14	17	S. E. by S.	20
	S. E. by S.	11		N. E. by N.	11
	S. S. E.	9		N. E. by N.	6
2	S. E. by E.	6	18	E. S. E.	4
	S. S. E.	17		E.	6
	S.	17		N. by E.	4
3	S. by E.	20	19	S. E. by S.	17
	S. S. E.	23		S. by E.	19
	S. S. E.	14		S. by E.	11
4	E. S. E.	2	20	S. E. by S.	19
	W.	9		S. E. by S.	29
	S. W. by W.	11		S. S. E.	31
5	N. by W.	9	21	S. S. E.	26
	S. W. by W.	9		S. by E.	30
	S. W. by W.	6		S. by E.	29
6	S. S. E.	14	22	S. by E.	33
	S. by E.	29		S. S. E.	30
	S. S. E.	25		S. S. E.	29
7	S. S. E.	30	23	S. E. by S.	25
	S. by E.	33		S. E. by S.	21
	S. by E.	34		S. S. E.	26
8	S. E. by S.	12	24	N. E. by N.	9
	—	—		N. W. by N.	11
	—	—		N. W.	10
9	N. by W.	10	25	S. W.	9
	N. N. W.	9		S. by E.	10
	N. N. W.	9		S. by E.	10
10	S. by E.	12	26	S. by E.	16
	S. by E.	17		S. by E.	31
	S. by E.	17		S. by E.	33
11	S. by E.	11	27	N. E.	10
	S. S. E.	16		N. E.	9
	S. S. E.	15		N. N. E.	6
12	S. S. E.	4	28	S. E. by S.	10
	S. E.	6		S. E. by S.	14
	S. by E.	14		S. S. E.	12
13	S. S. E.	16	29	S. E. by S.	10
	S. E. by S.	20		E. by N.	9
	S. by E.	16		S. W.	9
14	S. S. E.	20	30	N. N. W.	10
	S. S. E.	19		N.	19
	S.	16		N. N. W.	10
15	S.	16	31	S. S. E.	20
	S. by E.	15		S. by E.	28
	S.	15		S.	32
16	S. E. by S.	30			
	S. S. E.	34			
	—	—			

TABLE II.—*Continued.*

NOVEMBER	Direction.	Force. Miles per hour.	NOVEMBER	Direction.	Force. Miles per hour.
1	S. S. E.	33	16	N. by E.	14
	S. by E.	35		W. by S.	13
	S. S. E.	34		W.	9
2	S.	15	17	S. by E.	26
	S. S. E.	27		S. E. by S.	29
	S.	34		S. E.	10
3	S. E. by S.	21	18	S. E. by S.	19
	S. S. E.	20		S. S. E.	16
	S. S. E.	9		S. S. W.	13
4	S. E. by S.	14	19	S. W. by S.	9
	E. by N.	9		S. by E.	17
	W. by S.	9		S. by W.	11
5	S. W.	12	20	S. S. W.	6
	W.	12		W. by N.	9
	S. W. by W.	10		N. W. by N.	11
6	N. N. W.	10	21	W. S. W.	10
	N. W. by N.	12		W. by S.	10
	W. S. W.	11		S. W. by W.	10
7	S. by E.	16	22	N. N. E.	2
	S. by E.	29		E. by S.	4
	S. by E.	32		S. E.	6
8	E. S. E.	15	23	N. N. W.	11
	S. S. E.	25		N. by W.	15
	S. S. E.	21		N. N. W.	13
9	N. by E.	16	24	S. W. by S.	9
	N. W. by N.	25		S. S. W.	10
	W. N. W.	14		S. W. by S.	12
10	E. N. E.	10	25	S. S. E.	20
	S. by E.	20		S. by W.	26
	S. S. E.	12		S. W. by S.	22
11	S.	9	26	S. W. by W.	9
	W. N. W.	14		W. by N.	6
	W. by N.	9		S. W. by W.	11
12	N. N. E.	4	27	S. S. E.	26
	N. by W.	11		S. by E.	32
	N. W. by N.	12		—	—
13	W. N. W.	14	28	S. S. E.	33
	N. W. by W.	11		S. S. E.	32
	S. W.	9		S. by E.	31
14	E.	13	29	S. E. by S.	30
	S. S. E.	14		S. S. E.	32
	S. S. E.	11		S. S. E.	34
15	S. by E.	9	30	S. S. E.	35
	S. W. by W.	14		S. S. E.	35
	—	—		S. S. E.	35

TABLE II.—*Continued.*

DECEMBER.	Direction.	Force. Miles per hour.	DECEMBER.	Direction.	Force. Miles per hour.
1	S. S. E.	33	17	S. by E.	20
	S. S. E.	35		S. W. by S.	11
	S. S. E.	35		S. W.	12
2	S. S. E.	34	18	N. N. W.	10
	S. by E.	35		—	—
	S. by E.	38		—	—
3	S. E. by S.	20	19	N. W. by N.	11
	S. S. E.	23		N. W. by N.	10
	S E. by S.	21		N. N. W.	14
4	S. S. E.	31	20	W. N. W.	9
	S. by E.	33		W.	12
	S. by E.	32		W. by S.	10
5	S. E. by S.	30	21	E. by N.	4
	S. S. E.	33		S. S. E.	15
	S. by E.	32		S. by E.	20
6	S. E. by S.	30	22	S. E. by S.	9
	S. by E.	29		S. S. E.	19
	S. S. E.	35		S. S. E.	21
7	S. E. by S.	14	23	N. E. by N.	6
	N. N. W.	6		—	—
	N. by W.	4		S. W. by W.	11
8	S. E. by E.	2	24	S. E. by S.	26
	S. E.	4		S. S. E.	27
	S. W. by W.	10		—	—
9	S. S. E.	20	25	E. by S.	4
	S. by W.	26		W. S. W.	9
	S S. E.	25		W. by N.	10
10	S. S. E.	29	26	N. N. W.	12
	S. S. E.	31		N. N. W.	17
	S. by E.	33		S. W. by W.	10
11	S. E. by S.	20	27	S. by E.	16
	S. by E.	18		S. by E.	21
	S. by E.	16		S. by E.	20
12	S. S. E.	20	28	S. by E.	16
	S. by E.	22		S. S. W.	12
	S. by E.	31		S. by W.	10
13	S. S. E.	24	29	S. E.	6
	S. S. E.	33		S. by W.	9
	S. S. E.	30		S. S. E.	12
14	S. E. by S.	20	30	S. W. by W.	6
	S. S. E.	28		W. by S.	6
	S. by E.	35		W. N. W.	6
15	S. by E.	30	31	S. S. E.	9
	S. by E.	28		S. E. by S.	14
	S. by E.	26		S. by E.	10
16	S. S. E.	28			
	S.	26			
	S.	20			

TABLE III.—*Direction and Force of the Wind at Simonstown, referred to the Points of the Magnetic Compass.*

JULY, 1861.			AUGUST, 1861.		
Direction.	Number.	Force.	Direction.	Number.	Force.
North,	12	82	North,	11	113
N. by E.,	1	10	N. by E.,	3	25
N. N. E.,	2	10	N. N. E.,	9	113
N.E. by N.,	1	10	N. E. by N.,	1	11
N. E.,	2	10	N. E.,	1	10
N. E. by E.,	1	2	N. E. by E.,	2	15
E. N. E.,	3	10	E. N. E.,	0	0
E. by N.,	1	6	E. by N.,	3	12
East,	7	28	East,	1	2
E. by S.,	4	12	E. by S.,	0	0
E. S. E.,	0	0	E. S. E.,	2	6
S. E. by E.,	1	4	S. E. by E.,	0	0
S. E.,	9	65	S. E.,	1	8
S. E. by S.,	0	0	S. E. by S.,	8	79
S. S. E.,	4	27	S. S. E.,	2	24
S. by E.,	1	9	S. by E.,	6	79
South,	7	51	South,	4	19
S. by W.,	1	6	S. by W.,	0	0
S. S. W.,	0	0	S. S. W.,	2	16
S. W. by S.,	0	0	S. W. by S.,	1	9
S. W.,	4	25	S. W.,	2	10
S. W. by W.,	0	0	S. W. by W.,	0	0
W. S. W.,	1	6	W. S. W.,	2	15
W. by S.,	1	9	W. by S.,	0	0
West,	2	6	West,	1	6
W. by N.,	0	0	W. by N.,	2	18
W. N. W.,	2	6	W. N. W.,	1	6
N. W. by W.,	3	22	N. W. by W.,	0	0
N. W.,	5	25	N. W.,	1	9
N. W. by N.,	2	10	N. W. by N.,	3	27
N. N. W.,	3	21	N. N. W.,	8	55
N. by W.,	6	31	N. by W.,	6	36
	86			84	

TABLE III.—*Continued.*

SEPTEMBER, 1861.			OCTOBER, 1861.		
Direction.	Number.	Force.	Direction.	Number.	Force.
North,	6	78	North,	1	19
N. by E.,	4	55	N. by E.,	1	4
N. N. E.,	4	70	N. N. E.,	1	6
N. E. by N.,	2	19	N. E. by N.,	3	26
N. E.,	0	0	N. E.,	2	19
N. E. by E.,	1	6	N. E. by E.,	0	0
E. N. E.,	0	0	E. N. E.,	0	0
E. by N.,	0	0	E. by N.,	1	9
East,	1	2	East,	1	6
E. by S.,	1	4	E. by S.,	0	0
E. S. E.,	2	10	E. S. E.,	2	6
S. E. by E.,	0	0	S. E. by E.,	1	6
S. E.,	2	10	S. E.,	1	6
S. E. by S.,	4	45	S. E. by S.,	14	252
S. S. E.,	12	206	S. S. E.,	21	430
S. by E.,	11	167	S. by E.,	22	468
South,	2	44	South,	5	96
S. by W.,	0	0	S. by W.,	0	0
S. S. W.,	3	25	S. S. W.,	0	0
S. W. by S.,	2	15	S. W. by S.,	0	0
S. W.,	4	27	S. W.,	2	18
S. W. by W.,	1	11	S. W. by W.,	3	26
W. S. W.,	0	0	W. S. W.,	0	0
W. by S.,	2	18	W. by S.,	0	0
West,	2	12	West,	1	9
W. by N.,	0	0	W. by N.,	0	0
W. N. W.,	2	22	W. N. W.,	0	0
N. W. by W.,	4	60	N. W. by W.,	0	0
N. W.,	3	36	N. W.,	1	10
N. W. by N.,	2	18	N. W. by N.,	1	11
N. N. W.,	5	65	N. N. W.,	4	38
N. by W.,	4	40	N. by W.,	2	19
	86			90	

TABLE III.—*Continued.*

NOVEMBER, 1861.			DECEMBER, 1861.		
Direction.	Number.	Force.	Direction.	Number.	Force.
North,	0	0	North,	0	0
N. by E.,	2	30	N. by E.,	0	0
N. N. E.,	2	6	N. N. E.,	0	0
N. E. by N.,	0	0	N. E. by N.,	1	6
N. E.,	0	0	N. E.,	0	0
N. E. by E.,	0	0	N. E. by E.,	0	0
E. N. E.,	1	10	E. N. E.,	0	0
E. by N.,	1	9	E. by N.,	1	4
East,	1	13	East,	0	0
E. by S.,	1	4	E. by S.,	1	4
E. S. E.,	1	15	E. S. E.,	0	0
S. E. by E.,	0	0	S. E. by E.,	1	2
S. E.,	2	16	S. E.,	2	10
S. E. by S.,	5	113	S E. by S.,	10	204
S. S. E.,	20	504	S. S. E.,	24	630
S. by E.,	10	247	S. by E.,	22	561
South,	3	58	South,	2	46
S. by W.,	2	37	S. by W.,	3	45
S. S. W.,	3	29	S. S. W.,	1	12
S. W. by S.,	4	52	S. W. by S.,	1	11
S. W.,	2	21	S. W.,	1	12
S. W. by W.,	5	54	S. W. by W.,	4	37
W. S. W.,	2	21	W. S. W.,	1	9
W. by S.,	3	32	W. by S.,	2	16
West,	2	21	West,	1	12
W. by N.,	3	24	W. by N.,	1	10
W. N. W.,	3	42	W. N. W.,	2	15
N. W. by W.,	1	11	N. W. by W.,	0	0
N. W.,	0	0	N. W.,	0	0
N. W. by N.,	4	60	N. W. by N.,	2	21
N. N. W.,	3	34	N. N. W.,	5	59
N. by W.,	2	26	N. by W.,	1	4
	88			89	

The Secretary, on the part of the Rev. CharlesVignoles, Vicar of Clonmacnoise, presented rubbings of three ornamented stones lately discovered at Clonmacnoise, one of which bears the inscription Op com ȝaṅ.

The thanks of the Academy were voted to the donor.

MONDAY, JUNE 9, 1862.

The Very Rev. Charles Graves, D. D., President, in the Chair.

The Rev. Dr. Reeves read a paper concerning the "Identification of St. Molagga's Church of Lann Beachaire, in Fingall, with the Ecclesiastical Remains at Bremore, in the parish of Balrothery, a little north of Balbriggan, which bear the name of Lambeecher in the Liber Niger of the See of Dublin."

Sir William R. Hamilton, LL. D., read the following paper:—

On a New and General Method of Inverting a Linear and Quaternion Function of a Quaternion.

Let a, b, c, d, e represent any five quaternions, and let the following notations be admitted, at least as temporary ones:—

$$ab - ba = [ab]; \quad S[ab]c = (abc);$$
$$(abc) + [cb]Sa + [ac]Sb + [ba]Sc = [abc];$$
$$Sa[bcd] = (abcd);$$

then it is easily seen that

$$[ab] = -[ba]; \quad (abc) = -(bac) = (bca) = \&c.;$$
$$[abc] = -[bac] = [bca] = \&c.;$$
$$(abcd) = -(bacd) = (bcad) = \&c.;$$
$$0 = [aa] = (aac) = [aac] = (aacd), \ \&c.$$

We have then these two Lemmas respecting Quaternions, which answer to two of the most continually occurring transformations of vector expressions:—

$$\text{I.} \ldots 0 = a(bcde) + b(cdea) + c(deab) + d(eabc) + e(abcd),$$
$$\text{or I}'. \ldots e(abcd) = a(ebcd) + b(aecd) + c(abed) + d(abce);$$
$$\text{and II.} \ldots e(abcd) = [bcd]Sae - [cda]Sbe + [dab]Sce - [abc]Sde;$$

as may be proved in various ways.

Assuming therefore *any four* quaternions a, b, c, d, which are *not* connected by the relation,

$$(abcd) = 0,$$

we can *deduce* from them four others, a', b', c', d', by the expressions,

$$a'(abcd) = f[bcd],\ b'[abcd] = -f[cda],\ \&c.,$$

where f is used as the characteristic of a linear or *distributive quaternion function* of a quaternion, of which the form is supposed to be given; and thus the *general form* of *such* a function comes to be represented by the expression,

$$V. \ldots r = fq = a'Saq + b'Sbq + c'Scq + d'Sdq;$$

involving *sixteen scalar constants*, namely those contained in $a'b'c'd'$.

The *Problem* is to *invert* this *function* f; and the *solution* of that problem is easily found, with the help of the new Lemmas I. and II., to be the following:—

$$VI. \ldots q(abcd)(a'b'c'd') = (abcd)(a'b'c'd')f^{-1}r = [bcd](rb'c'd') + [cda](rc'd'a') + [dab](rd'a'b') + [abc](ra'b'c');$$

of which solution the correctness can be verified, *à posteriori*, with the help of the same Lemmas.

Although the foregoing problem of *Inversion* had been *virtually* resolved by Sir W. R. H. many years ago, through a reduction of it to the corresponding problem respecting *vectors*, yet he hopes that, as regards the Calculus of *Quaternions*, the new solution will be considered to be an important step. He is, however, in possession of a general *method* for treating questions of this class, on which he may perhaps offer some remarks at the next meeting of the Academy.

The Secretary announced the following donations to the Museum:—

1. A medal struck in honour of Frederic Thiersch: presented by the Royal Academy of Sciences of Bavaria.

2. A commemorative medal: presented by the Royal Society of Christiania, Norway.

3. A stone ball and collar, found in a limestone gravel pit: presented by Hugh Blackney, Esq., Ballyellen, Goresbridge. The stone ball weighs about six ounces, and measures six inches in circumference, is slighly oval, and fits the collar exactly.

4. A small cannon-ball, weighing 2 lb. 14 oz., found on the battle-field of Aughrim: presented by Dr. Bigger.

5. A portion of a very flat stone "celt" found in a turf bog at Connemara: presented by Dr. Mac Swiney, Stephen's-green. The celt is of peculiar interest, as it retains on the weathered surfaces of its cutting edge the scratches or marks of the fine sand with which it appears to have been sharpened shortly before it was lost.

6. A specimen of yellow tile, or brick, from the foundation of a building at the corner of Grafton-street and Nassau-street, described in Mr. Mallet's note accompanying the donation.

7. A peculiarly shaped stone celt, and a leaden cross, found at Newry: presented by P. Brophy Esq., Dawson-street.

8. A number of copper coins: presented by Mr. James Murphy, Lombard-street.

9. Three tradesman's tokens, viz:—MacAvragh, of Belfast; Wilson, of Dublin; and Nicholls, of Maryborough; all found at the latter place: presented by the Rev John O'Hanlon, C. C., of Dublin.

10. A piece of a modern sword-blade; a very beautiful V-shaped flint arrow-head; and the under and two upper stones of one of those primitive hand-mills called grain-rubbers in Dr. Wilde's Catalogue, Part I., p. 104. The under stone has its loop on its side, and not on its back, which is usual in perfect specimens of this kind: presented by Colonel Edwards, of Fintona.

James O'Reilly, Esq., exhibited the following from the collection of J. Summers, Esq.:—1. A copper blade, of the scythe shape; length about $12\frac{3}{4}$ inches—Mr. O'Reilly cannot say where it was found originally; 2. A small brass or bronze spur, said to have been found at Dunshaughlin; 3. A steel or iron arrow-head; 4. One of several cinerary urns found on Tallaght Hill.

The thanks of the Academy were voted to the donors and exhibitor.

MONDAY, JUNE 23, 1862.

The Very Rev. Charles Graves, D. D., President, in the Chair.

On the recommendation of the Council, it was

Resolved,—To authorize the Treasurer to sell out so much of the Cunningham Fund Stock as will produce £61 4*s.* 4*d.*, to pay the difference between the cost of the four Cunningham Medals lately awarded, and the half-year's interest on the Stock, now due: the amount to be sold out being part of the amount of Interest added to the Capital Stock since the former award of Medals in 1858.

The Rev. Dr. Lloyd read a paper—

On the probable Causes of the Earth-currents.

In a former communication to the Academy, I endeavoured to prove that the diurnal changes of the horizontal needle were the result of electric currents traversing the earth's crust. The existence and continuous flow of such currents had been established, as I believe, by the observations of Mr. Barlow, made on two of the telegraphic lines of England; and it only remained to show that their laws corresponded with those of the magnetic changes. This part of the solution of the problem has, I venture to think, been given in the paper above referred to.

In that communication I refrained from offering any conjecture as to the origin of the currents themselves. Every speculation of this kind must remain a pure hypothesis, until it can be confronted and compared with facts; and the magnetic phenomena presented at different points of the earth's surface are so diversified, that a wide collection of the facts is necessary in order to form the basis of any sound physical theory. For these reasons, I have deemed it the more proper course to ascertain the *laws* of the diurnal changes of the Earth-currents at many places, so far as they may be inferred from the magnetic phenomena which they produce, before proceeding to the consideration of their *causes*. This procedure is in accordance with the acknowledged rules of the inductive philosophy; and the departure from it has given rise to speculations on this subject, which, however well they might accord with the phenomena with which they were compared, could not have been admitted for an instant in the presence of a wider generalization.

It has been shown, in the paper referred to, that the Earth-currents, as inferred from the changes in the two horizontal components of the magnetic force, observe certain general laws, which are common to all the stations at which these changes have been observed; while, on the other hand, their departures from a common type are various and considerable. We thus learn that the phenomena are produced by a common cause, the effects of which are greatly modified by the physical peculiarities of the parts of the earth where they are observed. The following are the principal features of the phenomena common to all, or to most of the places of observation.

I. The point to which the resultant Earth-current is directed follows the sun, although not at a uniform rate, throughout the day. In the northern hemisphere its direction is *eastward*, on the average, at $10^h\ 30^m$ A. M.; *southward*, at $2^h\ 30^m$ P. M.; and *westward*, at 7 P. M.

II. The *intensity* of the current is *greatest* between noon and 2 P.M., the mean time of the maximum in the northern hemisphere being about $1^h\ 30^m$ P. M. The intensity of the current is *least* at an interval of about twelve hours from the epoch of the maximum; and the direction of the current of least intensity is, in nearly all cases, opposite to that of the greatest.

III. There are two subordinate maxima, separated from the principal maximum by intervening minima. The morning maximum occurs, on the average, at $8^h\ 30^m$ A. M. It may be traced in the diurnal curves of the American and Siberian stations, and in those of the Cape of Good Hope and Hobarton. The current is then northerly in the northern hemisphere, and southerly in the southern. The evening maximum occurs at about 10 P. M., and is observed at almost all the stations.

The foregoing facts leave no doubt that the sun is the primary cause of the currents; and the only question is as to the mode of its agency. Upon this point I concur with Dr. Lamont in believing the electrical currents (or waves) on the earth's surface to be due to disturbances of

equilibrium of statical electricity; but I regard these derangements of equilibrium to be simply the effects of solar heat, and not (as Dr. Lamont believes) the results of an electrical force emanating directly from the sun.

It is well known that the earth and the atmosphere are, in ordinary circumstances, in opposite electrical states—the electricity of the earth being negative, and that of the atmosphere positive. It is also known that the electricity of the air increases rapidly with the height, a few feet—and in some cases even a few inches—being sufficient to manifest a difference of electrical tension. The rate of this increase is very different at different periods of the day, the difference appearing to be due to the greater or less conductibility of the lower strata of the atmosphere, giving rise to a greater or less interchange of the opposite electricities.

Now, we have in this machinery, as it appears to me, means fully adequate to the production of the observed effects. If it be assumed that the sun produces these changes by its calorific action, the effects at any given place will depend upon the relative temperatures of the neighbouring portions of the earth's surface. The earth being, in its normal state, negatively electrical, this negative electricity will be greatest (or the positive electricity least) at the parts most heated; and there will, consequently, be a flow of electricity to these parts from the place of observation. Thus the varying azimuth of the current, which is directed towards the most heated parts of the earth's surface, is explained. The maximum intensity of current, at $1^h\ 30^m$ P. M., is also accounted for, that being the period of the day when the solar calorific action is most intense. It should be noted, however, that the magnitude of the effect will depend, not on the absolute temperature, but on its relative increase. It is, accordingly, greatest at those parts of the earth at which the increment of temperature corresponding to a given distance is greatest.

The secondary maxima are probably due to the recombination of the atmospheric and terrestrial electricities, through the medium of vapour in the lower regions of the atmosphere. The effects of this recombination in producing horizontal currents in the earth's crust will, of course, be differential only, and will depend on the excess of the positive electricity thus transported at the places on the same meridian which are nearer to the equator. In confirmation of this view, it may be observed, that the epochs correspond with those of the maxima of atmospheric electricity, as deduced by Quetelet from the observations made under his directions at Brussels, the morning maximum of atmospheric electricity, in summer, occurring at 8 A. M., and the evening maximum at 9 P. M.

The phenomena hitherto described are such as would take place if all the parts of the earth's crust were similarly constituted, and therefore similarly acted on by the solar rays. In order to be able to explain the diversity which exists in the magnetic phenomena at different places, we must know something more of the nature of the solar action, and of the mode in which electricity is developed by it.

The speculations respecting the origin of atmospheric and terrestrial electricity are various. Thus, De Saussure believed that this electricity was developed by evaporation, the vapour taking the positive electricity, and the water the negative; and this hypothesis, with some limitations, has been very generally admitted by physicists. On the other hand, M. de la Rive is of opinion that the origin of this electricity is to be sought in the chemical actions which he supposes to be going on in the interior of the solidified crust of the earth; and he thinks that evaporation acts merely by transporting one of the separated electricities, and carrying it into the higher regions of the atmosphere. But whatever be the correct view as to the force which develops the electricity, it seems to be granted that the separation of the two electricities, in the earth and the atmosphere, is the consequence of evaporation, the vapour carrying with it the positive electricity, and the vaporizing body retaining the negative. Now, it follows from this, that the effect produced will vary greatly with the distribution of land and water, and will be greatest, *cæteris paribus*, where they come into juxtaposition at the coasts of the great continents, especially where the coast-lines are in, or near, the meridian. The evaporation from the surface of the sea being much greater than from the land, the electricity will be most deficient at the former. Hence there will be a flow of electricity *from land to sea*, which will combine with, and often mask, that due to the sun's position alone.

Now this is precisely what happens. The most marked instance of the phenomenon which we possess is that afforded by the diurnal changes of the currents at St. Helena. There the currents (as I have already shown) flow *from* the coast of Africa during the hottest portion of the day, and *towards* it during the night. The influence of the form of the coast seems to be shown in the diurnal curve of the Cape of Good Hope, by the existence of *three maxima*, of which the principal is directed from the land, and the two subordinate along the lines of coast. At Hobarton, in Van Diemen's Land, the same influence is shown in the extension of the southern lobe of the curve, which is there nearly equal to the northern.

I have since calculated the direction and intensity of the currents at the Indian stations, and I find that the curves follow nearly the type of the St. Helena curve. Thus, at Singapore, for which place we possess the results of observation during the three years 1843–1845, the maximum of current intensity takes place between 10 A. M. and 11 A. M., and its direction is S. 80° W. At Madras, so far as may be inferred from the observations of a single month, the maximum takes place at noon; and the direction of the current is then nearly the same as at Singapore, viz. S. 78° W. At Simla, in the Himalaya, the maximum occurs also at noon; but the direction of the current of greatest intensity is more southerly, its mean yearly direction being S. 47° W. This is precisely what should happen according to the hypothesis, this being

nearly the direction of the line drawn to the nearest point of the coast.*

The variation in the epoch of the maximum intensity of the current, at different places, is also in accordance with the same principles; that epoch being earliest in islands, or places nearly encompassed by sea, and latest in the interior of the great continents. Thus it occurs at noon at St. Helena, and in the southern parts of the peninsulas of Hindostan and the Malaya; while it takes place at 2 P. M. at Catherinburg and Barnaoul, in the interior of Siberia. This accords with the laws of the sun's calorific action.

It will be seen, upon an inspection of the diurnal curves of the Earth-currents (Trans. Royal Irish Academy, vol. xxiv.), that at most of the northern stations, as well as at Hobarton in the southern, the *easterly* currents being greater than the westerly. I believe this effect to be due to the *disturbance-currents*, which (as I have already shown) have an easterly tendency. This preponderance of the easterly currents, however, is found to be greater at places—such as Greenwich, Dublin, Makerstoun, and Toronto—which are near an eastern coast, than at those places—such as Petersburg, Catherinburg, and Barnaoul—which are in the interior of the continent. The results, therefore, so far confirm the supposition above made.

There are, unfortunately, very few places situated near the *western* shore of a great continent, at which continued observations of the two magnetic elements have been made. I know of none, excepting Sitka, on the western coast of North America. The results at this station, however, confirm the view above stated,—the *westerly* currents being there greater than the easterly.

There are probably many other circumstances in the configuration and structure of the earth's surface which influence the direction and magnitude of the currents; but I incline to think that the principal one is that above stated, viz. the distribution of land and water in the vicinity of the place of observation. It may be, also, that this cause is sufficient to account for some of the peculiarities in the form of the diurnal curve noticed in my former communication, and there referred to other causes. Thus, it is not improbable that the *persistent* direction of the current at Munich, there referred to the influence of a mountain range, may be, in fact, the result of the proximity of the Adriatic Gulf, which lies nearly in the direction of the persistent current.

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* These additional results oblige me to abandon the conclusion formerly derived from a more limited induction, that the direction of the current of greatest intensity is connected with the magnetic meridian of the place. From the facts which we now possess, it would appear that the currents affect a meridional direction in the higher latitudes, while they are nearly parallel to the equator within the tropics. This will be seen in a striking manner by comparing the directions of the maximum currents in India, above given, with those of the Russian stations in the northern part of the Asiatic Continent.

In the preceding remarks I have referred only to the *regular* diurnal changes. I believe that the irregular are produced by the same forces, but operating in a somewhat different manner. The regular currents are produced, as I conceive, chiefly by the separation of the two electricities by evaporation, under the action of the sun; while the disturbance-currents are caused by their rapid recombination, through the medium of moisture, in the lower strata of the atmosphere.* In connexion with this view, I will, for the present, merely refer to the fact which has been established by an examination of the mean effects of the magnetic disturbances (Proceedings, April 28, 1862)—namely, that the epochs of the maxima of the disturbance-currents depend, in their mean values, upon the sun's hour-angle, and are independent of the longitude of the place. This result is in accordance with the hypothesis which ascribes these currents to changes in the sun's calorific agency, and to the meteorological effects which these engender.

In the limits within which it is necessary to confine this abstract, I have been able only to refer to some of the leading facts in confirmation of the hypothesis which I have ventured to propose; and I am obliged to omit altogether all reference to the objections which will probably be raised against it. There is, however, one fact which appears at first sight to offer a formidable difficulty to its reception, and which it may be necessary to notice here. The regular magnetic changes are greater in summer than in winter; while with the electrical tension, and its changes, it is the reverse. This objection, however, disappears when it is viewed more closely. The physical quantity measured by our electrometers is not the *absolute* electric tension, but its *variation with the height;* while the electric changes which engender terrestrial currents are the variations as depending on *horizontal distance.* It is easily conceivable that these should not correspond. In fact, it is natural to suppose that in summer the zero-plane, which separates the two electricities, should rise considerably; and thus that the variations for a given increase of altitude (which probably diminish with the distance from that plane) should lessen, although the absolute tensions, as well as the changes in horizontal distance, may be greater.

It would be of importance, in reference to this inquiry, to institute electrical observations of a totally different kind from any which we now possess, and to measure the differences of tension as depending on horizontal distance. There seems to be no difficulty in the way of such observations,—at least none greater than those which present themselves in the ordinary observations of atmospheric electricity; and the results would probably do more to clear up the physical aspect of these complex and interwoven phenomena than any other observational means.

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* This hypothesis as to the cause of magnetic disturbances is due to M. de la Rive; but his views respecting the laws of the resulting currents are, as I have elsewhere shown, inconsistent with the phenomena. The regular diurnal changes of terrestrial magnetism are ascribed by M. de la Rive to a direct electrical action emanating from the sun.

Sir W. R. Hamilton, LL. D., read the following paper:—

On the Existence of a Symbolic and Biquadratic Equation, which is satisfied by the Symbol of Linear Operation in Quaternions.

1. In a recent communication (of June 9, 1862), I showed how the general Linear and Quaternion Function of a Quaternion could be expressed, under a standard quadrinoial form; and how that function, when so expressed, could be inverted.

2. I have since perceived, that whatever *form* be adopted, to represent the *Linear Symbol of Quaternion Operation* thus referred to, that *symbol* always satisfies a certain *Biquadratic Equation*, with *Scalar Coefficients*, of which the *values* depend upon the particular *constants* of the *Function* above referred to.

3. This result, with the properties of the *Auxiliary Linear* and *Quaternion Functions* with which it is connected, appears to me to constitute the most remarkable accession to the *Theory of Quaternions proper*, as distinguished from their *separation* into *scalar* and *vector parts*, and from their *application to Geometry* and *Physics*, which has been made since I had first the honour of addressing the Royal Irish Academy on the subject, in the year 1843.

4. The following is an outline of one of the proofs of the existence of the biquadratic equation, above referred to. Let

$$fq = r \tag{1}$$

be a given linear equation in quaternions; r being a given quaternion, q a sought one, and f the symbol of a linear or distributive operation: so that

$$f(q + q') = fq + fq', \tag{2}$$

whatever two quaternions may be denoted by q and q'.

5. I have found that the *formula of solution* of this equation (1), or the formula of *inversion* of the *function*, f, may be thus stated:

$$nq = nf^{-1}r = Fr; \tag{3}$$

where n is a *scalar constant* depending for its *value*, and F is an auxiliary and *linear symbol* of operation depending for its *form* (or rather for the *constants* which it involves), on the *particular form* of f; or on the special values of the *constants*, which enter into the composition of the *particular function*, fq.

6. We have thus, independently of the particular quaternions, q and r, the equations,

$$Ffq = nq,\ fFr = nr; \tag{4}$$

or, briefly and symbolically,

$$Ff = fF = n. \tag{5}$$

7. Changing next f to $f_c = f + c$, that is to say, proposing next to resolve the *new linear equation*,

$$f_c q = fq + cq = r, \tag{6}$$

where c is an *arbitrary scalar*, I find that the *new* formula of solution, or of inversion, may be thus written:

$$f_c F_c = n_c\ ; \tag{7}$$

where $$F_c = F + cG + c^2 H + c^3, \tag{8}$$

and $$n_c = n + n'c + n''c^2 + n'''\ c^3 + c^4\ ; \tag{9}$$

G and H being the symbols (or characteristics) of *two new linear operations*, and n', n'', n''' denoting *three new scalar constants*.

8. Expanding then the symbolical product $f_c F_c$, and comparing powers of c, we arrive at *three new symbolical equations*, namely, the following:

$$fG + F = n'\ ;\ fH + G = n''\ ;\ f + H = n'''\ ; \tag{10}$$

by elimination of the symbols, F, G, H, between which and the equation (5), the *symbolical biquadratic*,

$$0 = n - n'f + n''f^2 - n'''\ f^3 + f^4, \tag{A}$$

is obtained.

B. B. Stoney, B.A., read the following paper:—

On the Strength of Long Pillars.

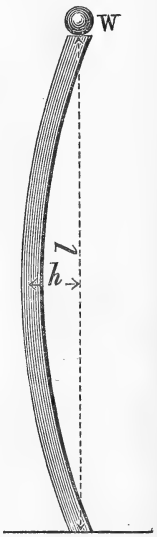
Among the numerous difficulties encountered in designing large iron structures, such as railway girders or roofs of large span, none perhaps is of more importance, or requires greater skill to overcome, than the tendency of parts under compression to deflect beneath the pressure, and yield sideways, like a thin walking-cane, when the load is greater than it can support without bending.

To understand the matter clearly, we must recollect that the mode in which a pillar fails varies greatly, according as it is long or short in proportion to the diameter. A very short pillar—a cube, for instance—will bear a weight sufficient to splinter or crush it into powder; while a still shorter pillar—such as a penny, or other thin plate of metal—will bear an enormous weight, far exceeding that which the cube will sustain, the interior of the thin plate being prevented from escaping from beneath the pressure by the surrounding particles. We can thus conceive how stone or other materials in the centre of the globe withstand pressures that would crush them into powder at the surface, merely because there is no room for the particles to escape from the surrounding pressure.

It has been found by experiment that the strength of short pillars of any given material, all having the same diameter, does not vary much, provided the length of the pillar is not less than one, and does not exceed four or five diameters; and the weight which will just crush a short pillar, one square inch in section, and whose length is not less than one or greater than five inches, is called the *crushing strength* of

the material experimented upon. If the length of pillars never exceeded four or five diameters, all we need do to arrive at the strength of any given pillar would be to multiply its transverse area in square inches by the tabulated crushing strength of that particular material. It rarely happens, however, that pillars are so short in proportion to their length; and hence we must seek some other rule for calculating their strength, when they fail, not by actual crushing, but by flexure.

If we could insure the line of thrust always coinciding with the axis of the pillar, then the amount of material required to resist crushing merely would suffice, whatever might be the ratio of length to diameter. But practically it is impossible to command this, and a slight deviation in the direction of the thrust produces a corresponding tendency in the pillar to bend. With tension-rods, on the contrary, the greater the strain, the more closely will the rod assume a straight line, and, in designing their cross section, it is only necessary to allow so much material as will resist the tensile strain. This tendency to bend renders it necessary to construct long pillars, not merely with sufficient material to resist crushing, supposing them to fail from that alone, but also with such additional material or bracing as may effectually preserve them from yielding by flexure. It is evidently, therefore, of considerable importance that we should ascertain the laws determining the flexure of long pillars, which may be done as follows:—



Let the figure represent a pillar, very long in proportion to its breadth, and just on the point of breaking from flexure.

Let W = the deflecting weight;
b = the breadth of pillar;
d = its depth;
l = its length;
h = the central deflection;
R = the radius of curvature;
C = the resultant of all the longitudinal forces of compression on the concave side at the centre of the pillar;
T = the resultant of all the longitudinal forces of tension on the convex side;
δ = the distance between the centres of tension and compression.

The longitudinal forces acting at the centre of the pillar are three, viz. the weight W acting in the chord line of the curve, the resultant C acting at the centre of compression in the concave half, and the resultant T acting at the centre of tension in the convex half. Taking moments round either centre of strain, we have approximately

$$W = \frac{T\delta}{h} = \frac{C\delta}{h}, \quad \ldots\ldots\ldots \text{I.}$$

h being assumed equal to the distance between the chord-line and either

centre of strain, which is a close approximation when the pillar is very long in proportion to its width.*

The values of T or C in different pillars are proportional to the number of fibres subject to strain, that is to bd, and δ is obviously proportional to d; so that we have the numerator on the right side of the equation proportional to bd^2. Again, assuming that the deflection curve is a parabola, from which it can differ but slightly,† we have

$$h = \frac{l^2}{8R};$$

but so long as the strain per sectional unit in the extreme fibres, to which their change of length is proportional, is constant, R will vary in the same ratio as d; and we have, therefore, h proportional to

$$\frac{l^2}{d}.$$

Whence, by substitution,

$$W = K\frac{bd^3}{l^2}, \quad \ldots\ldots\ldots \quad \text{II.}$$

in which K is a constant depending on the elasticity of the material, which may be determined by experiment.

If the pillar be round, and if d represent the diameter,

$$W = K\frac{d^4}{l^2}, \quad \ldots\ldots\ldots \quad \text{III.}$$

which proves that the strength of long round pillars varies as the 4th power of their diameter, divided by the square of the length; and the longer the pillar is in proportion to its diameter, the nearer will this formula represent the truth.

As all the longitudinal forces at the middle of the pillar balance, we have the following equation:—

$$C = T + W,$$

which enables us to predict how a long pillar will fail, whether by the convex side tearing asunder, or by the concave side crushing. A wrought iron pillar, for instance, may be expected to fail on the concave side, as its power to resist crushing is less than that to resist extension. A long pillar of cast iron, on the contrary, will probably fail by the convex side tearing asunder, as the compressive strength of cast iron greatly exceeds its tenacity. Further, the effective strength of wrought iron to resist crushing is about 12 tons per square inch, while the tensile strength of cast iron is nearly 7 tons per square inch; and hence we

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* Mr. Hodgkinson's experiments show that this investigation is not applicable to cast iron pillars whose length is less than about 30 times their width: even with such short pillars it requires certain modifications, which he has deduced from experiment.

† The curve will probably be intermediate between a parabola and a circle, approaching the latter if the pillar taper towards the ends.

may conclude that the strength of long similar pillars of wrought and cast iron will be nearly as 12 to 7.

It is also worthy of note that, if the same pillar be bent in different degrees, T will vary as h, while δ remains constant; whence it follows from equation (I.) that W, the weight which keeps the pillar bent, is nearly the same whether the flexure be greater or less. This statement would be accurately true, were it not that equation (I.), on which it is founded, is only approximate. It will, however, agree very closely with experiment so long as h is considerable, that is, whenever the flexure is not slight. From this it follows, that any weight which will produce considerable flexure will be very near the breaking weight, as a trifling addition to it will bend the pillar very much more, and strain the fibres beyond what they can bear.

The Secretary of Council, for Hodder M. Westropp, Esq., read a paper—

On the Fanaux de Cimitieres and the Round Towers.

In reading De Caumont's "Rudiments d'Archeologie," I have been struck with a remarkable analogy between the Irish Round Towers and what are named in De Caumont's work "Fanaux de Cimitieres," and also "Lanterns of the Dead." The following is his description of them:—

"Fanaux de Cimitieres are hollow towers, round or square, having at their summit several openings, in which were placed, in the middle ages (twelfth and thirteenth centuries), lighted lamps, in the centre of large cemeteries. The purpose of the lamp was to light, during the night, funeral processions which came from afar, and which could not always reach the burial-ground before the close of day. The beacon, lighted, if not always, at least on certain occasions, at the summit of the towers, was a sort of homage offered to the memory of the dead—a signal recalling to the passers-by the presence of the departed, and calling upon them for their prayers. Mr. Villegille has found in Pierre de Cluni, who died in 1156, a passage which confirms my opinion. These are the words in which he expresses himself with regard to the small tower of the beacon of the monastery of Cherlieu:—'Obtinet medium cemiterii locum structura quædam lapidea, habens in summitate sui quantitatem unius lampadis capacem, quæ ob reverentiam fidelium ibi quiescentium, totis noctibus fulgore suo locum illum sacratum illustrat.'

"Mr. Lecointre Dupont remarks, that these towers or beacons are found particularly in cemeteries which were by the side of high-roads, or which were in greatly frequented places. 'The motive for erecting these beacons was,' he says, 'to save the living from the fear of ghosts and spirits of darkness, with which the imagination of our ancestors peopled the cemeteries during the night-time; to protect them from that *timore nocturno*, from that *negotio perambulante in tenebris* of whom the Psalmist speaks; lastly, to incite the living to pray for the dead.'

"As to the origin of these sepulchral towers, and chapels surmounted by towers (these I shall mention further on), nothing certain is known. Le Cointre thinks that they are of very ancient origin, and can be traced, perhaps, to the early periods of Christianity. Without disputing this opinion, which would require to be confirmed by authorities which I am not in a position to produce, I think that it was about the twelfth century, consequently about the time of the Crusades, that the greater number of these erections were built; for, among those which remain, I know of none to which an earlier date can be assigned than that of the end of the eleventh century, and many are of the thirteenth. If we are to judge by those which remain, few sepulchral chapels with towers were built after the thirteenth century; some of these which were rebuilt in the fourteenth and fifteenth centuries took the form of a high tower. Such is, at Bordeaux, the tower of Peyberland, not far from the cathedral. This very high tower was commenced in 1481, and finished in 1492, but it has succeeded or was built on a sepulchral chapel; for it is well known that, in 1397, the base on which it was built was used as a sepulchral vault, and that over the sepulchral vault was a chapel, in which the canons celebrated mass. The belfry of St. Michael, of the same town, which has a sepulchral vault at its base, and which is of the fifteenth century (1480), has been, perhaps, also built over some sepulchral vault; it is detached from the church, and is in the midst of a plot of ground which formed the ancient cemetery."

De Caumont then describes one of the towers at Antigny, near St. Savin, department of Vienne:—"It is in the middle of a square, before the parish church, which evidently formed part of the ancient cemetery, for it is almost completely paved with tombstones. Four square windows turned towards the east, west, north, and south, open, under its roof, at the summit of the tower; it was there the light was placed. The door was at some distance from the ground."

He then mentions others:—"The Fanal of Fenioux is in the cemetery of the village, at a hundred paces from the church, opposite the south door.

"The Fanal of Estrees occupies nearly the centre of a large plot of ground, to the south of which is the ancient road from Buzancais to Palluan, and to the north of which are the remains of the parish church of Estrees, a building of the eleventh century, the choir of which is still remaining. This plot of ground was formerly the burial-ground of the parish. This tower has an octagonal basement; its height is eight metres thirty centimetres.

"The Fanal of Ciron is one hundred and fifty metres from the church of the village, and, like that of Estrees, is in the centre of a vast cemetery.

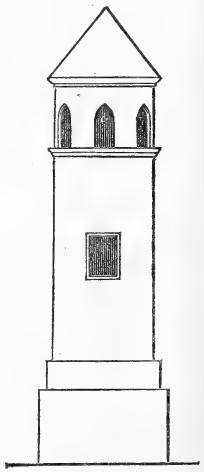
"The Fanal of Terigny l'Eveque was also in a cemetery, about three hundred paces from the church, near which passed the ancient road, which, according to Mr. Dumazy, was the ancient way which led from Mans to the Roman camp at Songè. It is terminated by a conical roof;

its four windows face the four cardinal points. Its height is eleven metres seventy centimetres."

He adds:—"I could also mention several towers, pointed out by different authors, which ought to be assigned to this class of structure which I have pointed out."

This description, it must be allowed, bears a very striking resemblance to everything that is characteristic of the Round Towers. They are almost all placed unsymmetrically at some little distance from the churches, in the centre of a burial-ground. In much frequented places, such as Clonmacnoise and Glendalough, they have been even used for sepulchral purposes, as skeletons have been found beneath the floors of several Round Towers, as at Ardmore, Cloyne, Drumbo, and other places; their windows face the east, west, north, and south; and, further, there is a tradition that they were used for beacons. Their doors are at some distance from the ground, which was evidently for the purpose of raising a ladder through the door, into the tower. They are also of nearly the same period, none being later than the thirteenth century.

De Caumont adds further:—"Sometimes the Fanaux have been replaced by sepulchral chapels, surmounted by a hollow tower and a beacon. Sepulchral chapels were evidently for the same purpose as the towers; for they, too, had beacons at their summit. They could be also used for the purpose of exposing the bodies of the deceased before burial, of celebrating mass, and for other purposes, the memory of which has passed away. I know but one in a state of preservation, that of the ancient cemetery of the nuns of Fontevrault. It is square; from the summit of the stone roof of the building arises a hollow tower, of four or five metres high, bearing a lantern at its summit; each face is pierced with an opening; a conical roof covers the whole. In the interior, the chapel is vaulted. The date is 1223."



St. Kevin's Kitchen would seem to answer this description; and thus, if the analogy which I have suggested between the two be correct, St. Kevin's Kitchen would be a stone-roofed sepulchral chapel, surmounted by a tower, which was used as a beacon, for the same purpose as the Fanaux de Cimitiere, or Lanterns of the Dead. I give here an engraving from De Caumont of a round Fanal.

Crosses of Cemeteries.—In De Caumont's work I remark a further analogy to Irish antiquities, in his description of Crosses of Cemeteries, which would lead one to think that there was some connecting link between France and Ireland with regard to these towers and crosses. There was certainly an intercommunication between France and Ireland in the early periods, particularly with regard to religious dogmas and

practices. St. Patrick, we know, was a Frenchman, and was educated in France; St. Columbanus, also, travelled in France. St. Declan, who it is said built the town at Ardmore, travelled to Italy. Vergilius, in the eighth century, was an Irishman, and, like most of his countrymen at that period who were distinguished for learning, left his own country, and passed into France. De Caumont's words are ("Cours d'Antiquites," vol. vi., p. 349):—

"*Crosses of Cemeteries.*—Crosses raised in the centre of church-yards are also objects deserving of study, when they are ancient; for I am persuaded that, in the middle ages, they have in many burial-grounds taken the place of the towers of which I have spoken; at the present day, they have taken their place in many sites. The most ancient I know of are of the twelfth, or about the end of the eleventh century. They are most frequently simple crosses, enclosed in a circle, and raised on a square, or sometimes on an octagonal, pedestal. In Brittany, crosses have been erected on which are sculptured rather complicated groups of figures, and of a workmanship the more remarkable, as they are in granite."

Crosses like the first mentioned are found at Glendalough; and crosses like those in Brittany are to be met with at Monasterboice, Clonmacnoise, and other churchyards.

Dr. Robert M'Donnell read a paper "On the Organs of Touch in Fishes."

Mr. John Morisy read the following—

Inquiry into the Existence of a pure Passive Voice in Hindustani.

In his "Hindustani Grammar," published at Calcutta, 1798, Dr. Gilchrist gave an exposition of the Preterite tenses, which has been repeated by subsequent grammarians, and by none more distinctly than by Dr. Forbes, who, nevertheless, leans heavily on his distinguished predecessor. Gilchrist did not please himself; but Forbes, although he has done as little as the former, seems self-satisfied; and, like him, frames his rule respecting the "Agent with *Ne*," on the supposition that the Preterite tenses are Active—a theory which I shall show to be untenable.

That Dr. Forbes accepts them as Active, we have abundant evidence in his "Hindustani Grammar."

1. He leaves them in the paradigm of the conjugation of a transitive verb. Had he thought them Passive, he would have separated them.

2. He introduces them, p. 54, with this observation: "All the nominatives assume the case of the agent, characterized by the postposition *ne*;" but it must be allowed that this expression is not decisive, for the agent case and the nominative are confounded.

3. Had Forbes taken the Passive view, he would not have been under the necessity of writing (p. 105): "The only real difficulty likely to arrest the progress of the learner consists, not in the use of *ne* to express the agent, but in that of *ko* to define the object of a transitive verb (*scil.* in a preterite tense.)" Nothing could be more conclusive; he calls the verb, when *ne* is used, transitive.

4. Dr. Forbes says, again, that it does not fall within his province to account philosophically for the mode in which this particle (*ne*) is applied. If he had held the Passive doctrine, he would have been in no want of philosophy.

5. "It is a form of construction," he adds, "very common in Sanskrit." So it is, but he derived no light from the Sanskrit. In this language the past participle is often verbalized by putting a pronoun or noun before it, and then both constitute a preterite passive, which is followed, when needful, by the instrumental case. In Sanskrit, the most common termination of this case is *na*, which is the origin of the Hindustani postposition *ne*. I refer to Professor Williams' Sanskrit Grammar, p. 320, where, however, he graciously leaves me the honour of establishing the legitimacy of the Preterite tenses to a purely Passive character. The Sanskrit construction here noticed is, without doubt, the origin of the like form in the Hindustani; and is in itself a conclusive demonstration of the correctness of the judgment which pronounces the *Urdú* Preterites to be pure Passives—a judgment which I propose to establish by a rigid investigation.

The Passive character will be easily ascertained from the examination of a few simple sentences, presenting all the varieties connected with the Preterite tenses. To understand the argument, all that is necessary is a knowledge of any inflected language, of the true nature of a Passive phrase, which our Hindustani scholars appear to have ignored, and of these few particulars: A postposition requires the preceding noun or pronoun to be inflected, visibly or virtually. Feminine nouns are not inflected in the singular; nor masculine (including participles), unless they end in *alif* (*a*). The plural inflection always ends in *on*. The termination (*a*) is mas. sing.; *e* is the corresponding plural; *i* is fem. sing.; *in* its plural. The present participle ends in *ta*, and is verbalized by simply giving it a subject; the passive drops the *t*, is verbalized in the same way, and thus affords the Preterite tenses. These I take to be pure Passives. The received opinion is, that the Passive voice can be formed only by means of the auxiliary *jáná*, "to go, or to be;" but a Passive, even of this kind, is rejected by the ablest of the native grammarians, of whom the most distinguished is Muhammad Ibrahim, of Bombay.—(*Vide Tufhde Elphinstone.*)

The character of the verb is assertion. When the verb is Active, its subject is the agent of the action; its object, the thing acted upon. When the verb is Passive, the object of the Active form becomes the subject of the assertion, and therefore is in the nominative case; and the agent is in an inflected case, with or without a governing preposition: that this should not be superfluous seems strange.

The statement of the construction of the preterite phrases, as laid down by Gilchrist, Shakespear, Eastwick, and Forbes, is, in Forbes's words ("Gram.," p. 103, ed. 1860): "The verb agrees with the object in gender and number; unless it be deemed requisite to render the object definite by the addition of *ko*, in which case the verb remains in the simple form of the third person singular masculine."

This rule is exactly adapted to the appearances, but gives a false account of the process by which they are produced. If you follow it in writing, the principles, though erroneous, will eventuate in correct results.

That the object indicated here is the object of the preterite as an Active tense, has been shown at 3, *supra;* but that the question may be more clearly comprehended, it is better to examine a few sentences, on this supposition, and this will be doing no more than following the exact words of Dr. Forbes's rule.

In the sentence—

(A) اُس نے لڑکی ماری *us ne larkí márí*, "He beat the girl,"

we are told that *larkí* is the object; if so, *us* is the subject of *márí*. Here we have an inflected nominative, and the verb, instead of agreeing with it in the masculine, agreeing with the object in the feminine. *Us* is the singular inflection of *wuh*, "he," and governed by the postposition *ne;* which is the most frequent termination of the instrumental case in the Sanskrit. Our unmerciful authorities, then, force on us the *casus obliquus* as the *casus rectus*, and confer on the object the governing powers of the subject or nominative.

This ablative-nominative is fatal to the theory of the rule; it is opposed to all our cognizances, and subversive of all grammatical principles. It so bewildered Gilchrist, that, at one time, he calls *ne* an expletive, and at another he incorporates it with the agent, as part of the nominative. This leaves no doubt whatsoever as to his views.

In Hindustani there are two forms of the Accusative: one is the same as the Nominative; the other is associated with the postposition *ko*, and therefore in an inflected state, whether it show itself so or not. Now, taking *larkí* as a nominative, and *márí* as passive, we can, in accordance with every known principle of general grammar, translate the above sentence thus:—

"The girl was beaten by him."

If *ko* be introduced into the construction, the phrase becomes—

(B) *us ne larkí ko márá*, "He beat the girl;"

and, making *larkí* plural,

(C) *us ne larkíyon ko márá*, "He beat the girls;"

in both of which I have no nominative, but two inflected cases. The verb is in its simplest state, owing to the presence of *ko*, whose influence bound Gilchrist and the rest more closely to their errors, whilst it had quite a contrary effect on me. I took it as it came, gave it its real value, and, still adhering to my Passive speculation, escaped from all danger by translating thus:

"As to the girl (*or* girls) it was beaten by him."

The impersonal form presented no impediment, for many verbs are so used in Hindustani; and as in Arabic, which has no grammatical neuter, the names of natural neuters are mostly feminine. As there is no neuter in Hindustani, the masculine is here used instead; and, consequently, I looked upon the masculine singular, *márá*, as that "petrified neuter" which Bopp describes as unconscious of gender. Having taken this view, I found myself at liberty to give a smoother translation:—

"As to the girl, she was beaten by him."
"As to the girls, they were beaten by him."

The absence of concord suggested no difficulty: (1.) because the subject of the verb is indirectly mentioned; and (2.) because the Hindustani shows a willingness to dispense with inflection, whenever its absence does not give rise to ambiguity; thus, *achchí kitaben* is used for *achchi, yan kitaben*, "good books." Moreover, I saw no objection to the neutral and singular state of *márá*, upon any general principles whatsoever. We find a Greek neuter plural, and an Arabic broken plural, take a verb singular; and also an Arabic numeral under three, and another between three and ten, require a different construction. We do not complain; we discover a peculiar usage, and register it beside the leading rule. But in this case there is really nothing peculiar; for the verb, being impersonal, must be in the singular number, and must be deemed to be in the neuter, though the gender cannot be formally exhibited as it can in *ventum erat ad Vestæ*.

Let me now submit all the varieties of the preterite phrases, the consideration of which will conduct to a clear understanding and determinate judgment. Eight may be written without *ko*, and eight with *ko;* but of these latter two will be sufficient. There may be sixteen others by making the agent masculine, but the change would not alter the argument.

1. *'Aurat ne laṛkí márí.*	"The woman beat the girl."
2. *'Aurat ne laṛká márá.*	"The woman beat the boy."
3. *'Aurat ne laṛkiyán márín.*	"The woman beat the girls."
4. *'Aurat ne laṛke máre.*	"The woman beat the boys."
5. *'Auraton ne laṛkí maṛí.*	"The women beat the girl."

6. *'Auraton ne larkâ márá.* "The women beat the boy."
7. *'Auraton ne larkiyan márin.* "The women beat the girls."
8. *'Auraton ne larke mare.* "The women beat the boys."

In this series, if we follow the Active hypothesis, concord between the subject (as assumed by Gilchrist and Forbes) and the verb, is visible only in the first and seventh; thus (1.) *'aurat* and *márí* are fem. sing.; (7.) *'auraton* and *marin*, fem. plur.; but (2) *'aurat* is fem., and *márá* mas.; (3) *'aurat* is sing., and *márin* plur.; and so of the rest. On the Passive theory, there is concord throughout; taking the sentences consecutively, *larkí* and *márí* agree; *larkâ* and *márá; larkiyán* and *márin;* and so to the last (*'aurat*, woman; *larkí*, girl).

In four of the remaining varieties we have such forms as—

3. *'Auraton ne larkiyon ko márá.* "The women beat the girls."
8. *'Auraton ne larkon ko márá.* "The women beat the boys."

In these, concord acts no part, and we must seek for the principles of the construction in some other direction. We shall find them in the Passive theory, and only there.—See (B) and (C). Those principles are embodied in the following statement, against which, as no argument can be produced, so no authority can avail; and least of all that of the *Munshis*, who have no clear perception of what the Passive voice is. Taking the Preterite phrases by their weight, instead of their construction, they totally misconceive them. Even among ourselves we have *Munshis*, who judge by form, instead of function. Drs. Bosworth and Crombie deny the existence of an English passive verb, because it is not built on inflection. On this point Dr. Stoddart writes ("Encyc. Metrop.," Art. Grammar, p. 48):—"In the distinction of verbs, as in most other parts of grammar, we find grammarians continually confounding signification with form."

Professor Kay's views of the Latin Passive Voice are very extraordinary, and serve to throw it greatly into the shade. In his "Latin Grammar," p. 52, he sketches a Passive Verb thus:—"When the source of an action, i. e. the nominative, is not known, or it is thought not desirable to mention it, it is common to say that the action proceeds from the object itself. A reflexive so used is called a passive." Supposing this language to have some meaning, it is evident that the object must be known to us. As the action proceeds from that object, we arrive at the source of action, i. e. the nominative, which therefore becomes known; and so the reflexive or passive is miserably lost.

Mr. Kay says—"*Vertitur*, literally *he turns himself*, is often used for *he is turned*." This use is good news for a Latin scholar; who, however, will insist that *se vertit* is the Latin for *he turns himself*. It is true that *vertitur* = *se vertit;* but this is no proof that the literal version above given is in the least defensible. Besides, the grammatical equa-

tion is true only by chance; for any number of similar constructions may be produced which will not constitute equations; thus *discipulus docetur* is not = *discipulus se docet*, &c. It is evident, therefore, that the Professor endeavours to confound the Latin Passive Voice with reflexive phrases.

Again, applying those novel principles to *vertitur interea cœlum*, we find that *vertitur* is not reflexive; for the source of the action is disclosed by *cœlum;* and as it is not *reflexive*, it is not *passive*. The Professor leaves it "no character at all."

In support of his views, he appeals to French reflected verbs, and is very unlucky:—"Many European languages afford examples of this (the *passive*) use of the reflexive." In those languages a passive signification is frequently expressed by a reflexive form, though this is rarely the case except in the third person. This does not prove the reflexive is passive, or the passive reflexive. If we receive Mr. Kay's doctrine, the French for *I am flattered* is *je me flatte*, instead of *on me flatte;* and the Latin for *thou lovest thyself* is *amaris*. To such absurdities does Mr. Kay's theory of the Passive Voice lead.

If, then, some of our foremost grammarians entertain such obscure or absurd notions of the Passive Voice, can we wonder that the less expert and less learned grammarians of India have been puzzled with it? Some of the best English scholars reject the English Passive; shall we be surprised that the *Munshis* have not been able to detect the *Urdú Passive?* Certainly not. My assertion, therefore, of independent *Hindustani* Passive tenses can no more be invalidated by pleading against me the authority of the *Munshis* than the authority of Gilchrist or Forbes. No mere authority can impair the investigation, argument, and inferences which have been exhibited. My analysis and reasoning are unconnected with any peculiar theory or favourite speculation; they are rigidly applied to the features of the construction; conducted according to the essential nature of the Passive Voice, and the clearest analogies of language; and their consequences confirmed by the consistency and harmony to which they lead.

Being satisfied of the Passivity of the preterite tenses, I drew up the following simple and consistent statement:—

1. The preterite tenses of transitive verbs are pure Passive forms.
2. The subject, when directly spoken of, is in its simple state as the nominative case, and requires the verb containing the Passive assertion to agree with it in gender and number.
3. If the subject of the verb be placed under the government of *ko*, the verb remains in its elementary form, singular and masculine.
4. In the latter case it must be translated as impersonal Passive; but the appropriate pronoun may be supplied from the indirect nominative, or subject of the discourse, which has been put under the government of *ko*. Thus:—

'Auraton ne laṛkiyon ko márá. (عورتون نے لڑکیون کو مارا)

"As to the girls, it was beaten by the women,
Or, "As to the girls, they were beaten by the women."

5. The agent of the verb in these preterite terms is governed by *ne*.

This exposition, I conceive, makes everything connected with this subject clear and harmonious. It proves the Hindustani to have a pure though defective preterite Passive voice, independent of the auxiliary *jáná*, and shows *ne* to be as intelligible with the Preterite tenses as *à* with the Latin passive, or *by* with the English. The tenses which are not derived from the Past particle must be supplied by the help of *jáná;* and thus we shall have a complete paradigm of the Passive voice in the *Urdú* of Hindustan.

Mr. B. B. Stoney read a paper "On the Relative Deflection of Lattice and Plate Girders."

The President, before leaving the chair, congratulated the Academy on the number and variety of communications of great interest and value which had been brought before the Academy during the Session now closed.

MONDAY, NOVEMBER 10, 1862.

William R. Wilde, Esq., Vice-President, in the Chair.

W. H. Hardinge, Esq., read (in continuation) his paper on Mapped Townland Surveys of Ireland.

The Rev. Professor Haughton read the following Paper: —

Observations on the Wind, made in the Years 1848–49, in Leopold Harbour, North Somerset, on Board Her Majesty's Ship "Investigator."

The following observations were made during the winter of 1848–9, on board Her Majesty's ship "Investigator," which, with the "Enterprise," formed the first Franklin searching expedition, under the command of Sir James C. Ross.

I owe the opportunity of discussing and publishing them to the kindness of Captain Washington, R. N., Hydrographer, who placed them at my disposal, for scientific use, together with the Tidal Observations that accompanied them. The observations themselves were made by Lieutenant Robinson, R. N., and appear to have been very accurately recorded.

The latitude of Port Leopold is 73° 50′ N., and the longitude is 90° 20′ W.

No observations of temperature were made by Lieutenant Robinson, whose meteorological observations were intended to assist the corresponding Tidal Observations; and for this reason the wind and barometer were observed, not at fixed hours of the day, but at the times of high and low water.

The following mean temperatures of Port Leopold, observed during the same winter, are recorded by Professor Dove in his "Klimatologische Beiträge," 1857:—

Mean Monthly Temperature of Port Leopold in 1848–9, *in degrees Fahrenheit.*

1848.		1849.	
October, . . .	+ 9°·7	January, . . .	− 35°·7
November, . .	− 14 ·5	February, . .	− 35 ·2
December, . .	− 22 ·8	March, . . .	− 22 ·8
		April, ...	− 10 ·0

I have arranged the observations in two Tables:—

Table I. contains the observations in the order of their occurrence.

Table II. contains the direction and force of the wind for each month, arranged with reference to the points of the compass; and

The diagrams at the end exhibit the curves of frequency and force of wind, constructed from Table II.

TABLE I.—*Observations on the Wind and Barometer at Leopold Harbour. Latitude, 74° N. Longitude, 90° W.*

October.	Direction.	Force.	Barometer at High Water.	Barometer at Low Water.	October.	Direction.	Force.	Barometer at High Water.	Barometer at Low Water.
1					17				
2					18				
3					19				
4					20				
5					21				
6					22				
7					23				
8					24				
9					25	S. E.	6	29·84	29·93
						S. E.	6	29·63	29·70
10					26	East.	7–8	29·53	29·60
						East.	7–8	29·61	29·60
11					27	S. E.	3	29·55	29·55
						S. E.	3	29·55	29·70
12					28	N. E.	2	29·73	29·70
						N. E.	2	29·46	29·47
13					29	S. E.	3–4	29·44	29·41
						S. E.	3–4	29·45	29·60
14					30	Var.	1	29·70	29·80
						N.	1	29·90	30·03
15					31	N.	3	30·07	30·07
						N. W.	3	30·11	30·16
16									

LEOPOLD HARBOUR.—1848.

November.	Direction.	Force.	Barometer at High Water.	Barometer at Low Water.	November.	Direction.	Force.	Barometer at High Water.	Barometer at Low Water.
1	N. W.	1	30·159	30·145	16	. . . . .		30·144	30·032
	N. W.	1	30·132	30·095				29·950	29·888
2	N. W.	1	30·025	29·890	17	. . . . .		29·830	29·764
	North.	5–6	29·640	29·465				29·750	29·750
3	North.	5–6	29·388	29·426	18	. . . . .		29·760	29·820
	North.	5–6	29·442	29·430				29·905	29·820
4	North.	6–7	29·462	29·675	19	. . . . .		29·840	29·908
	N. W.	3	29·838	30·004				29·776	29·805
5	North.	3	30·070	30·225	20	. . . . .		29·701	29·724
	N. W.	2	30·310	30·320				29·789	29·780
6	N. W.	2	30·100	30·320	21	. . . . .		29·854	29·841
	North.	5–6	30·308	30·302				29·948	29·916
7	N. W.	5-6	30·780	30·255	22	. . . . .		29·960	29·975
	N. W.	4–5	30·090	29·908				29·950	30·000
8	N. W.	6–7	29·779	29·795	23	. . . . .		29·982	30·000
	N. W.	6	29·730	29·704				29·960	29·975
9	N. W.	2·3	29·730	29·790	24	. . . . .		29 916	29·942
	N. W.	2·3	29·800	29·784				29·940	29·942
10	N. W.	0–2	29·780	29·800	25	. . . . .		29·872	29·903
	N. W.	1–2	29·860	29·925				29·980	29·940
11	S. E.	4–5	29·966	29·980	26	. . . . .		29·980	29·985
	S. E.	6–7	29·940	29·970				29·968	29·966
12	S. E.	4	29·966	30·255	27	. . . . .		29·890	29·860
	. . . .	.	29·988	30·324				29·854	29·880
13	. . . . .		30·132	30·185	28	. . . . .		29·866	29·844
			30·134	30·150				29·814	29·778
14	. . . . .		30·136	30·060	29	. . . . .		29·750	29·730
			30·100	30·090				29·775	29·846
15	. . . . .		30·116	30·253	30	. . . . .		29·890	29·900
			30·300	30·218				29·954	29·998

LEOPOLD HARBOUR.—1848.

December.	Direction.	Force.	Barometer at High Water.	Barometer at Low Water.	December.	Direction.	Force.	Barometer at High Water.	Barometer at Low Water.
1	S. E.	4	30·004	30·005	17	S. W.	1	29·980	30·068
	N. W.	4–5	29·990	29·950		S. E.	1	30·152	30·068
2	N. W.	4–5	29·950	30·008	18	S. E.	1	30·124	30·160
	N. E.	2–3	30·108	30·050		South.	1–2	30·050	30·100
3	N. E.	2–3	30·000	29·994	19	South.	1–2	29·820	29·946
	North.	2–3	29·980	29·926		South.	1–2	29·624	29·723
4	North.	2–3	29·902	29·900	20	North.	1	29·450	29·552
	North.	3–4	29·860	29·900		North.	1	29·344	29·374
5	North.	3–4	29·812	29·845	21	North.	1–2	29·316	29·350
	N. W.	4–5	29·816	29·806		North.	1–2	29·346	29·342
6	N. W.	4–5	29 950	29·894	22	North.	2–3	29·218	29·305
	N. W.	4–5	30·116	30·060		North.	2–3	29·165	29·198
7	N. W.	4–5	30·140	30·140	23	N. W.	4–5	29·258	29·190
	N. W.	3–4	30·125	30·150		N. W.	4–5	29·234	29·315
8	N. W.	3–4	29·980	30·080	24	N. W.	4–5	29·200	29·168
	N. W.	2–3	30·115	29·880		N. W.	4–5	29·330	29·300
9	North.	2–3	29·770	29·772	25	N. W.	4–5	29·330	29·347
	North.	2–3	29·838	29·792		N. W.	4–5	29·280	29·265
10	N. N. E.	3–4	29·950	29·900	26	South.	1–2	29·274	29·305
	N. N. E.	3–4	29·968	29·968		South.	1–2	29·378	29·402
11	South.	2	29·968	29·920	27	Calm.	—	29·415	29·410
	South.	2	29·892	29·900		Calm.	—	29·408	29·414
12	S. S. W.	1–2	29·905	29·900	28	S. S. E.	4	29·414	29·382
	S. S. W.	1–2	29·930	29·947		S. S. E.	4	29·366	29·412
13	Calm.	—	29·936	29·910	29	South.	4–5	29·464	29·542
	Calm.	—	29·916	29·886		South.	4–5	29·710	29·790
14	Calm.	—	29·842	29·808	30	S. S. E.	8	29·831	29·853
	North.	1	29·800	29·794		S. E.	4	29·984	30·142
15	North.	1	29·760	29·720	31	North.	4	30·264	
	North.	1	29·742	29·700		North.	1		
16	N. N. W.	2–3	29·808	29·838					
	S. W.	1	29·884	29·934					

LEOPOLD HARBOUR.—1849.

January.	Direction.	Force.	Barometer at High Water.	Barometer at Low Water.	January.	Direction.	Force.	Barometer at High Water.	Barometer at Low Water.
1	S. S. E.	7	30·415	30·478	17	N. N. W.	4–5	30·680	29·714
	S. S. E.	6–7	30·485	30·420		N. N. W.	4	30·740	29·714
2	S. E.	5–6	30·362	30·326	18	N. N. E.	4–5	30·738	29·738
	S. S. E.	5–6	30·355	30·326		N. W.	5–6	30·880	29·810
3	S. E.	5–6	30·260	30·310	19	N. N. W.	5–6	30·948	29·922
	S. S. E.	5–6	30·288	30·295		North.	5–6	30·922	29·962
4	S. S. E.	4–5	30·314	30·307	20	North.	1–2	30·814	29·862
	S. S. E.	3–4	30·360	30·290		N. W. S E.	1–2	30·771	29·824
5	N. W.	3–4	30·424	30·448	21	S. E.	4–2	30·492	29·655
	N. W.	2–0	30·440	30·436		S. E.	3	30.400	29·432
6	N. W.	3–4	30·416	30·450	22	S. E.	3	30·508	29·464
	N. W.	6–7	30·315	30 374		S. E.	4–5	30·556	29·555
7	Var.	6–7	30·660	29·950	23	North.	4	30·670	29·572
	N. N. W.	2–3	30·810	29·650		Calm.	0	30·838	29·780
8	Var.	2–3	30·860	29·860	24	N. N. W.	1–2	30·838	29·892
	S. E.	3–4	30·760	29·884		N. N. W.	1–2	30·946	29·990
9	S. E.	3–4	30·450	29·600	25	N. N. W.	2	30·016	30·030
	N. W.	2–3	30·450	29·440		N. N. W.	1–2	30·048	30·063
10	N. W.	2–3	30·491	29·694	26	South.	4–5	30·050	30·000
	N. W.	1–2	30·491	29·733		South.	3	30·012	30·060
11	Var.	1	30·695	29·652	27	South.	3–4	30·078	30·094
	West.	1	30·648	29·700		North.	2–3	30·228	30·276
12	N. W.	2	30·690	29·682	28	N. N. W.	5	30·274	30·200
	North.	3–4	30·684	29·670		N. N. W.	6	30·100	30·010
13	North.	4	30·618	29·583	29	N. W.	8–9	29·884	29·765
	N. W.	4–5	30·565	29·589		N. W.	7–8	29·740	29·700
14	N. W.	4	30·592	29·640	30	N. W.	3	29·667	29·672
	N. W.	4	30·672	29·714		N. N. W.	2	29·702	29·730
15	North.	4–5	30·732	29·732	31	N. N. W.	1	29·700	29·666
	North.	4–5	30·726	29·746		N. W.	3	29·654	29·600
16	N. W.	6–7	30·670	29·614					
	N. by E.	7	30·665	29·685					

LEOPOLD HARBOUR.—1849.

February.	Direction.	Force.	Barometer at High Water.	Barometer at Low Water.	February.	Direction.	Force.	Barometer at High Water.	Barometer at Low Water.
1	N. N. W.	6	29·394	29·270	15	South.	7	29·926	30·150
	N. W.	8	29·145	29·034		S. by E.	5	30·314	30·350
2	N. W.	8	29·068	29·034	16	S. S. E.	5	30·240	30·012
	N. W.	5	29·562	29·300		S. S. E.	7	29·875	30·012
3	S. S. E.	3	29·890	29·768	17	S. S. E.	7	29·610	29·440
	N. W.	2	30·065	30·000		S. S. E.	7	29·430	29·472
4	North.	1	30·018	30·069	18	S. S. E.	7	29·480	29·510
	North.	3	30·003	30·022		S. S. E.	9	29·552	29·592
5	N. N. W.,	6	29·862	29·940	19	S. S. E.	9	29·650	29·810
	N. N. W.	6	29·710	29·802		S. E.	6	30·036	30·130
6	N. N. W.	6	29·522	29·625	20	South.	3–1	30·200	30·230
	N. N. W.	6	29·574	29·590		Calm.	0	30·285	30·295
7	N. N. W.	8	29·674	29·565	21	S. W.	1	30·262	30·270
	N. N. W.	7	29·674	29·759		Calm.	0	30·347	30·270
8	N. N. W.	7	29·796	29·810	22	South.	1	30·382	30·386
	N. W.	7	29·904	29·914		North.	1	30·408	30·408
9	N. W.	8	29·870	29·810	23	N. N. W.	2	30·408	30·410
	N. N. W.	7	29·782	29·782		Calm.	0	30·440	30·520
10	N. N. W.	7	29·755	29·692	24	North.	1	30·544	30·555
	N. W.	8	29·662	29·676		Calm.	0	30·590	30·632
11	N. W.	6	29·610	29·628	25	Calm.	0	30·630	30·600
	N. W.	7	29·612	29·568		N. N. W.	3	30·570	30·500
12	N. W.	9	29·450	29·430	26	N. E.	6	30·290	30·078
	N. W.	6	29·470	29·604		East.	7	29·906	29·850
13	N. W.	4	29·768	29·980	27	N. W.	5	29·690	29·594
	N. W.	2	30·134	30·216		N. W.	5	29·540	29·578
14	S. S. E	1–6	30·080	30·000	28	N. W.	5	29·604	29·690
	S. S. E.	7	29·930	29·875		N. W.–S. E.	4–2	29·816	29·900

LEOPOLD HARBOUR.—1849.

March.	Direction	Force.	Barometer at High Water.	Barometer at Low Water.	March.	Direction.	Force.	Barometer at High Water.	Barometer at Low Water.
1	Calm–N. W.	4	29·958	30·034	17	Calm.	0	29·732	29·730
	N. W	2	30·060	30·070		East.	6	29·752	29·725
2	S. S. E.	2	29·976	29·944	18	East.	4	29·830	29·912
	South.	2	29·824	29·715		N. E.	4	29·955	29·912
3	Calm.	0	29·616	29·715	19	N. E.	4	29·974	29·976
	Var.	2–3	29·705	29·635		N. E.	5	29·992	30·000
4	S. E.	4	29·650	29·726	20	N. E.	6	29·882	29·930
	S. E.	4–7	29·514	29·600		N. E.	5	29·858	29·862
5	S. E.	5	29·585	29·505	21	North.	3	29·804	29·818
	S. E.	7–3	29·868	29·775		North.	1	29·812	29·804
6	S. E.	3–2	29·892	29·910	22	North.	3	29·736	29·760
	S. E.	3–7	29·634	29·752		North.	4	29·700	29·700
7	E. S. E.	6–7	29·490	29·520	23	North.	2	29·912	29·766
	East.	8–9	29·472	29·472		Calm.	2	30·138	30·085
8	S. E.	7–4	29·540	29·474	24	Calm.	2	30·138	30·174
	S. S. E.	2	29·540	29·070		South.	2	30·246	30·296
9	N. N. W.	1	29·772	29·832	25	S. S. E.	3	30·310	30·318
	N. N. E.	2	29·940	30·008		S. S. E	3	30·364	30·386
10	N. W.	2	30·030	30·034	26	S. S. E.	5	30·394	30·380
	N. W.	2	30·052	30·140		S. S. E.	5	30·382	30·452
11	N. W.	3	30·223	30·300	27	S. S. E.	5	30·455	30·440
	N. W.	6	30·334	30·312		South.	4	30·452	30·454
12	N. W.	5	30·325	30·280	28	East.	4	30·351	30·346
	W. N. W.	6	30·285	30·200		North.	1	30·316	30·298
13	W. N. W.	6	30·068	30·060	29	East.	7	30·208	30·100
	W. N. W.	7	30·039	30·076		East.	7	29·985	29·908
14	W. N. W.	9	30·040	30·033	30	N. E.	5	29·868	29·925
	W. N. W.	6	30·030	30·010		N. W.	5	29·972	30·034
15	N. W.	5	29·862	29·835	31	North.	2	30·066	30·081
	N. W.	2	29·826	29·836		South.	3	30·082	30·030
16	N. N. W. / S. S. E.	1–1	29·792	29·790					
	S. E.–S. W.	1–3	29·790	29·786					

LEOPOLD HARBOUR.—1849.

April.	Direction.	Force.	Barometer at High Water.	Barometer at Low Water.	April.	Direction.	Force.	Barometer at High Water.	Barometer at Low Water.
1	E. S. E.	6	29·862	30·030	16	S. S. E.	4	30·316	30·352
	E. S. E.	8	29·710	29·748		S. S. E.	3	30·260	30·282
									30·200
2	E. S. E.	8	29·714	29·658	17	S. S. E.	3	30·097	30·038
	N. E.	4	29·685	29·679		S. S. E.	3	29·947	39·038
3	N. E.	4	29·626	29·677	18	South.	2	29·740	29·860
	N. E.	4	29·474	29·573		N. W.	9	29·650	29·674
4	N. W.	3	29·397	29·442	19	N. W.	6	29·605	29·644
	N. W.	2	29·611	29·449		N. W.	8	29·663	29·674
5	N. W.	4	29·880	29·777	20	N. W.	7	29·644	29·706
	Calm.	0	30·041	30·036		N. W.	4	29·607	29·648
6	Calm.	0	30·063	30·077	21	S. S. E.	2	29·573	29·586
	North.	1	30·068	30·110		S. S. E.	4	29·727	29·669
7	Calm.	0	29·929	30·038	22	N. N. W.	2	29·702	29·736
	N. W.	2	29·929	29·895		N. N. W.	2	29·783	29·740
8	N. W.	3	29·891	29·946	23	North.	3	29·776	29·792
	N. N. W.	3	30·042	30·137		North.	2	29·776	30·816
9	N. N. W.	2	30·208	30·234	24	North.	3	29·878	30·956
	N. N. E.	4	30·253	30·241		North.	5	30·003	30·034
10	N. E.	4	30·211	30·150	25	N. N. E.	4	30·061	30·058
	N. E.	5	30·080	30·057		N. N. E.	6	30·033	30·032
11	North.	2	30·086	30·137	26	N. E.	5	30·065	30·088
	South.	2	30·145	30·154		N. N. W.	3	30·127	30·180
12	North.	3	30·080	30·048	27	N. by E.	4	30·225	30·234
	N. N. W.	3	30·091	30·217		N. N. E.	5	30·273	30·288
13	Var.	2	30·317	30·422	28	N. N. E.	3	30·323	30·364
	S. S. E.	1	30·495	30·511		N. W.	6	30·320	30·252
14	S. S. E.	3	30·532	30·497	29	N. W.	5	30·090	30·000
	S. S. E.	5	30·510	30·501		N. W.	2	29·962	29·945
15	S. S. E.	6	30·508	30·458	30	S. S. E.	2	29·955	29·945
	S. S. E.	6	30·409	30·352		S. S. E.	1	25·961	29·952

LEOPOLD HARBOUR.—1849.

Mar.	Direction.	Force.	Barometer at High Water.	Barometer at Low Water.	Mar.	Direction.	Force.	Barometer at High Water.	Barometer at Low Water
1	N. N. W.	1	29·993	29·998	17	East.	3	29·839	29·856
	N. W.	3	30·019	30·026		S. E.	3	29·874	29·850
2	N. N. E.	3	30·072	30·073	18	N. E.	5	29·954	29·885
	N. N. E.	4	30·116	30·095		North.	1	30·137	30·067
3	North.	3	30·114	30·137	19	N. W.	4	30·203	30·188
	North.	3	30·115	30·114		N. W.	4	30·251	30·261
4	North.	5	30·061	30·110	20	N. N. W.	5	30·263	30·266
	N. N. E.	4	29·917	30·018		N. W.	4	30·260	30·293
5	N. N. E.	3	29·781	29·846	21	N. N. W.	2	30·178	30·260
	N. N. E.	3	29·795	29·844		S. S. E.	2	30·040	30·260
6	North.	3	29·920	29·869	22	North.	2	29·962	29·993
	N. N. W.	5	30·095	30·025		S. S. E.	2	29·883	29·939
7	S. E.	2	30·200	30·177	23	S. S. E.	2	29·811	29·829
	South.	2	30·297	30·249		N. N. W.	3	29·811	29·801
8	Var.	1–3	30·297	30·320	24	N. N. W.	2	29·789	29·777
	East.	7	30·297	30·170		N. W.	3	29·723	29·720
9	East.	7	29·986	29·827	25	Calm.	0	29·734	29·768
	South.	2	29·747	29·819		N. W.	6	29·792	29·816
10	Var.	2–4	29·960	30·144	26	N. W.	7	29·824	29·830
	Var.	3	30·250	30·287		N. W.	5	29·832	29·871
11	S. S. E.	5	30·303	30·267	27	N. W.	5	29·912	29·897
	South.	5	30·247	30·213		N. W.	6	29·946	29·991
12	Var.	2	30·125	30·086	28	N. W.	5	30·028	30·031
	S. S. E.	2	30·111	30·191		N. W.	3	30·060	30·054
13	S. S. E.	2	30·273	30·324	29	N. W.	2	29·974	29·885
	S. S. E.	2	30·348	30·336		Var.	1	29·830	29·790
14	S. S. E.	4	30·342	30·287	30	East.	2	29·752	29·790
	East.	5	30·248	30·167		East.	1	29·762	29·762
15	S. E.	4	30·128	30·064	31	North.	2	29·743	29·756
	S. E.	4	30·023	29·972		North.	2	20·763	29·769
16	S. E.	5	29·929	29·972					
	S. E.	4	29·883	29·897					

LEOPOLD HARBOUR.—1849.

June.	Direction.	Force.	Barometer at High Water.	Barometer at Low Water.	June.	Direction.	Force.	Barometer at High Water.	Barometer at Low Water.
1	North.	1	29·769	29·774	16	S. E.	2	29·849	29·778
	N. N. W.	2	29·798	29·786		Var.	1	29·891	29·876
2	N. N. W.	4	29·787	29·799	17	S. E.	4	29·852	29·896
	N. N. W.	3	29·767	29·777		S. E.	2	29·807	29·833
3	N. N. W.	4	29·773	29·796	18	E. S. E.	3	29·760	29·782.
	N. N. W.	4	29·731	29·747		E. S. E.	5	29·717	29·728
4	N. N. W.	5	29·799	28·771	19	East.	2	29·770	29·754
	N. N. W.	7	29·840	22·819		North.	2	29·805	29·797
5	N. N. W.	6	29·842	29·864	20	East.	2	29·859	29·846
	N. N. W.	7	69·909	29·846		East.	4	29·895	27·900
6	N. W.	7	29·909	29·977	21	East.	4	29·895	29·900
	N. W.	7	30·025	30·058		Var.	2	29·918	29·903
7	N. W.	7	30·092	30·140	22	N. N. E.	2	29·856	29·848
	N. W.	5	30·134	30·131		N. E.	3	29·817	29·819
8	North.	2	30·159	30·152	23	N. E.	2	29·807	29·741
	North.	1	30·143	30·160		N. E.	2	29·734	29·725
9	N. E.	3	30·158	30·080	24	North.	1	29·739	29·763
	E. N. E.	6	29·982	29·966		South.	2	29·797	29·846
10	East.	5	29·945	29·943	25	Var.	1	29·884	29·937
	N. N. E.	2	29·964	29·966		S. S. E.	2	29·930	29·970
11	E. N. E.	6	29·968	29·968	26	S. S. E.	5	29·996	29·975
	E. N. E.	6	30·025	30·007		S. W.	5	30 011	30·040
12	Var.	2	30·015	29·976	27	S. S. E.	5	30·092	30·088
	N. W.	1	29·831	29·731		S. S. E.	5	30·080	30·064
13	N. N. E.	3	29·659	22·656	28	S. S. E.	4	30·011	30·064
	N. N. E.	1	29·650	29·603		S. S. E.	5	29·905	29·938
14	Var.	1	29·555	29·524	29	S. S. E.	3	29·877	29·887
	East.	2	29·533	29·558		S. S. E.	1	29·937	29·874
15	East.	6	29·620	29·558	30	S. S. E.	1	29·855	29·924
	East.	6	29·727	29·679		S. S. E.	2	29·763	29·837

LEOPOLD HARBOUR.—1849.

July.	Direction.	Force.	Barometer at High Water.	Barometer at Low Water.	July.	Direction.	Force.	Barometer at High Water.	Barometer at Low Water.
1	S. S. E.	4	29·671	29·736	17	S. S. E.	2	29·745	29·766
	S. S. E.	4	29·643	29·654		S. S. E.	3	29·732	29·734
2	Var.	1	29·658	29·656	18	S. S. E.	3	29·776	29·749
	North.	2	29·662	29·660		N. W.	3	29·812	29·813
3	N. W.	4	29·730	29·725	19	N. W.	5	29·809	29·808
	N. W	5	92·830	29·775		N. W.	5	29·845	29·845
4	N. W.	4	29·730	29·760	20	N. W.	3	29·801	29·854
	N. W.	4	29·730	29·731		N. W.	4	29·801	29·775
5	N. W.	5	29·713	29·736	21	North.	4	29·761	29·779
	N. W.	2	29·678	29·714		North.	3	29·791	22·782
6	N. W.	3	29·678	29·665	22	North.	1	29·807	29·855
	N. W.	2	29·656	29·643		North.	2	29·878	29·934
7	N. W.	2	29·609	29·605	23	North.	1	29·963	30·002
	N. W.	3	29·601	29·635		N. N. E.	2	30·016	30·029
8	N. W.	5-6	29·647	29·723	24	N. N. E.	3	30·030	30·008
	N. W.	6	29·735	29·738		N. N. E.	4	30·016	30·039
9	Var.	2	29·750	29·755	25	North.	5	30·054	30·084
	S. S. E.	3	29·718	29·696		N. W.	4	30·091	30·054
10	S. E.	4	29·635	29·621	26	N. W.	6	30·036	30·000
	North.	2	29·635	29·631		N. W.	7	29·941	29·906
11	North.	3	29·553	29·457	27	N. W.	6	29·868	29·847
	North.	2	29·407	29·344		N. W.	6	22·832	29·820
12	Var.	2	29·257	29·257	28	N. W.	5	29·792	29·820
	N. W.	4	29·290	29·339		N. W.	–	29·697	29·739
13	N. W.	4	29·371	29·404	29	N. W.	3	29·677	29·669
	Var.	2	29·409	29·392		N. E.	–	29·643	29·665
14	N. W.	2	29·400	29·441	30	N. E.	4	29·570	29·620
	N. W.	3	29·466	29·441		E. N. E.	–	29·620	29·611
15	N. W.	4	29·527	29·567	31	E. N. E.	6	29·549	29·581
	N. W.	3	29·607	29·547		East.	6	29·504	29·518
16	N. W.	2	29·674	29·640					
	N. W.	2	29·738	29·726					

LEOPOLD HARBOUR.—1849.

August.	Direction.	Force.	Barometer at High Water.	Barometer at Low Water.	August.	Direction.	Force	Barometer at High Water.	Barometer at Low Water.
1	E. S. E.	7	29·446	29·485	17				
	N. E.	6	29·320	29·407					
2	E. S. E.	5–6	29·262	29·261	18				
	E. S. E.	6	29·414	29·380					
3	East.	4	29·553	29·478	19				
	S. E.	5	21·553	29·567					
4	S. E.	6	29·469	29·567	20				
	Var.	3–7	29·469	29·488					
5	S. E.	7	29·431	29·415	21				
	S. E.	6	29·439	29·550					
6	South.	4	29·661	29·731	22				
	South.	4	29·787	29·731					
7					23				
8					24				
9					25				
10					26				
11					27				
12					28				
13					29				
14					30				
15					31				
16									

TABLE II.—*Frequency and Force of Wind at Leopold Harbour.*

LEOPOLD HARBOUR.—1848, 1849.

OCTOBER, 1848.			NOVEMBER, 1848.		
Direction.	Number.	Force.	Direction.	Number.	Force.
North.	2	4	North.	6	31½
N. N. E.	0	0	N. N. E.	0	0
N. E.	2	4	N. E.	0	0
E. N. E.	0	0	E. N. E.	0	0
East.	2	15	East.	0	0
E. S. E.	0	0	E. S. E.	0	0
S. E.	6	25	S. E.	3	15
S. S. E.	0	0	S. S. E.	0	0
South.	0	0	South.	0	0
S. S. W.	0	0	S. S. W.	0	0
S. W.	0	0	S. W.	0	0
W. S. W.	0	0	W. S. W.	0	0
West.	0	0	West.	0	0
W. N. W.	0	0	W. N. W.	0	0
N. W.	1	3	N. W.	14	41
N. N. W.	0	0	N. N. W.	0	0
Var.	1	1			
	14			23	

DECEMBER, 1848.			JANUARY, 1849.		
North.	17	35	North.	8½	33½
N. N. E.	2	7	N. N. E.	1½	7½
N. E.	2	5	N. E.	0	0
E. N. E.	0	0	E. N. E.	0	0
East.	0	0	East.	0	0
E. S. E.	0	0	E. S. E.	0	0
S. E.	3	6	S. E.	9	33
S. S. E.	3	16	S. S. E.	6	32½
South.	9	20½	South.	3	11
S. S. W.	2	3	S. S. W.	0	0
S. W.	2	2	S. W.	0	0
W. S. W.	0	0	W. S. W.	0	0
West.	0	0	West.	1	1
W. N. W.	0	0	W. N. W.	0	0
N. W.	15	63½	N. W.	18	72
N. N. W.	1	2½	N. N. W.	12	37
Var.	0	0	Var.	3	10
	56			62	

TABLE II.—*Continued.*

LEOPOLD HARBOUR.—1849.

FEBRUARY, 1849.			MARCH, 1849.		
Direction.	Number.	Force.	Direction.	Number.	Force.
North.	4	6	North.	7	16
N. N. E.	0	0	N. N. E.	1	2
N. E.	1	6	N. E.	6	29
E. N. E.	0	0	E. N. E.	0	0
East.	1	7	East.	6	36½
E. S. E.	0	0	E. S. E.	1	6½
S. E.	2	9	S. E.	8	34½
S. S. E.	9½	66½	S. S. E.	8	26
South.	3½	12	South.	4	11
S. S. W.	0	0	S. S. W.	0	0
S. W.	1	1	S. W.	1	2
W. S. W.	0	0	W. S. W.	0	0
West.	0	0	West.	0	0
W. N. W.	0	0	W. N. W.	5	34
N. W.	17	98	N. W.	10	36
N. N. W.	12	71	N. N. W.	2	2
Var.	0	0	Var.	1	2½
	51			60	

APRIL, 1849.			MAY, 1849.		
North.	7½	21	North.	8	21
N. N. E.	5½	24	N. N. E.	5	17
N. E.	6	26	N. E.	1	5
E. N. E.	0	0	E. N. E.	0	0
East.	0	0	East.	6	25
E. S. E.	3	22	E. S. E.	0	0
S. E.	0	0	S. E.	6	22
S. S. E.	12	40	S. S. E.	8	21
South.	2	4	South.	3	9
S. S. W.	0	0	S. S. W.	0	0
S. W.	0	0	S. W.	0	0
W. S. W.	0	0	W. S. W.	0	0
West.	9	0	West.	0	0
W. N. W.	0	0	W. N. W.	0	0
N. W.	13	61	N. W.	13	57
N. N. W.	6	15	N N. W.	6	18
Var.	1	2	Var.	5	11
	65			61	

TABLE II.—*Continued.*

LEOPOLD HARBOUR.—1849.

JUNE, 1849.			JULY, 1849.		
Direction.	Number.	Force.	Direction.	Number.	Force.
North.	5	7	North.	10	25
N. N. E.	3	6	N. N. E.	3	9
N. E.	4	10	N. E.	1	3
E. N. E.	3	18	E. N. E.	2	10
East.	8	31	East.	1	6
E. S. E.	2	8	E. S. E.	0	0
S. E.	3	8	S. E.	1	4
S. S. E.	10	33	S. S. E.	6	19
South.	1	2	South.	0	0
S. S. W.	0	0	S. S. W.	0	0
S. W.	1	5	S. W.	0	0
W. S. W.	0	0	W. S. W.	0	0
West.	0	0	West.	0	0
W. N. W.	0	0	W. N. W.	0	0
N. W.	5	27	N. W.	31	123½
N. N. W.	9	42	N. N. W.	0	0
Var.	5	7	Var.	4	7
	59			59	

AUGUST, 1849.			SEPTEMBER, 1849.		
North.	0	0	North.		
N. N. E.	0	0	N. N. E.		
N. E.	1	6	N. E.		
E. N. E.	0	0	E. N. E.		
East.	1	4	East.		
E. S. E.	3	18½	E. S. E.		
S. E.	4	24	S. E.		
S. S. E.	0	0	S. S. E.		
South.	1	4	South.		
S. S. W.	0	0	S. S. W.		
S. W.	0	0	S. W.		
W. S. W.	0	0	W. S. W.		
West.	0	0	West.		
W. N. W.	0	0	W. N. W.		
N. W.	0	0	N. W.		
N. N. W.	0	0	N. N. W.		
Var.	1	5			
	11				

The following valuable collection of coins and other antiquities, from the cabinet of the late Very Rev. Richard Butler, was presented, through Dr. Aquilla Smith, by Mrs. Butler:—

Coins.—5 Hiberno-Danish; 25 John; 8 Henry III.; 15 Edward I.; 65 Edward IV.; 4 Richard III.; 35 Henry VII.; 24 Henry VIII.; 8 Philip and Mary; 11 Elizabeth; 7 James I.; 2 Charles I. Total, 209 silver coins.

13 Elizabeth; 16 James I., and Charles I. (farthings). 4 Charles I. (Confederate money). 4 Charles II.; 35 James I. (gun-money). 4 James II. (halfpence). 2 George I.; 14 George II.; 8 tokens, "Vox Populi," &c.; 49 traders' tokens, seventeenth century, issued in Dublin; 52 tokens issued in Drogheda, &c.; 4 William and Mary halfpence; and 19 coins of great rarity, published by Dr. A. Smith in the "Transactions of the Royal Irish Academy," vol. xix., and in Sainthill's "Olla Podrida," vol. ii., p. 125.

Total coins presented, 433.

Seals.—No. 1, a large circular copper seal—legend, "S. Conversus de Benedictione Dei," from Athlone; No. 2, brass circular seal—legend, "Scutum Stephani Episcopi Rossensis;" No. 3, a copper signet ring, with initials "J.M.D."; No. 4, a circular leaden seal—legend, "S. Ricardi Alligani;" No. 5, Bulla of Pope Martin V.; No. 6, Bulla of Pope Pius II.; No. 7, Bulla of Benedict XIV.

Electrotypes.—No. 1, facsimile of an oval seal—legend, "Sigill. de Abbatis. S. Marie de Truin," and reverse of the same matrix—legend, "Si. M. Abb. S. Marie de Durmag;" No. 2, facsimile of a circular Irish seal; No. 3, facsimile of an episcopal seal—legend, "Sigill. Epale Jois Epi Fermeb; No. 4, facsimile of a circular seal—legend, "Sigillum officii recepte Scaccarii regis iii Anglia," apparently of the reign of Edward III.; and a large number of impressions of seals in wax.

Antiquities.—2 small circular brooches; 3 buttons; 1 large copper pin; 30 weights; 18 bronze and stone celts, &c.

Resolved,—That the marked thanks of the Academy are due, and are hereby presented, to Mrs. Butler for her very valuable donation.

12 fragments of encaustic tiles, from the Palace of Swords, were presented, through the Rev. Dr. Todd, by R. P. Colles, Esq.

The thanks of the Academy were given to the donor.

STATED MEETING.—Saturday, November 29, 1862.

The Very Rev. Charles Graves, D. D., President, in the Chair.

R. R. Madden, M. D., was elected a member of the Council in the department of Polite Literature; and the Rev. J. H. Todd, D. D., was elected a member of the Council in the department of Antiquities.

J. Beete Jukes, M. A., F. R. S., read a paper—

On the Flint Implements found in the Gravel of St. Acheul, near Amiens, and their Mode of Occurrence.

On my return from a Continental trip in August last, I halted for a day in Amiens, in order to visit the locality where the well-known flint implements have been found in some of the deposits that are generally associated under the name of "the drift." These have been so thoroughly explored and described by Mr. Prestwich, Mr. Evans, and others, since the publication of M. Boucher de Perthes' work, that I could not hope to make any new observations; but I wished, if possible, to procure some of the implements, and also to acquire that kind of knowledge of the features of the neighbourhood and the "lie and position" of the beds, which can only be acquired by personal inspection.

In what I have to say, then, I appear rather as an expositor of Mr. Prestwich's papers, and as bearing witness to their accuracy and fidelity to nature, than as an original investigator. The "drift" of the north-west of France is very different from the great northern drift of our islands, which consists of materials derived from great distances, mingled in confusion with those of the neighbourhood, and all driven pell-mell over the country. In France, as was long ago shown by D'Arhtriac, the gravels and sands of each river basin contain only those materials that can be found *in situ* in the upper part of the basin itself; and even where two adjacent basins, like those of the Seine and the Somme, are separated by a water-shed that is often very low and inconspicuous, there is still no mingling of the "drift" of the two basins. This fact, together with the additional one that the fossils found in these "drifts" are all fresh water, or terrestrial forms, prove that this "drift" is the result of the river action, even where the deposits are far above the present bed of the river.* The fact that these rivers have excavated an additional hollow in their valleys, 100 or 150 feet deep, and often one or two miles in width, since the deposition of the gravels, seems to me perfectly natural, since I have arrived at the conclusion that a far greater atmospheric erosion has operated in the river valleys and over the whole sur-

* Marine fossils occurring occasionally in the "drift" of the lower part of the river basin merely show that the land stood at one time at a lower level, and that the sea accordingly flowed farther up the valley than it does now.

face of Ireland (see a paper "On the River Valleys of the South of Ireland" in the "Q. J. Geol. Soc.," vol. xviii., 1862). Among the fossils found in these fresh-water gravels there are many land and fresh-water shells, all of existing species, and nearly all still living in France, some ranging as far south as the south of France; but others, and those the majority, spreading more to the north, and as far north as Finland. There are also found fragments of the woolly elephant, or mammoth (*Elephas primigenius*), the woolly rhinoceros (*Rhin. tichorhinus*), the ancient ox (*Bos priscus*), the reindeer, an extinct species of hippopotamus, and others.*

There are also in certain spots numerous flint implements and weapons to be found, evidently fashioned by the hands of an early race of men, who were contemporaneous with these animals. Those now on the table, which I was lucky enough to secure by purchase from the workmen and their children, must not be taken as examples of the best specimens that have been got, except one, which is of a different form to any that I have seen elsewhere. This is like an adze, and very similar to those implements used by the Polynesians at the present day, which can be made to act the part either of a hatchet or an adze, according as they are fastened vertically or horizontally in the handle.† A part of the original surface of the flint, which formed an indentation, has obviously been taken advantage of in this specimen, to make the grasp of the hand or the fitting of the handle more secure. A similar adaptation of part of the original surface of concretion in the flint, that which it had when it lay in the chalk, can be seen in others of the specimens, which seem to have been used as either knives, daggers, or chisels, the rest of the flint having been chipped to a point for the purpose.

I have placed alongside of these flint implements a spear-head made of quartz-rock, which I brought many years ago from Port Essington, in North Australia, where flat splinters of quartz-rock are greatly used for this purpose by the natives. This, which at first sight has a more artificial appearance than the flint implements, is in reality much less artificially formed. The original form of all chalk flints is that of a rounded lump, however irregular and sometimes grotesque may be the shape of that lump. If broken accidentally, the fracture is like that which a lump of glass would have—generally very uneven and irregular, with sharp, projecting corners. The quartz-rock, however, has evidently been naturally split, either by cleavage or jointing, into long, regular flakes, with smooth, even surfaces, only requiring a little chipping so as to produce a point to be fit for use as spear-heads. The Australians will

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* I am not aware that any specimens of the cave bear, or the cave hyæna, or of the Irish elk (*Megaceros Hibernicus*), have yet been found in the gravels of the Somme valley, though they have been found elsewhere associated with the remains of the animals above mentioned.

† The Polynesians cut and fashioned large and magnificent canoes with these stone implements, and the Papuans of New Guinea not only make canoes, able to carry thirty or forty men, but build immense wooden houses, raised on large platforms of trees, all cut down to one level, without the aid of any metal implement.

transfix a man or an animal at a distance of thirty or forty yards with one of these stone-headed spears when launched from a *wamera*, or throwing-stick.

Some of the small, flat, oval, flint implements from St. Acheul seem to me well adapted for fitting on to long sticks, so as to be used as spears, not to be thrown perhaps, but to be thrust, either into animals or enemies.

The other larger implements with a squarish form at one end, and chipped to a sharp point at the other, were evidently digging instruments, used either for grubbing up roots, or for making holes in ice, or other similar purposes. Some that I have seen in Sir C. Lyell's collection had convenient parts of the original surface of the flint left about the broad end, in order to afford a better grasp for the hand.

The first thing that occurred to me after examining the gravel pits was to find some means of determining between the true flint implements, which were originally buried in the gravel, and any spurious ones manufactured by the workmen. As it happened to be a Sunday afternoon, the men were not at work, and I had therefore an opportunity of quietly examining the undisturbed gravel in the vertical faces of the gravel pits before I went into the cottages to make purchases.

The gravel consists chiefly of flints, some whole and some broken; and on examining the broken surfaces of large undisturbed flints, I perceived that, in addition to the stains and discolourations which some of them showed, they all, even the blackest, had a peculiar "sheen" or polish, not unlike the glaze on a piece of porcelain. On breaking a few of these flints, I found that even the smoothest of the new surfaces of fracture had a very different lustre from that of the old fractured surfaces which had been formed before the flints were deposited in the gravel.

I put into my pocket, accordingly, one of these lumps of flint as a test instrument. This shows in some parts the original surface of concretion which the flint had when it lay in the chalk, as may be known by the thin white coating surrounding the dark flint, the surface of which coat is, in the gravel, often stained brown or yellow by ferrugineous colouring matter. In other places this piece of flint shows some old, irregular surfaces of fracture, exhibiting the porcelain-like lustre side by side with a new fracture made by my own hammer. The latter surface has an obviously inferior kind of lustre to that on the former, being just like the surface of an ordinary gun-flint. This lump of flint is among those on the table, and a little comparison of its surfaces will enable any one, as it enabled me, to recognise the genuine flints fashioned by the old Pleistocene men, and buried in the gravel at the time of its deposition, and distinguish them from any newly fashioned imitation of them. There is a spurious example among those on the table, which one of the young boys from whom I bought them palmed off on me as a genuine one, but which differs from the genuine ones in its form as much as in the lustre of its surface. A little bit of an old fracture of surface remaining on this spurious example makes the contrast between the old

and the recent surfaces more marked. The polish is apparently one that is only to be acquired by long weathering, possibly by the slow percolation of water or other similar action; and though it might no doubt be artificially imitated, yet it could hardly be done except by labour and expense which would raise the cost much beyond the few *sous* which the children ask for the most common kind of worked flints.

I only gave two francs even for the peculiar adze-like flint. One of the workmen produced this for me from a shelf in his cabin, and he would doubtless have taken less had I chosen to beat him down. This possesses the peculiar sheen or polish which attests it genuineness.

I have deposited this collection of flint implements in the Palæontological Gallery of the Museum of Irish Industry, among the fossils collected by the officers of the Geological Survey of the United Kingdom, near the skeleton of the Irish Big Horn (commonly called the Irish Elk), and some other bones of that animal, presented to us by Lady Elizabeth Butler, and also near the few specimens of bones and teeth of the mammoth and other Pleistocene animals which we possess.

I would beg leave to take this opportunity of indorsing Mr. Prestwich's explanation of the mode of occurrence of these fluiviatile deposits. He concludes that they were formed by the currents and floods of the rivers when they ran at different levels during the latter part of the process of the excavation of the valleys. The land, he says, may have stood at a lower level at one time, and he gives some independent evidence for that, and the rivers may accordingly have had different rates of velocity during its elevation. All this must have required a great length of time, during part of which geologists know, from other evidence, that the climate of France and England was more like that of North Siberia and North Labrador than it is now; and there was also perhaps a greater fall of rain and snow, and, consequently, greater occasional floods than at present.

The old savage tribes of men at this period probably lived very much as do the people of the countries alluded to above at the present day, and during the winter they would in like manner make holes in the ice of the river, and watch them, in order to spear the fish and other aquatic animals that would come to them. This would account for the number of implements found at particular spots, near the village of a tribe perhaps, or where the aquatic animals were most abundant; while the men being fewer, and more wary than the herds of land animals (mammoths and others) which they pursued, would be a sufficient reason why the bone or tooth of a man should be of even still rarer occurrence than the bones of the other animals.

W. H. Hardinge, Esq., concluded the reading of his paper on the Mapped Townland Surveys of Ireland.

MONDAY, DECEMBER 8, 1862.

The Very Rev. Charles Graves, D. D., President, in the Chair.

D. F. Mac Carthy, Esq., read the following paper :—

Memoirs of the Court of Spain, from 1679 to 1681.* (Ascribed to the Marquis de Villars.)

The publication of M. Delepierre's "Analyse des Traveaux de la Societé des Philobiblon de Londres"† has revived in me the interest which I took at the beginning of the year (1862) in a bibliographical inquiry connected with the above subject, but which, with other matters of more importance, I have had to put aside under the pressure of a severe domestic affliction. Along with the circumstances personal to myself which have suspended my labours in this direction, and would still suspend them but for the appearance of M. Delepierre's "Analyse," I felt a disinclination to make public a chain of circumstances connected with the inquiries that preceded the publication of Mr. Stirling's volume, which, however delicately handled, might have the appearance of conveying a reflection upon the bibliographical knowledge and literary industry of the many distinguished personages who, in one way or the other, have been parties to a mistake which has scarcely ever been paralleled in the annals of bibliography. I need not say that I totally disclaim any such intention; and that towards Mr. Stirling himself, the principal victim, I may say, to the short memory of his friends, and indeed to his own, I feel that respect which his eminent services to literature and art so justly entitle him. Indeed, the frank and friendly spirit in which Mr. Stirling received from me the first, perhaps unwelcome, intelligence of the previous publication of his book, and the valuable assistance which he has since given me in the prosecution of the inquiry, leave no doubt in my mind that he will accept the following narrative in the spirit in which it has been drawn up—a narrative which, if possessing little historical value, will be found to present bibliographical features of no common interest from which, perhaps, a future "Curiosities of Literature" may obtain materials for one of the not least amusing of its chapters.

The account which Mr. Stirling gives of the time and mode of his procuring the MS., and of its subsequent publication by him, is given in

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* "Mémoires de la Cour d'Espagne, depuis l'année 1679 jusqu' en 1681." Paris, 1733.

"Mémoires de la Cour d'Espagne, depuis l'année 1678 jusqu' en l'année 1682." — MS. in the possession of William Stirling, Esq., M. P.

"Mémoires de la Cour d'Espagne, sous le Regne de Charles II., 1678–1682." Par Le Marquis de Villars. (Edited by Mr. Stirling). Londres: Trübner et C^ie^, 1861.

† "Analyse des Traveaux de la Société des Philobiblon de Londres." Par Octave Delepierre. Londres: Trübner et C^ie^, 1862.

the preface to the printed volume, and more fully in a letter to myself (April 20, 1862), from which I make the following extract:—

"When I bought the *Mémoires de Villars,* in MS. for a few shillings, at a sale at Sotheby's, some eight or ten years ago, I concluded it to be a transcript—for such it obviously was—of a book afterwards printed. I did not, it is true, know the book, but I had little doubt of meeting with it—my collection of books relating to Spain not being so large as it is now. This conclusion unfortunately prevented me from attaching any importance to the MS., and even from making any note of the date, or the sale, when it came into my possession. It was not until some years had passed that my attention was again directed to it, on being asked to contribute something to one of the miscellanies of the Philobiblon Society. On looking into the matter, I was surprised at the absence of all mention of the book in either of the editions of the *Lettres de Mme. de Villars* in Brunet, Querard, the *Biog. Universelle,* or any of the obvious sources of information. I showed the volume at several meetings of the society, and I especially consulted on the subject M. Van de Weyer, M. Delepierre,* and the Duc d'Aumale, the latter of whom was sufficiently interested in the matter to take it home with him, and examine it in the midst of all the resources of his very remarkable library. The Duke returned it to me, with the assurance that he could discover no account of it, or any reason to believe that it had been printed.† Sir F. Madden afterwards examined it, and gave it as his opinion that it had not been printed. Many other persons saw it, and from none of them did there fall any expression of belief or suspicion that they had seen it in print. Under these circumstances, considering it was hardly lively enough to afford specimen extracts for a paper, and much too bulky to form part of the Philobiblon annual volume, I determined to present it to the society as a separate work, and to print also a few copies (seventy-five, I think), for sale."

Now, it will be noticed that, among the list of obvious sources of information which Mr. Stirling mentions in this statement, M. Barbier's "Dictionnaire des Ouvrages Anonymes et Pseudonymes" is not included. This, I think, supplies the key to all the subsequent mistakes which took place, and accounts for the extraordinary blindness which seems to have fallen upon so many intelligent and well-informed persons on a matter susceptible of the simplest and most obvious explanation. The

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* M. Delepierre has, it appears, since discovered his error, it is presumed through original research, as he does not quote any authority. The rather meagre account which he gives of the volume of 1733, at pp. 108, 109, of his "Analyse," is curiously confined to the description of that volume which I gave to Mr. Stirling, in my reply to the letter above quoted.

† The MS. which Mr. Stirling has been kind enough to lend me has inserted the following interesting autograph letter of the Duc d'Aumale upon the subject:—

"Le Duc d'Aumale présente ses complements à Mr. Stirling et lui renvoye les deux volumes qu'il avait eu l'obligeance de lui prêter. Il regrette de n'avoir pu trouver aucun renseignment nouveau sur les curieux mémoires du Marquis de Villars.

"Orleans House, 11 Avril, 1856."

statement by the anonymous copyist of Mr. Stirling's MS., that these Memoirs were written by the Marquis de Villars, was too readily received, notwithstanding the glaring improbability, if not impossibility, of what is added, namely, that they were written, not only *by* the Marquis de Villars, but *for* the instruction of the Marquis de Blécourt—a statement almost totally irreconcilable with positive dates and facts. The claim of authorship being thus too readily admitted, all inquiries were turned in the one, and I fear the wrong direction, namely, the Marquis de Villars. Whereas, if the work had been understood to be what it really is, an anonymous one, a moment's search would have cleared up the mystery, and the Philobiblon Society would have been poorer by one superfluous but still curious and interesting book. Barbier's "Dictionnaire des Anonymes," &c., (tom. 2, p. 372, seconde edition, Paris, 1823), in referring to Madame d'Aulnoy's well-known "Mémoires de la Cour d'Espagne," has the following remark:—

"Le volume intitulé *Mémoires de la Cour d'Espagne*, depuis 1679 jusqu'en 1681, Paris, 1733, in-12, ressemble beaucoup a l'ouvrage de Madame d'Aulnoy."

Now, it will be remarked that we have here a work mentioned which is almost identical in title with the MS. of Mr. Stirling, "Mémoires de la Cour d'Espagne, depuis l'année 1678 jusqu' en l'année 1682;" and the examination of which, and collation with the MS., one would have thought, would be the first step in the inquiry. Why this was not done arose, of course, from the preoccupation of all the parties concerned with the name of Villars. If this *had* been done, there would of course have been an end of the matter, as the MS. of Mr. Stirling and the anonymous volume of 1733 are identical, excepting those trifling differences which I shall subsequently point out. It will also be noticed that the resemblance between Madame d'Aulnoy's "Mémoires de la Cour d'Espagne" and the anonymous volume of 1733, which struck Mr. Stirling and others with so much surprise when pointed out by the well-informed writer in "The Spectator" newspaper (March 8 and March 15, 1862), is referred to so early as the year 1823. What is, however, still more surprising is the fact that this very resemblance is pointed out by *Mr. Stirling himself* in his valuable "Annals of the Artists of Spain," published in 1848, not many years before the time that he fell in with the supposed Villars' MS. at Sotheby's. Mr. Stirling, writing of the river Manzanares at Madrid, which, he pleasantly says, "though the dryest in Europe, has been the great source of smart sayings,"* adds in a note the following remark:—

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* Some of these smart sayings are collected in the "Relation de Madrid," p. 3, appended to Aarsens de Sommerdyck's "Voyage d'Espagne," Elzevir, 1666.—Cologne, 1667. When speaking of the largeness of the bridge, and the insignificance of the stream, it is said that the bridge was waiting for the river, like the Jews for the Messiah. "Esta Puente espera il Rio come los Judios el Messias." These jokes seem to have been the common property of all the early travellers in Spain. Thus Madame d'Aulnoy, in her "Voyage d'Espagne," tom. iii., p. 9, says, speaking of this bridge—"Il est superbe, et

"The author of 'Mémoires de la Cour d'Espagne,' 12mo., Paris, 1733, likewise has his fling at this unfortunate river—p. 3. These memoirs seem to be a compilation from Madame d'Aulnoy and others."*

Barbier, however, having been passed over, it appears that Brunet was looked into. The old editions of Brunet make no mention of the anonymous volume of 1733, neither does the new (1860, tom. i., p. 570); but what he there says by way of explanation to the mention of Madame d'Aulnoy's "Mémoires de la Cour d'Espagne," if not inaccurate, has probably added to the mystification which already existed on the subject. Under the head of Aulnoy, or Aunoy, he has the following entry:—"Mémoires de la Cour d'Espagne (depuis 1679 jusqu' en 1681, anonyme) Paris *Cl. Barbin*, 1690"—thus giving, or seeming to give, as the title of Madame d'Aulnoy's book that which really belongs to the anonymous volume of 1733, which he does not mention at all, but which he doubtless has confounded, like so many others, with the former. The copy of Madame d'Aulnoy's "Mémoires de la Cour d'Espagne," which I possess, is the third edition, published at the Hague in 1692. Its title is simply "Mémoires de la Cour d'Espagne," without any addition, and is identical with the original edition of *Cl. Barbin*, Paris, 1690, a copy of which I have examined in the Library of Saint Genevieve at Paris. The words "depuis 1679 jusqu' en 1681," which he gives in a parenthesis, and I suppose by way of explanation, do not appear upon the title-page of any edition of Madame d'Aulnoy's "Mémoires;" but they form a prominent part of the title of the volume of 1733, which is a different book altogether, but which any one reading this article by Brunet would conceive to be the same.

The next step to be noticed in this very curious story is the letter which Mr. Stirling published in "Notes and Queries" (2nd series, vol. x., p. 187, Sept. 8, 1860), appealing to the readers of that widely diffused and useful journal for any information relative to Villars, or the "Mémoires" attributed to him, or of any printed copy or other manuscript of them. Mr. Stirling went very clearly and very fully into the subject in this letter, and stated the various researches that he had made even among the MSS. in the British Museum, "where his friends could not give him any information on the subject." Unfortunately

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pour le moins aussi beau que le Pont-neuf, qui traverse la Seine a Paris." . . . "Il y en eut un qui dit plaisammant là-dessus, qu'il conseilleroit de vendre le Pont pour acheter de l'eau." This curiously corresponds, almost *verbatim*, with the following passage in the then unpublished "Lettres de Madame de Villars," p. 96:—"Il est bien plus large et bien plus long que le Pont-neuf de Paris: et l'on ne peut s'empecher de sçavoir bon gré a celui que conseilla a ce Prince de vendre ce Pont ou d'acheter une riviere." The substance is in the "Relation de Madrid," above quoted. "Il est vray que l'Empereur *Charles V.* y a fait bâtir un Pont fort grand et fort beau, que l'on appelle *La Puente Segoviana*. Et l'ayant un jour fait voir a un Ambassadeur pour sçavoir ce qu'il luy ensembloit? Il luy respondit, *Menos Puente o mas agua*."

* "Annals of the Artists of Spain," p. 592, vol. iii., note. The "Mémoires de la Cour d'Espagne," Paris, 1733, are quoted at pp. 957, 958, 960, 961, and 963, where there is a misprint in the reference, which should be to pp. 229, 230 of the "Mémoires," instead of pp. 129, 130, as quoted.

this appeal met with no response. Had the printed books in the Museum been examined instead of the MSS., the search would probably have been rewarded with better success, as it is scarcely possible that the volume of 1733 can be so rare as not to be found in that vast collection. In Paris I met with it without the slightest difficulty, in the public libraries there; two copies being in the *Bibliothèque de l'Arsenal*, and one in the *Bibliothèque Imperiale*, which are identical with my own.

With regard to the history of this copy, at least for the last twenty-two years, it is easily given. In 1840 it seems to have come into the possession of the late Mr. Ford, the well-known author of the "Handbook of Spain," as the title-page bears his autograph with that date. It appears to have been a favourite of his, being bound in the beautiful style of his pet books. It seems also to have been read by him with care, several pencil marks occurring throughout, and the fly-leaf in front containing also in pencil the reference to Barbier, already mentioned, as well as the following suggestion:—"It is possible that the author may have had access to the MS. letters of the Marquise de Villars, ambassadress in Spain at the time of the marriage of Charles II., which were printed at Amsterdam, in 12mo., 1760."*

The mention of the name of Villars in this MS. note, coupled with the fact of the volume having been in the possession of Mr. Ford for more than twenty years, must be considered not the least curious incident in this bibliographical Comedy of Errors, when it comes to be stated that the very person who advised Mr. Stirling to resort to "Notes and Queries" for information was *Mr. Ford himself!*

When I apprised Mr. Stirling, in April last, of my having identified his Villars' "Mémoires" with the anonymous Memoirs of 1733, his surprise was great indeed. But far greater was his astonishment when he learned from me a few days later that it was at Mr. Ford's sale, in May, 1861, that I bought my copy of these Memoirs.† In a letter to me from Keir, dated April 23, 1862, Mr. Stirling says on this subject:—

"If you had told me that you had found Villars in print on my own shelves, you could hardly have surprised me more than by saying you bought the book at Mr. Ford's sale. He was my intimate friend and near neighbour in London, and each of us had the entire use of each other's books. He saw the MS. of Villars many times, and, although, I cannot say positively that he ever took it home with him, I think it very likely he may have done so. We have several times discussed the matter and looked at the MS. together, and nothing in it ever suggested to him the volume which he seems to have had at home. What is still more strange is, that I, knowing as I thought his books well, bid for *every one* at the sale that I knew not to be in my own collection, and

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* A copy of the "Lettres de Madame La Marquise de Villars," published at Amsterdam (obligingly lent me by Mr. Stirling) is dated 1759.

† It is numbered 410 in Mr. Ford's Catalogue, and cost me 11*s*.

certainly paid them more than one visit at Sotheby's. Indeed, as I read over again your description of your 'Mémoires,' I have a vague recollection of having the book in my hand, and supposing it to be identical with a little book printed at Cologne some time at the end of the 17th century—'Relation de ce qu'est passée a la Cour d'Espagne entre D. Juan d'Autriche et le Pere Nithard,' or some such title.* However this may be, I do not think I ever chanced to meet it at Mr. Ford's, and I am sure he had either forgotten the fact of its existence, or did not connect it in any way with the name of Villars, or the subject of my MS. . . . . Whether my letter to 'Notes and Queries' was written before or after Ford's death, I cannot say, having no copy of it here; but I think it was *after*. I remember that he suggested my trying that source of information."

Having thus cleared away this preliminary matter, it remains for me to give a brief account of the anonymous volume of 1733; to establish its perfect identity (the authorship and a short introduction alone excepted) with the MS. and printed volume of Mr. Stirling; to point out certain difficulties in the way of receiving *some* at least of the statements of the unknown transcriber of Mr. Stirling's MS.; to show, not vaguely, but by direct reference to the pages of each book, and to what extent, the "Mémoires de la Cour d'Espagne," by Mme. d'Aulnoy, and the "Mémoires de la Cour d'Espagne" published in 1733, are taken one from the other, or both from a common source; and, finally, to indicate the track which led me with little difficulty up to what I believe to be *that* source, namely, the MS. "Memoires de la Cour d'Espagne," in the Library of the Arsenal at Paris, of which, as far as this inquiry is concerned, I may claim to be the discoverer; which I believe to be the source of all the others; and of which I shall give a full description at the end.

ON THE EDITION OF 1733.

"Memoires de la Cour d'Espagne, depuis l'année 1679 jusqu' en 1681. Où l'on verra les Ministeres de Dom Juan et du Duc de Medina Celi. Et diverses choses concernant la Monarchie Espagnole. A Paris chez Jean-Fr. Josse. rue Saint Jacques, à la Fleur de Lys d'Or. M.DCC.XXXIII. Avec Approbation, et Privilege du Roy."

This book, which I have been the first to identify with the MS. and printed "Mémoires de la Cour d'Espagne par le Marquis de Villars," of Mr. Stirling, is an octavo volume, containing 371 pages, exclusive of three leaves of introductory matter which are unnumbered. These consist of an *Avertissement*, two pages; *Approbation* and *Privilege du Roy*, three pages, and *Fautes a Corriger*, one page. The *Avertissement* is as follows:—

* I have an early translation of this book, with the following title:—"The Spanish History, or a Relation of the Differences that happened in the Court of Spain between Don John, of Austria, and Cardinal Nitard, with other Transactions of that Kingdom." London, 1678.

"AVERTISSEMENT.

"Quoique je puisse dire en faveur de ces Mémoires, on ne doit rien croire qu'apres les avoir lûs; il m'est impossible de m'autoriser du nom de leur Auteur puisque je l'ignore, et il importe peu de quelle main vienne un ouvrage pourvû qu'il soit bon; celui que je présente au public a paru tel à plusieurs personnes de gout qui m'en ont conseillé l'impression après l'avoir examiné tres-scrupuleusement; je souhaite que ceux qui le liront, pensent de même; on a toujours aimé les Mémoires, cette façon d'ecrire l'Histoire a paru toûjours plus propre qu'aucune autre aux details, souvent plus intéressants que le fonds même de l'Histoire; sur ce principe le Public doit me sçavoir gré de l'intention que j'aí euë et me pardonner d'avoir hazardé un ouvrage inconnu en faveur de l'esperance que je devois avoir de lui plaire."

The "*Approbation*," signed "GROS DE BOZE," and the "*Privilege du Roy*," signed "SAINSON," with the docket of registration signed "G. MARTIN, Syndic," do not call for any particular description.

From the whole of this introductory matter, it will be seen that the same consultations, the same inquiries, and the same forgetfulness of collateral circumstances which preceded the publication of Mr. Stirling's volume in 1861 attended the appearance of the same work 129 years before.

The differences existing between the Paris edition of the "Mémoires de la Cour d'Espagne," 1733, and the manuscript and printed "Mémoires" of Mr. Stirling, consist principally in frequent transpositions of words and sentences; in the punctuation, which varies considerably throughout; in numerous substitutions of small but nearly corresponding words, easily mistakeable by the copyist or compositor, and in occasional omissions or additions, seldom extending beyond a few words, except at p. 198 of the Paris edition, where 14 lines in the Stirling "Memoirs," p. 190, reflecting on the zeal of the monks who assisted at the "Auto da Fe" of 1680, are omitted.*

These minute differences are so numerous and so unimportant that it would be wearisome and useless to point them out. They occur in almost every sentence. "Sa" for "la," "ce" for "le," "six" for "dix," are perpetually replacing each other. A few that involve substantial differences may be noted. In Mr. Stirling's edition, p. 52, speaking of the king's journey towards the frontier to meet his bride, we read, "Le Roy étant parti de Madrid le 21 Octobre, arriva le 31 à Burgos." A journey of less than forty-three miles in ten days seems rather slow even for the most careless of lovers, which Charles II. of Spain, though very different

* These fourteen lines, as given in the Stirling MS., p. 210, and in the printed "Mémoires de Villars," p. 190, commences thus:—"On voyoit des moins d'une extrême ignorance haranguant *impunement* ces juifs," &c. The Arsenal MS. gives the passage entire (folios 58 and 59; but reads "*impetueusement*" for "*impunement*," which is clearly more correct.

from his namesake of England, certainly was very far from being.* The reading of the Paris edition of 1733, p. 53, restores the character of the king for ardour and rapidity. "Le Roy étant parti de Madrid le 2 Octobre, arriva *le lendemain* à Burgos." In the London edition, p. 101, line 14, we have "*Le conferance* et la Camerara Mayor." The Paris edition, p. 105, l. 5, reads more correctly "*le confesseur* et la Camera Mayor." In the Paris edition, p. 107, l. 2, "il [ils] ne fournirent point les cessions dans le tems" is omitted from the London edition, p. 103, l. 9. The Paris edition, p. 270, l. 10, has "il se retira ensuite chez lui et tint son équipage prêt pour partir, le lendemain il reçût l'ordre signé du Roy," which is not given in the London edition, p. 259, l. 17. At p. 260, l. 10, speaking of the banishment of the Count de Monterey, the London edition says—"Tout le monde luy *croit* contraire." The Paris edition, p. 271, l. 5, reads "tout le monde *étoit* contraire," and adds the important reason, "parce que tout le monde le craignoit." At p. 287, l. 20, the date [1630], which is wanting in the London edition, is supplied in the Paris edition, p. 300, l. 2. These specimens will, it is presumed, be sufficient to show the extent of the differences which exist between the Paris edition of 1733 and the so-called *Villars* MS. and printed "Memoires" of 1861.

THE MARQUIS DE BLÉCOURT.

"Dans une note en tête de ces Mémoires, l'on dit qu'ils ont été écrits pour l'instruction du Marquis de Blécourt."—Préface, xviii.

"Ses Mémoires ont été donnés pour instruction au Marquis de Blécourt, Lieutenant-Général des Armées du Roy lorsque sa Majesté l'a envoyé en Espagne aprés la Traité de Partage au sujet du Testament du Roy Charles Second, et y a resté pendant plusieurs années en qualité d'Envoyé auprès de Phillippe V."—Préface des Mémoires, p. xxv.

The statement in the above extracts that the "Mémoires de la Cour d'Espagne" were written by the Marquis de Villars *for the information of the Marquis de Blécourt*, is, as I have said, almost totally irreconcilable with positive dates and facts.

The Marquis de Villars died on the 20th March, 1698, at an advanced age, whether 80 years or 75 is not of much consequence.† The Mar-

* Madame de Villars, in her first letter, 2nd November, 1679, writes expressly on this point as follows:—"Je n'ai pas eu le courage d'aller à Burgos. M. *de Villars*, qui m'attendoit ici, est parti pour rejoindre le Roi, qui va chercher la Reine *d'une telle impetuosité qu'on ne le peut suivre.*"—Lettres de Madame de Villars, p. 6.

† Saint-Simon says—"Le vieux Villars mourut en même temps [1698] à Paris en deux jours a plus de quatre-vingt ans" ("Memoires de Saint-Simon," t. ii., p. 104)—a statement which is adopted by the "Biographie Universelle," t. xlviii., p. 523, which says that the Marquis de Villars died in 1698, aged 80. But Mr. Stirling points out that Anselme, in his "Histoire de la Maison Royale de France," Paris, 1730, fol., t. v., p. 106, only gives him 75 years. This seems to be corroborated substantially in a note to "Lettres de Madame la Marquise de Villars" (Amsterdam, 1759, p. 170), which, under date 26th September, 1680, says, "M. et Madame *de Villars* avoient tous deux 55 ans. Il mourut en 1698, elle en 1706."

quis d'Harcourt, in whose train the Marquis de Blécourt first went to Spain, was sent ambassador to Madrid in the month of December, 1697.*

It is barely possible that, in the eight or nine weeks that intervened between the appointment of the Marquis d'Harcourt and the death of Villars, the "Mémoires de la Cour d'Espagne" in which there is internal evidence to prove that they were written by a cotemporary of the events which they describe,† *might* have been given to Blécourt, an attaché to the embassy of the Marquis d'Harcourt. The improbability, however, of his having done so, is so striking that it scarcely requires to be pointed out. No connexion whatever between the Marquis de Villars and the Marquis de Blécourt has been asserted, even by the most credulous believer in the alleged authorship, by the former, of the "Mémoires de la Cour d'Espagne." No reason can be suggested, either of private friendship or public duty, for the Marquis de Villars, in the last days of his protracted life, putting into the hands of a stranger a manuscript containing, as I shall prove, the most cruel reflections on the memory of the niece of his sovereign. This princess, Louisa of Orleans, the young Queen of Spain, the object of so much censure in the "Mémoires," had been eight years dead, and her place filled almost for the same period by a stranger to those "Mémoires," the less popular and less attractive Maria Anne of Newburg. The Queen Dowager, another of the prominent characters in the "Mémoires," had just died. The Duke of Medina-Celi had been dead since 1691. Everything was changed. For practical purposes, Villars might as well have given to Blécourt a copy of the romance of Cyrus, from which he derived his surname of Orondates, as a history of the Spanish Court as it existed eighteen years before. If it were intended for his amusement, the *rifacimento* of Madame d'Aulnoy, already in print for seven years, would have answered the purpose much better. Why burden a soldier's baggage with a large manuscript in folio, when he could have carried the whole matter in print in the Hague edition of 1692, in the compass of a pack of cards ?‡ That the author of the "Mémoires de la Cour d'Espagne" was aware of the use which had been made of them by Madame d'Aulnoy, in 1690, may be considered certain. That they were not then in any public depository, and could not have been consulted without the express sanction of the writer, admits of little doubt. As much of them as could be published without giving offence having appeared under the name of a lively and popular authoress, who seems to have had a privilege for such revelations, the original writer's interest in them seemed to cease. How the editor of the volume of 1733 could have been ignorant of Madame

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* "Histoire Generale de la Diplomatie Française," par M. de Flassan, Paris, 1811; seconde edition, t. iv., p. 190; also "Memoirs of the Marquis de Torcy," London, 1755, vol. i., p. 13; and "Biographie Universelle," t. xix., p. 404.

† This will be made made manifest when I come to speak of the MS. "Mémoires de la Cour d'Espagne," in the library of the Arsenal at Paris.

‡ My copy of Madame d'Aulnoy's "Mémoires de la Cour d'Espagne" (the Hague, 1692) is about $5\frac{1}{4}$ inches long, by $2\frac{1}{4}$ inches wide.

d'Aulnoy's volumes of 1690, bearing a similar name and treating of a similar time, is very strange; but it is not more strange than the forgetfulness of Mr. Ford.

To return to our narrative, it was not until April, 1700, two years after the death of Villars, that Blécourt was left at Madrid by the Marquis d'Harcourt, as his representative.* In this somewhat subordinate position he remained at the court of Spain until May, 1705,† during the several embassies of M. de Marsin;‡ the Cardinal d'Estrées, M. l'Abbé d'Estrées,§ and the Duc de Grammont.‖ To these succeeded Amelot, whose capacity, activity, and fascinating manners, are spoken of in the highest terms by Saint-Simon.** Towards the end of April, 1705, Amelot took his departure for Madrid, where he remained as ambassador until the autumn of 1709.†† On the 6th of May, 1709, in a letter to Louis XIV., he asks for his *congé*, partly on public grounds, and partly that the state of his health required it.‡‡ In a subsequent letter, dated 17th May, 1709, he urges the matter of his *congé* more earnestly, and suggests M. de Blécourt as his successor.§§ His wishes were acceded to in both respects; and we find him, in July, 1709, waiting for the arrival of M. de Blécourt.‖‖ It was on the 23rd of August, 1709,*** exactly eleven years and a half after the death of Villars, that the Marquis de Blécourt entered Madrid as ambassador in his own right, and for the first time justified the description of the anonymous editor of the MS. "Mémoires" in the possession of Mr. Stirling, of having been *sent* by his Majesty into Spain in this or any other capacity. As ambassador he remained but two years at Madrid, having asked and obtained his recall in 1711.††† To conclude this sketch of the life of Blécourt, it may be added that he died in 1719.‡‡‡

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* "Lundi 12 [Avril, 1700] a Versailles."

"Le marquis d'Harcourt, notre ambassadeur a Madrid, a pris son audience de congé du roi d'Espagne; mais il demeurera là encore quelques jours. Il y laissera Blécourt, qu'il y avoit amené avec lui, à qui le roi donne le titre d'envoyé avec 18,000 francs d'appointments."—Journal de Dangeau, t. vii., p. 291.

† "Dimanche 27. Jour de la Pentecôte à Versailles" [Mai, 1705].

"Avant que le roi allât à la Messe, M. de Torcy lui presenta M. de Blécourt, qui revient d'Espagne on il avoit eté avec M. le duc d'Harcourt, qui l' y avoit laissé pour y faire les affaires du roi."—Journal de Dangeau, t. ix., p. 200.

‡ M. de Marsin asked to be recalled in September, 1702.—Saint-Simon, t. iii. p. 434.

§ The Cardinal d'Estrées left M. l'Abbé d'Estrées after him, "avec le caractere d'ambassadeur."—Saint-Simon, t. iv., p. 178.

‖ The Duc de Grammont was appointed successor to M. l'Abbe d'Estrées in 1704. —Ibid. p. 270.

** Saint-Simon, t. vii., p. 323.

†† Saint-Simon, t. iv., p. 432; t. vii., pp. 453, 454.

‡‡ Saint-Simon, t. vii., p. 452. §§ Saint-Simon, t. vii., p. 452.

‖‖ Journal de Dangeau, t. xii., p. 461.

*** Saint-Simon, t. vii., pp. 453, 454.

††† M. de Bonnac, neveu de Bonrepaux, was named as his successor in 1711.—Journal de Dangeau, t. xiii., p. 410.

‡‡‡ Decembre, 1719, Mercrédi, 13.

"Blécourt gouverneur de Navarreins est mort."—Journal de Dangeau, t. xviii., p. 181.

But, although the Marquis de Blécourt did not, and could not, have received from the Marquis de Villars the "Memoires de la Cour d'Espagne," which are alleged to have been written for his information, it is very singular that he *did* receive from his predecessor, Amelot, a remarkable letter of instructions relative to the position of the French Embassy at Madrid, and the conduct to be pursued there by the ambassador, the subject of which has a striking resemblance to one or the other of the missing works attributed to the Marquis de Villars, by the anonymous editor of the MS. "Mémoires." These works are:—

"Des Mémoires des affaires concernant le Commerce que les Ambassadeurs du Roy Très Chretien out poursuivi à la cour d'Espagne depuis le Traite de Nimegue," &c.

"Du cérémonial des Ambassadeurs de la Cour de France à celle d'Espagne."

This important document, written by Amelot, is headed "Mémoire pour le Marquis de Blécourt, Envoyé Extraordinaire du Roi en Espagne" (Bibl. imp. du Louvre. F. 325, t. xxvi. piéce 74).

It is too long for insertion here, but is worth referring to in the "Mémoires de Saint Simon," tom. vii. from p. 454 to 458, where it is given in full. It is very interesting, and makes us acquainted with some curious circumstances. Among others, the following, which shows that the author of "The Bible in Spain" had some active predecessors in the reign of Queen Anne. Speaking of the efforts of the English and Dutch to introduce the Protestant religion into Spain, Amelot, writing to Blécourt, says:—

"On sait ce qu' ils ont fait en Aragon et en Valence, pendant qu' ils en ont été les maitres; que la doctrine catholique y a été corrompue en bien des endroits, et que l'on a trouvé sur un vaisseau anglois qui a été pris, quatorze mille exemplaires du catechisme de la liturgie anglicane, que la reine Anne envoyoit pour fair distribuer dans ces deux royaumes."*

This state paper, given by Amelot to Blécourt, upon a subject and under circumstances so closely resembling the alleged previous transaction of Villars, is taken from the vast collection of manuscripts, amounting to about 200 volumes in folio, which was formed towards the close of his life by the celebrated Marechal Duc de Noailles. It was to the second daughter of Noailles, Amable-Gabrielle, that Marshal Villars (the son of the Marquis de Villars), married in 1721 his only son.† From this connexion between the families of the Duc de Noailles and the Marquis de Villars, it is not at all improbable that a Memoir connected with the French embassy at the Court of Spain, which was found among the

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* For this passage see Saint-Simon, t. vii., p. 457. The Memoir begins at p. 453.

† "Le maréchal de Villars maria son fils unique à une fille de duc de Noailles extrêmement jolie, et depuis dame du palais, et après dame d'atours de la reine, femme de beaucoup d'esprit et d'agrément, devenue devóte à ravir, et dans tous les temps intrigante et cheminant à merveille."—Saint-Simon, t. xviii., p. 172.

papers of the former, should have been attributed to the latter by the anonymous editor of the MS. "Mémoires," whose inaccurate recollection of other circumstances connected with these "Mémoires" I think I have established.

MADAME D'AULNOY.

Her "Voyage d'Espagne," and "Cour d'Espagne."

I now come to a brief examination of Madame d'Aulnoy's celebrated "Travels in Spain," and her less known, but to us more interesting "Memoirs of the Court of Spain." This inquiry has an historical importance, which, in a bibliographical point of view, perhaps, it cannot lay claim to. The very curious statements contained in both works, particularly in the latter, would, if taken merely on her own authority, possess little if any value. It is therefore important to discover, if possible, the source from which she derived those minute details of courtly intrigue which form so large a portion of her amusing narratives.

Her "Relation du Voyage d'Espagne" was first published at Paris in 1691. It has frequently been reprinted, my own copy being that published at the Hague in 1715. It has always been very popular in England, under the name of "The Lady's Travels," of which the eleventh edition was published in 1808, in two volumes. Her "Mémoires de la Cour d'Espagne" were first published, as I have already said, at Paris in 1690. This book seems at first to have met with the same favourable reception in England as her travels, which it does not appear to have retained. It was translated into English by the facetious Tom Brown, in 1692, but I am not aware of its having been ever reprinted.*

These works appear to have met with less favour in France than in foreign countries, at least as far as any belief in their marvellous state-

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* "Memoirs of the Court of Spain. In Two Parts. Written by an Ingenious French Lady. Done into English by T. Brown. Utile Dulci." London, 1692.

Since this paper was written, I have met with a later edition of this translation, having the following fuller title, but differing in no other respect, except being printed on better and larger paper, from the edition of 1692, which it does not mention:—"Memoirs of the Present State of the Court and Councils of Spain. In Two Parts. With the true Reasons why this vast Monarchy, which in the last Century made so considerable a Figure in the World, is in this so Feeble and Paralytick." London, 1701. They both contain an amusing "Epistle Dedicatory" "To His Honest Friend Mr. William Pate of London, Woollen-Draper," in which the facetious Tom Brown translates the line, "*Penitus toto divisos Orbe Britannos*," "The Britons are the most divided people in the whole world." I have another old translation, but of a different book altogether, called "The Present Court of Spain, Or the Modern Gallantry of the *Spanish* Nobility unfolded, &c. By the Ingenious Lady ——, Author of 'The Memoirs and Travels into Spain.' Done into English by J. P. London, 1693.'"

This last seems to be a mere fabrication. It is a collection of love-letters, more sentimental and more unreal, however, than the "Mémoires de la Cour d'Angleterre," also attributed to Madame d'Aulnoy, of which the Duke of Monmouth may be considered the hero, and of which I have an edition, in two small volumes, printed at the Hague in 1795.

ments was concerned. So early as the year 1718, we find the Abbé de Vayrac, in his "Etat Present de l'Espagne," disposing of the lady's pretensions to veracity in a very summary manner, and even charging her with a deliberate attempt to bring the Spanish nation into contempt. In the "Discours Preliminaire," (p. 7), prefixed to that work, the Abbé has the following remarks upon the lively authoress of "L'oiseau bleu" and "La Biche au bois," which in our nursery days we would have thought rather severe.

M. de Vayrac, after referring with some degree of approval to a cotemporary traveller, thus continues:—"Mais si j'ai cette complaisance pour lui, je ne sçaurois me resoudre a l'avoir pour Madame L. C. D., . . . puisque de propos délibére, et contre ses propres lumieres, elle a composé deux ouvrages, dont l'un a pour titre *Mémoires*, et l'autre *Voyage de la Cour d'Espagne** dans lesquels on ne voit depuis le commencement jusqu'à la fin qu' un enchainement de contes fabuleux, ou de railleries picquantes pour tourner les Espagnols en ridicules. Mais parce que je me suis proposé de ne rien dire qui ne soit absolument necessaire pour donner au Lecteur une idee juste des mœurs, des coutumes et du gouvernment de ces peuples, je me contenterai d'en citer quelques endroits qui luy feront voir jusques où elle a porté les traits de sa Satyre, et qui le détermineront à n'ajouter pas plus de foy a ce qu'elle a dit, qu' aux ingenieux *Contes des Fées*, dont elle a regalé le publie, pour faire perdre agreeablement le tems a ceux qui n'avoient rien de mieux a fair qu' à les lire."—Discours Preliminaire, pp. 7, 8.

The example which the Abbe de Vayrac quotes of Madame d'Aulnoy's want of truth is the account which she gives of the entry of Anne of Austria into a town of Catalonia, when she was going to be married to Philip IV. This town was famous for its manufacture of silk stockings, and the good people thought they could not present their future Queen with anything more acceptable than some of the useful articles in which they excelled. But her Mayor domo mayor the Duke of Medina Sidonia rejected the offerings with indignation, telling them that it should be understood that the Queens of Spain had no legs. "*Aveis de saber*," said he, "*que las Reynas de Espana no tienen piernas.*"† This anecdote is taken from the "Cour d'Espagne," that from the "Voyage" is about Madame d'Aulnoy's own reception by the ladies of Bayonne.‡

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* The Abbé is evidently too angry to give the titles of these detestable books correctly. The same may be said of the initials of the author's name, which should be "M. C." (Marie Catherine), and not "L. C.," as he gives them.

† See "Mémoires de la Cour d'Espagne," premiere partie, p. 3. The sequel may be given in the translation of Tom Brown:—"However it was, the young Queen, who was not as yet acquainted with the niceties of the Spanish language, took it in the literal sense, and began to weep, saying 'that she was fully determined to go back to Vienna; and if she had known before her departure from thence that they had designed to cut off her legs, she would rather have died than stirred a foot.'"—Page 4.

‡ "Some who came to see me brought little sucking-pigs under their arms, as we do little dogs; it is true they were very spruce, and several of them had collars of ribbons of

As to her "Travels," keen observation, lively imagination, a fund of humour, and a bold appropriation of the labours of her predecessors, have been the sources whence they were derived. In writing her "Voyage d'Espagne" she evidently had before her the same mysterious authority of which she made so much larger use, when compiling her "Mémoires de la Cour d'Espagne." A few instances will suffice. From p. 6 to p. 9, in Mr. Stirling's book, beginning at "Les grands officiers," and ending at "del despacho universal," the whole matter is given almost verbatim in the "Relation du Voyage d'Espagne," t. 3, from p. 98 to p. 100. A few shorter passages I shall put under their respective heads, quoting Mr. Stirling's book for shortness' sake as VILLARS :—

VILLARS.

"Depuis plus de cent ans Les Roys d'Espagne tiennent ordinairement leur cour à Madrid."—p. 5.

"C'est une Ville assés grande, sans murailles, située au milieu de l'Espagne, dans un païs sec et decouvert."—p. 5.

"Le Palais du Roy est à l'extremité de la ville vers le Midy: Sa façade en d'ordre Dorique, d'une pierre comme de Grez: deux Pavillons de Briques la terminent à droite et à gauche: Les trois autre côtés de ce Palais n'ont ny forme ni raport entre eux."—p. 5.

"Au dessous du Palais Le Terrain qui va en penchant jusqu'au Manzanares, est fermé de Murailles," &c.—p. 6.

D'AULNOY.

"Il y a plus d'un Siecle que les Rois d'Espagne la choisirent pour y tenir leur cour."—Voyage, t. ii., p. 112.

"La ville n'est pas entourée de murailles: * * * La ville est située au millieu d'Espagne:* * * tous les Pais est sec, et fort decouvert."—Voyage, t. ii., pp. 112, 113.

"Le Palais est a l'extremité de la ville vers le Midi. Il est bati de pierres fort blanches. Deux Pavillons de brique terminent la façade: le reste n'est point regulier."—Voyage, t. iii., p. 4.

"Le terrain, comme je l'ai marqúe, s'etend jusqu' au bord du Mançanares. Tout est enclos de murailles," &c.—Voyage, t. iii. p. 6.

With regard to the other work, her "Mémoires de la Cour d'Espagne," which more nearly concerns us, it may be said in one word, that there is scarcely a sentence in it, from beginning to end, bearing upon political matters (a few sentimental messages and letters excepted), which cannot be found almost *verbatim* in the original MS., from which she, as well as the unknown editor of the volume of 1733, took their materials. There is this important difference, however, between the two, that while Madame d'Aulnoy, either to make her book more interesting, or the better to disguise her theft, or perhaps the task assigned her, has so broken up and rearranged the matter of the original, dividing and reuniting it in such a capricious way, that it requires the utmost patience and perseverance to follow her through all her windings, the anonymous editor of the volume of 1733 gives his story as he finds it, merely omitting such portions as would be likely to give offence to the French court. This, I

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various colours; however, this custom looks very odd, and I cannot but think that several among themselves are disgusted at it: when they danced, they must set them down, and let these grunting animals run about the chamber, where they made a very pleasant harmony. These ladies danced at my entreaty, the Baron of Castlenau having sent for pipes and tabors."—The Lady's Travels, vol. i., p. 3.

think, will be clearly manifest when I come to speak of the MS. in the library of the Arsenal at Paris, to which I have already alluded. To prove these resemblances by direct quotation would be simply to reprint the two books. A reference to the corresponding pages of each work must suffice. In the following columns will be found the entire result of my collation of the two "Mémoires de la Cour d'Espagne," using for that purpose Mr. Stirling's volume of 1861, as being the most accessible, and quoting it for convenience by the name of VILLARS, and of Madame d'Aulnoy's work, the edition published at the Hague, in 1692, in two parts.*

MÉMOIRES DE LA COUR D'ESPAGNE.

(VILLARS)—1861. *Page.*	(D'AULNOY)—1692. *Part I., Page.*
13, 14, 15, 15, 16.	78, 78, 80, 81, 81.
17, 18.	95.
19.	99.
20.	66, 67.
21 [Valenzuela].	67.
21, 22.	67, 68.
22 [Verses on Don John]·†	69.
23, 23, 24.	74, 74, 75.
25, 26.	75, 76, 77.
26, 27, 28.	89, 90, 91.
29.	87, 91, 92.
30.	92, 93.
31, 32.	88, 94.
32.	101, 102, 103.
33, 34.	Part I., p. 9; Part II., p. 103; and "Voyage," t. i., p. 97, t. iii., p. 185.
35, 36.	88, 89, 102.
36, 37.	104, 105.
38, 39, 40.	117, 118, 119.
41, 42.	84, 85.
42, 43.	82, 83.
43, 44.	105, 119.
44.	121.

(VILLARS.)—1861. *Page.*	(D'AULNOY.)—1862. *Part I., Page.*
44, 45.	124, 125.
46, 47.	126, 127.
49, 50, 51.	120, 121.
51, 52.	129.
52, 53.	130.
53, 54.	130.
54, 55, 56.	131, 132.
56, 57, 58, 59, 60.	132, 133, 134, 135.
60, 61, 62.	135, 136, 137, 138.
62, 63, 64, 65.	139, 140, 141, 142.
66, 67, 68, 69, 70.	143, 144, 145, 146, 147.
70, 71, 72, 73, 74, 75, 76.	147, 148, 149, 150, 151, 152, 153.
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89, 90, 91, 92, 93, 94, 95.	177, 178, 179, 180, 181, 182.
95, 96, 97.	182, 183.
100, 101, 102.	184, 185.
105.	186, 187.
109.	189.
110, 111, 112, 113.	190, 191, 192.
114, 115, 115.‡	193, 194, 195.
116, 117, 119, 120.	195, 197.

* It will be recollected that the opening pages of Villars and Madame d'Aulnoy's "Voyage" have been already identified. I begin at p. 13 of the "Mémoires de la Cour d'Espagne." London, 1861.

† Those lively verses on Maria Calderon, the celebrated actress and mother of Don John, which are only alluded to in Villars, are given in full, with a French translation by Madame d'Aulnoy, part 1, p. 69. They are "done" into English verse somewhat freely, in every sense of the word, by Tom Brown, at p. 68 of his translation.

‡ One of the passages at p. 115 of Villars, p. 120 of the volume of 1733, and p. 194–5 of d'Aulnoy, is the following. It is a portion of the account which is given of the tumultuous assembling of the people at Madrid, in 1679, during the illness of Marcos Dias:—"Il arriva même que dans ce temps là le Roy étant allé à quelques églises, ils le suivirent en grande nombre criant, *viva el Rey, Muera el Mal Govierno.*" This seems to have been a favourite cry with the Madrilenes. It is again repeated at p. 154 of Villars, and p. 46, *seconde partie* of Madame d'Aulnoy. In "A Relation of a Voyage

(Villars,)—1861. *Page.*	(D'Aulnoy.)—1692. *Part I., Page.*
121.	200, 201.
122 to 127.	Part II., p. 13 to 17.
128 to 134.	18 to 21.
135, 136.	6, 7, 8.
138.	25, 26.
143.	29.
144.	36.
145.	37.
148, 149, 150, 151.	39, 39, 40, 41, 42.
153, 154, 155.	44, 45, 46.
187 to 191.	52 to 56.
193.	59.
196.	59.
202.	92.
206.	95.
207, 209.	97, 98.
211.	106, 107
213, 214, 215.	108, 109, 110.
216, 217.	111, 111, 112.
218, 220, 223, 224.	101, 103, 122, 123.
226, 228.	127, 128.
230, 231.	131, 132, 133.
232, 233.	134.
234, 235.	141, 143.

(Villars.)—1861. *Page.*	(D'Aulnoy.)—1862. *Part I., Page.*
237.	137, 140.
240, 241.	146, 147.
242, 243.	148, 149.
243, 244, 245.	150, 150, 151.
248, 249.	164, 165.
250, 252.	164, 167.
258.	174.
260.	178.
263, 264.	180, 181.
267.	188.
268, 269.	189.
270, 271.	190, 191.
274.	193.
276, 278.	194, 195.
283, 284.	195, 210.
287, 288.	206, 207.
291.	209.
298.	213.
299, 300.	214, 215.
300, 301, 302.	215, 216.
303, 304, 305.	216, 217.
308, 309.	218, 219.
309, 310, 311.	118, 119, 120.
312.	Part I., p. 202.

The description of the various councils with which the Villars' "Mémoirs" conclude, appears at the end of the first part of Madam d'Aulnoy's "Mémoires," from p. 202 to p. 216. Perhaps the fullest account of these councils is given in the Abbé de Vayrac's "Etat Present de l'Espagne," Paris, 1718, tom. 3, pp. 300–462. I have an earlier tract, "The Present State of Spain, &c., translated from the Spanish copy lately printed at Madrid," London, 1706, which also gives an account of them.

THE MS. "MÉMOIRES DE LA COUR D'ESPAGNE," IN THE LIBRARY OF THE ARSENAL AT PARIS.

Considering the easy steps that led me to a knowledge of this MS. it is singular that among Mr. Stirling's friends at the British Museum, and the still wider circle of the contributors to "Notes and Queries," there was no one found discursive enough in his reading to point out to him its existence, which, the clew once being given, was as easy to discover as the *Barrière du Trone*, or the *Place de la Concorde*. Finding, like Mr. Stirling and his referees, that the usual sources of in-

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made through a great part of Spain," by Francis Willoughby, Esq., London, 1673, we have the following account of it thirty-five years earlier :—

"Bread is very scarce and very dear in many places of Spain, because of the barrenness of the soil and want of rain, &c. . . .

"This summer [1664] there was a tumult at Madrid : the poor people gathering about the King's palace cried out, "Let the King live, but let the ill government die," &c., p. 497.

formation would reveal nothing more of the Marquis de Villars and his supposed authorship, I determined to break new ground. Luckily, in the Library of the King's Inns, Dublin, there is one department particularly rich in French historical memoirs. Among these is the "Histoire Generale et Raisonnée de la Diplomatie Française (seconde edition)" Paris, 1811, 7 tomes in 8vo., by M. de Flassan. On turning over the leaves of this book, and consulting the index, the name of the Marquis de Villars at once rewarded me for departing a little out of the beaten track. I found to my astonishment in vol. 4, from p. 25 to p. 30, an elaborate account of a certain difference which the Marquis de Villars had with the government at Madrid in reference to the rights and privileges of the Spanish embassy, of which I had a perfect recollection from my reading of the volume of 1733, and Mr. Stirling's volume of 1861. On collating the passages, I found them identical, M. de Flassan's account corresponding almost *verbatim* with that at pp. 8 and 9, and from p. 127 to p. 136 of the volume of 1733; p. 10, and from p. 122 to p. 131 of Mr. Stirling's book; and in Madame d'Aulnoy's "Mémoires de la Cour d'Espagne," part 2, from p. 13 to p. 17. What appeared to me to be very singular, however, was, that the account was taken, not from the volume of 1733, in which it had been published to the world seventy-five years previously, nor even from the better known and older published work of Madame d'Aulnoy, whose name, however, would scarcely have been of much weight in the grave investigations of diplomacy, but from a MS., the title of which is thus given—"Etat de l'Espagne, manuscr. in fol. bibl. de l'Arsenal" [Paris]. On this discovery, I felt at once that I was on the right track; and circumstances having led me to the continent in June last, I had the pleasure of examining the MS. during the few hours of the two or three days I was permitted to stay at Paris, that the Library of the Arsenal was open. On inquiry at the Library for the MS. under the name by which it is quoted by M. de Flassan, I learned with dismay that the Library contained no such MS. On examining the catalogue or printed list of MSS., however, I found it under its more appropriate name, "Mémoires de la Cour d'Espagne," which appears at the top of the front page, as in Mr. Stirling's MS. Why M. de Flassan preferred to call it by a name which does not belong to that portion of the volume from which he quoted, and which only appears in the MS. (a blank page intervening) at folio 106—if indeed in strictness it appears even there—I cannot say, except that he did so, perhaps from a salutary fear of having his trustworthy authority confounded with the suspicious narrative of Madame d'Aulnoy.

The MS. is a folio volume, containing 130 leaves, somewhat closely written on both sides. The older forms of spelling, which had become modernized before the time Mr. Stirling's transcript was made, are preserved throughout. There are no erasures or interlineations by the original writer from beginning to end. The MS. does not appear to have been prepared for the press, but seems to be a fair copy of the original draught made by the author himself, whoever he was, for his own ac-

commodation or the information of some other party. There is no introduction or preface of any kind, the writer commencing his narrative abruptly with the sentence—"Le guerre qui commença en 1672 entre la France et la Hollande," &c., as at p. 9 of the Villars "Memoires." The differences which exist between the Arsenal MS. and all the other known copies of these "Mémoires" begin at the very beginning. They are sometimes trifling and verbal, like those between the Stirling MS. and the volume of 1733, but generally they are far more important. The Arsenal MS. seems to be the first outpouring of the author's mind; the whole truth, as he believed it, is spoken frankly and fully—too frankly, it would appear, for the unknown editor of the volume of 1733 or his censor, either of whom, doubtless from the fear of giving offence to the royal family of France, has omitted some of the most interesting of its passages. The most curious of these refer to the conduct of the young Queen of Spain, the first wife of Charles II., who, it will be recollected, was the niece of Louis XIV. These suppressed passages betray an amount of hostility, and almost hatred, to this princess, who, if she exhibited little strength of character, appears to us so amiable and interesting in the charming letters of the Marchioness de Villars, as to create a strong disbelief that these "Memoirs" could have been written by the ambassador of France and the husband of the writer of these letters. I shall take the passages as they occur, by no means offering them as a complete list of the differences which characterize the Arsenal MS., but of such only as I was able to note during the short time I had the opportunity of examining it. None, however, that are really important have, I believe, been overlooked.

The MS. commences, as I have said, at the words, "La guerre qui commença," &c., Stirling MS., p. 8, "Villars' Mémoires," p. 9, "Mémoires" of 1733, p. 8. The passage at p. 12 of the Villars' "Mémoires," "Le Roy très Chrétien ne jugeant pas qu'un Bâtard du Roy d'Espagne pût avoir droit de prendre de tels avantages sur son Ambassadeur, luy commenda," &c., reads thus in the Arsenal MS., folio 1—"Le Roy tres Chrestien ne jugeant pas qu'un bastard du Roy d'Espagne deut avoir sur son Ambassadeur des avantages *que les princes du sang de la Maison de France* ne prennoient point sur celui d'Espagne, luy commanda," &c. On the same page the following passage is omitted both in the Paris and London editions—"Pour trouver un milieu a deux interests si contraires Le Marquis de Villars proposa a D. Geronimo d'Egüya Secretario d'Estat qu'il verroit D. Juan sur le meme pied que les autres Ambassadeurs, pourveu qu'on luy donnast un ordre par escript du Roy d'Espagne a son Ambassadeur en France, de voir les princes du sang et les Enfans naturels des Roys* de la meme maniere," fol. 1. In the line "avoient signé *chez Le Duc d'Albe*," Arsenal MS. fol. 1, 2, the words *underlined* are omitted in the Villars' "Mémoires," p. 20, l. 24, though given in

* This allusion to "les Enfans naturels des Roys" as a settled institution in France, is rather amusing.

the "Mémoires" of 1733. After "par l'indignité de sa conduite," Paris "Mémoires," p. 24, Villars' "Mémoires," p. 25, is added "*et de sa naissance,*" fol. 6. In the passage, "Villars' Mem.," p. 25, beginning "ces *derniers* pas," we have (fol. 6) "*premiers* pas," which is also the reading of the Paris edition; for "la situation de la Reine," we have "la *hauteur naturelle* de la Reyne mere;" for "infamies passées," "infidelités passées;" for "la Jeunesse du Roy," "la *foiblesse* du Roy *plus enfant par son genie que par son age,*" and several other differences of a similar character. At p. 26 of Villars, after the words "un grand nombre d'espions" is added "*jusques dans la maison de la Reyne,*" fol. 6. The general summing up of the character of Don John of Austria, at p. 33 of Villars, is given more fully at fol. 8 of the MS. At fol. 24 (Villars, 81) the following reference to the Queen is strongly underlined in darker ink than the text—"On creut meme, quelque temps que la reyne estoit grosse, *mais cette esperance finit au commencement de Janvier de l'annee* 1680."*

Nearly the entire of pp. 82 and 83 (of the Villars' "Mémoires"), from "Quelques jours" to "remplis d'un nombre infini de spectateurs," is omitted, at least in this place, from the Arsenal MS., fol. 24. After "qui la gouvernoit comme un enfant" (Villars, p. 84) is added (fol. 24) "*et sans cesse avec le Roy accompagné de deux nains qui seuls faisoient sa conversation et son plaisir.*"† This, omitted by all the others, is given somewhere by Madame d'Aulnoy.‡ Arsenal MS., fol 32, "Les *instances* du nonce;" Villars' "Memoirs," p. 110, "Les *interets* du nonce." The extracts given by Flassan in his "Histoire de Diplomatie" are from fol. 35, commencing "Les Ministres Etrangers," to fol. 39, "s'il les avoit fait demander:" it is the only part of the MS. which has marks in the margin, as if they were directions either to the transcriber or compositor. "*La fin de Janvier,*" Arsenal MS., fol. 36. Villars' "Mémoires," p. 123, is heavily underlined by the same hand as before.

Folio 44 contains the following passages omitted in the Villars' "Mémoires," p. 150, after the words "ny de la saluer":—

"Elle [la Duchesse de Terra Nova, el Camerera Mayor] ne laissoit

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* "La Reine n'est plus grosse."—Lettres de Madame de Villars, 12th January, 1680, p. 49.

† "Le Roi a un petit nain Flamand qui entend et qui parle tres-bien Francois. Il n'aidoit pas peu à la conversation."—Lettres de Madame de Villars, p. 25. And again, p. 60, "Il y a deux nains qui soutiennent toujours la conversation."

‡ This mania for dwarfs does not seem to have been peculiar to the court. Madame d'Aulnoy, in her "Travels," has the following passage:—"They keep also both Male and Female Dwarfs, and very ugly ones: the Females, particularly, have very frightful looks, their heads are bigger than their Bodies; they always wear their hair loose about their Ears, and hanging down to the ground. At first sight, one would wonder what these little Figures were when they present themselves before one's Eyes. They wear rich cloaths, they are their Mistresses Confidents, and for this Reason, they are denied nothing they have a mind to."—The Ladies Travels into Spain, 1708, p. 137; Voyage d'Espagne, t. ii., p. 123.

pas de faire quelques fois faire des complimens et des honnetez a l'ambassadeur de France, temoignant a l'ambassadrice le deplaisir qu'elle avoit qu'il ne vint point chez la Reyne, et l'on sçavoit que personne ne travailloit plus qu'elle a l'en empecher et a le faire haïr par le Roy a un tel point qu'il ne pouvoit le voir ni l'entendre parler sans dire en particulier quelque extravagance ou quelque injure."

"On le voit quelquefois longtemps assis parlant seul tout haut, donnant mille maledictions aux Français, il reprochoit souvent a la Reyne qu'elle estoit fille de François, et lorsqu'il sceut que le Roy demandoit satisfaction de l'offence qu'on avoit faite a son ambassadeur en luy ostant ses privileges, il entra dans un emportement qui alla jusqu'a faire a la Reyne des menaces qui pouvoient luy donner tout a craindre."

This is a strange exhibition of royalty, it must be confessed; but another suppressed passage, at fol. 45, preceding "La Reine cependant" (of Villars, p. 150), is stranger still:—

"On n'avoit pas moins inspiré d'aversion au Roy pour l'ambassadrice, que pour son mary, souvent il se cachoit derrière quelque rideau de porte pour l'observer, quand Elle parloit a la reyne, et l'on asseure qu'un jour qu'il la vit entrer, il commenca a dire en son particulier des injures contre Elle basses et grossieres. La Camerera Maÿor qui L'avoit entendu, le reprit en suite devant La reyne, et Luy fit une severe leçon de parler d'une maniere si mal honnette d'une personne de merite comme L'ambassadrice, c'est a dire qu'elle le reprit ainsi de dire devant le monde des choses que l'on devoit estre bien persuadé que'elle Luÿ inspiroit en particulier, ainsi la Reyne croyoit qu'elle Luÿ servoit a gouverner l'esprit bizarre du Roy—de luÿ manager l'amitié de la Reyne, et tout le monde qui sçavoit combien elle estoit a craindre, Luÿ tenoit compte du mal qu'elle ne faisoit point et des fausses honnestetez qu'elle faisoit."*

The following account of the Queen's mode of life at this period is omitted at p. 151, of the Villars' "Mémoires":—

"Sa vie estoit toujours ennuyeuse et renfermée, elle ne sortoit que pour aller en devotion à quelque couvent ou en visite chez la Reyne mere, ou toutes deux estoient dans la conversation du monde la plus froide, elle ne pouvoit souffrir celle des Dames Espagnole qui la venoient voir, et n'en essuÿoit l'ennuÿ que parce que l'ambassadrice de France Luÿ preschoit sans cesse qu'elle devoit garder des mesures honnestes avec Elles. D'ailleurs elle n'avoit point d'autre divertissement que des Commedies Espagnolles, qui ne la divertissoient point du tout. Elle jouoit tout le jour pour rien aux Eschets avec le Roy, l'homme du monde

* The Ambassadress herself believed that she was an exception to this general hatred of the French by the king. "A l'egard du jeune Roi, et de sa haine pour les François, qui est grande, je puis dire qu'elle est moins violente pour moi, que pour les femmes Françoises de la Reine, par le raison qu'elles sont plus souvent auprès d'elle, que je n'ai cet honneur."—Lettres de Madame de Villars, p. 227.

de la plus mechante compagnie et ne voyoit aupres de luÿ que ses deux nains."

"Dans cet Estat elle sceut se faire pour quelque temps une apparence de tranquilité. Elle acquit de la complaisance pour le Roy, des manieres et des exactitudes telles qu'il pouvoit les souhaiter pour croire qu'il estoit aimé, on La voyoit gaÿe avec de la santé, et de l'embonpoint. La compagnie de ses chiens et de ses perroquets l'amusoit souvent, et son esprit sans suitte, sans ambition et sans attachement pour rien de ce que son rang luÿ donnoit, la consoloit par certaines idées de France ou Elle se faisoit de seules esperances de retourner un jour et de gouster hors du throne les douceurs d'une vie sans crainte, qui luÿ laisseroit la liberté de suivre des penchans particuliers qui l'attachoient beaucoup plus que la grandeur."—Folios 45 and 46.

At folios 51 and 52 there are thirty-six lines in the MS. which are omitted in the Villars' "Memoirs." From these it would appear that the queen opened her mind first to the ambassadress as to her intention of asking the king for the dismissal of her camera-mayor. The ambassadress discouraged the idea for a while, through fear of the queen's want of persistence in her object; but finding some days after that she persevered in her intention, she advised her to speak to the king, but to use the utmost secresy and caution in her proceedings.*

Folios 80 and 89 contain eighty lines which are omitted in the printed books. They commence near the top of p. 274 of Villars. They are curious, referring both to Madame de Villars and to the Queen, whose imprudence, in appearing at the windows of the palace, "qui donnent sur la place," with her French ladies or attendants, and addressing such French people as passed by "contre toutes les regles du Palais et la bienseance de son rang et de son sexe" is severely condemned. I regret that I had not time to copy this passage in full.†

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* There is nothing of this in Madame de Villars' Letters. At p. 154 she simply says—"On lui a changé de Camarera Major." In the next letter, at p. 156, she says again:—"Je vous ai mandé par ma derniere Lettre la destitution de la Duchesse de Terra Nova; qu'on avoit mis a sa place la Duchesse d'Albuquerque; et que je ne pouvois etre ni aise ni fâchée de ce changement, que selon que la Reinè s'en trouveroit bien ou mal."

† It is curious that Madame de Villars mentions as one of the chief advantages of the change of *Camarera Mayor* the privilege of *looking out of a window* which is here denounced as such a crime:—

"On se trouve toujours bien du changement de la Camarera Major. L'air du Palais en est tout different. Nous regardons présentement la Reine et moi, tant que nous voulons, par une fenêtre qui n'a de vüe que sur un grand jardin d'un couvent de Religieuses qu'on appelle l'*Incarnation* et qui est attaché au Palais. Vous aurez peine à imaginer qu'une jeune Princesse née en France, et élevée au Palais Royal, puisse compter cela pour un plaisir."—Lettres, pp. 163, 164.

The following passages from Madame d'Aulnoy (in the translation of Tom Brown), perhaps refer to the subject in the text:—"For, as I signified before, the Queen durst not play with the little Dogs she had brought along with her, before the King; and the two Parrots were killed for no other reason but because they talked *French*. The King was out of humour as oft as any *Frenchman* passed through the court of the Palace, especially if the Queen looked upon him, although it was through the windows and lattices of her chamber."—Memoirs of the Court of Spain, London, 1692, Part ii., p. 35.

After the word "compassion" in Villars, p. 308, speaking of the wife of the Connétable de Colonna, is added in the MS., "Sil n'avoit pas été le fruit de sa mechante conduitte qu'elle avoit fait paroistre a tout le monde depuis plusieurs années." In continuation of this comes the following long and important passage, which has been suppressed in all the other copies:—

"Le Marquis de Villars avoit quelque temps auparavant reçu permission du Roÿ de finir son ambassade et d'en avertir les ministres de Madrid avec ordre neantmoins d'y attendre le successeur qu'on luy nommeroit, il y avoit pres d'un an qu'il sollicitoit son congé; Les excessive depenses ausquelles la cherté de Madrid l'engageoit, luy en avoit fourny une raison evidente, c'estoit celle dont s'estoit servy pour presser le Roÿ de luy permettre de se retirer, et des l'année precedente il luy avoit demandé permission d'envoyer en France La Marquise sa femme pour vivre a quelqu' une de ses terres et diminuer ainsi sa depense. Il cachoit une autre raison qui peut estre n'estoit pas moins pressante que celle la. C'estoit l'esprit et la conduite de la Reyne que luy ni l'ambassadrice ne pouvoient redresser, et dont les suittes auroient pu neanmoins retomber sur Eux comme sur les seules personnes dont elle devoit suivre les conseils, mais elle ne les escoutoit point et par un genie assez extraordinaire elle ne laissoit pas pour se disculper de leur attribuer le retour de ses fautes, soit a Madrid ou meme a la cour de France. ils ne pouvoient en eviter les suittes dangereuses qu'en se retirant; le Roy n'y avoit point consenty d'abord, Mais depuis Le Marquis de la Fuente, ambassadeur d'Espagne ayant insinué que celuy de France a Madrid et L'Ambassadrice sa femme estoient entrez dans des intrigues qui avoient troublé la maison Royalle, et ajoutant fait connoitre que le Roy d'Espagne souhaittoit leur rappel, le Roy instruit du veritable sujet de cette plainte qui ne venoit que des interrets particuliers de quelques ministres entierement opposez a ceux de la maison Royalle ne laissa pas de rappeller Le Marquis de Villars en luy marquant qu'il estoit satisfait de sa conduitte, il demeura encore plusieurs mois a Madrid attendant qu'on luy donnait un successeur et cependant l'ambassadrice revinst en France."—Arsenal MS., fol. 101.

I have called this passage an important one, because it supplies almost for the first time the opportunity of testing the statements and opinions contained therein by an authority that cannot be impeached. Among the various records of those two years, snatched so strangely out of the surrounding darkness, we fortunately possess one, the truth of which, especially on matters connected with the private affairs of the writer, cannot be questioned. These are the *Letters of the Marchioness de Villars*,* the wife of the supposed writer of the foregoing statement:

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* "Lettres de Madame La Marquise de Villars, Ambassadrice en Espagne, dans le temps du Mariage de Charles II., Roi d'Espagne, avec la Princess Marie-Louise d'Orléans, fille de Monsieur, frere unique de Louis XIV. et de Henriette Anne d'Angleterre, sa premiere femme.—a Amsterdam, 1759."

"Les lettres charmantes," says Mr. Stirling, "écrites par sa femme à Madame de Coulanges, durant son séjour à la cour d'Espagne, sont bien connues. Ce sont les esquisses les plus agréables qui aient été écrites sur la vie et les mœurs Castillanes, au dix-huitième siècle, en même temps qu' elles présentent le récit le plus fidèle et le plus digne de foi que nous possédions sur la triste vie intérieure de la royauté autrichienne expirante en Espagne."*

If her statements concerning the interior life of the palace are so trustworthy, surely, on matters connected with her own household and her husband's affairs, they must be considered worthy even of more implicit belief. What account does she give of the recall of the Ambassador, and in what way does it corroborate the above statement, alleged to have been written by the Ambassador himself? So far from Villars having been soliciting his recall for more than twelve months, it is evident that the intelligence of it came upon himself and the Marchioness by surprise. So sudden indeed was it, that so late as the 3rd April, 1681, she thought it necessary to explain to her correspondent in France why she had not previously mentioned so important a matter, the simple reason being that she had known nothing whatever about it.† In fact the whole court was surprised, and the king himself so astonished, that, on the news reaching Madrid, he asked those about him if it boded a new war with France.‡ The account also which the author of the Arsenal MS. gives of the expenses of the embassy, and the steps taken in connexion therewith, is too loose and inaccurate to have been written by one who was so much interested in the subject. Madame de Villars has a good deal to say upon the matter, as might be expected. On the 29th August, 1680, she writes, "De douze mille écus que le Roi donne à M. de Villars, ce n'est à Madrid qu'environ 5500 écus. Notre maison nous coûte neuf mille francs de loyer, voyez ce qui reste pour toutes sortes d'autres dépenses." § She says that at this time M. de Villars had some idea of sending her back to France, in order to diminish his expenses; but this step was abandoned, and the financial difficulty removed, by the king's coming to the relief of his ambassador, and by the removal of the embassy to a smaller house. "Le petit secours," says Madame de Villars, nearly four months afterwards (12th December, 1680), "que le Roi a eu la bonté de donner à M. de Villars, nous fait un peu respirer. Nous avons payé et quitté notre grande maison de huit cent pistoles de loyer, et nous sommes présentement dans une autre la moitié moins chère, et mille fois plus commode." ‖ As to the different estimate of

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* Preface to "Mémoires de la Cour d'Espagne sur le Regne de Charles II.," p. ix.

† "Lettres de Madame de Villars," p. 225.

‡ "Si le premier Ministre a fait négocier notre retour en France par l'Ambassadeur d'Espagne qui est à Paris, le Roi leur Maitre n'en a rien sçu; car le jour qu'on en eut ici la nouvelle, il parut fut etonné quand on la lui apprit, et demanda aussi-tôt si ce n'etoit point une marque qu'on allât rentrer en guerre avec la France."—Lettres de Madame de Villars, p. 227.

§ "Lettres de Madame de Villars," p. 153. ‖ Ibid, p. 196.

the Queen's character and conduct formed by the writer of the MS. "Mémoires de la Cour d'Espagne," and Madame de Villars, they are so striking, as to render it scarcely possible that they could have been written by a husband and wife so united, so intelligent, and so observant. This subject will be best treated when I give the last crowning passages of the MS., where the writer accumulates such a torrent of invective against the poor queen as to suggest some motive more exciting than the æsthetic pleasure of painting an historical character.

Among the most curious episodes which are given in the printed "Mémoires de la Cour d'Espagne," there is one which in all the copies is called by its Spanish name "Los Galantéos de Palacio." Along with what is given in the other books, the Arsenal MS. contains the following story, which, under the circumstances, has perhaps no rival for effrontery and audacity. It occurs at folio 102, and is in continuation of p. 311 of the "Villars' Mémoires," after the line "à régaler leurs maîtresses et les servir."

"Peu de jours avant le départ pour Aranjuez il arriva sur ce sujet une affaire qui fist bien voir jusques ou pouvoit aller l'insolence des courtisans et la foiblesse du Roÿ. Le jour de jeudy Saint que la Reyne sert les pauvres, on avait, suivant la coutume, laissé entrer quelques femmes plus curieuses de voir la Reyne que la ceremonie. Comme le nombre s'en augmentoit, le grand maistre d'hotel fit deffense d'en laisser entrer davantage. Le Comte de Baños vinst peu après a la porte voulut faire entrer des femmes qu' il y rencontra. L' huissier l'en voulut empescher suivant l'ordre qu'il en avoit, mais le Comte l'ayant repoussé fist passer les femmes de force, il trouva auprès de la Reyne une de ses filles d'honneur dont il estoit l'amant, et sans respect ny du lieu ny de sa Majesté qui estoit presente il commença avec cette fille une conversation libre jusqu' à l'effronterie. Le guarda Damars voulut le faire retirer, mais il en recut des injures, et sur ce qu'il insista encore a le presser de se retirer, le Comte mist la main sur son poignard le menaçant de luy en donner dans le corps. Le guarda Damars ne pouvant se faire obeir, alla se plaindre au grand maistre qui en fit une consulte au Roy pleine de considerations capables de se porter a faire justice de cette insolence, mais le Comte de Baños estoit proche parent du premier ministre, et n'en eust pas seulement une reprimande."

The most important, and the longest of the suppressed or omitted passages in the printed books and in Mr. Stirling's MS., follows immediately after the above. It is a general summing up of the entire evidence, but done more in the angry spirit of an accuser than with the calm dispassion of a judge. The character of the weak young king may be left without much compunction in the hands of this merciless manipulator. Probing knife and forceps in the hands of historical practitioners have left so little sensibility in this poor victim, as to render the most humane sceptic of the received diagnosis in his case indifferent to the effect which this new, though old, operator may produce upon him. Indeed, some of the pictures in this new sketch it would be a pity to

have lost. We have already seen the poor king hiding behind the curtains of the door to overhear the conversation of the queen with the Ambassadress of France; or sitting alone, talking to himself, and uttering aloud a thousand maledictions on the French. We have him here retiring to rest at seven o'clock, taking his solitary supper in bed, with the doors of his chamber locked, and allowing the queen to knock several times before he would admit her. But the character of the queen is very different. The shadows are laid on certainly with a Rembrandt vigour and depth, unillumined, however, even by that one gleam of atoning light by which we penetrate the mysterious darkness of that great master's grouping. The small virtues she possesed are left in impenetrable shade, while her smaller defects are exaggerated by having the historian's lantern turned exclusively on them. We have fortunately the sunlight of Madame de Villars to flood the entire picture, and as it will be found totally to change its effect. The old offence of looking out of the windows is again brought against the poor queen by the friend of Scarron and a courtier of Versailles; and the crime of a poor French princess keeping her mother-tongue alive (for she knew no other language), by addressing a few words of French to French people, is pronounced unpardonable by the ambassador of France. One is surprised he does not mention that the queen occasionally *laughed*—a breach of etiquette noticed by his lively marchioness. "Elle a le teint admirable," says Madame de Villars, "de beaux yeux; la bouche très-agréable quand elle rit. Que c'est une belle chose de rire en Espagne!"* Almost every statement in this bill of indictment is contradicted by the unimpeachable evidence of Madame de Villars. A few extracts are given from her letters in the notes. I leave the task of reconciling these extracts with the statements in the text to those who can still believe that the "Mémoires de la Cour d'Espagne, depuis l'année 1679, jusqu' en 1681," at least in their integrity, were written by the Marquis de Villars.

"Cette estoit la disposition de la Cour d'Espagne au mois de May de l'année 1681. Le Roy depuis six mois estoit entré dans sa vingtieme année aussi peu avancé d'Esprit et de connoisance, que s'il eust encore esté enfant; il n'avoit pas meme la force d'avoir des passions. Les plaisirs et les exercises luy estoient indifferents; s'il alloit a la chasse, c'estoit seul et presque toujours en carrosse; son aversion pour les dames alloit jusqu' a dire que si quelqu'un luy parloit jamais d'une Maitresse il le poignarderoit."

"Presque toute sa vie passoit dans le palais sans occupation, sans plaisirs, sans conversation, melée seulement de certaines devotions d'habitude moins semblables a la pieté qu' a la superstition, et peu differentes du reste de son oisiveté, il n'avoit d'ordinaire pres de luy que le gentilhomme de sa chambre qui estoit de jour quelque valet de chambre, et deux nains avec lesquels il jouoit, et souvent pour rien, il ne les quittoit que pour passer de temps en temps dans l'appartement de la Reyne,

* "Lettres de Madame de Villars," p. 28.

d'ou il sortoit incontinent. Vers le commencement de l'année 1681, il prist la coutume de se coucher a sept heures du soir, et de souper seul dans son list, faisant fermer son appartement de maniere que la Reyne meme n'y entroit qu' après avoir long temps frappé a la porte, il l' aymoit cependant et auroit esté dans une entiere dependance d' Elle, si Elle avoit eu quelque application a luy plaire et a le gouverner."*

"Mais elle paroissoit pour luy sans amitié comme sans estime† et le plus souvent avec peu de complaisance et de menagement, hors dans les momens qu' elle en vouloit obtenir quelque grace. Son indifference estoit generalle pour tout le reste de la Cour, n'ayant ni bonté effective, ni meme d'honnesté apparente pour les personnes qui l' approchoient, esloignée de faire du bien autant par faute de volonté que de credit, peu liberalle, insensible au service comme a l'injurie, capable de brouiller tout le monde par son indiscretion, entestée de deux ou trois femmes de chambre confidentes de ses souhaits et de ses vues, comme Elle l'estoit a leur amours, sacrifiant tout le reste pour elles, on en vit une marque lorsque dans un jour de ceremonie elle voulut, contre toutes les regles du palais et de la bienseance, que ses femmes de chambres portassent certains voiles comme les filles d'honneur, ce caprice luy attira le chagrin et les plaintes des plus grandes Maisons de la Cour offensées du mepris qu' elle faisoit de leurs filles."‡

"On Luy voyoit d'ailleurs peu de pieté, peu de modestie et de retennue, et tout le jour attachée aux fenestres du Palais si estroittement deffendües aux Reynes et aux princesses d'Espagne, elle estoit a parler des doigts et quelques fois mesme tout haut avec des miserables François qui paroissent autant ses amants que ceux de ses femmes de chambre:§

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* "Cette jeune Reine se conduit jusques ici avec beaucoup de douceur et de soumission pour le Roi,"—Lettres de Madame de Villars, &c. p. 53 (12 Janvier, 1680).

"Cette Princesse continue a se bien porter, . . . Le Roi l'aime autant qu' il peut; elle le gouverneroit assez; mais d'autre machines, sans beaucoup de force ni de rapidité donnent d'autres mouvemens, et tournent et changent les volontés du Roy" Lettres, p. 208—(26 Janvier, 1681).

"Le Roi et la Reine sont dans une grande union, et meilleur depuis deux ou trois mois, qu' elle n'a jamais eté."—Lettres, p. 228, (3 Avril, 1681).

† "Le Roi l'aime passionnément a' sa mode; et elle aime le Roi à la sienne. Elle est belle comme le jour, grasse, fraîche; elle dort, elle mange, elle rit; il faut finir là; et avec tout l'esprit que vous avez, je vous défie de devenir tout ce que j' aurai à vous dire ensuite de tout cela."—Lettres de Madame de Villars, p. 164 (12 Septembre, 1680).

‡ This complaint has a surprisingly feminine look about it, and savours more of the vindictiveness of a dismissed camerera mayor, or a disappointed lady-in-waiting, than the dispassionate recollection of an ambassador.

§ Madame d'Aulnoy's account of one affair of the window, at least, is far from being discreditable to the young Queen—"Mémoires de le Cour d'Espagne, Seconde partie," p. 25. I give it in the translation of Tom Brown:—"The next morning the King went out very early a hunting all alone, without saying a word to the Queen. This disquieted her all day long, and she past the greatest part of it leaning upon the windows of her chamber, although the Dutchess *de Terra Nova* frequently disturbed her, and told her, *that a Queen of Spain ought not to look out at a window.* All that day she impatiently expected the King's return, and as soon as ever he lighted from his horse, met him about

il est certain que selon le genie et les manieres d'Espagne sa conduite auroit dû luy faire craindre des suittes facheuses, si le Roy, et le gouvernement n'eussent esté egallement foibles. Elle ne menageoit point le premier Ministre, mais comme elle estoit sans pouvoir, il se contentoit de la mepriser sans tirer avantage de son peu de conduite ny Luy faire plus de mal qu'elle s'en faisoit Elle meme."*

"La Reyne mere la connoisoit bien et après avoir fait toutes les demarches pour entrer avec Elle en une veritable confiance, dont les liaisons auroient pu leur donner tout pouvoir sur l'esprit du Roy et sur les ministres, elle n'y trouva que de l'indifference et de la legereté, de sorte que voyant ses soins jnutiles elle fut obligée d'abandonner toutes les viies qu'elle avoit formées pour le bien de la Maison Royalle et de l'estat, et ne songea plus qu' a donner le reste de sa vie au repos et a la pieté. Princesse vertueuse, honneste, juste, liberalle, peut estre trop bonne et trop facile, moins sensible, et moins severe qu'il ne convient aux personnes de son rang."†

"Le genie du premier ministre n'estoit guerre plus elevé, que celuy du premier Roy, il avoit quelque facilité pour les complimens et pour le dehors des affaires, hors cette apparence on le trouvoit jusques dans les moindres affaires incapable d'agir de luy meme, et sans discernement

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half the stair-case and threw herself about his neck with that agreeable French liberty which she had not yet forgotten."—Part ii. p. 21.

* Surely this cannot be the same queen of whom Dunlop writes as follows:—

'Yet Louisa d'Orleans passed the dangerous period of life with untainted reputation, and with many claims to popularity and esteem among her subjects. Leaving in the first dawn of youth the most brilliant court in Europe, and entering the most gloomy, she bore the change with cheerfulness, and, except in the few first days of probation, without repining. United to a husband of the most despicable understanding and deplorable ignorance, and who possessed no qualifications which could win attachment or esteem, she paid him, in all his fits of caprice or despondency, unremitting attention, and never was suspected of allowing her affections to stray to a more worthy object. From the beginning of her reign, she showed the greatest sympathy for the distresses of the people; and, during her last illness, being informed that the citizens who had assembled at the gates of the palace, were offering up prayers for her recovery, she said, 'that she was well entitled to this return of affection, as she would at any time have laid down her life to relieve them of the burdens they endured.'"—Memoirs of Spain during the reigns of Philip IV. and Charles II., by John Dunlop, v. 2, p. 247.

† In Madame de Villars' letter there is no mention of this disgust of the queen-mother, and of her abandonment of all efforts to be useful to her daughter-in-law and her son. There is, however, evidence of the strong regard which the queen-mother entertained towards the French Ambassador and his wife. The last sentence we have of Madame de Villars' letter proves this; but it proves also that at this time, towards the very close of M. de Villars' embassy, May, 1681, the union which had been brought about by the good offices of M. de Villars and his wife between the queen-mother and her daughter-in-law still continued. "J'ai vû la Reine Mere ces jours passés," says Madame de Villars in her last letter: "dont j'ai tous les sujets du monde de me louer, par toutes les choses obligeantes qu' elle dit de la conduite de M. de Villars et de la Mienne, quant à l'union de sa belle-fille avec elle; et je suis bien persuadée qu' elle en' écrit conformement à la Reine en France."—Lettres, p. 244.

With regard to the general character of the queen-mother in the text, it is strangely the reverse of that insinuated by Dunlop, and broadly stated by Mr. Ford. (See "Hand-Book of Spain," sect. xi., p. 840.

pour profiter des lumieres d'autruy, il n'en tiroit que de D. Geronimo d'Eguya qui le gouvernoit aussi absolument que s'il en eust esté capable, l'un et l'autre gouvernoient le Roy par le confesseur et par Vibanco qui dans son poste de valet de chambre estoit un petit favory."

"La Camerera Mayor toujours unie avec le premier Ministre, luy rendoit compte de la Reyne aupres de laquelle elle se maintenoit par une grande complaisance a luy laisser faire tout ce qu'elle vouloit, cette liberté excessive fut un malheur pour la Reyne qui s'abandonna sans contrainte a une conduite dangereuse et l'on eu lieu de douter pour les suittes si la severité dure de la Duchesse de Terra Nova ne luy eust point este plus utile que la foible tolerance de la Duchesse d'Albuquerque."

"Le Duc de Medina Celi se conservoit dans le ministere par une conduitte toute singuliere, il sembloit que la foiblesse et l'incapacité qui precipitent d'ordinaire les favoris, servoient a le soutenir; il laissoit aux conseils la disposition des affaires, aux tribuneaux le cours libre de leurs injustices, il ne recherchoit point les malversations passées et ne s'y opposoit point pour l'avenir, les grands et les personnes de qualité vivoient dans leur insolence ordinaire et dans le mepris des loix et de leur Maistre. La Licence et l'impunité estoient generalles, et hors le peuple qui se trouvoist accablé presque tout le monde s'accomodoit d'un gouvernement ou tout le monde estoit le Maistre."—Folio 105.

The "Mémoires de la Cour d'Espagne," properly so called, end at the above passage, on the 105th folio of the Arsenal MS. A blank leaf then follows, and the next page (folio 106) is headed, "Estat de la Cour d'Espagne en L'année 1680." This second division of the MS. extends to folio 132, where the volume ends. There is no difference in the handwriting or the colour of the ink. The first entry is about the King, which certainly was written by a contemporary—"Le Roy est entré dans sa 19e année le 7e Novembre de l'année passée 1679." To this succeeds a description of the personal appearance of the king, which resembles very much that which Madame d'Aulnoy gives of him in her "Travels." * The same may be said of the entry about the queen commencing "La Reine agée de 18 ans." † Characters of the queen-

* "Relation du Voyage d'Espagne," A la Haye, 1715, t. ii., p. 17. It is thus translated in "The Lady's Travels," v. ii., p. 15:—

"I must tell you, then, that his complexion is delicate and fair; he has a broad forehead, his eyes are fine, and have a great deal of sweetness in them; his face is very long and narrow; his lips, like those of the house of Austria, are very thick, and his mouth is wide; his nose is very much hawked; his chin is sharp, and turns up; he has a great head of hair, and fair, lank, and put behind his ears; his stature is pretty high, straight and slender; his legs are small, and almost of a thickness; he is naturally very kind and good; he is inclined to clemency, and of the great variety of council he has given him, he takes that which is most for the advantage of his people, for he loves them extremely. He is not of a vindictive spirit; he is sober, liberal, and pious; his inclinations are virtuous; he is of an even temper, and of easy access; he hath not had all that education which is requisite to form the mind, but yet he seems not deficient."

† Madame de Villars also sketches her at this interesting age:—"En vérité sa douceur, sa complaisance et toute sa conduite, sont des choses extraordinaires à dixhuit ans."—Lettres, p. 83.

mother, the Duke of Medina Celi, and the other officers of state, follow; then the household of the king and queen; the various councils, &c., as in the other books. At folio 123 there is a list of "viceroys, capitaines, generaux, gouverneurs au dedans de l'Espagne," followed by those "Hors d'Espagne." Then comes a list of "Tropes" (corrected "Troupes" by a later hand), "au dedans de l'Espagne." At fol. 125 there is an elaborate list of "Ambassadeurs et Envoyez en la Cour d'Espagne en l'année 1679 et 1680." They are all described minutely, even to their physical appearance, except the Marquis de Villars, who is given the third place. He is simply mentioned thus:—"Le Marquis de Villars, ambassadeur de France pour la seconde fois." This reticence in his favour may not be without significance. After this comes a description of Madrid, and the palace, resembling, if not identical with, that given by Madame d'Aulnoy; this is at folio 126; references are then given to the ports of Spain; and the MS. ends with a recapitulation of the state of the revenue, and the irregularities connected with the administration of the law, justice, &c.

In concluding this inquiry, I should perhaps apologize for the length to which my report of it has run, and which to most persons, I am afraid, will appear quite out of proportion to its importance. Truth, however, is such a very precious material, that the preservation even of its most minute particle is worth the sacrifice of some time and trouble. I feel, nevertheless, that in this investigation I have not so much added to the stock of truth as diminished a little the amount of error. The author of "Mémoires de la Cour d'Espagne" still remains to be discovered. That the papers of the Marquis de Villars may have largely assisted in their compilation is very probable; but that he himself could have been their compiler, or that some of their most curious and interesting statements could have had him for their author, I think I have disproved upon good evidence. It is impossible now to fall back upon Madame d'Aulnoy. The personal and private history of the court was as much out of her reach, as the political reflections throughout the volume were beyond her power. In seriousness, solidity, and reality, the "Mémoires de la Cour d'Espagne" differ as widely from the "Mémoires de la Cour d'Angleterre," or even the "Mémoires de la Cour de France," * as would one of her avowed fairy tales. The arguments which I have

* I have before me three different Memoirs of the Court of France, two of which, at least, are ascribed to Madame d'Aulnoy. One, which appears the oldest, is without date —"Mémoires secrets de Mr. L. D. D. O. ou les Avantures comiques de plusieurs grands Princes de la Cour de France. Par Mad. D'Aunoy. *Auteur de Mem. et Voyage d'Espagne.* A Paris, chez Jaques Bredou."

"Memoirs of the Court of France, &c., written in French by Madame Daunois, the Famous Author of the Letters of Travels into *Spain;* and Done into English by Mr. *A. B.*" London, 1697.

"Memoirs of the Court of France, and City of Paris, &c., in two parts. Translated from the French." London, for *Jacob Tonson* at *Gray's-Inn-Gate*, 1702.

This last can scarcely be a translation of Madame d'Aulnoy's "Mémoires de la Cour de France," or, as it is more generally called, "Mémoires Historiques de ce qui s'est passé

drawn against the authorship of the Marquis de Villars, from the reflections on the queen, would be perhaps still stronger in her case than in his, as the last words of *her* Memoirs are devoted to a grateful recollection of the kindness which the queen had shown her, and to a hope that in the Memoirs of another court, which she was about to write, she would have an opportunity of giving a faithful portraiture "de cette aimable Reine"—a promise which, in the two works I have just quoted, and in the others mentioned in the notes, she does not fulfil.*

The Rev. Dr. Reeves (for Dr. William Bell) read the following paper:—

On the so-called Ring-money, in reference to many Specimens in the possession of the Right Hon. the Earl of Londesborough, and more especially an Irish one, with a Moveable Swivel Ring.

"Flexilis obtorti ad digitos et circulus auri."

It will at the present day be superfluous to prove, from the similarity of our British antiquities with those of the continent in religious rites and temples, or from an identical Anglo-Saxon language, and the close resemblance of names for persons and places, as well as from uniformity in customs and usages, that much, nay, possibly all, that the ancient historians of Germany have left us on these topics may be used to illustrate the earliest religion and language, the nomenclature, and the customs of our ancestors. Adam of Bremen, Wittichind of Corvey, Holmald of Bosan, Ditmar of Merseburg, and numerous others, give us glimpses of manners and usages that may be usefully brought to bear upon the imperfect relations of our own annalists; nor is the benefit unreciprocated. Continental writers call largely into requisition the writings of Bede, of Asser, of Nennius, and our Monkish historians, to supply the deficiencies or elucidate obscurities in their own early records. For Englishmen, however, the best use that can be made of foreign historical inquiries is only in so far as they tend in a more or less remote degree to clear up what is forgotten or obscure in our own history; for manners and practices of distant countries that are without relation to British objects, may be feasibly neglected or feebly regarded by us.

It is with this view that we take up the subject of those curious articles frequently found in the British empire, and commonly, and possibly in part rightly, known under the name of Ring Money, to

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en Europe, depuis 1672 jusqu' en 1579," alluded to by Mr. Planché in the introduction to his translation of Madame d'Aulnoy's Fairy Tales (London, 1858). It contains no preface; but Madame d'Aulnoy (or D'Anoy, as she is called), is incidentally mentioned at p. 118, part 2.

* "Mémoires de la Cour d'Espagne (by Madame d'Aulnoy). A la Haye, 1692. *Seconde partie*, p. 212."

prove by foreign usages and historical evidence the real and principal nature of these enigmatical objects; and which one more curious, and possibly unique, in the valuable collection of the Earl of Londesborough, will incontestibly prove.

The subject is not, however, without danger, as we must not only run counter to preconceived opinions, but it is difficult to bring minds fully occupied with a prior theory to pay attention to citations and proofs from distant, and possibly to them, unknown authorities, which bring only fragmentary and widely dispersed evidence. It has been well observed by a writer on German mythology, in Part xxi. of the Journal of the "*Verein für Alterthumskunde im Reinlande* (Association for the Knowledge of the Archæology of the Rhine Countries) that its specialities have to be collected, and an entirety to be constructed anew from very disjointed and distant fragments; and he adds the exemplification of another writer on the same topic: one place will give us Thor's hammer, and another, possibly, its curious feature of hitting every object at which it is aimed; whilst a third locality, perhaps a hundred miles distant, will adduce its property of always returning (like the Australian boomerang) to the powerful hand from which it was hurled. This may excuse and apologize for referring in our proposed inquiry to old continental practices and writers; and it is only from, as I trust, the successful results, that something of prolixity may be justified.

Before, however, proceeding farther, it may be necessary to animadvert to the prevalent belief that these objects were used as fibulæ to fasten the garments of their owners—a purpose, certainly, for which, from their form, they are very ill adapted: we must suppose, for such intent, that the two projecting lips were inserted in two holes of a heavy toga or outer covering of skins; but in that case the prominent semicircular head must have pressed so forcibly against the breast, and dug itself so deeply in the flesh of the wearer, that the pain must have been insupportable; if inverted, and the bend brought outwards, it would have been often an inconvenient obstacle to the use of the arm or the bend of the neck. We have in Montfaucon some examples of Druidical costume, and in various authors references to their habits and dress, but in none is there the slightest allusion to such a use; and as the articles were, from their material, evidently only in use by the higher classes, such neglect does not appear probable, had this use obtained.*

If we consider the radical meaning of the RING as a symbol, we shall find, without having recourse to the idea of Adelung (*s. v.*), that the final *g* is merely a superfluous suffixus, and that consequently the word contains the idea of purity, from *rin* (to run as a brook), and *rein* (clean); or that our old Saxon *rinse*, and still better *wring*, or Anglo-Saxon

* We believe the entirety of the exhumations of tumuli in this and every other country, though rich in fibulæ and personal ornaments, may be challenged for the production of a single object of this description. My own extended observations have never yet met with an instance; but, at all events, never on skeletons in the necessary position of this ornament.

Hring, with only a variation of the initial guttural, will give the same idea of purity, by transfer of the subjective to its objective consequence; for, though the idea of purity, and consequently of sanctity and truth, be not inherent in our present use of the word *ring*, yet its earliest use as the symbol in acts where purity is especially implied, in the marriage ceremony, proves its ancient acceptance amongst us in this meaning.

Rings were originally, no doubt, an entire circle. The easy fabrication of a circle, and their Greek and Latin denominations, *circulus* or κυκλος, prove this evidently; but the Latin synonyms for orbis terrarum, as *mundus*, which also signifies clean, give us again the primitive meaning of the Saxon *ring* for purity. It is therefore in accordance, that, though we find no classical use of the ring in the marriage ceremonies of either Greeks or Romans, we find it in their usages where faith and truth are implied; in their compacts and agreements of amity and peace. This usage derives from the earliest periods of history; but the Greeks and Romans may have derived the practice more immediately from the East and Persia, where existing monuments sufficiently evince its frequent and solemn use. In the numerous engravings with which Sir R. Ker Porter has illustrated his Persian travels, the examples are frequent.

In vol. i., at page 571, plate 27, we have two examples at Nakshirajab, in which the sacred girdle or guebre belt adds force to the adjuration of the ring, the girdle being, no doubt, the antitype of the Catholic stole, the imposition of which on the joined hands is a portion of the sacramental rite of marriage in that religion.

At page 548 is the representation of a large rock sculpture at Nakshi Roustam: two sovereigns on horseback hold a ring conjointly in each right hand, over a battle-field, as evinced by the corpses beneath their horses' feet: an early example of a *belle alliance* or more modern *enteinte cordiale*.

At page 520 are two standing figures, with rings and concomitants, which would require a long dissertation, and repay the labour, at a more fitting opportunity. A priest of Mithras is emphatically blessing the act with joined hands.

In plate 40 we have a procession following the sacred bull, and in the tier next below we have a person bearing perhaps the monarch's sword, and after him follows another, bearing two rings in his hand, the exact prototypes of a very heavy golden one, dug up in Bornholm, and now in the Royal Museum at Copenhagen; but this latter is too narrow to encircle any portion of the human body, is without the lips, and only a thick solid bar of the valuable metal turned over at both ends so as to be capable of being grasped only by the closed fist in the act of adjuration or abjuration.

As we are at present not writing a history of these rings, but only of their uses, it may be unnecessary to prove that they are found both annular and penannullar in *iron* strongly oxidized, in *bronze* finely patinated, in *silver* more rarely, but frequently in *gold*, and of great weight.

Their sanctity will detain us longer. We find them almost universally as an ornament and sacred utensil of the Northern Germanic and Scandinavian temples, for the purpose of administering oaths or receiving the prayers of the votaries. For this reason Hauptmann von Ledebur, in his account of the Royal Museum of Fatherland antiquities at Berlin, describing the valuable ring found at *Stabelwitz* in Silesia, adopts justly the opinion of Professor Büsching, in calling them *Schwurringe*, rings of adjuration. This example is possibly the heaviest and most valuable of its kind yet discovered, weighing 227 ducats of the purest 24 carats gold: it is oval in form, and its interior diameter $3\frac{1}{8}''$ to $2\frac{1}{2}''$, wide enough to introduce the hand and get it over the wrist, but with no signs of ever having been so worn, which, by the softness of the metal, must have been evident, had it ever been so used: it is, however, certain, that it could never have been used as a fibula, for, though the ends are beautifully chased into lion and dragon heads, whose manes form an elegant ornament some way down the back, they are not sufficiently prominent to bear the weight of a garment as a button, nor is the interval or opening betwixt the two figure-heads sufficient to admit conveniently any kind of web or cloth to have served as a covering. Von Ledebur farther remarks (p. 51), similar gold rings, although not equal to this in weight, have been often found in Denmark and Sweden, and are now preserved in the royal collections at Copenhagen and Stockholm.

For the frequency of these sacred emblems, in Iceland and the north, we quote from "Mallet's Northern Antiquities" (p. 291):—"The Thingstead was always near the temple, in which one of the sacerdotal magistrates performed a sacrifice, and sprinkled the walls of the edifice, as well as the bystanders, with the blood of the victims: *holding in his hand, on this as on every other solemn occasion, a massive silver ring, with which the altar of every temple was furnished.*" The ring in the hand of a priest was the symbol of sacrifice, as in those of the laity a sign of truth, just as at the present day oaths are taken on the Testament, which serves in the pulpit for public supplication and prayer.

Wheaton, in his "History of the Northmen" (p. 32), is more specific on the subject of their attesting sanctity in Iceland:—

"Thorolf landed where the columns of the temple of the god Thor, when thrown into the sea, came to land, and took formal possession of that part of the coast in the ancient accustomed manner, by walking with a burning firebrand in his hand round the lands he intended to occupy, and marking the boundaries by setting fire to the grass. He then built a large dwelling-house on the shores of what was afterwards called the Hofs-vag, or Temple Bay, and erected a spacious temple to Thor, having an entrance door on each side, and towards the inner end were erected the sacred columns of the former temple (in Norway), in which the *reginalar*, or the nails of the divinity, were fixed. *Within these columns was a sanctuary, in which he placed a silver ring, two ounces in weight, which was used in the ministration of every solemn oath,* and adorned the person of the pontiff chieftain in every public assembly,

the oath was—So help me Freyr, Njord, and the Almighty As: a formula found both in the 'Eyrbyggia Saga,' cap. ii., and in the 'Laudnama-Bok,' p. 300."

It is a somewhat earlier period of our own history which gives us confirmation of this method of swearing, and its solemnity as well as inviolability. Most nations have esteemed one mode of adjuration more binding and more sacredly restrictive than the rest. The Roman Styx is too well known to need much illustration, as the imprecation which the gods themselves could not break with impunity: as,

"Adjuro Stygii caput implacabile fontes;"
VIRGIL, *Æn.* xii., 186;

and also,

"Di cujus jurare timent et fallere numen."

But water in general, or chalybeate springs, seem sometimes to have the same inviolable virtue, as in Eumenius, "Panegyr., Constant.," c. xxi.:—"Jam omnia te vocare ad se templa videntur præcipuequeque Apollo, cujus ferventibus aquis, perjuria puniuntur quæ te maxime oportet odisse."

The oath of Odin in the Orkneys, when broken in the case of a seduced female, was punished with increased severity by the elders of a Scotch presbytery, even in the last century; but the most characteristic and most sacred oath of the hot-headed and ever-armed Highlander was by *his dirk*, for the elucidation of which we must refer to Sir W. Scott's own note on the subject, in the 8vo. edition of "Waverley" (note 2 N, p. 153).

The passage referred to from our own history on this topic is an interesting event in the life of our great Alfred, as related by Asser, Giles' translation (p. 58)—"Also they (the Danes) swore an oath over the Christian relics which, with King Alfred, were next in veneration after the Deity himself." But Asser is rightly corrected by the Saxon Chronicle of the year 876; though these piratical invaders seem to have despised even the most solemn obligation of their own temples:—

"And in this same year the army of the Danes in England swore oaths to King Alfred *upon the holy ring*, which before they would not do to any nation; and they delivered to the king hostages from among the most distinguished men of the army, that they would speedily depart from his kingdom. And notwithstanding this, that part of the army which was horsed stole away by night from the fortress to Exeter."

For the *frequency* of these rings in temples we may instance, amongst many other discoveries of them about Druidical circles or cromlechs, the large number of twenty-five exhumed from beneath one of the monolithic pillars of the great Temple of Carnac, in Brittany, which were engraven and offered for sale throughout Europe about five years since.

But that the practice of ring swearing was not altogether foreign to our own island, the oath to Odin, already adduced, seems to prove; and the following passage from the "Gloucester Book of the Brit. Archæolog. Association," p. 62, will render it indisputable:—

"St. Bega was the patroness of St. Bee's, in Cumberland, *where she left a holy bracelet*, which was long an object of profound veneration: a small collection of her miracles, written in the 12th century, is extant, and has been published." In the prefatory statement of the compiler, we learn, among other things, that—"*Whosoever forswore himself upon her bracelet swiftly incurred the heaviest punishment of perjury, or a speedy death.*"

Upon this passage we may observe, that as the Anglo-Saxon *Beagas*, the French *Bague*, is the usual denomination of our Saxon ancestors for rings, we may venture to predict that holy St. Bega was but a personification of one of the holy rings, which, having gained great hold on the minds of the heathen Cumbrians, it was not politic in their first Christian missionaries wholly to subvert; the Papal policy sought to divert the popular veneration to its own benefit by the improvisation of a new saint, and the onomatopœia of the ancient venerated emblem, as in the other instances, by which St. Veronica and St. Longinus were transferred as veritable personages to the Papal calendar from the sudarium, and the spear by which the body of the Saviour was pierced on the cross.

With inscriptions we have only, as oath rings, a single one, but graven with an important word; it was found in Bavaria, and described with an engraving in vol. i. of the "Philosophical Transactions of the Royal Bavarian Academy;" the letters, in old German characters, form the obsolete German word

Gewrokt,

which has the same meaning almost as the obsolete English *wroke* and *wroken*, from the verb to *wreak*, viz., to imprecate revenge or vengeance; so in the Bremen low Saxon dictionary—"*Wraken wreken*, rächen; Cod. Argent. *wriken*, ad. *wroxan*, Holl. *wraecken*, Altfräuk. *wrerecho*." It is further remarked:—"This word is allied to the preceding *wraken;* to throw out (Baltic merchants know well the meaning of wracked or bracked deals and timber), because the avenger throws out from him and persecutes the perjurer."

There is, however, still remaining another possibly unique specimen of these rings in the possession of the Earl of Londesborough, found in Ireland, which deserves special attention, as elucidating the magisterial uses of these rings, and a curious passage in Scotch judicial practice, which seems hitherto to have escaped inquiry, and of which I can find no trace but in the curious pages of our Northern Wizard, comes to our aid, and we trust also by it to explain to Teutonic inquirers a passage in their own mythology which they appear to have hitherto misunderstood.

This ring, as far as a cursory view amongst an assemblage of objects of the highest archæological interest, and through a glass case, enabled me to note, is of silver, almost annular, and with the usual lips; but the peculiarity consists of *a moveable swivel ring, which can be slided round the circle*, but not taken off the ring, from the obstruction of these protruding lips.

The chronicler Ditmar, Bishop of Merseburg, about the year 1010, has the following passage (Pertz, vol. iii., lib. iii., p. 858):—

"Non est admirandum quod in hiis partibus tale ostentatur prodigium (a portentous noise) nam traditores illi raro ad ecclesiam venientes de suorum visitatione custodum nil curant. Domesticos colunt Deos, multumque sibi prodesse eosdem sperantes, hiis immolant. *Audivi de quodam baculo in cujus summitate manus erat unum in se ferreum ferens circulum* quod cum pastore illius villæ in quo is fuerat per omnes domos has singulariter ductus, in primo introitu a portitore suo sic salutaretur '*Vigila, Hinnil, Vigila,*' sic enim rustica vocabatur lingua, et epulantes ibi delicate de ejusdem se tueri custodia stulti autumabant, ignorantes illud Daviticum: simulacra gentium opera hominum, &c."

The Latinity of the good Bishop is universally given up, and we know not whether it be owing to the obscurity of his language, or to the imperfection of the verbal report he had received, that his commentators are completely at fault on the passage. Ursinus and Wedekind (p. 242, note), seem to think that *Henil* in the passage has been generally but erroneously taken for a household deity—"Nomine *Hennil* non Penates intellexerunt;" whilst Jacob Grimm (in "Deutsche Mythologie," 2ter Ausgabe, p. 710), contrary to his usual wont, hesitates in his deduction from a Bohemian word and practice to bring it in conformity with the morning dawn, and construes the three words—"aurora est (erumpet) Vigila, Vigila." Yet he had before him, in the following note quoted from Wedekind, probably the true explanation—"Ego vero longe aliam rem, sub hoc baculi ritu, arbitror latere, ut scilicet genius rusticorum illius ætatis tulit. *Baculus iste, ut ego quidem reor, signum erat quod pro convocanda concione pagana ostiatim mittebant.* Nomine *Henil* non Penates sed quidlibet proximum sibi vicinum allocutus est familiariter ut excubiarum vigiliarumque vices in pago servaret; hinc acclamatio 'Vigila! Hennil Vigila!' (auf die wache! nachbar! auf die wache!) conservant passim consuetudinem hanc incolæ pagorum nostrorum ad hunc usque diem, *ut quando prætor paganus convocare velit, hastam vel baculum vel malleum ostiatim mittat, quo incola vicini cujusque fores pulsat donec ex ultimi manu ad prætorem redeat* In quibusdam pagis ad concionem convocandum ex ordine in unum annum eligitur paganus quem vocant *Heimburgen.* Ditmari ætate illud convocationis symbolum pastori pecoris tuendum tradebant."

Had Ursinus, the writer of this note, extended the sign and scene of convocation from a town or village to a hundred or county, he would have described exactly the practice so well established for Scotland in sending round *the fiery cross* (to which we shall again revert), after finding there conformities in judicial practices explained by Lord Londesborough's Irish ring, a combination of dispersed localities, which the authority mentioned at the commencement of the paper explains and justifies.

In the Cyrmogea of the learned Icelander, Arngrim Jonas, (p. 71), we have the same intimation for his native island, and an indigenous name for the staff that has much verbal conformity, and a satisfactory expla-

nation in our native tongue; he says:—"Conventus vero habendi, *crux lignea* signum erat, post annum certe millesimum, quum jam in fidem Christianam jurassent antea fortasse *cestra vel malleus Jovis* (Thor's hammer) pro ejus temporis religione;" and in the periodical from which I borrow this quotation ("Balt. Stud," vol. x., part ii., p. 23), it is added—"Die Isländer brauchen als *Budstikke* ein Stück Holz, das, wie ein Axt geformt ist, nach alter Sitte." (The Icelanders use as their *Biddingstick* a piece of wood in the form of an axe (hammer) according to ancient custom,

That I have translated *Budstikke* in this passage into Bidding stick, will not appear forced to those who have heard of the bidding weddings of Wales or the North; or who in Hamburg have witnessed the calls of a guild of operatives, joiners, masons, &c., to attend the funeral of a deceased fellow-labourer by a *Ver-bitter* with a short black staff entwined with a white fillet and surmounted by a lemon, as the emblem of his melancholy office.

There are variations in this name, as *Budkafte, Budlafa;*—but the latter alters the idea merely by the introduction of dispatch—by the Yorkshire *loup* to run, and the German *laufen;* as also in the north, when a traveller wished to avoid the delays usual at the post stations, a *lauf* zettel was forwarded before him from place to place, to have relays in readiness. *Budkafte* may be a modification of the symbol sent round; which, from the analogy of other magisterial or potential commands, may frequently have been a *ring* or staff. These were often the symbols of the most important acts—"Et illuc venit Dux Thassilo et reddit ei (Carolo magno) ipsam patriam cum *baculo* in cujus similitudo hominis (Pertz, i., 43, *l. c.*); and, "Conradus rex—curtem per investituram *baculi imperialis* tradit ipsumque baculum in testimonio reliquit" (Lang. Reg. 1, 76, anno 1076).

But in a collection on Lithuanian history, compiled by a body of learned Jesuits, we have a very full and complete explication of this emblem in connexion with the high dignity of the royal pontiffs of heathen Prussia, the Krive Krivesto (Pontifex Pontificorum), and the subordinate degrees of this regulated priesthood, on which latter I refer to my "Shakspeare's Puck and his Folkslore" (pp. 267, 317, 326):—

"Postea (Krive) floruit in ducatu tantum Samogitiæ usque ad extremum tempus conversionis, scilicet ad annum 1414 Mens. Jul. 28, qua mortuus est in Villa Onkain ultimus Krive Krivesto nomine Gutowtus numero lxxiv. flamen. Cum eo verum extincta est dignitas, magni olim ponderis, in rebus sacris juditiarisque per totam terram Lethovicam, Semigalliam, Livoniam, Lithuaniam, Samogithiam, Curroniam, Sanigalliam, Livoniam, Lethigaliam necnon Kreviciensium Russorum: qua in declinio xi. sæculi incipit sensim deperire: denique tenebræ eviternæ paganismi fugientes se de terra in terram dissipatæ sunt ante faciem Christianæ fidei et crucis sanctæ."

We have here also the forms of the Bajulus Symbolum Jurisdictionis of this Krive and his subordinates, which the writer says, "vulgo sermone *Bathiuckas* nuncupatus."

These symbols are merely intensitive, from the simplest for the third degree of the priesthood, to the Waidelot, which, for the Ewarte and Krive, was duplicated and triplicated, and therefore it will be sufficient to give the description of the lowest.

"Symbolum jurisdictionis communi sacerdotis jusjudicandi habentis, Waidelote vel alii id generis, vulgari sermone *Buthus* nuncupatis, talem habuit formam.

"Baculus longiusculus ligno simplici querci supra quem est una virga curvata in modum nodi paululo inclinatæ rursumque junctione una bursa pendet; sed et sigilla eorum portabunt talia symbola ut ait chronista Ruthenus."

We have before remarked that the next stage in the priesthood had this symbol doubled, and the third or highest had it trebled; and from it the pontiffs of Rome may have taken their hint of a symbol for their threefold claim of power over hell, on earth, and in heaven, in the papal tiara.

In the imperfect drawing, however, of this heathen symbol we may readily find in the top bend the penannular Irish ring; and not improbably in the lines and bends surmounting it, the imperfect rudiments of a moveable swivel, to bring it into perfect conformity with the principal object of our inquiry.

Had Von Ledebur, in his above-quoted work, given a drawing of the following enigmatical (räthselhaft) object, described at p. 32, we might possibly have found the swivel in an evidently heathen magisterial symbol, dug up from beneath a tumulus near Schwerin in Mecklenburg, and *in an urn!*

"It exhibits the upper portion of a buckle (bügel), an inch broad, and $3\frac{1}{2}$ inches wide at the head, which on the under surface is flat, but on its upper is ornamented with lines and rings. In its centre is a four-sided pyramid, with one step, *and in its upper portion a hand ring or catch* (griff) *moves freely* Its bronze material, incrusted with a beautiful ærugo nobilis, is finely worked, and glitters on some places, where worn by friction, like gold."

It is to this moveable portion of the emblem that we particularly direct attention, as, from whatever cause or concatenation of ideas, judicial importance attaches to a moveable ring in Scottish jurisprudence. It is solely to the antiquarian knowledge of the great Scotch novelist, in "The Antiquary" (8vo edit., 1846, Part i., p. 476, cap. xi.), that I owe my knowledge of this fact; for my search elsewhere in books has been fruitless, and I have no personal legal friends in the north from whom to make inquiries.

The transaction refers to an execution put into Wardour Castle, and the resistance offered to the officer by the hot-headed zeal of the Highland soldier, M'Intyre:—

"The legal officer confronted him of the military; grasped with one doubtful hand the greasy bludgeon which was to enforce his authority, and with the other produced his short official baton, tipped with silver,

and having *a moveable ring* upon it. 'Captain M'Intyre—Sir,—I have no quarrel with you; but if you interrupt me in my duty, I will break the wand of peace, and declare myself deforced.'

"'And who the devil cares,' said Hector, totally ignorant of the words of judicial action, 'whether you declare yourself divorced or married; and as to breaking your wand, or breaking the peace, or whatever you call it, all I know is, that I will break your bones if you prevent the lad from harnessing the horses, to obey his mistress's orders.'——'I will take all who stand here to witness,' said the messenger, 'that I showed him my blazon, and explained my character. He that will to Cupar maun to Cupar'—*and he slid the enigmatical ring from one end of the baton to the other*, being the appropriate symbol of his having been forcibly interrupted in the discharge of his duty."

"Honest Hector, better accustomed to the armoury of the field than that of the law, saw this mystical ceremony with great indifference, and with the like unconcern beheld the messenger sit down to write out an execution of deforcement. But at the moment, to prevent the well-meaning honest Highlander from running the risk of a severe penalty, the antiquary arrived, puffing and blowing, with his handkerchief crammed under his hat, and his wig upon the end of a stick.

"'What the deuce is the matter here?' he exclaimed, hastily adjusting his head-gear—'I have been following you in fear of finding your idle loggerhead knocked against one rock or other.'—'I think you would not have me stand quietly by and see a scoundrel like this, because he calls himself a king's messenger, forsooth (I hope the king has many better for his meanest errands), insult a young lady of family and fashion, like Miss Wardour?' 'Rightly argued, Hector,' said the antiquary; 'but the king, like other people, has now and then shabby errands, and, in your ear, must have shabby fellows to do them. But even supposing you unacquainted with the statutes of William the Lion, in which, *capite quarto versu quinto*, this crime of deforcement is termed *despectus Domini Regis*, a contempt, to wit, of the king himself, in whose name all legal diligence issues—could you not have inferred, from the information I took so much pains to give you to-day, that those who interrupt officers, who come to execute letters of caption, are *tanquam participes criminis rebellionis*? seeing that he who aids a rebel is himself *quodammodo* an accessory to rebellion."

The extract is long, but the words are those of Sir Walter Scott, and the entire citation was necessary to elucidate the practice, since, contrary to the author's usual wont, when Scotch customs require elucidation for the English reader, this, one of the most curious, is left without explanation, though it is termed enigmatical and mystical; it would have been a great boon to southern readers to have known how Scott found "the symbol *appropriate*."

The result of our inquiries hitherto may, we think, be fairly stated—that rings were heathen symbols of great veneration and general juridical use in the possession of the priests of our own and foreign heathen

temples; that from the close verbal conformity of the Anglo-Saxon beaga (ring), and the Latin baculum (a staff), the two objects might easily be confounded; and that convenience and centuries may have imperceptibly wrought the change; both the heathen ring and the Scotch baton may have had moveable swivel rings by which to attach criminals. The Irish ring of Lord Londesborough would then be explainable, partly from the Icelandic rings, and partly from the Scotch "enigmatical symbol," and the combination of both would be mutually corroborative.

Their use as ministering sanctity to oaths would be only one of the purposes to which they might be applied; but the penannular form and lipped ends fit those of such shape more especially for administering an oath by the priest or Krive. Held in his hand, the party taking the oath would lay a finger from each hand, or his palms, upon the flattened ends, whilst calling the Deity to witness the truth of his affirmation. Exposing the palms of the hand was in all ages appropriate in addresses to the Deity: the classics abound in such proofs:—

> "Tendit duplices ad sidera palmas—
> Geminas tollit ad astra manus,—
> Digitis intendit mollibus arcum."

And from this touching seems to have originated the custom of *a corporal oath;* as before the Reformation oaths were taken on the reliques of saints—*super corpora sanctorum,* as is witnessed in the relation of Harold's oath to William of Normandy. Even subsequently, in the raths-strike of the old town of Lüneburg, oaths are still administered by the venerable fathers of its senate upon a popish reliquary, the bones having been removed from it.

It may also be noticed that one of these Irish rings, late in the possession of Mr. C. Croker, and figured by him in Smith's "Collectanea Antiqua," seems to have flanges broad enough for the full palm to rest on; so in Wilde's "Catalogue," Figs. 591, 592, 593.

Different and distant countries may have varied the manner of administering oaths. What we have hitherto seen supposes them given in a set formula by the priest holding the sacred symbol in his own hand for the imposition on it of the palms or fingers of him by whom the oath was taken. This view may be justified by the method of swearing fealty to a suzerain lord, which was by the vassal placing the fist of his lord in his two hands, and so vowing fidelity and homage. The fist of the lord here replaced the heathen ring, as, no doubt, the ancient ceremony is more adapted to Christian practice. But in some places the practice may have been to give the symbol into the hands of him who swore, and this method is reduced in our modern courts to delivering the Testament to be held by the witness. Rings without lips or flanges, and which are only capable of being held by the fingers doubled on the palm, may have been used for such variation of the ceremony, as one exists at Copenhagen, dug up in the island of Bornholm, formed merely by doubling both ends of a massive circular bar of the purest

gold, and in weight five pounds, which could have served no other purpose. It is also curious in another respect, having a thin gold wire of equal purity twisted round it, evidently with the intention of bringing the object to a certain weight and value; *ad certum pondus*, is Cæsar's expression when speaking of the monetary use of iron rings in Britain; and that these rings of valuable metal and ready distribution, might not have served like any other costly chattel, immediately at hand, as a reward or payment, may easily be admitted; but only occasionally and by no means as what their usual designation of *ring money* might imply, the current coin of a country; we seem to have taken this name and idea from the quantities of bronze objects in this form which are now so largely imported into Africa from Liverpool, as a species of currency, of which the late Sir John Tobin was the principal exporter, and is now succeeded by Mr. Charles Stuart, who informed me, in an accidental meeting at a table d'hôte at Münster, that his possession of the receipt for the peculiar combination of the metals was a valuable legacy from Sir John, which gave him nearly the monopoly of the African trade, and of the importation of palm oil into this country, to the extent of ten thousand tons annually. The swarthy negroes of the Gambia and Senegal reject all such rings as do not conform to his receipt, by some peculiar analysis, which it might be curious and beneficial to any one to investigate.

To the antiquary it might be more curious and interesting to know why these savages still insist upon the peculiar form of the Anglo-Saxon beaga, which, to European ideas, seems very inconsistent with commercial utility or convenience. In my 'Shakspeare's Puck and his Folks-lore" (London, 1852, 8vo., p. 238), I have traced the only religious idea or emblem which those Africans, that do not profess Mahommedan tenets, hold sacred, viz., their *Fetisch*, to a western word, and a connexion with our legends of Robin Goodfellow, Puck, &c.; and it may, therefore, have been by some equally circuitous route that the form and shape of this ring money may have penetrated where but few Europeans have forced their way. Sir William Beetham tells us ring money in this form has been found in Italy; and he exhibited at the Archæological Institute, July 17, 1848, two specimens found respectively at Chiusi and Perugia; these may have been the first stepping-stones of their route into Africa.

In a country where the mind is stagnant, and progress precluded by ignorance and barbarism, the prestige of sanctity once established would remain unaltered for ages; and our country receives at present possibly greater material benefit from this sanctity in the manufacture of the article, than our ancestors from its use.

As an example that these rings, when of the precious metals, might have frequently, like modern snuff-boxes, pins, &c., been dispensed by princes as rewards, we will give an example of other valuable moveables being thus disposed of from Giesebrechts, "Geschichte der Wenden," "Hist. of the Wends," vol. i., p. 218: — "Einar took opportunity to tell

Harold he would not remain longer with Jarl Hakon, who valued gold more than Skalds and their praises; he would rather go over to Signaldi, if he would receive him. But Einar suffered himself to be persuaded, when he got a present of a golden pair of scales with two weights, one of gold, the other of silver (which were also magical dies) which revealed the future. From this circumstance, Skald Einar got the surname of *Skalagtam* (Scale King)."

We have before said that Christianity introduced the *cross* in lieu of the ring, for summoning the clans; and fitness and its greater readiness of being seen at a distance rendered this cross *fiery*. In the following beautiful lines from Scott's "Lady of the Lake," the knowledge of this custom is rendered immortal for his country; but before I give them, permit me to make a remark on the emphatical introduction of the goat into the custom and sacrifice, as it may show the poet's great knowledge of the practice even abroad, and give German mythologists a better interpretation of Ditmar of Merseburg's enigmatical *Henil* than has yet appeared. I must again refer to my "Shakespeare's Puck," where at p. 239 is the mythical figure of a fawn, and the following pages explanatory of it and kid bearing in general; it is there remarked that kid in our language means both the young of the goat and a faggot or bundle of sticks; now, the Latin *hinnulus* for kid is merely a prosopopœia of the natural bleating of the young animal, and may therefore have been as easily received by one nation as another, for its designation; it would be merely requisite to supply the other sense of baculus in the northern tongue; at all events, the oldest Teutonic word for a sheep is hammel, and many instances may be adduced from all languages of the indiscriminate use of the letters *m* and *n*. Adelung, on the letter *n*, gives various examples of the change; and hammer, Thor's Hamar, which Adelung (s. v.) deduces from the same root as differing (objective and subjective) views of mutilation, has both a verbal and national connexion, and would give the Icelandic axe, which was sent round for their gatherings, as my extract from Arngrim Jonas proves; so that *Vigila! Henil, Vigila!* interpreted by modern practice, would mean, *Awake, there is the fiery cross to bear! awake!* But I will no longer detain my readers from the beautiful lines of Scott, as a compensation for the possibly dry details of the preceding pages:—

VIII.

"'Twas all prepared, and from the rock
A *goat*, the parent of the flock,
Before the kindling pile was laid,
And pierc'd by Roderick's ready blade.
Patient the sickening victim eyed
The life-blood ebb in crimson tide
Down clotted beard and shaggy limb,
Till darkness glaz'd his eye-balls dim.
The grisly priest, with murm'ring prayer,
A slender *crosslet* form'd with care,
A cubit's length in measure due,
The shaft and limbs were rods of yew,
Whose parents in Inch-Caillach wave
Their shadows o'er Clan Alpin's grave,
And answering Lomond's breezy deep,
Soothe many a chieftain's endless sleep.
The cross thus form'd he held on high
With wasted hand and haggard eye,
And strange and mingled feelings
woke
While his anathema he spoke.

IX.

"'Woe to the clansman who shall view
This symbol of sepulchral yew,
Forgetful that its branches grew
Where weep the heavens their holiest dew
On Alpine dwelling low.
Deserter of his chieftain's trust,
He ne'er shall mingle with their dust,
But from his sires and kinsmen thrust,
Each clansman's execration just
Shall doom him wrath and woe.'
He paus'd: the word the vassals took
With forward step and fiery look;
On high their naked brands they shook,
Their clattering targets wildly strook,
And first in murmurs low,
Then, like the billow on his course,
That far to seaward finds its source,
And flings to shore its muster'd force,
Burst with loud roar their murmurs hoarse
'Woe to the traitor, woe!'
Benan's grey scalp the accents knew:
The joyous wolf from cover drew,
Th' exulting eagle scream'd afar—
They knew the voice of Alpine's war.

XI.

"Then deeper paus'd the priest anew,
And hard his lab'ring breath he drew,
While, with set teeth and clenched hand,
And eyes that glow like fiery brand,
He meditated curse more dread,
And deadlier on the clansman's head,
Who, summon'd to his chieftain's aid,
The signal saw, and disobey'd.
The crosslet's points of sparkling wood
He quench'd among the bubbling blood;
And as again the sign he rear'd
Hollow his curse and voice was heard.
'When flits this cross from man to man,
Vich Alpine's summons to his clan,
Burst be the ear that fails to heed,
Palsied the foot that shuns to speed.
May ravens tear the careless eyes,
Wolves make the coward heart their prize.
As sinks that blood stream in the earth,
So may his heart's blood drench his hearth;
As dies in hissing gore this spark,
Quench so his light, destruction dark;
And be the grace to him denied
Brought by this sign to all beside.'
He ceas'd; no echo gave again
The murmur of that deep amen.
Fast as the fatal symbol flies,
In arms the huts and hamlets rise;
From winding glen, from upland brown,
They pour'd each hardy tenant down;
Nor slack'd the messenger his pace—
He show'd the sign, he nam'd the place,
And, pressing forward like the wind,
Left clamour and surprise behind.
The fisherman forsook the strand,
The swarthy smith took dirk and brand;
With changed cheer the mower blithe
Left in the half-cut swathe his scythe;
The herds without a keeper staid,
The plough was in mid furrow laid;
The falc'ner toss'd his hawk away,
The hunter left the stag at bay;
Prompt at the signal of alarms,
Each son of Alpine rush'd to arms.
So swept the tumult and affray
Along the margin of Achray."

These beautiful lines give us a view, in vivid language, how these *rings* were transmitted as the emblem of the supreme Priest and his warrant; this was not restricted to a staff or any particular badge. We learn, in a curious passage of Peter of Dusburg, an early contemporary chronicler of the conflict of the Teutonic knights with the ancient Wends of heathen Prussia, that this symbol might be a staff *or any other known sign* sent round by the Krive to his subjects; and what so known as the ring always kept in the temple?

"Fuit in media nationis hujus perversæ, scilicet in Nadrovia, locus quidem dictus Romove in quo habitabat quidem dictus Crive quem colebant pro papa, quia sicut dominus papa regit universalem ecclesiam fidelium ita istius nutum seu mandatum non solum gentis prædictæ sed Lithowini et aliæ nationes Livoniæ terræ regebantur. Tantæ fuit auctoritatis quod non solum ipse vel aliquis de sanguine suo verum *et nun-*

cius cum baculo suo vel alio signo noto transiens terminos infidelium prædictorum a regibus et nobilibus et communi populo in magna reverentia habebatur."

Voigt, in his history of ancient Prussia, gives a somewhat varied version of the passage and practice:—"Quod etiam nuncius qui ejus *baculum aut signum aliquid* portabat ab eo missum principes etiam et communis populus multo honore colebant et omnia præcepta ejus firmiter servabant."

In his note F to the above lines, at the end of the volume, the great poet brings his legendary lore in aid of his poetic painting. The cross was called in Gaelic *Creaw-Fareigh*, or the cross of shame, because disobedience to what the symbol implied inferred infamy: this idea is not farther removed from that implied in the Bavarian inscription above, *Gewrokt*, than cause from effect. He also appends a relation from Olaus Magnus, to the same purpose, and corroborative of those older ones I have adduced from Dusburg. More extended reading would have given Sir Walter stronger and better coincidences with his Creaw-Fareigh in the Danish *Budlafa* already noticed, and still stronger in the Swedish *Budstikke*, on the authority of John Stiernhook, "De Jure Suev." (lib. i. b):—"In priscis Sueoniæ legibus citatio per baculum. Hunc emittebant territorii quadrantibus et per manus vicinorum extraditus et facti notitiam simul et comparandi mandatum circumferet; quomodo non judicia tantum sed et promiscue omnes conventus publici indicati fuerunt ubi de casu aliquo extra ordinem deliberandum erat aut indicandum. Erat autem hic baculus nuntiatorius effectus ad modum rei de qua in conventu tractatio instituenda fuit, ut si res sacra, *crux lignea;* si homicidium, *ligneum telum aut securis.*"

More examples might be adduced; but if the above are insufficient, any addition could scarcely insure conviction, and must be wearisome to follow.

Sir Walter, in the same note, adduces instances of a comparativel recent and successful use of the fiery cross during the Scotch rebellion in 1745–6:—

"During the civil war of 1745–6, the fiery cross often made its circuit; and upon one occasion it passed through the whole district of Breadalbane, a tract of 32 miles, in three hours.

"The late Alexander Stuart, Esq., of Inverhagle, described to me his having sent round the fiery cross through the district of Appine during the same commotion. The coast was threatened by a descent from two English frigates, and the flower of the young men were with the army of Prince Charles, then in England; the summons was so effectual, that even old age and children obeyed it; and a force was collected in a few days so numerous and enthusiastic, that all attempts of the intended diversion upon the coasts of the absent warriors was, in prudence, abandoned as desperate."

In continuance of these notices, the following passage, from a provincial newspaper of October, 1853, may be adduced, showing that the

memory of the fiery cross is not yet entirely extinguished in the minds of the warm-hearted Highlanders:—

"The other day, John M'Arthur, employed as a serviceman on the roads, while attired in full Highland costume, and *carrying a large fiery cross*—the emblem by which the clans in the days of other years were assembled—ran on the public road west from the east end of old Kilpatrick, a distance of three miles in eighteen minutes, in order to show the juveniles how telegraphing in the Highlands was performed long before the existence of steamboats, or rails, or common roads."

It may also be allowed to remark that Leach, the popular illustrator of "Punch," must have presumed upon a very general knowledge of the practice and custom when, during the commotion excited by the elevation of Archbishop Wiseman to the title of Eminence and the dignity of Cardinal, he is represented *in pontificalibus* hurrying with the fiery cross through the country.

Our further and final deductions regarding the ring more particularly under notice may be summed up as follows:— That it has been one of the solemn symbols of our Irish pontiff, and has been most probably sent round to summon his flock for convocations in peace; for arming and assembling against the enemy or invader in time of war; that the ring could be slided from one point to the other, and was used to indicate the anathema and imprecations which Scott has so forcibly set forth upon any recusant or clansman,

> "Who, summon'd to his chieftain's aid,
> The signal saw, and disobeyed."

The term *backslider* would be a curious verbal modern term and interpretation. We are justified in such interpretation of the swivel ring from the use still thus made of it in the long quotation above, from "The Antiquary;" and the conclusion we arrive at may be fairly stated, that this ring bears impress of the vitality of British (Irish and Scotch) judicial customs, from their earliest Paganism, unaffected by the influences of Christianity, or a new and entirely opposite code of laws. Jurisprudence may change its precepts, a fresh view of duties and morals obtain, but customs and observances founded in nature are unchanging and permanent in the minds of a nation.

Mr. William Lawless, of Kilkenny, presented the following donation:—

A silver pectoral cross, of elaborate workmanship, composed of five crosses, connected together, and ornamented in the front with settings of uncut garnets and light-blue glass beads, surrounded with twisted wire, and twenty triangular pyramids, composed of small silver shot. The back, though much worn, retains traces of the crucifixion and evangelical emblems, wrought on a ground of niello. Portions of both front and back were originally gilt; and from the remains of two pins, which extend from the rays of the central cross, it may be concluded that four beads were necessary to complete this part of the ornament. When per-

fect, this cross was an unusually rich specimen of the jeweller's art of the time. It was found at Callan, county of Kilkenny, and is noticed in the "Transactions of the Kilkenny Archæological Society," vol. iii., p. 412.

Mr. Lawless also presented a crucifix and reliquary of silver; a slender crucifix of silver; a collection of 32 amber, 32 jet, 13 variegated glass, 26 opaque, and 203 amber-coloured glass beads.

The thanks of the Academy were returned to the donor.

Catterson Smith, Esq., on the part of Mrs. Tottenham, of Rochfort, county of Westmeath, presented a choice collection of Irish antiquities, consisting of articles in bronze, bone, and wood—42 in number.

The marked thanks of the Academy were returned to Mrs. Tottenham; as also to Mr. Smith, at whose suggestion the gift was made.

MONDAY, JANUARY 12, 1863.

The Very Rev. Charles Graves, D.D., President, in the Chair.

Christopher Coppinger, Esq., Q.C.; Patrick W. Joyce, Esq.; Thomas Richardson, M.D., and Captain Meadows Taylor, were duly elected members of the Academy.

The Very Rev. the President read a paper on—

Some Notices of the Acts of St. Patrick, contained in the Book of Armagh.

The conclusions which Dr. Graves endeavours to establish in this paper are the following:—

I. That Muirchu Maccumachteni, the author of the Life of St. Patrick, with which the "Book of Armagh" commences, was the son of Cogitosus.

This conclusion is founded (1) on a necessary and certain emendation of the text in the prologue of Muirchu's Life of St. Patrick. The prologue stands thus in the manuscript:—

"Quoniam quidem, mi domine Aido, multi conati sunt ordinare narrationem utique istam, secundum quod patres eorum et qui ministri ab initio fuerunt sermonis tradiderunt illis, sed propter difficillimum narrationis opus, diversasque opiniones, et plurimorum plurimas suspiciones, nunquam ad unum certumque historiæ tramitem pervenerunt; ideo, ni fallor, juxta hoc nostrorum proverbium, ut deducuntur pueri in amphitheatrum, in hoc *periculosum et profundum narrationis sanctæ pelagus*, turgentibus proterve gurgitum aggeribus, inter acutissimos Charybdes, per ignota æquora insitos, a nullis adhuc lintribus excepto tantum uno patris mei cognito si expertum atque occupatum, *ingenioli mei* puerilem

remi-cymbam deduxi. Sed ne magnum de parvo videar fingere, *pauca hæc de multis* Sancti Patricii gestis, parva peritia, incertis auctoribus, *memoria labili*, attrito sensu, *vili sermone*, sed affectu piissimo caritatis et sanctitatis tuæ et *auctoritatis imperio obediens, carptim* gravatimque *explicare aggrediar.*"

[Here follow the headings of the chapters into which the first Book of Muirchu's Life of St. Patrick is divided; and at the close of them is the following colophon].

"Hæc pauca de Sancti Patricii peritia et virtutibus Muirchu Maccumachteni, dictante Aiduo Slebtinensis civitatis episcopo, conscripsit."

The change of the words *cognito si* into *Cogitosi* restores meaning to the foregoing passage, which, in its present state, is unintelligible.

The author's conjecture is confirmed (2) by the observation that Machteni is, in its signification, exactly equivalent to Cogitosi. Machtnaim is the word which would be chosen to represent the Latin *cogito*.

II. Dr. Graves proceeds to show that the Cogitosus who was father of Muirchu Maccumachteni was the author of the Life of St. Bridget, edited by Colgan, in his "Trias Thaumaturga," p. 518. This conclusion rests mainly upon a comparison of phrases in Muirchu's prologue, given above, with phrases occurring in the introduction and concluding paragraph of the life of Bridget, by Cogitosus.

The passages referred to are as follows:—

"Cogitis me fratres ut Sanctæ et Beatæ memoriæ Brigidæ virginis virtutes, et opera, more doctorum memoriæ litterisque *tradere aggrediar.* Quod opus impositum, et delicatæ materiæ arduum, parvitatis et ignorantiæ meæ, et linguæ minime. Sed potens est Deus de minimis magna facere; ut de exiguo oleo et farinæ pugillo domum implevit pauperculæ viduæ. Itaque *jussionibus vestris coactus, satis habeo meam non defuisse obedientiam*, et ideo, *pauca de pluribus* a majoribus et peritissimis tradita, sine ulla ambiguitatis caligine, ne inobedientiæ crimen incurram, patefacere censeo. Ex quibus quanta qualisque virgo virtutum bonarum florida cunctorum oculis innotescat. Non quod *memoria, et mediocritas, et rusticus sermo ingenioli mei*, tanti muneris officium *explicare* valeret; sed fidei vestræ beatitudo et orationum vestrarum diuturnitas meretur accipere, quod non valet ingenium dictantis. Hæc ergo egregiis crescens virtutibus, ubi per famam bonarum rerum ad eam de omnibus provinciis Hiberniæ innumerabiles populi de utroque sexu confluebant vota sibi voventes voluntarie, suum monasterium caput pene omnium Hiberniensium Ecclesiarum, et culmen præcellens omnia monasteria Scotorum (cujus Parrochia per totam Hiberniensium terram diffusa, a mari usque ad mare extensa est) in campestribus campi Liffei supra fundamentum fidei firmum construxit; et prudenti dispensatione de animabus eorum regulariter in omnibus procurans, et de Ecclesiis multarum provinciarum sibi adhærentibus sollicitans et secum revolvens, quod sine summo sacerdote, qui ecclesias consecraret, et ecclesiasticos in eis gradus subrogaret, esse non posset, illustrem virum et solitarium, omnibus moribus orna-

tum, per quem Deus virtutes operatus est plurimas convocans eum de eremo, et de sua vita solitaria, et sibi obviam pergens, ut ecclesiam in episcopali dignitate cum ea gubernaret, atque ut nihil de ordine sacerdotali in suis deesset ecclesiis, accersivit. Et postea sic unctum caput et principale omnium episcoporum, et beatissima puellarum principalis fælici comitatu inter se et gubernaculis omnium virtutum suam erexit principalem ecclesiam; et amborum meritis sua cathedra episcopalis et puellaris, ac si vitis fructifera diffusa undique ramis crescentibus, in tota Hiberniensi insula inolevit. Quam semper Archiepiscopus Hiberniensium Episcoporum, et Abbatissa quam omnes Abbatissæ Scotorum venerantur felici successione, et ritu perpetuo dominantur. Exinde ergo, ut supra dixi, a fratribus coactus beatæ hujus virginis Brigidæ virtutes, tam eas quas ante principatum, quam alias in incipatu gessit, multo studio brevitatis, licet præpostero ordine virtutum, *compendiose explicare conabor.*"

"Veniam peto a fratribus et lectoribus hæc legentibus, qui causa obedientiæ coactus, nulla prærogativa scientiæ suffultus, *pelagus immensum virtutum S. Brigidæ* et viris fortissimis formidandum, *his paucis rustico sermone dictis virtutibus de maximis et innumerabilibus* cucurrerim. Orate pro me Cogitoso nepote culpabili, et ut oratione vestra pio Domino me commenditis exoro, et Deus vos pacem evangelicam sectantes exaudiat."

III. We are thus enabled to determine the time at which Cogitosus lived. For the death of Aed, Bishop of Sletty, at whose request Muirchu wrote, is set down in the "Annals of the Four Masters" at the year 798. There is also a passage in the "Book of Armagh" from which it is plain that Aed survived Segene, Abbot of Armagh, who died A. D. 786; but died before Flann Feblai, whose obit is recorded under the date 704. Again, Colman, the son of Muirchu, and Abbot of Moville, died A. D. 731. It may, therefore, be inferred that Cogitosus died about the year 670.

IV. Dr. Graves points out the great importance of thus establishing the time of Cogitosus, as that writer has recorded the condition of architecture, and art in general, in Ireland in his own time ("Vita S. Brigidæ," cap. xxxv.) The objection urged by Dr. Petrie, who was of opinion that Cogitosus must have written after A. D. 799, is obviated by showing that the translation, in that year, of the relics of Bishop Conlaid into a shrine was an occurrence different from his burial under a monument described by Cogitosus.

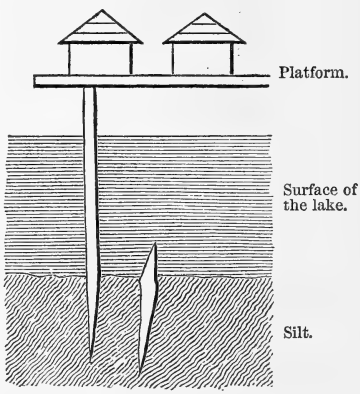
V. The author shows that the prefix *maccu*, in the name Maccumachteni, is equivalent to the Latin *filiorum*, occurring in the "Book of Armagh" and other very ancient documents. He establishes this by a careful review of the numerous names into which this element enters in the "Book of Armagh," in "Adamnan's Life of St. Columkille," and in inscriptions on monuments.

Description of an Oak Pile found in the Lake of Geneva.

Mr. Starkey presented to the Academy a wooden pile, which he had himself brought from Switzerland in the month of October, 1862, it having been given to him in the kindest manner by M. Frederic Troyon, the eminent Swiss antiquary, to whom he had been introduced by Mr. Wilde. Mr. Starkey conceived that it might be considered valuable and interesting, not only as an object of antiquity, but as illustrative of the crannoge remains of this country. Along with the pile he presented an explanatory paper, drawn up for him by M. Troyon at the time, of which the following is a translation:—

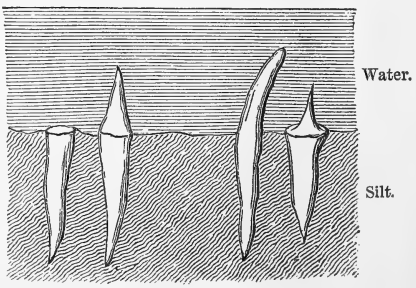
"This pile I raised on the 15th of September, 1862, from among the lacustrine remains at Thonon, on the Lake of Geneva. The site had been occupied during the stone period, and continued to be so until the end of the bronze-period. We find here instruments of stone and of bronze, but none of iron.

"The length of the pile is 4 ft. 4 in.; the thickest end was buried 3 ft. 4 in. in the bottom of the lake; so that the upper end projected only one foot above it. It must be borne in mind, that when the water is at its extreme height, the place from which I drew this stake is sunk 12 feet beneath the surface. The platform supported by these pillars was at least 4 feet above the highest level of the water, so as to allow of the waves passing beneath the planks which supported the huts.



"It follows from hence that this pile must originally have been 20 feet long,—that is, 4 feet in the silt of the lake, 12 feet in the water, and 4 feet above it.

"In many of these sites there may still be seen thousands of the piles which supported the platforms, burnt down, as most of them were, to the surface of the lake at the time when these lacustrine villages were destroyed. It is by degrees, and by the extremely slow action of ages, that the water has worn the piles, which on the sites referable to the bronze period still stand from 1 to 3 feet above the bottom; while on the sites destroyed before that period they are generally worn down to the bed of the lake.



"On the sites occupied during both these periods it is not unusual to see, in close proximity with a pile worn down to the bottom, others which stand up from 2 to 4 feet, having been doubtless renewed during the bronze period."

Mr. Starkey stated that the difficulty of extracting these piles from the bed of the lake, whole and uninjured, is great. A boat is steadied immediately over the place where they appear; a kind of forceps is used, from 12 to 15 feet long, by which the stake selected is seized at the point where it emerges from the silt, rocked gently to-and-fro for some time, and then carefully drawn upwards, from a depth ranging from 10 to 14 feet. The principal cause of the difficulty is the sponginess of that portion of the stake which has been sunk in the silt. It is almost as fragile as a fungus or mushroom, whereas the portion that has been in the water is comparatively sound.

Mr. Starkey stated that he had himself, instructed by M. Troyon, visited one of these sites at Morges, on the north shore of the Lake of Geneva, and distinctly seen, at a depth of about 12 feet, the ranges of piles, extending at unequal intervals, over an area of from 12 to 14 acres. Objects of antiquity, in stone, bronze, horn, &c., are taken up in vast numbers, by means of instruments constructed for the purpose, on or near these sites, of which, as M. Troyon informed Mr. Starkey, there are more than twenty in the Lake of Geneva alone.

The attention of the Academy having been called to the recent death of Professor Siegfried,

It was proposed by the Rev. William Reeves, D. D., and seconded by the Rev. J. H. Todd, D. D., and—

Resolved,—That the Academy has received with the deepest regret the intelligence of the lamented death of Professor Siegfried; and, although he was not a member of its body, avails itself of the present opportunity to testify its respect for a scholar of such distinction, who had so cordially made Ireland his home, and her language the favoured subject of his valuable studies.

It was proposed by W. R. Wilde, V. P., and seconded by H. H. Stewart, M. D., and—

Resolved,—That the Academy, as a body, attend the funeral of Dr. Siegfried.

The corporation seal of the borough of Belturbet was presented to the Museum of the Academy by the Earl of Belmore.

The thanks of the Academy were returned to Lord Belmore.

MONDAY, JANUARY 26, 1863.

The Very Rev. Charles Graves, D. D., President, in the Chair.

W. R. Wilde, Vice-President, read the following—

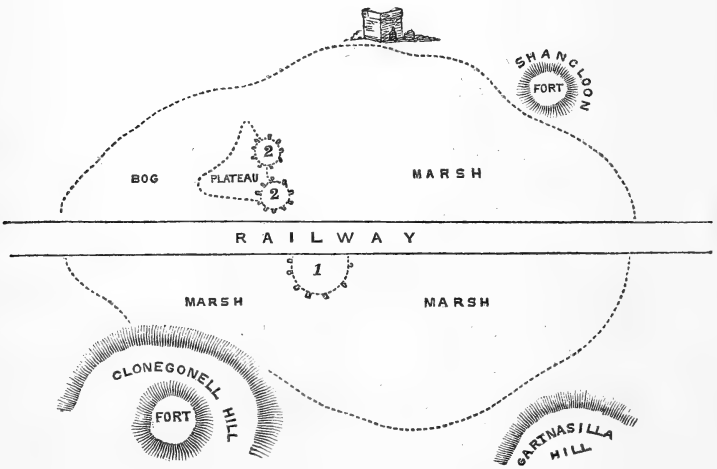
Description of a Crannoge in the County of Cavan.

On the 23rd of January, 1860, I communicated to the Academy an account of a newly discovered crannoge, on the property of Lord Farnham, in the townland of Cloneygonnell, parish of Kilmore, barony of Lower Loughtee, and county of Cavan.

The aspect of this crannoge at that time was that of a green oblong mound, partially cut away by the line of railway from Crossdoney to Cavan, from which town it is distant about two miles, one mile from the old cathedral church of the diocese, and about 500 yards from the ruined castle of Tonymore.

In the Ordnance Sheet, No. 25, for Cavan, may be seen a small lake, about a quarter of a mile in diameter, with a remarkable sharply-defined island, near the northern bank, and opposite Tonymore Castle. In common with many other small tracts of water in that part of Ireland, this Tonymore Lough was run off by the arterial drainage a few years ago, leaving the mound or island near its centre perfectly dry; and where the railway passed through it, the site of the lake was only a swamp or marsh.

The surrounding country rises in a succession of low hills from the margin of the lake; and on the north and south sides are the ancient



raths of Shancloon and Cloneygonnell, as shown in the above illustration. There are also several raths of minor importance in the neigh-

bourhood. So far, this lake fortress accords in situation with most others of its class, and was probably used as a place of safe retreat; first for the dwellers in the raths; and in later times, when stone buildings had taken the place of rude earthworks and stockades, by the inhabitants of the adjoining castle.

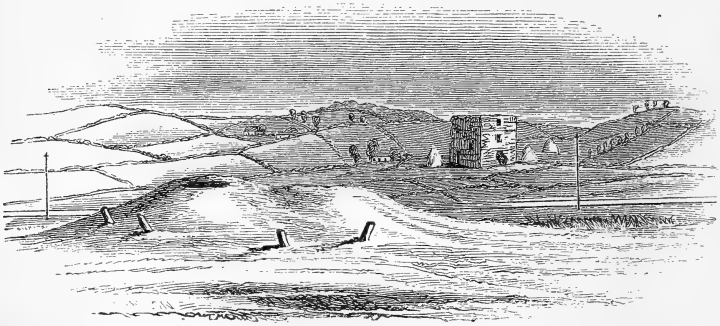
The lake was celebrated for its pike fishing, and the crannoge (or "Island in Tonymore Lake," as it was termed), which rose slightly above the water, was much resorted to by sportsmen. The real nature of the island, however, was not suspected until after the railway was run through a portion of it; although, when the land had been sufficiently dried, the tops of the outer row of piles, or stockades, could be seen projecting above the surface. Some of these piles were in so decayed a condition as to crumble beneath the touch; but others were as fresh and strong "as if they had been driven in but yesterday"—a fact which shows that this crannoge had been repaired from time to time.

Notwithstanding the fact of a portion of the railway being absolutely supported on this crannoge, and a number of household articles having been discovered in it when the line was making, no notice, strange to relate, appears to have been taken of it until about three years ago. "The Proceedings" of the Academy, many of which contained notices of crannoges, having appeared from time to time in the public papers, the attention of several persons throughout the country was turned to such matters; and I have, in consequence, received much useful information, and the Academy some valuable donations.

For the first description of the Tonymore crannoge, we are indebted to Mr. O'Brien, the intelligent station-master at Cavan, who enhanced his information by the donation of some of the articles found there. The mound, he states, was "fifty yards in diameter, measured from the old stakes, on each side. Only one-half of the work now [1859] remains, the other having been cut away in making the line. The outer paling appears above ground at regular intervals, and is partly composed of roots and limbs of oak. The crannoge rests on a layer of oak, crossed by beams in every direction. Within about eighteen inches of the top there is a layer of bones, and bones appear scattered all about the surrounding marsh, and are continually turned up in repairing the railway, and occasionally in such quantities as to become a profitable article of sale. One or two querns were found within the enclosure, and are now preserved in the neighbourhood; several sharpening stones, and also a portion of a yew bow, were discovered; outside in the marsh, two elks' heads were dug out, one of which is now in the possession of Lord Farnham."

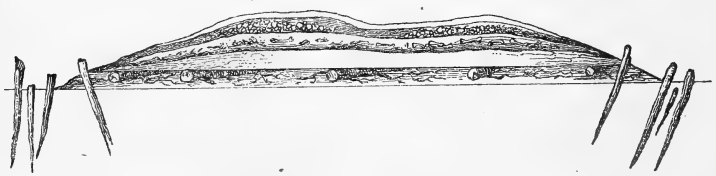
In 1860, I presented, on the part of Mr. O'Brien, the following articles, which have been found in the crannoge:—The upper stone of a grain-rubber, like those described in the Museum Catalogue, p. 104; a stone, half perforated, as if done with another stone; a circular flat stone disc, or quoit, like those on Tray N. N.—see p. 99 of Catalogue,—and similar to some found in connexion with cinerary urns. Four small earthen crucibles, of the usual shape which has come down to modern times; three of these would only contain a couple of drachms of fluid

each, and were very probably used in gold smelting. This observation is confirmed by the fact of finding amongst them a small pipe-clay cupel, manifestly intended for refining. It is quite similar to articles used in the present day for the assay of gold and silver. Several small oval stones, like those still used by weavers for polishing the surface of the web, and usually called "rubbing stones," were found in the crannoge, and three of them were presented. A flat polished piece of bone, which was possibly used in weaving or netting; and two small bone spoons, ingeniously formed out of the epiphyses or joint surfaces of the vertebræ of young animals, and one of which I have figured in the Museum Catalogue. See fig. 174, page 267. The only metal article Mr. O'Brien was able to present was an imperfect bronze ring, which in all probability formed a portion of a fibula.



During the past year, Lord Farnham has caused a further examination of the mound to be made, under the judicious directions of Dr. Malcomson, of Cavan, to whom we are indebted for the following additional particulars, as well as the original of the foregoing illustration, consisting of a landscape view of the crannoge and the surrounding country, where crossed by the railway, and also of the adjoining ruin.

The annexed engraving represents a section of the crannoge, where cut across by the railway.



Dr. Malcomson states—"The piles or stakes were arranged in two circles, one within the other; the diameter of the greater one being 120 feet, that of the other about 90 feet. The piles in the outer circle were very numerous; and, in some instances, driven in close proximity to each other. A few, having withstood the ravages of time, appeared

about three feet above the surface, and, upon being withdrawn and examined, were found to have been carefully pointed. The stakes in the inner row were not so numerous, nor were they altogether composed of oak, some of them being of sallow or other soft wood.

"Within the stockades were observed two small mounds (upon which the grass was much more verdant than upon any other part of the island), one at the north, the other at the south. Corresponding with the depression between these, and three feet under the soil, we found, during the excavation, a flat stone, about four feet square, and three inches thick, resting on a number of upright blocks of decayed oak. This, no doubt, was a hearthstone.

"The most elevated point of the mound, towards the south of the island, had a depressed or crater-like appearance. Besides the wooden stakes entering into the formation of the circles, others appear to have been laid horizontally, their beam-like ends showing at that part of the enclosure which was disturbed by the passage of the railway.

"On exploring the crannoge, which was done by removing the soil from the circumference of the lesser circle towards the centre, a few objects of antiquity were discovered. The soil, which was carefully examined, was carried a short distance, and spread over the adjoining marsh. It was composed of black and grey ashes; small flat stones, which had evidently been exposed to the action of fire; fragments of charcoal; blue and yellow clay, charred bones, and the teeth and tusks of animals, &c.

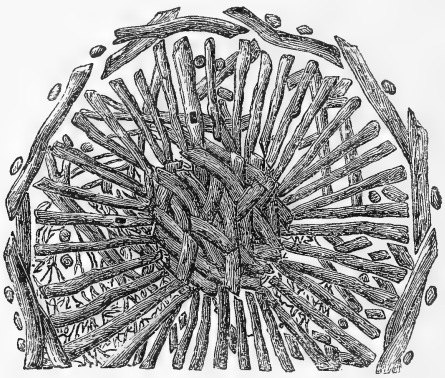
When the excavation had been carried to the centre, the cut surface presented, from above downwards, the appearance shown in the foregoing illustration, viz.: 1st, clay; 2nd, black and grey ashes, with small stones and sand; 3rd, bones and ashes, with lumps of blue and yellow clay; 4th, a quantity of grey ashes; and, 5th, the horizontal sleepers or stretchers, and hazel branches, resting on the peat bottom.

"On the same marsh, and about one hundred yards' distance from the island, but nearer to Tonymore Castle, are two other stockaded forts, on a raised plateau. They do not appear to have been islands, as an elevated causeway leads from them to the mainland; but otherwise they resemble the crannoge in their stockaded and mound-like appearance. They are marked No. 2 on the plan of the lake, forts, and railway given on page 274.

"The further examination of this crannoge (which was deferred in consequence of the inclemency of the weather, and the quantity of rain which had fallen on the surrounding marsh), was resumed on the 2nd of January, and continued for three days. The soil, which still lay superficial to the horizontal stretchers, was gradually removed, in order to fully expose the original flooring, and examine its peculiar arrangement. During the removal of this stratum (which was composed of dark ashes, half-burnt bones, pieces of charcoal, and occasional lumps of blue and yellow clay), a few antique specimens, similar to those already found, were turned up by the workmen, and have been forwarded by Lord Farnham to the Royal Irish Academy. Amongst them may be men-

tioned a portion of a glazed crucible, and a large mass of brownish metallic dross, regularly convex on one surface, as if it had been turned out of a large concave vessel.

"The principal stretchers (about forty in number) which composed the flooring, were made of black oak, and were in a tolerable state of preservation. Each plank was from six to twelve feet in length, and from six to twelve inches square. They were laid down so that they extended lengthways from the circumference towards the centre, forming a number of radii, somewhat like the spokes of a wheel, as shown in this illustration. Their outer ends were kept in position by slender crooked



RAILWAY

trunks of oak trees, forming a kind of circle; and these again were fixed into their places by the outer row of stockades—before described—which, no doubt, prevented the earthy portion of the island from being undermined during occasional winter inundations. The planks were not in close apposition, and the spaces so left were filled by a quantity of blocks, and thick branches of sallow, deal, and hazle, some of them unstript of bark; many of their branches extended underneath the sleepers, and separated them from the peat bottom. The branches were for the most part rotten, and were easily broken down. We found here hazel nuts, hard and brown, as if they had but just fallen from the tree.

"When the peat was removed to the extent of two feet in depth, near the outer part of the enclosure, the space so left was immediately filled up with bog water; a similar examination near the centre exposed a hard foundation of blue clay. The timber composing the crannoge appeared to have been roughly hewn, and in no instance were the pieces of which it was constructed joined together by nails or mortises; two of the stretchers, however, had mortises skilfully cut in them."

On the part of Lord Farnham, Mr. Wilde exhibited to the Academy various articles which were found in the examination of the crannoge, and which are enumerated in his letter of the 9th February, communicated to the Academy at the meeting held on the 16th of that month (see p. 289).

The Rev. John H. Jellett read a paper—

On a new Optical Saccharometer. (Plate XXII.)

The author said that his attention had been directed to the possibility of applying the new analyzing prism, the construction of which he had described to the Academy some time since, to the construction of a saccharometer, capable of giving more accurate results than those obtainable by means of the instrument of Soleil. Having described this latter instrument, he said that, as far as he could judge, both from his own experiments and the report of others who had used it, the error to which even an accurate observer would be liable in attempting to estimate the strength of a saccharine solution, could not be reckoned as less than half a grain per cubic inch for a single observation. Having stated what he believed to be the cause of this want of accuracy, the author exhibited and described the instrument which he had himself devised for the same purpose. Of this instrument, the accompanying diagram (Fig. 1) is a representation.

aa is a short tube, containing two large lenses, serving to condense the light of a lamp, which is placed as nearly as possible in the principal focus of the lower lens. *bb*, *cc*, is a short tube, carrying at one extremity a lens, *cc*, and at the other extremity a diaphragm, *bb*, pierced at its centre by a very small hole, *O*, which is situated in the principal focus of the lens *cc*, and also, when the instrument is adjusted, in the principal focus of the upper lens *a*. By this arrangement a beam of light is obtained emerging from *cc*, sensibly parallel to the axis of the tubes. This beam is polarized by being transmitted through a Nicol's prism, contained in the tube *dd*. *ee* is a vessel, pierced at the lower end by a circular hole, which is closed with plate glass. This vessel contains a fluid, possessing a rotative power opposite to that of the fluid under examination. This latter fluid is contained in the tube *ff*, which rests on the two upright pieces *yy*. These pieces are attached to the transverse piece *vv*, which carries a vernier, whose divisions correspond to those of the scale, *ss*, which is attached to the bar *zz*, which carries all the parts of the instrument. The transverse piece, *vv*, is capable of sliding along *zz*, this motion being produced by a chain, attached at both ends to *zz*, passing round a spindle with a matted head, attached to *vv*. By these means a motion can be given to the tube *ff* parallel to its own axis; and, by a very simple arrangement, the zero of the vernier is made to coincide with the zero of the scale, when the extremity, *f*, of the tube is in contact with the piece of glass covering the lower aperture in the vessel *ee*. It is plain, then, that the numbers read on the scale, which is graduated so as to be read to 0 inch ·001, will denote the length of the column of fluid *E F* (Fig. 2) interposed between the bottom of the vessel and the bottom of the tube. *gg* is an analyzing prism, constructed as before described.* *hh* is a lens, and *l* a diaphragm, with a small hole, at which the eye of the observer is placed. The polarizing and analyzing prisms are fixed in their places by small screws, σ, σ', each passing

* "Proceedings of the Royal Irish Academy," vol. vii., p. 348.

through a transverse slit in the outer tube, so that when partly unscrewed they allow the prisms to turn through a small angle round the axes of the tube. In using the instrument, the polarizing prism may be set in any position, the analyzing prism being then carefully adjusted, so that the tints in the two halves of the circular spectrum* may, when there in no fluid interposed, be exactly equal.

Suppose now that the object is to ascertain the strength of a given solution of cane sugar. In this case, the fluid to be used in the vessel, *EE*, may be French oil of turpentine. A certain quantity, the amount of which depends on the strength of the solution to be observed, having been poured into the vessel, the tube, *ff*, is then filled with a solution of sugar, whose strength is accurately known. The tube is now replaced in the upright pieces, and the zero of the vernier made to coincide accurately with the zero of the scale. The milled head is now turned so as to draw back the tube until the tints on the two parts of the circular image, seen through *L*, become equal. The number on the scale corresponding to the zero of the vernier is then noted. Let this reading be *R*, and let *S* be the strength of the known solution.

Now, let this solution be removed from the tube, which is then to be filled with the solution whose strength is required. The same process having been gone through, let the new reading be *R′*; then the strength required is given by the equation—

$$S' = \frac{R'}{R} \cdot S.$$

If the experiment be carefully conducted, and if there be no error in the strength of the standard solution, the error in the measurement made, as above described, ought not to exceed 0 grs. ·02 per cubic inch for a single experiment. If the mean of a number of experiments be taken, the error would, of course, be still less.

The author has given to this instrument the name saccharometer, derived from one important use to which it may be applied. This, however, is but one of its applications; and there are many others, at least as important. It may generally be defined to be an instrument by which the ratio of the rotatory power of any transparent fluid to that of a standard fluid may be accurately determined.

It is not desirable to use a very strong solution of the substance to be examined. The reason of this is the imperfect compensation which exists between fluids possessed of opposite rotatory powers. It is generally assumed that the ratio of the rotation produced in the planes of polarization of any two of the simple rays of which a white ray is composed is the same, whatever be the substance causing the rotation. It follows, indeed, from the law of Biot, that this is not accurately true, but it has been generally supposed that the error is too small to be perceived. If this were true, it would always be possible to assign to the lengths of two columns of oppositely rotating fluids such a ratio, that the effect of the one should be accurately compensated by the effect of the other.

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* Proceedings of the Royal Irish Academy, vol. vii., p. 349.

But the author has found that in certain cases the error is very perceptible indeed. This is shown by the impossibility of giving to the tube *ff* any position in which the shades of colour are exactly the same in the two parts of the circular image. Suppose, for example, that the position of the tube is such that the plane of polarization of the mean ray has the same position as at first. This plane is then equally inclined to the planes of analyzation of the two parts of the analyzing prism. But this is not true of the planes of polarization of any of the other rays; of these, the less refrangible will have their planes of polarization nearer to one of the planes of analyzation, while those of the more refrangible are nearer to the other.

There will therefore be in the one half of the image a preponderance of red light, and in the other a preponderance of blue light, when the intensities of the two parts are equal. The difference of colour, which makes it difficult to equalize these intensities with perfect accuracy, will evidently be greater, the greater the amount of the rotations which the compensating fluids would severally produce, and therefore the greater the strength of the solution.

On the other hand, it must be remembered that the error in the result, arising from an incorrect position of the tube, is inversely proportional to the length of the column of the compensating fluid. Thus, if the reading of the scale be ·1, an error of one division, or ·001 will have the same effect on the result, as an error ten times as great would have, if the reading were 1·000.

No general rule can be given for determining the strength of the solution which it is desirable to use. If the law of Biot, &c.,—that the amounts of rotation produced by the same substance in the planes of polarization of the different simple rays are proportional to the squares of the corresponding refractive indices—be strictly true, then, the more nearly these indices are in the same proportion for the fluid under examination and the compensating fluid, the stronger may be the solution used. If the fluid under examination be a saccharine solution, and the compensating fluid French oil of turpentine, a solution containing, in each cubic inch, thirty grains of sugar, may be used without inconvenience.*

James Dombrain, Esq., of Monkstown, through Gilbert Sanders, Esq., presented a very perfect long tapering sword-blade, made of bronze, found in a bog, near Timoleague, county of Cork.

Henry Kingsmill, Esq., on the part of his son, Henry Kingsmill, Jun., Esq., presented a collection of rubbings from monumental brasses.

The Master of the Rolls in England, through the Librarian, presented a large collection of Record publications, completing the series already in the Library of the Academy, and consisting of 63 volumes.

The thanks of the Academy were presented to the donors.

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* The instrument here described was constructed by Messrs. Spencer and Son, of Aungier-street, to whose ability, both in carrying out the instructions given to them, and in suggesting methods for overcoming practical difficulties, the author is much indebted.

MONDAY, FEBRUARY 9, 1863.

The Very Rev. Charles Graves, D. D., President, in the Chair.

John Ribton Garstin, Esq., and John H. Tyrrell, Esq., were elected members of the Academy.

Mr. George V. Du Noyer presented the following drawings :—

Catalogue relating to Ninety-five Drawings from Original Sketches of various objects of Antiquity.

No. 1. View looking north of the Kistvaen on the south flank of Bree Hill, townland of Ballybrittas, county of Wexford, near Enniscorthy.—Ordnance Survey Map, No. 31, 2nd quarter.

No. 2. View of the same, looking west.

No. 3. Plan of the same, showing the side and covering stone.

No. 4. Plan and section of a square earthen rath, in the townland of Craane, parish of Clonmore, on the northern flank of Bree Hill, and close to the Enniscorthy road. This structure is one of the most perfect of its class which I have observed in the county of Wexford. It consists of a deep fosse, about 22 feet wide, having a narrow platform and high parapet wall around its outer face, which is sloped like the glacis of a modern fort. The inner enclosure is bounded by a thick earthen wall, and measures about 80 feet square.

Works such as this are rather common over the eastern or lowland portion of the county of Wexford, extending from near Arklow on the north, to the Waterford estuary on the south.

In the townland of Myler's Park, a few miles to the south-east of New Ross, there is one of these earthen works which measures about 170 feet square internally, and the walls are protected by a massive semicircular bastion at each angle, being in fact an earthen model of an Anglo-Norman castle. I have an idea that raths of this character are not as old as those which are circular in form; and as the county of Wexford was the territory which the Anglo-Normans first gained possession of in Ireland, they may have constructed those square earthen works as camps, or forts of occupation, for such was certainly the rath in Myler's Park. If they are native structures, the Irish may have copied this form of defensive work from their invaders. Be this as it may, it is well to direct attention to the occurrence of square earthen raths over the county of Wexford. The rath which I have illustrated is not engraved on the Ordnance Survey Map.

No. 5. View of the group of stones at the ancient grave at *Tivoria*, half a mile east of the village of Dunquin, to the west of Dingle. Tivoria means the house or resting place of Mary; and this spot is popularly recognised over the Irish-speaking districts of the whole south-west of Ireland, as being the farthest or most remote grave or "house of rest." If by this is implied the most westerly place of interment, the old idea

is quite correct, as Dunmore Head, which is close to it, stretching into the Blasket Sound, is the most westerly point in Ireland. One of the stones exhibits the Greek cross enclosed in a circle; and the upright monolith has a single straight-armed cross, with divergent ends deeply cut on it.

No. 6. Sketch of the tall and rude cross standing in the grave-yard of Adamstown, county of Wexford; it is cut out of a single slab of trappean ash, and is ten feet high.

No. 7. View looking west of the rude and small granite cross and large square plinth on the road side, close to the old church of Kill-o'-the-Grange, county of Dublin. The cross is of the simplest form, and the only ornamentation on it is a small circle deeply cut at the centre of the intersecting arms. This may be the embryotic form of the circle as connected with the cross, and, if so, it is of some interest.

Nos. 8, 9. Sketches of St. Gobbonet's Stone, preserved in a field close to the Roman Catholic chapel of Ballyvourney, county of Cork. The rude incised carving on this monolith is exceedingly curious. It represents a cross of the Greek form, enclosed in a narrow double circle, the whole being surmounted by a diminutive figure in mere outline of the saintly female, St. Gobbonet. The hair is divided on the forehead, and falls over the back of the neck, to the waist; the dress is long, and reaches to the ankles; and one hand carries the cambutta or short pastoral staff, of the same type as those in our Museum. The opposite face of the stone exhibits merely the same form of cross as the other. St. Gobbonet lived in the 6th century, and this carving is undoubtedly of contemporaneous age.

No. 10. On the rise of ground to the west of, and close to the old church of Ballyvourney, I discovered the remains of a large circular cloghaun or stone hut, measuring 26 feet in diameter, internally, the wall at the doorway being 3 feet thick, but increasing to 5 feet at the opposite part of the circle. This is erroneously marked on the Ordnance Survey Map as the base of a round tower. Local tradition calls this St. Gobbonet's house, and we have every reason to believe that it is so. I give a plan of this building in the sketch No. 10.

No. 11. View of what remains of St. Gobbonet's cloghaun, showing the two upright flags which formed the sides of its doorway.

No. 12. This represents a small rude carving on the top stone of the window, in the south wall of the nave of Ballyvourney old church; it is popularly known as the effigy of St. Gobbonet, and its date may be about the fourteenth century.

No. 13. View of the doorway of the old church of Mungret, county of Limerick. The massive cyclopean character of this work stamps it of considerable antiquity, though its proportions are not slender enough to induce me to class it with the earliest doorways of this type.

No. 14. View, looking east, of the croft of St. Columbkill's house, at Kells, county of Meath, showing the two partition walls which divide it into three chambers, and the square opening in the floor affording access to, or from, the body of the building beneath; St. Columb died

A. D. 596, and we have every reason to believe that he caused this structure to be erected for his use. See Dr. Petrie's work on the Round Towers, p. 430.

No. 15. Plan of the croft of St. Columbkill's house.

No. 16. Section of the building from north to south, showing the rude method of constructing its roof by causing the stones to overlap till the apex of the croft was closed in by one stone, after the manner of the very earliest of our stone oratories. See Dr. Petrie's account of the stone oratory at Gallarus, county of Kerry, p. 133.

No. 17. Plan of St. Flannan's Oratory at Killaloe. The date of this building is the seventh century. See Dr. Petrie's work, p. 281.

Nos. 18 and 19. Sketches of the capitals of pilasters at either side of the doorway to St. Flannan's church at Killaloe. That on the north side is strikingly Corinthian in its style; and that on the south side is ornamented with two animals, having one head at the external angle of the capital, common to both.

No. 20. Incised cross with enclosing circle, carved on a limestone slab, placed at the foot of the ancient doorway built up into the south wall of the cathedral of Killaloe, and close to the west gable.

No. 21. View of the doorway of the Round Tower of Kells, county of Meath, showing the mixture of sandstone and limestone used in its construction.

No. 22. View of the round tower of Kinneigh, county of Cork. The base of this singular structure is hexagonal within and without, to the height of about 18 feet, when it abruptly becomes circular. The doorway is flat-headed, and constructed in the side of the hexagon facing the north-east. The doorway is revealed within, to receive a wooden door; the first floor is level with the doorway, and is constructed of four large flag-stones crossing each other, but so far apart as to allow of a large square opening in the centre, affording access to the dark chamber beneath. The walls at the basement are five feet thick. Above the hexagonal base there are four offsets in the wall, and about ten feet apart, thus dividing the tower into a corresponding number of rooms, each of which was lighted by a small porthole-shaped window. I believe that the tower wants one story to complete it height, as there are none of the ordinary large openings at the summit. The present height of the tower is fully 60 feet, to which, if we add 10 feet for the terminal chamber, and 10 feet for the conical roof, we would have 80 feet as the original height of the tower. Its external diameter at the springing of the circular portion is 16 feet 6 inches, and only 8 feet 6 inches internally.

No. 23. View of the doorway of this tower.

No. 24. Plan of the hexagonal base at the doorway of this tower, showing the manner in which the stone floor was constructed.

No. 25. Section of the Round Tower at Kinneigh.

No. 26. Ground plan of St. Edan's Monastery at Ferns, county of Wexford, showing the connexion of the round tower with the nave of the building at its north-west angle.

No. 27. View of the round tower attached to the Monastery of St. Edan, at Ferns. This tower, which is 58 feet in height, forms a portion of the west gable of the nave of the church, and is square from its base to the height of 40 feet, when it becomes circular; the base is square within, and incloses a winding stairs which terminates where the tower becomes round; the upper circular portion is divided into two apartments, the upper one being lighted by four square-headed apertures, facing N. N. W., S. S. E., E. N. E., and W. S. W. The conical roof is wanting.

No. 28. Sketch of one of the windows lighting the upper floor of this round tower.

No. 29. One of the narrow loops lighting the winding stairs at the square base of the same round tower.

Nos. 30, 31, 32, and 33. Views of the four sides of the granite shaft of a cross, highly ornamented with the Greco-Irish fret pattern; and standing in the grave-yard of the cathedral of Ferns (now the parish church).

No. 34. Plan and section of the plinth of the above cross.

No. 35. Head of granite cross built up in the wall of the grave-yard attached to Ferns cathedral (now the parish church).

No. 36. Head of large granite cross from the gateway to Ferns church, where its fragments are used to prevent the gate from swinging.

No. 37. Top of mediæval window, now used as a tombstone in the grave-yard of Ferns church: at either side of the ogee are sculpturings typifying the good and evil spirit by an angel in the attitude of prayer, and a non-descript grinning monster.

No. 38. Small standard cross of granite from the grave-yard of old Leighlin cathedral, county of Carlow.

No. 39. Small standard granite cross and plinth from Nurney, county of Carlow.

No. 40. Doorway of the ancient church of Agha, county of Carlow, possibly of the seventh or eighth century. It was closed from the inside by a wooden door.

No. 41. Ground plan of Agha old church, showing the ancient or western portion, which is constructed in courses of dressed blocks of granite, as is illustrated by the doorway and surrounding masonry; and the less ancient, or eastern part, built of rubble masonry.

No. 42. View of the interior of the east window of Agha old church. From the style of this window it is doubtless a work of the twelfth century.

No. 43. Exterior view of the same window, showing the change in the style of masonry, as compared to the western portion of the church.

No. 44. Interior of window in the south wall, and close to the east gable of Agha church. This ope is triangular-headed within, but flat without.

No. 45. Exterior view of the window just alluded to, in the south wall of Agha church.

No. 46. Square ope near the summit of the south wall in the western or more ancient portion of the old church of Agha. Its sill is formed by a series of three small steps; the regularity of the masonry is here very apparent.

No. 47. Plan of the old church called Whitechapel, near Bagenalstown, county of Carlow. The most perfect portion is the east gable with the window; the remainder of the walls are merely foundations.

No. 48. Interior view of the window in the east gable of this church, the date of which is, doubtless, the twelfth century.

No. 49. Plan of the old church of Enniscorthy, county of Wexford, showing the ancient nave and modern choir. All the features of the former are gone, except a window placed eight feet from the ground in the south wall, and near what was originally the east gable.

No. 50. Interior and exterior view of the small window in the south wall of the old church of Enniscorthy. This is also twelfth century work.

No. 51. Exterior view of the large fourteenth century east window of Jerpoint Abbey, county of Kilkenny, showing the remains of the small twelfth century three-ope window, which was destroyed in its construction. It is not necessary to enter on any detailed description of this interesting fact in the re-edification of the abbey, as the sketch sufficiently explains it.

No. 52. Exterior view of an early thirteenth century window in the west gable of Jerpoint Abbey, lighting the rood loft of the nave.

No. 53. Exterior view of a window from the north wall of north side aisle, Jerpoint Abbey. The drip moulding of this and the former window is of quaint design, partaking much of twelfth century art.

No. 54. Exterior view of two-ope window, with terminal four-cusped opening. This is clearly thirteenth century work, and is most characteristic.

Nos. 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, and 65. Drawings made one-half the full size, showing the ornamentation of the capitals of the square cluster columns supporting the side aisle arches of Jerpoint Abbey, county of Kilkenny.

No. 66. Tombstone with Anglo-Norman inscription and foliated cross from the interior of St. Canice's Cathedral, Kilkenny. The inscription is

Hic Jacet Valterus cluhy,

with a contraction over the first two letters of the surname.

No. 67. Plan of the remains of Ferns Castle, county of Wexford. The large suite of apartments which originally occupied the internal quadrangle of this building were evidently all constructed of wood.

No. 68. Enlarged plan of the chapel on the second floor of the circular Tower, at the south-east angle of Ferns Castle, showing also the design of the groining in the arched roof.

No. 69. Exterior view of one of the long and cross-bow loops from the winding stairs in the tower just alluded to.

No. 70. Exterior view of a window in the north wall of the old church of Newcastle, county of Tipperary. The design of this window is so quaint and unlike any of the known styles of architecture, that it is difficult to assign a date to it. It may be early in the thirteenth century.

No. 71. East gable of the old church of Crook, near Passage, county of Waterford. The three windows piercing this gable are of the lancet form; and the rude arches surmounting them so closely resemble that over the window from Jerpoint Abbey, No. 54 of this series, that we may suppose this church to be of the thirteenth century.

No. 72. Exterior view of the doorway of Ballyhack Castle, county of Wexford.

No. 73. Exterior views of two window loops from the north wall of Ballyhack Castle.

No. 74. Exterior view of two larger windows from Ballyhack Castle. Fig. 1 is near the summit of the west wall, and Fig. 2 near that of the north wall.

No. 75. Plan of the Castle of Enniscorthy.

No. 76. Main doorway of Enniscorthy Castle. From the style of this doorway and that of the loops throughout the castle, I think the date of the building cannot be earlier than the beginning of the sixteenth century.

No. 77. Small cruciform loops from the circular flanking towers of Enniscorthy Castle.

No. 78. Single loops splayed externally from the same building.

No. 79. View of the choir, arch, and east window of Faithlegg old church, near Passage, county of Waterford. Both these features in this building are of remarkably small proportions; the former is more like a large semicircular headed doorway, and the latter is of the narrow lancet form.

No. 80. Plan of the same old church, which I suppose to be of the 15th century.

No. 81. Sketch of the font of the old church of Faithlegg.

No. 82. Sketch of the font of the old church of Ballybacon, near Ardfinnan, county of Tipperary, 15th century.

No. 83. Carving of quaint design, representing a crucifixion, springing from a shield which bears the date 1594, from the old abbey of Kilmallock, county of Limerick.

No. 84. Rude representation in incised lines of an "Agnus Dei," bearing the shaft of what may have been a cross before the stone on which it was cut was defaced, from the grave-yard of the old church of Ballybrennan, near Enniscorthy.

Nos. 85, 86, and 87. Three small head stone crosses, possibly of modern date, from the same grave-yard.

No. 88. Sketch of a coffin-shaped tombstone, from the abbey of Jerpoint, bearing in incised lines the outline of a male figure, clothed in the costume of the 14th century; a long staff is held in the right hand, and

over the head the stone has been cut into, to form a small square hollow, possibly to receive a brass; a very illegible inscription in the Anglo-Norman letter may be traced around part of the slab, but the date, anno MCCC., 1300, is very plainly seen.

No. 89. Effigy, in high relief, of a knight on a tombstone in the grave-yard of the old church of Ratoath, county of Meath. The head of the figure, which rests on a large cushion, is bare, without a beard, and the general expression of the face is that of age. The body is clothed in the surcoat, but is without armour. The knight's good sword, with heavy pommel, is, however, girt about his waist by a broad belt, and hangs before him. The right arm and hand are in the attitude of sheathing it, while the left holds the scabbard. There is great boldness and character in the execution of this figure.

No. 90. Sketch of a small effigy from the old abbey of Gowran, county of Kilkenny. The length of this figure is only two feet nine inches, and it represents a juvenile person, possibly a chorister. The head, which rests on a cushion, is either tonsured, or the thick flowing hair is confined by a band across the forehead. The figure is clothed in a long surplice, fitting close to the neck, with tight sleeves. The arms rest on the chest, and the hands hold a large book, possibly a psalter, as indicative of the ecclesiastical rank of the deceased. Diminutive effigies such as this are of the rarest occurrence in Ireland.

No. 91. Effigy of a female of rank, with highly ornamented horned head dress, characteristic of the 15th century, from the old abbey of Gowran.

No. 92. Fragment of a tombstone from the same abbey, which represented a knight in the armour of the 15th century. The sword is suspended from around the neck, and rests on the chest, as if laid on the body after death.

No. 93. Another and similar effigy from the same abbey. Strange to say, the head and face of this effigy have been cut away, probably to allow of the insertion of a brass plate, on which to engrave the features and head armour. A large cushion supports the head, at either side of which, and on the cushion, is engraved a hawk with wings partly extended.

No. 94. Sketch of a flat tombstone from the abbey of Gowran, on which a full-length male figure is carved in deeply incised lines. The hair is cut close to the head, but falls over the ears. The moustache is indicated, but no beard. The figure is clothed in a long loose robe, with short tight sleeves. The feet are cased in shoes with ankle straps, and rest on a rude representation of a writhing serpent. The evident want of skill in this work stamps it of the 16th century, when the sculptors' and builders' art in our realms was at its lowest ebb.

No. 95. Tombstone from Rathmore Abbey, county of Meath, on which the effigy of a knight, in the armour of the 15th century, is carved in high relief. I give it as affording us an illustration of the holme or massive tilting helmet of the period, the large vizor of which is raised so as to show the features of the wearer.

I beg to present this collection of Drawings of objects of antiquarian interest (many of which are falling into decay) to the Library of the Academy, with a view to its forming the fourth volume of donations of a similar kind made to the Academy on three former occasions.—G. V. D.

A collection of miscellaneous Donations was presented, accompanied by the following explanatory letter from W. R. Wilde, Esq. (V. P.), addressed to the Secretary of the Academy, which was read in his absence by J. T. Gilbert, Esq.:—

Dear Sir,—In the names of the undermentioned noblemen and gentlemen, I beg to present the following donations to the Library and Museum of the Academy:—

From the Marquis of Kildare, "The Earls of Kildare and their Ancestors, with the Addenda, from 1659 to 1773 (new edition);" the former edition of which I had the honour of presenting in 1861.

From Lord Farnham, a handsomely bound copy of the "Farnham Descents, from King Henry III.," a genealogical work descriptive of the Maxwell family, printed at Cavan, in 1862, for private circulation. The donation is enhanced by the autograph revisions of the author.

On the part of George Porter, M.D., a bound collection of twenty-four government broad-sheets, descriptive of the Irish Rebellion, between the 24th of May, and the 28th September, 1798; and consisting of public notices and letters from Generals Lake, Asgill, Dundas, Duff, Johnston, Gosford, Needham, and many other persons, to Lord Castlereagh; and containing accounts of the various engagements with the rebel forces in the counties of Antrim, Mayo, Longford, Carlow, Kildare, Wicklow, Wexford, and Dublin.

I also beg to present a very ancient Icelandic medical manuscript, written on thick vellum, and consisting of seventy-three small quarto folios, which I was given by the late lamented Professor Siegfried; as I consider our Library the most suitable place for it, and I am anxious to associate, even in this small matter, the name of so distinguished a scholar with that of the Royal Irish Academy. It contains some MS. philological notes by the late Professor.

From W. Wakeman, Esq., a specimen of French and Co.'s Tuam bank-note, issued in 1812.

A photograph of Cahill's medallion of the late John Mitchell Kemble, which has been recently placed on the tomb of that distinguished antiquary, historian, and philologer, in Mount Jerome Cemetery.

From Lord Farnham, a highly finished conical bone piercer, five inches long, found fifteen feet deep in a sand pit in the townland of Clonnygonnell, parish of Kilmore, county of Cavan. The circumstance of any remains of man's handiwork being found either in drift or gravel, having of late years formed the subject of scientific investigation, invests this article with peculiar interest.

I have also been entrusted by his lordship with the following valuable collection of antiquities, found in Toneymore Crannoge, which have been referred to in my paper laid before the Academy, on the last night of meeting, and also several found during the past week, as the excavation is still going on :—

Five pieces of oak and other timber, which formed the stakes and framework of the crannoge. One of these, a round stake, seven and a half feet long, and eight inches thick, is worthy of comparison with that from a Swiss *Pfaulbauten*, recently brought from Lausanne, and presented to the Academy by Mr. Starkey, which is only four and a half feet long, with an average thickness of three and a quarter inches. The portion which was above ground in each is one foot. The outer surface of both the Irish and Swiss specimens have cracked in precisely the same manner. One of the timbers from Toneymore—thirty-five inches long, ten broad, and six thick—has a mortise cut in its centre 8 inches by 5 ; it probably formed a portion of one of the crannoge houses, which appear to have been constructed like the square wooden house found in the bog of Drumkein, county of Donegal, in 1833, and the base of which was twenty-six feet below the surface. See the model of it in the Museum, presented by Sir Thomas Larcom, and described in the Catalogue, part I., p. 235. Another portion, with a smaller mortise at one end, appears to have been part of the roof. These are the only remains of crannoge structures as yet possessed by the Academy.

A very perfect quern, seventeen inches in diameter, with the upper surface of the top stone highly decorated;—found at the bottom and near the centre of the crannoge.

Several pieces of slag,—tending to prove that iron smelting was carried on in this crannoge.

A barrel-shaped piece of wood, three and a quarter inches long, hollow throughout, and perforated with six holes; either used in weaving or as a net-float.

Three flat circular stone discs or quoits, averaging three and a quarter inches in diameter, and half an inch thick, similar to those on Tray N N in the Museum, and described at pp. 96 and 99 in the printed Catalogue.

A fragment of what would appear to be the stone coulter of a plough, now thirteen inches long, and having an artificial hole near the broad end for attaching it to the beam.

A most perfect and highly decorated mortar, eight inches high by seventeen and a half wide, decorated at the corners with four grotesque figures.

A stone mould, ten inches long, with the casting groove in the long axis.

A four-sided whetstone, twenty inches by three, the largest ever presented to the Museum ; much worn. Eleven fragments of sharpening stones, of which two are perforated and one oval,—averaging from two and a half to six inches long.

A large oval stone, artificially smoothed on all its surfaces, ten and a half inches by three and a half; probably used as a web-polisher before the art of calendering by machinery was known to the Irish. Five globular stones, probably used as weights or sink stones for nets or lines.

A flat red touchstone, three and a quarter inches long, of jasper, used for testing the purity of gold, and similar to those described at pp. 11 and 81 of the Museum Catalogue.

A stone shot, three inches in diameter.

Two weapon-sharpeners, like those figured at p. 75 of Catalogue, of remarkably hard stone, resembling quartz; one circular, and apparently unfinished; the other, two and three quarter inches long, and much used, with a flattened edge, and deeply grooved diagonally on the flat surfaces by the points of the swords, daggers, or spears, it was used for whetting. The use of this description of implement (which is of not uncommon occurrence in Scandinavia) has recently been determined by finding one with a metal collar encircling the edge, and having a hook and strap at one extremity for attaching it to the person, like the modern "steel" of the flesher.

A smooth curved waterworn dark stone, highly polished, and probably used as a burnisher.

Two imperfect red deer's horns. Ten large boars' tusks, and some teeth of ruminants.

Two large bone beads; a variegated enamel bead; a large irregularly shaped amber bead; a smaller one of enamel paste, showing a mixture of red, yellow, and blue colours; and also a small blue glass bead.

Two imperfect bone combs, like those already figured in the Catalogue at p. 272.

A bone ferule, two and a half inches long; solid at one end.

A hazel nut, found near the bottom of the crannoge.

Fourteen portions of pottery, some rudely glazed, others burned, and some only baked; and consisting of fragments of various vessels used either in the arts or for domestic and culinary purposes, such as crucibles, pitchers, and bowls. Among these is a fragment of a bowl or urn, of unglazed pottery, highly decorated with deeply grooved lines on the outside, and slight indentations on the everted lip. It is of great antiquity; composed of very black clay, darkened still more by the long-continued action of the bog, and mixed with a quantity of particles of white quartz or feldspar, which were probably added to give it stability. A similar description of art may be remarked in some of our oldest mortuary urns. When we consider that, except the urns which must be referred to the Pagan period, we have scarcely any examples of ancient Irish pottery, these specimens possess a peculiar interest for the investigators of fictile ware.

Fragments of Kimmerage coal rings; probably part of a bracelet, which seems to have been jointed at one end.

The bowls of two small pipes, similar to those in the Museum, and usually but erroneously denominated "Danish tobacco pipes."

An enclosed ring, of bronze, three and a quarter inches in diameter; a large decorated bronze pin, seven and a half inches long; and a smaller one, three inches in length.

An iron knife blade, with perforated haft, eight and a half inches long. This article looks as if it had been attached to a long handle. A smaller blade, with tang for haft, two and three-quarter inches in length. A globular piece of iron, two and three quarter inches in diameter, like a crotal, with an aperture on one side. The head of a small iron hammer. Three portions of rings, and eleven other iron fragments, the uses of which have not been determined.

Three oval artificially-worked stones.

A small perforated stone, like a whorl or distaff weight.

A very perfect bone piercer; and a small very highly polished bone pin.

Two portions of bone combs. A bone spoon, ingeniously formed out out of the epiphysis of a young ruminant animal.

With all these articles furnished by Lord Farnham from the Toneymore crannoge, may be associated the sixteen specimens from the same locality which I presented in 1860, on the part of Mr. O'Brien, and which are enumerated in vol. viii., pp. 275, 276.

When we consider that this is the only Irish crannoge that has ever been thoroughly examined from summit to base, all these articles, when collected together, and serving to illustrate the manners, habits, customs, arts, and mode of life, of that portion of the Celtic population which resided therein, perhaps for centuries, as well as illustrating beyond any account which has yet been given, the construction of these ancient habitations, they will, I am sure, be regarded with much interest, not merely by the archæological section of the Academy, but by the various other European investigators into like structures, who have called public attention to such matters during the last six years. And it is worthy of remark that, while these *memorabilia* of our ancestors have been past by with but little notice for the last twenty years, the Scientific Academy of Zurich and other literary bodies on the continent have published accounts and given illustrations of almost every fragment that has been found in the crannoges of Switzerland and Savoy.

The circumstance of several valuable gold articles having been found near the avenue leading up to the great sepulchral pyramid of Newgrange is already well known to the learned, from the description given of them in the "Archæologia," vol. xxx., p. 137, and from their being figured in Lord Londesborough's beautiful "Catalogue of articles of Ancient Art." Since then no other remnant of the past has been found either in or adjacent to Newgrange, except the grave containing the vitrified stones which I have described in the 3rd volume of "The Proceedings," p. 262, until the past year, when Mr. Maguire, the liberal landowner of Newgrange, to whom the public are much indebted for the preservation

of that great monument, and who has recently cleared away a large portion of rubbish from the opening, found in the adjoining field the small

fragment of gold which I now present to the Academy. It is a double fillet, soldered along one edge, plain behind, but highly decorated in front in two compartments, one of which presents a shell-like ornament, as yet unknown in Irish gold work, and much resembling Indian manufacture. It is $1\frac{3}{8}$ inches long by $\frac{9}{16}$ths wide, and weighs 3 dwts. 3 grs. The chasing and punched work is remarkably perfect.

I also beg to present on the part of Mr. Faulkner, of Lower Bridge-street, Dublin, the most perfect single-piece oaken boat which has yet been discovered in Ireland. It is eighteen feet nine inches long, and averages two feet ten inches wide, and twenty inches high in the side. It was found upwards of twenty years ago in the bed of the River Boyne, near the southern bank, in the deep water between Oldbridge and Drogheda, and was exhibited as a curiosity in Liverpool many years ago. It has three artificial apertures in the bottom, as shown in the accompanying illustration.

From the venerable William Thomson, Director of the Antiquarian Museum at Copenhagen, moulds and casts of the gold handle of a bronze leaf-bladed sword, recently found in Denmark, and which fit the handles of several of the bronze swords in the Academy.

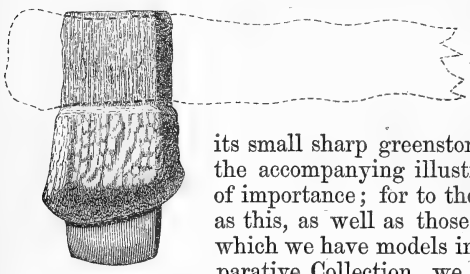
From Alex. M. Holmberg, a distinguished Swedish antiquary, a triangular flint arrowhead, two and three quarter inches long.

From the late Professor Andrew Retzius, the distinguished anatomist and physiologist of Stockholm, a collection of bronze antiquities, found in Scandinavia, and consisting of—A large and small dog-headed brooch; a double breast-fastener, the larger pin cruciform, the smaller plain, and connected by a chain a foot long, a peculiarity common to decorative articles in the north, especially along the shores of the Baltic.

Both the tortoise-shaped, the dog-headed, and many other brooches were worn double,—one over each breast, and connected by ornamental

chains; and even in the present day the inhabitants of Sweden and Norway wear double-chain brooches. Also two bronze bracelets,—a flat and a cylindrical one, the latter tapering to the ends like some of those of the same class found in Ireland.

From M. Troyon, of Lausanne—who, along with Professor Keller, has been the most successful investigator of Swiss crannoges—a collection of articles from those *Pfaulbauten*, where no trace of metal has yet been discovered. Among these, the deerhorn handle of a stone axe, with its small sharp greenstone celt attached, shown by the accompanying illustration, may be regarded as of importance; for to the discovery of such articles as this, as well as those from the same locality, of which we have models in our Illustrative and Comparative Collection, we are indebted for a knowledge of the manner in which our own stone celts were hafted.



Eight articles of deer's horn shaped into piercers, chisels, and rude needles.

Two fragments of pottery from Moosedorf, near Berne.

The half of an apple, hardened and preserved in a remarkable manner, from the deposits of Rohenhouser, in the Lake of Pfiffikon, in the canton of Zurich.

Specimens of corn preserved by carbonization; and also specimens of strawberry grains found in the same deposits, covered by a thick layer of turf, along with the half-burned remains of the lake villages. The Swiss archæologists entertain no doubt of the antiquity of these fruit and grains.

All these foreign antiquities, when arranged in our comparative collection, will serve to illustrate the antiquities preserved in our Museum; and although they have been forwarded to myself, I wish to present them to the Academy in the names of the donors, not only as a mark of respect, but also in the hope that other persons similarly situated may be led to assist, by presentations of foreign or local antiquities, a knowledge of the ancient history of Ireland.

I am, &c.,

Feb. 9, 1863. W. R. Wilde, V. P.

To the Secretary, Royal Irish Academy.

The marked thanks of the meeting were given to Mr. Du Noyer for his very valuable donation, and also to the several donors of the articles

presented by Dr. Wilde, and especially to Dr. Wilde for the interest exhibited by him in promoting the objects of the Academy.

The President informed the Academy that the articles of antiquity lent to the Academy for exhibition at the South Kensington Museum had been returned safely, and replaced in the Museum.

MONDAY, FEBRUARY 23, 1863.

The Very Rev. Charles Graves, D. D., President, in the Chair.

On the recommendation of the Council, it was—

Resolved,—That in acknowledgment of the very valuable donations of Drawings of Antiquities and Architecture presented to the Academy by Mr. G. V. Du Noyer, he be recognised as a Life Member, without the payment of the usual life composition.

The Rev. William Reeves, D.D., read the following paper:—

On SS. Marinus and Anianus, two Irish Missionaries of the Seventh Century.

The Academy owes to the vigilance of its excellent Librarian the recent acquisition of a volume which, independently of the value arising from its great rarity, possesses the merit of introducing to notice in this country two Irish Missionaries, whose names have escaped our ecclesiastical writers, and who, notwithstanding the deficiency of detail in their history, have yet a sufficient reality to render them a welcome accession to our recorded list of Irish worthies.

The volume comprises three tracts. The first bears the title—"*Das leben der Heiligen S. S. Marini Bischoues Martyrers, und Aniani Archidiaconns, Bekenners die aus Irrland in Bayrn kommen, des Gotshauses Rodt Patronen wordenseind. Durch Johan à Via, der H. Schrifft Doctorn beschrieben.*"* The lower half of the title-page is occupied by an engraved plate, having in the middle a shield, which bears quarterly the arms of the monastery of Rot, and of Christopher the abbot, supported by two eccle-

* There is a copy of this tract in the Library of Trin. Coll. Dubl. (Gall. NN. 10. 19); but the frontispiece is somewhat different, and is identical with that of the second tract in this volume. A copy of the German life was advertised some years ago in a catalogue of Thomas Thorpe, of London, marked, "extremely rare, £2 2*s*."

siastics, the dexter one vested in an episcopal, the sinister one in a sacerdotal habit. Between them is the inscription, "CHRISTOPHORVS. S. ABBAS. S. MARINVS. S. ANIANVS. PATRO. IN ROT. 1579." This German life, with the dedication, occupies nineteen leaves.

The second tract is a Latin version of the same life, and bears the title—"*Vita S. S. Marini Episcopi Hybernobavari, Martyris, et Aniani Archidiaconi Confessoris, Patronorum celebris Monasterii in Rota. Per Johan. à Via Doct. Theol. conscripta, Monachii excudebat Adamus Berg. Anno M. D. LXXIX.*" It has the same frontispiece as the former, except that it omits the date. To this tract is appended (fol. 12 *b*) a "*Sermo brevis cujusdam pii patris in Monasterio Rott ad Fratres ibidem pronunciatus.*" The verso of the concluding folio (15) contains the enactment of the Council of Trent, Session 25, "De Invocatione, etc., Sanctorum."

The third tract is intituled, "*Officium de Sanctis Marino Episcopo et Martyro, et Aniano Archidiacono Confessore celebris Monasterii in Rott Patronis. Jussu Reverendi in Christo Patris ac Domini, D. Christophori ejusdem Monasterii Abbatis vigilantissimi in ordinem redactum, et jam primum in lucem editum. Monachii excudebat Adamus Berg. Anno D. M. LXXXVIII.*" On the title-page is an engraving of a circular seal, having on the field two shields, charged respectively with the arms of Rott and the abbot Christopher, with the legend ✠ CHRISTOFF. ABBT. ZV. ROTT. A°. 1588. This tract contains twentysix folios.

The author, in his dedication to the abbot Christopher,* expresses his regret that the notices of the patrons of this monastery which were scattered through the ancient annals belonging to the institution had not been put together in any regular order, and that they who had been set upon a candlestick to give light to all that were in the house, should, through the neglect of past generations, have been kept hidden under a bushel. He states that the acts of SS. Marinus and Anianus were preserved in three very ancient manuscripts, together with a sermon on the same subject by a learned and pious member of the fraternity, which he has annexed as a separate chapter to the Latin life. Munich, 6th of April, 1579.

The following abstract of the Life contains the principal particulars of their history. Having alluded to the banishment and death of Pope Martin in 653, the narrative proceeds to say:—"Florebant tunc in Hybernia Scholæ ac nunquam satis laudata literarum studia, adeo ut ex Scotia† atque Britannia multi se pii viri eo conferrent, ad capessendam pietatis disciplinam. In iis quoque in omni doctrinarum genere excellenter eruditi fuerunt duo hi sanctissimi viri, genere nobiles, ac profes-

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* Christopher Schröttl was abbot of Rott from 1576 to 1589, and died in 1595. See Hundius, "Metropolis Salisburgensis," p. 274 (ed. Chr. Gewoldus, Munich, 1620).

† The use of this term as limited to Scotland proves that the writer of the tract lived subsequently to the eleventh century.

sione Ecclesiastici, Sanctus Marinus cum S. Aniano, nepote suo ex sorore: ille sacerdos et Episcopus, hic Archidiaconus: qui ambo ad modum Abrahæ patriam cognatosque post se relinquentes, voluntario exilio, et mundum sibi, et se mundo crucifixerunt. Transfretantes enim mare quod Hiberniam secernit a Germania, venerunt peregrinantes in urbem Romanam, vel ut propriæ saluti consulentes, devotionis suæ, limina beatorum Apostolorum, Petri ac Pauli frequentando, satisfacerent desiderio: vel ut Apostolicæ Sedis, si quem forte Deus pastorem in eam reponeret, authoritate confirmati, prædicando errorum zizania authoritative evellerent, et bonum verbi Dei semen in cordibus audientium inserent. . . . . Nam ubi Romam venerunt, non alta regum palatia, non porphyreticas statuas, non arces triumphales mirabantur, sed salutato eo qui tunc a Domino in eam sedem constitutus erat Pontifice, SS. Apostolorum limina frequentare, specus ac templa reliquorum Sanctorum visitare, votaque sua Deo offerenda ipsis commendare, unica illis voluptas erat. Et D. Laurentii memoria adeo delectabatur Marinus, ut ab eo tempore, quo ejus reliquias veneratus erat, simile sibi mortis genus pro Christi nominis gloria semper optaverit, atque a Deo ardentibus votis, si ejus voluntas esset, expetierit. Accepta autem ab Eugenio* Summo Pontifice benedictione, cum authoritate ubilibet prædicandi verbum Dei, via qua venerant, revertebantur. An vero in societate D. Iodoci ipsi quoque fuerint, incertum est: qui cum esset filius regis Britanniæ opulentissimus, amore Christi, regnum et omnem gloriam ejus circa idem tempus reliquit, et eremum intravit, ubi soli Deo serviens, miraculis claruit. Superatis igitur Alpium montibus, mox in vasta quadam eremo Boioariæ, Noricæ provinciæ subsidentes, pedem figunt ad ipsas radices Alpium. Erat locus ille in quo consederant, ad quietem et contemplationem aptus, sed hominibus non prorsus impervius, omnis generis lignorum copia ac pascuis uberrimis pecudum gregibus valde accommodus. Quæ res occasionem dedit, ut diu latere non possent, sicut nec ipsi optabant." Finding their labours among the pastoral inhabitants of the neighbourhood successful, they resolved upon settling in this region for the rest of their days, and erected huts for themselves over two caves about two Italian miles asunder. Here they led a life of solitude and self-mortification, meeting only on Lord's days and festivals, when they joined in the services of the altar. And thus they continued, teaching both by precept and example, and crowned with success in their endeavours to convert the surrounding people, until at length a horde of barbarians,† driven from the Roman provinces on the south, entered this territory, and proceeded to lay it waste. In their wanderings they arrived at the cell of S. Marinus, and the Life thus re-

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* Eugenius I. succeeded Martin as Pope in the year 654.

† The Life calls them Vandali, but Raderus suggests Sclavi or Venedi as the proper designation, "Bavaria Sancta," tom. i., p. 91. Aventinus states that Anianus et divus Marinus were slain by the Boii, under Theodor, "Annales Boiorum," lib. iii., cap. 2, § 10.

lates the cruel treatment which he experienced at their hands:—"Primum enim sancti viri supellectilem licet exiguam diripuerunt, postea corpus verberibus afflixerunt, et jam tertio animam, meliorem hominis partem, tollere cupientes, ut Christum negare velit, solicitant. Sed cum in omnibus laqueos ante oculos pennati frustra tenderent, ne quicquam ad summam truculentiam immanitatemque reliqui facerent, equuleo suspensum corpus flagris et aduncis ungulis diu sævissimeque lacerando usque ad denudationem costarum excarnificant. . . . Desperantes igitur victoriam, sententiam mortis super eum pronunciant, igni adjudicant. Continuo ergo, celeri manu ligna congerunt, struem componunt maximam, igni succendunt, et S. Martyrem, aridis ruderibus dorso alligatis (quo facilius totus in cineres solveretur) supra truculenter injiciunt." It happened that at the same time S. Anianus, who had escaped the notice of the barbarians, was released by a natural death from the trials of this life; and thus both master and disciple on the same day—namely, the 17th of the Calends of December, that is, the 15th of November, which afterwards became the day of their commemoration—passed to a happy immortality, while their remains were consigned to a common tomb, where they rested for above a hundred years. At the end of this period, the circumstances of their death and interment were made known to an eminent and devout priest named Priam, who resided in a neighbouring village. He, it is stated, communicated the matter to a bishop called Tollusius, who repaired to the spot, and having ordered a solemn fast, on the third day exhumed the remains with due solemnity, and conveyed them to the village of Aurisium, now known as Ros,* where they were deposited in a sarcophagus of white polished marble, within the church of that place. This invention is loosely stated to have occurred in the time of Pepin and Caroloman, kings of the Franks, when Egilolph was in Italy; and it is added—"Priamus præsbyter, jussus a domino Episcopo Tollusio, vidi omnia et scripsi: et testimonium his gestis perhibeo, et testimonium meum verum est, quod ipse scit, qui benedictus est in sæcula, Amen."

From this place the reliques of the two saints were subsequently transferred to a spot near the river Aenus (now the Inn), which obtained the name of Rota† from a little stream that flowed past it into the Inn, and here they were to be seen beneath the high altar of the choir.

A Benedictine Monastery was founded at Rot,‡ in 1073, by Chuno,

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* A village on the Inn, between Vasserburg and Rosenheim.

† In a charter it is styled "Rota quæ adjacet Glanne flumini"—Hundius, "Metrop., Salisburg," tom. iii., p. 265.

‡ Rot is marked in Blaeu's Map of the Saltzburg Archiepiscopatus, in the north-west corner, situate on the west bank of the Inn, to the N. W. of the Chiamsee; also, in the map of Bavariæ Ducatus, near the middle.—Geographia Germania, between pp. 81, 82, and pp. 87, 88. See also Spruner's Atlas, Deutchland, Nos. 9, 13. It and the neighbourhood are very minutely delineated in Captain Chauchard's "General Map of the Empire of Germany," &c., No. IX., below the middle (Lond. 1800).

or Conon, Count of Wasserburg,* and his charter, of that date, makes mention of the "altare SS. Marini et Aniani."†

In a bull of confirmation granted by Pope Innocent II., in 1142, Rot is styled "præfatum SS. Marini et Aniani monasterium."‡ Mabillon, who states that he visited this monastery in one of his journeys, describes it as the Benedictine Monastery of SS. Marinus and Anianus,§ but he takes no notice of the patron saints themselves in the earlier part of his "Annals." Raderus, however, gives a short memoir of them, which he illustrates by two engravings, representing respectively the martyrdom of S. Marinus, and the angelic vision of S. Anianus,‖ to which he assigns the date 697.

Under the year 784, this author makes mention of another Marianus, who also was an Irishman.¶ He came to Bavaria in company with St. Virgil of Saltzburg, and was one of the two companions who were sent by him with Declan to Frisingen.** The festival of this Marinus was the 1st of December, and his ashes were believed to be efficacious in curing certain diseases.††

As regards the names, it is not clear what is the Irish equivalent for Anianus; but Marinus is beyond all question a Latin translation of Muireḋhach, which is derived from muir (*mare*), and signifies "belonging to the sea." The name is of very early occurrence: thus, Muireḋach, the first bishop and patron of Killala, who is commemorated at August 12, is mentioned under the form of *Muirethacus* in the early part of the eighth century.‡‡ In like manner, the name of the celebrated Briton, Pelagius, is understood to be a Greek form of the British *Morgan*, which is equivalent to *Marigena*. We have in the Irish calendar a name closely allied to Morgan, in the form Muirgein, which means "sea-born," and is of common gender, for it is applied in one instance to an abbot of Gleann hUissen, now Killeshin; and in another to the celebrated Mermaid, in whose case it is interpreted liban, that is, "sea-woman."§§

The name Marinus is to be distinguished from Marianus, as the lat-

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* Ibid; Mabillon, "Annales Ord. S. Bened.," tom. v., p. 72.

† Hundius, ut supra.

‡ Hundius, ut supra, p. 267.

§ "Annales," tom. v., p. 72.

‖ "Bavaria Sancta," tom. i., pp. 87, 89, 91.

¶ Ibid., tom. ii., p. 114.

** The fragment of the Irish Chronicle, preserved by Canisius, seems, however, to identify this Marinus with the patron of Rot:—"B. Declanus cum aliis duobus ad Frisingiam, iique alii apud Rott beata ossa sua terræ commendaverunt."—Antiq. Lect., tom. iv., p. 474.

†† See the picture of their application in Raderus, tom. ii., p. 114.

‡‡ "Book of Armagh," fol. 9 *bb*, col. 2, 15 *aa*.

§§ See "Martyrology of Donegal," Jan. 27 (p 28). Ussher notices a bishop *Murgeus* (Wks., vol. vi., pp. 479, 606), but errs in identifying him with *Muirgen-i-Liban*, the Mermaid (ib., p. 536).

ter is derived from the name Maria, and represents, in a Latin form, the Irish Mael-Muire, "servant of Mary."*

In connexion with the above paper, Dr. Reeves exhibited a silver crown piece of Salztburg, which had been kindly sent to him by Count Charles Mac Donnell. It was from the mint of Maximilian Gandolph, Count Von Khuenburg, Sovereign Archbishop of that see in 1668. On the obverse are represented two archbishops, ecclesiastically habited, with the legend—✠ SS. RVDBERTVS. ET. VIRGILIVS. PATRONI. SALISBVRGENSES.; and on the reverse a shield, having in a chief the diocesan coat, and the family arms beneath, with the legend—✠ MAXIMIL : GANDOLPH' D : G : ARCHIEPS : SALISB : SED : AP : LEG. This coin is of great interest to Irishmen, as one of two patron saints of Saltzburg, who are represented on it, was a native of this country; and the other, if not a native, was connected with it. S. Rudbert, or Rupert, whose name Colgan† supposes to be a German form of Robarcach, went to Germany from the west, and died on the 27th March, 718. Virgilius, the celebrated philosopher, known by the epithet Solivagus, went out from Ireland to Germany about the year 770, and became Bishop of Saltzburg. His death is noted in the "Annals of Ulster," at 788; and the "Four Masters," more fully, at 784, thus record the event :—"Fergil, that is the Geometer, Abbot of Achadhbo, and Bishop of Saltzburg, died in Germany, in the thirteenth year of his episcopate." He was canonized in 1233 by Pope Gregory IX., and his festival is the 27th of November.‡

Dr. Reeves also exhibited an engraving of the Common Seal of the Canton of Glarus in Switzerland, which he had received from Dr. Ferdinand Keller, of Zurich. It represents on the field the full-length figure of a pilgrim, habited in a black cowl, bearing in the right hand a closed book, and leaning with the left on a pilgrim's staff, having a belt slung over the left shoulder, from which is suspended a wallet; with the letters ✠ S. FRID. Round the margin is the inscription ✠ SIG. MAIVS POPVLI CLARONENSIVM HELVETIORVM. This seal, and three others of the same design, but on a smaller scale, are figured in the "*Mittheilungen der antiquarischen Gesellschaft in Zürich*," Bd. ix. (Zürich, 1856), where they illustrate an interesting paper by E. Schulthess, entitled "*Die stædte-und Landes-siegel der xiii. alten orte der Schweizerischen eidgenossenschaft*," pp. 82–85, and Taf. xii. Prefixed is an account of the banners of the several Cantons, where that of Glarus is thus noted :—"Ibi sanctum Fridolinum confessorem summo celebrant honore, ipsum-

* See "Proceedings, vol. vii., p. 292. Marianus, the Chronicler's name was *Maelbrigde*, Brigid being the Mary of the Irish. The other Marianus, however, was *Muiredhach*, whose name was Latinized by a familiar appellation, without regard to the rules of etymology.

† "Acta Sanctorum Hiberniæ," p. 761, note 2.

‡ Raynaldus, "Annales Eccles.," tom. ii., p. 93 (ed. Mansi, Lucæ, 1747).

que sanctum in eorum armis ferunt indutum cuculla nigra in rubro clipeo stantem" (p. 10). The shield is also represented in the plate (Taf. i.), *Gules*, a hermit, holding in his left hand a staff, and wearing a wallet, all proper, the head surrounded by a nimbus *or*.

S. Fridolin, the patron saint of Glarus, was a native of Ireland; and the German form of his name is to be accounted for by the common practice of translating Celtic names, or accommodating them by transformations, more or less violent, to the genius of the languages spoken in the regions where the Irish missionaries settled. He flourished in the early part of the seventh century, and several memoirs of him are reprinted by Colgan from Continental writers, at his festival, the 6th of March.* All authorities, both written lives and local tradition, refer his birth and mission to Ireland, whence he set out as a pilgrim, and finally settled at Seckingen. He is often styled *Viator*, which title is fully borne out by his appearance on the seals and banner; and the staff on which he is represented as leaning illustrates the passage of his "Life" which alludes to his position—"interea fixo in terram sustentationis baculo, ipsique desuper innixus."†

Mr. Wilde presented, from Lord Farnham, the head of a Galloglass axe, a portion of slate with three circular cavities, and a flat highly coloured amber bead, found in Tonymore Lake, county of Cavan, in the year 1852.

The thanks of the Academy were returned to the donor.

STATED MEETING.—March 16, 1863.

The Very Rev. Charles Graves, D. D., President, in the Chair.

The Secretary read the following

REPORT OF THE COUNCIL.

Since our last Report was submitted to the Academy, the following papers have been printed in the "Transactions":—

In the department of Science:

1. Mr. F. J. Foot, "On the Distribution of Plants in Burren, County of Clare."
2. Dr. Robert MacDonnell, "On the System of the Lateral Line in Fishes."

And, in Polite Literature:

Mr. Denis Crofton's "Collation of a MS. of the Bhagavad-Gîtâ."

These papers form part of Vol. xxiv.

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* "Acta Sanctorum Hiberniæ," pp. 479-493.

† "Vita, auctore Balthero," cap. 5, ibid., p. 983 *a*.

In Antiquities:

Captain Meadows Taylor's paper "On the Cromlechs and other Antiquarian Remains in the Dekhan," has been in part printed, and the illustrations are in preparation.

Many interesting communications have been read before the Academy, abstracts of which have appeared, or will soon appear, in the "Proceedings." We have received papers in Mathematics from Sir William R. Hamilton; in the sciences of observation and experiment from Rev. Dr. Lloyd, Mr. Bindon B. Stoney, Rev. Professor Jellett, Mr. Jukes, Mr. F. J. Foot, Rev. Professor Haughton, Dr. Robert MacDonnell, Mr. Clibborn, Lieutenant J. Haughton, R. N., and Dr. Fleetwood Churchill, jun.: in Polite Literature and Antiquities, from the Very Rev. the President, Rev. Dr. Todd, Rev. Dr. Reeves, Mr. Hardinge, Mr. Wilde, Dr. Madden, Mr. M'Carthy, Captain Meadows Taylor, Dr. William Bell, and Mr. Hodder M. Westropp.

To the Academy's Library several valuable presentations have been made during the past year, amongst which may be specially mentioned those from the Right Hon. Sir John Romilly, Master of the Rolls in England; and from his Eminence, Cardinal Antonelli—the latter through our late President, the Rev. J. H. Todd.

Some small but very valuable additions have been made to the Academy's collection of Irish history in manuscript and print. We have expended as much as the means at our disposal permitted in the execution of binding, which had fallen into arrear; and various improvements connected with the arrangements of the Library have been effected by the Librarian.

The Academy's collection of antiquities has been increased during the past year by the addition of 910 articles; of which 20 were obtained by purchase, 683 by presentation, and 207 under the Treasure Trove regulations. The Academy is indebted to Lord Farnham for a large collection of antiquities found in the Tonymore Crannoge, in the county of Cavan, which his lordship recently explored. We are also under obligations to the Commissioners of Public Works for several interesting articles, contributed to our Museum. We have been fortunate enough to procure, through Mr. Wilde, the very ancient short crozier of St. Barry, of Termonbarry, in the county of Roscommon, commonly known as the Gearr-Barry.

In compliance with a request received from the Science and Art Department of the Committee of Council on Education, the Academy lent for exhibition in the South Kensington Museum, a number of select specimens of early Irish art. All of these have since been safely returned.

A considerable number of copies of the Catalogue of the Museum have been sold within the year. Twenty woodcuts have been executed during the past year, making up a total number of eighty-two woodcuts, illustrative of the articles of silver and iron in the Museum, which have been paid for out of the Catalogue fund.

There remains in favour of that fund a balance of £11 12*s*. 3*d*.

The Antiquities in the possession of the Academy already fill nearly the entire space available for their reception; and the Council are of opinion that arrangements for extending the Museum will soon become necessary.

The Treasurer reports that it appeared from an investigation of the accounts of the Academy, made on 7th March, that the net cash balance amounted to £232 1*s.* 10*d.*, and the outstanding liabilities to £323 7*s.* 5*d.*, leaving a deficit of £91 5*s.* 7*d.*, to be provided for either by the sale of stock, or out of the income of the next financial year. The payments made since that date for entrance fees and subscriptions have reduced this deficit to about £12.

The Academy has lost by death, during the past year, ten ordinary members, viz.:—

		Elected.
*1.	Thomas F. Bergin, Esq.,	November 30, 1836
2.	Very Rev. Richard Butler,	April 11, 1842
*3.	Right Hon. Philip C. Crampton,	January 23, 1828
4.	Eugene Curry, Esq.,	January 30, 1853
5.	Viscount Dungannon,	January 8, 1849
*6.	Eaton Hodgkinson, Esq., F. R. S.,	November 30, 1847
7.	John R. Kinahan, M. D., F. L. S.,	January 12, 1857
*8.	Rev. Thomas M'Neece, D. D.,	May 8, 1831
*9.	Rev. Charles W. Wall, D. D.,	April 10, 1837
10.	George Yeates, Esq.,	February 24, 1845

Five of these names meet us in the history of the labours of the Academy:—

1. Mr. Thomas F. Bergin was the author of the following papers, which have appeared in our "Proceedings":—"On an Aurora," "On Talbotized Photogenic Paper," "On Preservation of Rusted Antiquities," and "On Illumination of Objects in the Microscope." Mr. Bergin presented to the Academy some interesting antiquities. See "Proceedings," vol. iv., p. 273.

2. In Mr. Eugene Curry's death, this Academy and the cause of Irish learning have lost a scholar who possessed a familiar and accurate acquaintance with the whole body of accessible Gaelic manuscript Literature. Mr. Curry, in conjunction with the late Dr. O'Donovan, transcribed and translated a great number of ancient texts for the Irish Archæological and Celtic Societies. He compiled for this Academy a descriptive catalogue of a portion of the Irish manuscripts in its possession, and also prepared a catalogue of Irish manuscripts in the Library of the British Museum. He published, in 1861, a volume entitled, "Lectures on the MS. Materials of Irish History;" and it is understood that he had nearly completed a second volume, "On the Manners, Customs, and Social Life of the People of Ancient Erin." These courses of lectures he had delivered as Professor of the Irish Language and Irish Archæology, in the Catholic University in this city.

For several years before his death he had been employed, along

with Dr. O'Donovan, in deciphering, transcribing, and translating the MSS. of the Brehon Laws, under the superintendence of the Commission for the publication of the ancient laws and institutes of Ireland.

3. Dr. John R. Kinahan was Professor of Natural History in the Department of Science and Art. He was the author of a great number of memoirs on zoological subjects, communicated to the Natural History, and other kindred Societies, of Dublin. He published in the Transactions of the Academy papers "On the Genus Oldhamia (Forbes): its character, probable affinities, modes of occurrence, &c.," printed in vol. xxiii.; and "On the British Species of Crangon and Galathea," in vol. xxxiv. To our Proceedings he contributed papers "On a Proposed Scheme for a Uniform mode of Naming Type-divisions;" and "A Synopsis of the Families Crangonidæ and Galatheidæ which inhabit the seas around the British Isles."

4. The Rev. Charles William Wall, D. D., was Vice-Provost of Trinity College, Dublin, and had formerly held the Professorship of Oriental Languages in the University. He was author of "An Examination of the Ancient Orthography of the Jews, and the Original State of the Text of the Hebrew Bible," the first volume of which appeared in 1835. Four other volumes have since appeared, the last of which, published in 1857, is entitled "Proofs of the Interpolation of the Vowel Letters in the Text of the Hebrew Bible." For this work one of the Cunningham medals of the Academy was awarded him in the year 1858. He contributed to our Transactions "An Essay on the Nature, Age, and Origin of the Sanscrit Writing and Language," printed in vol. xxviii., and a paper "On the Different Kinds of Cuneiform Writing in the Triple Inscriptions of the Persians, and on the Language transmitted through the First Kind," printed in vol. xxi.

5. Mr. George Yeates was well known as an optician and manufacturer of scientific instruments. He contributed to our "Proceedings" records of meteorological observations made by him during the years 1843–1849.

Ten members have been elected during the past year, viz.:—

*1. Andrew Armstrong, Esq.
2. John Campbell, Esq., M. B.
3. Christ. Coppinger, Esq., Q. C.
*4. J. Ribton Garstin, Esq., M.A.
5. P. Weston Joyce, Esq., B. A.
6. J. Stratford Kirwan, Esq.
7. George Porte, Esq.
8. Thomas Richardson, M. D.
9. Captain Meadows Taylor.
10. John Henry Tyrrell, M. D.

Mr. G. V. Du Noyer was declared a life member by the Academy.

The ballots for the annual election of President, Council, and Officers, having been scrutinized in the face of the Academy, the President reported that the following gentlemen were duly elected:—

President.—The Very Rev. Dean Graves, D. D.

Council.—Rev. George Salmon, D. D.; Rev. Samuel Haughton, M. D., &c.; Rev. J. H. Jellett, A.M.; Robert W. Smith, M. D.; Robert M'Don-

nell, M.D.; William K. Sullivan, Esq.; and Joseph B. Jukes, A. M.: on the Committee of Science.

Rev. Samuel Butcher, D.D.; Rev. Joseph Carson, D. D.; John F. Waller, LL.D.; John Kells Ingram, LL.D.; John Anster, LL.D.; R. R. Madden, M.D.; and D. F. M'Carthy, Esq.: on the Committee of Polite Literature.

John T. Gilbert, Esq.; Rev. William Reeves, D.D.; W. R. Wilde, Esq.; George Petrie, LL.D.; W. H. Hardinge, Esq.; the Lord Talbot de Malahide; and Rev. J. H. Todd, D. D.: on the Committee of Antiquities.

Treasurer.—Rev. Joseph Carson, D. D.

Secretary of the Academy.—Rev. William Reeves, D.D.

Secretary of the Council.—John Kells Ingram, LL.D.

Secretary of Foreign Correspondence.—Rev. Samuel Butcher, D.D.

Librarian.—John T. Gilbert, Esq.

Clerk, Assistant Librarian, and Curator of the Museum.—Edward Clibborn, Esq.

The ballot for the election of Honorary Members having closed, the President and Officers made a scrutiny, and it was declared that all the persons recommended in the three departments were elected, viz.—

In Science.—Baron Giovanni Plana; Christopher Hansteen; F. G. W. Struve; Louis Agassiz; and H. W. Dove.

In Polite Literature.—Dr. Max Müller; George Grote, Esq.; Hermann Ebel; and Alphonse De Lamartine.

In Antiquities.—Dr. Ferdinand Keller; and L'Abbé Cochet.

Dr. Lyons handed in the two volumes of the late Professor Curry's transcripts of the O'Conor Don's Manuscripts.

Thanks were returned to the subscribers (see List of Subscribers, Appendix No. III., p. xxi.) who contributed towards the purchase of the above MSS.; and to Dr. Lyons and John E. Pigot, Esq., by whom they have been now delivered to the Academy.

MONDAY, APRIL 13, 1863.

The Very Rev. Charles Graves, D. D., President, in the Chair.

The President under his hand and seal nominated the following

Vice-Presidents.—Rev. George Salmon, D. D.; Rev. S. Butcher, D. D.; W. R. Wilde, Esq.; and George Petrie, LL. D.

The Earl of Granard; Rev. Josiah Crampton, A. M.; Thomas William Kinahan, Esq.; David R. Pigot, Esq.; and Edmund Waterton, Esq., were elected Members of the Academy.

The following Address to her Majesty, adopted by the Academy on the 16th March last, was read:—

"*To the Queen's Most Excellent Majesty.*

"May it please Your Majesty,—We, your dutiful and loyal subjects, the President and Members of the Royal Irish Academy, humbly approach your Majesty with our heartfelt congratulations on the attainment of his majority by his Royal Highness the Prince of Wales.

"We desire at the same time to express the joy with which we hail the prospect of his entering into an alliance sanctioned by your Majesty's approval, and holding out the fairest promise of domestic happiness.

"In thus undertaking the duties and responsibilities of manhood, his Royal Highness gathers round him the lively sympathies of all classes of your Majesty's subjects.

"Incorporated for the promotion of Science, Polite Literature, and Antiquities, our Academy devotes itself to studies, many of which have only an indirect bearing upon the interests of social and political life. But its Members cannot fail to recognise the close connexion which subsists between the prosperity of the whole nation and the welfare of our most gracious Sovereign and her royal house.

"We earnestly pray that your Majesty may be spared through many years to see his Royal Highness the Prince of Wales pursuing the wise and virtuous course which the instructions and example of your Majesty and his illustrious father have taught him to tread; and that your Majesty may thus find in him a solace and support under the cares incident to your exalted position as ruler of this great Empire.

"*Royal Irish Academy, March 2nd*, 1863."

Read, the following letter:—

"*Whitehall, April* 9, 1863.

"Sir,—I have had the honour to lay before the Queen the loyal and dutiful Address of the President and Members of the Royal Irish Academy on the occasion of the Marriage of His Royal Highness the Prince of Wales; and I have to inform you that her Majesty was pleased to receive the Address very graciously.

"I am, Sir, your obedient servant,

"(Signed) G. Grey.

"*The President of the Royal Irish Academy.*"

The following Address to the Prince of Wales, adopted by the Academy on the 16th March last, was also read:—

"*To his Royal Highness Albert Edward, Prince of Wales and Earl of Chester, Earl of Dublin, &c., &c., &c.*

"May it please your Royal Highness,—We, the President and Members of the Royal Irish Academy, respectfully entreat your Royal Highness to accept our hearty congratulations on the occasion of your attaining your majority.

"We also desire to express the lively satisfaction with which we see your Royal Highness about to contract a marriage with a Princess possessing all the qualities which inspire affection and command respect. We can offer no better wishes for the happiness of your wedded state than that it may be attended by every blessing which hallowed the union of your Royal Parents.

"The honest search after scientific truth, and the thoughtful study of the records of the past, have always proved conducive to the interests of religion, and favourable to the maintenance of those principles of liberty and subordination on which the constitution of these kingdoms is securely founded. We therefore feel assured that a Prince trained from his earliest years to respect and cultivate the pursuits of Art and Letters, will look with favour upon bodies associated as our Academy is for the advancement of the various departments of human learning.

"As a Councillor of our Queen, and the subject nearest to her throne, your Royal Highness has before you a field affording exercise for the noblest ambition. We trust you will enter upon it undiscouraged by the natural fear of falling short of what might almost seem the unapproachable excellence of the example set by your lamented Father. The affectionate loyalty of your countrymen will sustain you in all your labours for the common good; and we doubt not but that Almighty God will hear our prayers, invoking in your favour that divine aid without which the wisest counsels and the most strenuous efforts cannot ensure success.

"*Royal Irish Academy, March* 2, 1863."

READ, the following answer:—

"*Sandringham, 4th April*, 1863.

"Lieutenant-General Knollys has received the commands of the Prince of Wales to thank the President and Members of the Royal Irish Academy for their address of congratulation on his marriage and obtaining his majority. His Royal Highness appreciates to the fullest extent their kind sentiments towards himself, and their affectionate loyalty towards her Majesty the Queen. He cannot also but feel highly gratified by the terms in which they allude to his lamented father.

"*To the President of the Royal Irish Academy.*"

READ, the following letter from G. V. DU NOYER, Esq.:—

"*Sidney Avenue, Blackrock, 26th February*, 1863.

SIR,—I have to acknowledge the receipt of your letter of the 23rd instant, informing me that the Royal Irish Academy has placed me amongst its Life Members, without the payment of the usual life composition, in acknowledgment for the collection of drawings of Antiquities and Architecture which I have from time to time presented to the Library of the Academy.

"For this unexpected and most gratifying honour I beg to thank the Academy.

"The drawings to which you allude form only a portion of those which I contemplate placing in our Library, the value of which, I may

be permitted to hope, will be thereby increased to the student or the writer on Irish Archæology.

"I have the honour to remain, Sir,

"Your obedient servant,

"George V. Du Noyer.

"*To the Rev. William Reeves, D. D., Secretary,*
"*Royal Irish Academy.*"

Read the following Paper, from the notes of the late Dr. Siegfried, Professor of Sanscrit in the University of Dublin.

On the Gaulish Inscription of Poitiers, containing a Charm against the demon Dontaurios. From the papers of the late Dr. Rudolph Thomas Siegfried, arranged by Carl Friedrich Lottner.

(Plate XXIII.)

In the year 1858 there was found at Poitiers, on occasion of some digging for building purposes, a small silver plate, with an inscription, which was immediately laid before the Société des Antiquaires de l'Ouest. One of the members of this Society, M. de Longuemar, published a short treatise on this inscription, together with an engraving of it, reproduced before the present essay. From this writing, which appeared with the title, "*Rapport sur une inscription tracée sur une lame d'argent et découverte à Poitiers en* 1858," we learn that the silver plate was originally enclosed in a kind of case, which unfortunately was destroyed by the workman who found it, in his eagerness to get hold of its contents. This circumstance is not without some importance for the interpretation of the inscription on the plate. For the natural inference would seem to be that the inscription was intended to be carried about on the body of some person, which again renders it very probable that it contained a charm, and that the plate was a kind of amulet or talisman. The inscription itself is in Latin characters, such as, according to M. de Longuemar, were employed in public documents of the Merovingian or Gallo-Roman times. The nearest approach to them, according to the same scholar, is found in the alphabet of two documents of the 6th century—one a chart of the year 565, the other a sermon of St. Hilarius, written at about 570. This would not, however, necessitate the assumption that the inscription on the plate must be of the same century, but it might belong to a date somewhat more remote.

Owing to the very careless way in which the letters are traced, it was not easy to read them correctly. The only part which was clear at once were the concluding words, *Justina quem peperit Sarra*, which are evidently Latin. By a comparison with two of the incantations of Marcellus Burdigalensis, M. de Longuemar showed that the formula, "illius quem peperit illa," is peculiar to charms, the intention being thereby to make sure of the person for whom the spell was written, and to prevent its taking effect on anybody else. So much, then, was clear, that the inscription contained a charm. But, except the last sentence, scarcely anything could be made of it. Thrice the Latin word *bis* recurred, which also went to prove that one had to do with some incan-

tation, as it is evidently the direction to repeat certain parts of the formula. The remaining words, however, did not appear to be Latin at all, and naturally the hypothesis presented itself that they might be Gaulish. The word Gontaurion or Gontaurios, as it was then read, which recurred also thrice, would equally naturally be taken as the name of the spirit or spirits invoked or exorcised. On this basis, M. Pictet tried to raise an interpretation, but his conjectures were too bold to meet with much applause from other scholars. So great, in fact, was the obscurity of the whole subject, and so puzzling the circumstance of Latin words being mixed with, and as it were scattered through, the text of another language, that Mr. Whitley Stokes, in speaking of the inscription in Kuhn's "Beiträge" (III., 74), left it an open question whether, after all, the would-be Gaulish parts might not be a simple abracadabra, on which all learning and ingenuity would be wasted entirely.

Dr. Siegfried, who already had interpreted with success other Gaulish inscriptions, had his attention soon directed to this puzzle. He began by trying correctly to define the alphabetical value of the characters. He soon found out that the letter at the beginning of the name of the spirit or demon is not G, but D, and he also read some additional Latin words by more correctly defining the value of the letters. This stage of his knowledge of the formula is represented in the transcription given by W. Stokes (*l.c.*), who simply reproduces there Siegfried's reading.

In December, 1862, Dr. Siegfried made the further discovery that the ninth character from the end in the second line is a *d*, not a *c*; that the end of the third line contains the Latin words, *pater nam esto*; and that, consequently, the whole last part of the inscription being Latin, the third character in the word hitherto read *setuta* must be either a *b* or *c*, thus making the Latin word *secuta*. The whole, according to his last reading, will therefore be, separating the words:

bis dontaurion anala bis bis dontaurion
deanala bis bis dontaurios datala ges [*sa*]
uim danimauim [*s*] *pater nam esto*
magi ars secuta te iustina quem
peperit sarra.

Or, written according to the sense:

bis
Dontaurion anala
bis bis
Dontaurion deanala
bis bis
Dontaurios datala
ges [sa] vim danima vim [s ?]
pater nam esto
magi ars secuta te
Justina quem peperit Sarra.

After the second line there is room on the plate; and for reasons which will appear hereafter, it is likely that two characters have disap-

peared, which Siegfried thought might have been *sa*. The character before *pater* resembles an *s*, but it is more probable, as we shall see, that it is an accidental scratch which has no value at all.

On the interpretation of the whole of the inscription there will probably remain some differences of opinion, but it cannot be doubtful that the deceased scholar has succeeded in correctly determining the value of the letters. This is proved by that irrefragable intrinsic evidence which is, after all, the true touchstone of right interpretation and decipherment, namely, that his reading makes sense of what before seemed only Latin words interspersed with unmeaning syllables. For we have now one continuous string of Latin sentences: "Pater nam esto, magi ars secuta te, Justina quem peperit Sarra." That is, "A father thou shalt be, the art of the Druid has followed thee, whom Justina Sarra has born." For the first part of the formula we gain thereby a clue what its meaning in general must be. For it is clear that the son of Justina Sarra is here provided with a spell which is to make him a father, that is, to give him offspring. Consequently, the Gaulish part —assuming it to be that language, which of course has to be proved by proffering an intelligible interpretation drawn from Celtic sources, and not violating the laws of comparative philology—the Gaulish part must contain a spell either against male impotency or female barrenness.

Before I proceed further to state the reasons which led Siegfried to prefer the second alternative, I must say a few words about the Latin *bis*, recurring amongst the Gaulish words. The first sentence is to be repeated twice; the two following ones are to be spoken *bis*, *bis*, i. e., four times. It is highly probable that this is to be done in such a manner as to form a kind of canon, so that the words should appear in the diverse arrangements which they are capable of, in the last repetition those words coming at the end which in the first were at the beginning. Dr. Siegfried has drawn up two schemes of the manner in which this canon would run; but they do not well agree with each other, and one of them seems even to be slightly at variance with the direction of the inscription. I have not been able to reconcile these discrepancies, and I therefore insert only one of the two :—

Dontaurion anala	Dontaurios datala
Dontaurion deanala	Ges [sa] vim danimavim
Dontaurios datala	Dontaurion anala
Ges [sa] vim danimavim	Dontaurion deanala
Dontaurion deanala	Ges [sa] vim danimavim
Dontaurios datala	Dontaurion anala
Ges [sa] vim danimavim	Dontaurion deanala
Dontaurion anala	Dontaurios datala

The main question of the sense of the formula is no way affected by this uncertainty of the arrangement of the canon.

In trying to interpret a Gaulish inscription, it should be steadily borne in mind that we have to apply the laws of comparative philology. All Welsh or Irish words, which we make use of, should be first re-

moulded into their old Celtic shape, by removing the middle aspirations and vowel infections, and otherwise applying the laws developed by Zeuss. And not only the body of the words and roots has to be reconstructed, before it can be useful in any way, but the much harder task has to be attempted of restoring the terminations. As the Celtic languages are members of the Indo-Germanic family of languages, which originally possessed a very rich system of inflections, it follows of necessity that the worn out terminations of the Irish and Welsh must have been preceded by fuller forms analogous to those of the Sanskrit, Greek, and Latin. This is further borne out by the testimony of the Gaulish inscriptions already deciphered. The ă-bases of the old Irish decline: *ball, baill, baull, ball* [*n*]. Corresponding forms of the Gaulish inscriptions are: *-os, -i, -u, -on.* The dative plural in Irish ends in a mere *b:* the inscription of Nismes has *matre-bo Nemausica-bo,* with a termination *bo,* only one step removed from the Latin *bus.* Even where as yet we have not actual forms of Gaulish inscriptions to guide us, we must, by the laws of comparative philology, try to gain some idea what they may have been in the Gaulish stage. To do otherwise—to interpret Gaulish inscriptions through the assumption of Irish or Welsh inflections—would just be as ridiculous as to expect Swedish grammatical forms on a runic stone, or Italian want of inflection in an inscription of Cæsar's time.

Likewise, where the vocabulary of the modern Celtic fails us, we must have recurrence to the other and chiefly the older branches of the Indo-Germanic languages, as the Celtic may have lost, and has actually lost, old roots in use in Gaulish times. Thus *dede,* "he gave," from the well-known Indo-Germanic root *dâ,* is on the inscription of Nismes, but such a root is entirely unheard of in the later Celtic.

The first question which presents itself is the purport of the name *Dontaurion.* It is clear that this is either a nominative neuter, or accusative neuter, or accusative masculine. Considering the great probability of its being the name of a genius, good or evil, we shall choose the third supposition. The base of it is clearly *Dontaurio.* Since *dont* would be as odd a form for a root as *aurio* for a suffix, we are driven to the conclusion that the word is a compound of *don* + *taurio.* At first sight there is a slight difficulty in this assumption, since the Gaulish compounds generally show a vowel at the end of the first word; however, in *Lugdunum,* another form of *Lugudunum,* we have an example not only of the first part ending in a consonant, but of that ending being brought about through the loss of the original vowel *u.* We are therefore at liberty to treat the *don* either as the true form of the base of the first word, or else as a shortening of a base *dono, donu, doni,* according as the case may require. Assuming *dono* as the original form, the word bears a strong resemblance to Ir. *duine,* a man, which points back to *donio,* the vowel being altered as in Gaulish *mori* -sea = Ir. *muir.* Similar alterations of the *o* by the influence of a following *i,* we have in Ir. *slond,* significatio, *sluindid,* significat; *londas,* indignatio, *colluindi,* cum amaritudine, etc. (*vid.* Zeuss, 16, 18).

The Irish *duine*, then, or its predecessor *donio*, would be a derivative from the Gaulish *dono*, which therefore must have some cognate signification. As the root naturally presents itself, the Skr. *dhâ* to put, to create, to procreate, whence *dhâ-tṛ*, the creator. Especially with the prefix *â* it refers to the procreation of children, or, to speak more correctly to conception, being used both of the father and the mother: thus Rigvêda, 3, 27, 9: *yathéyaṁ prthivî bhûtânâṁ garbham âdadhê*, as this earth conceived the germ of beings, Bhâgavata Purâṇa, 9, 24, 51 (ed. Bopp). *Vasudêvah sutân ashtâv âdadhê Sahadêvayâ* V. engendered eight sons with S. Savitri upâkhyânam, 1.18 *mahishyâṁ garbham adadhê*, in his wife he placed (engendered) the embryo. Hence the word *âdhâna*, embryo.

But also the simple root *dhâ* is used in a similar sense, "to put the embryo into the womb, to cause to conceive." In this respect the hymn V. 25, of the Atharvaveda is classical, of which a few verses may be given in a translation:—

2. "As this broad earth conceived (*âdadhê*) germ of beings, so I create to thee (*dadhâmi tê*) an embryo, I will call thee to this help [i. e., this powerful charm].

3. "Put (*dhêhi*) an embryo, Sinîvâlî; put an embryo, Sarasvatî, an embryo both of the two Açvins may create (*dhattâm*) to thee, that wear garlands of lotus.

4. "An embryo may create for thee Mitra and Varuṇa; an embryo the god Vṛhaspati; an embryo Indra and Agni; an embryo the Creator may create to thee (*garbhaṁ dhâtâ dadhâtu tê*).

5. "Vishnu may make ready the womb; Tvashṭṛ may shape the forms; Prajâpati may sprinkle fluid; the Creator may create thee an embryo (*garbhaṁ dhâtâ dadhâtu tê*).

6. "That which King Varuṇa knows, or which the goddess Sarasvati knows, that which Indra, the slayer of Vṛtra, knows, that thou shalt drink, causing an embryo. [Here, evidently, a magical drink is administered.]

7. "Thou art the womb (or the germ?) of all herbs, the germ of trees, the germ of all things, o Agni, create an embryo here (*garbham â iha dhâḥ*).

8. "Rise above, be full of manly power, create an embryo in the womb (*garbham â dhêhi yónyâm*); a bull thou art; we bring thee here for the sake of procreation.

10. "O Creator (*dhâtaḥ*), in the loins of this woman create (*âdhêhi*) a male child, with most excellent form, to be born in the tenth month."

It results from the examples quoted that both *dhâ* and *â-dhâ*, have the sense of creating, literally putting the embryo. We have, indeed, even a word *dhânâ*, grain, literally that which is put or sown, which, as far as etymology is concerned, might mean embryo, as well as *âdhâna*, although custom has given it a different signification.

To this latter word, without the prefix *â*, our *dono* corresponds closely enough; and we may therefore assume that it has the meaning "germ, embryo." The Irish *duine*, i. e., *donio*, therefore means "re-

lated to the embryo," i. e., procreated, offspring, man, cfr. the Latin gen–s from *gigno*, and Skr. prajâ –s, people from the same root *jan*, to procreate, engender.

Probably the o of dŏno was short, as the long ô would be in Irish rather *ua;* but this shortening of the root *dhâ* is not more astonishing than the similar occurrence in Greek in θέσις, θετός, δόσις.

If *don* means the embryo, the meaning of the *taurio* is in a manner fixed. For, as the spell runs against either female or male want of sexual power, the spirit exorcised must be inimical to conception, the destroyer in fact of the embryo. *Taurio* is clearly a derivation from a root *taur;* and as our family of languages has no roots with diphthongs, this is a gunated form of *tur*. It does not appear that any Celtic language has such a root, but Sanskrit and Zend have preserved it. The Skr. root *tur* (*tûr, turv*) means generally to be strong, to be swift: *turaṇa*, swift; *turanyati*, he hastens; *turanyu*, hastening; *turyâ*, superior strength; *turîya*, σπέρμα; *tûr* (f.), haste; *tûrṇî*, hastening; *turati*, he hastens = *tûryati, ap-tura*, busy, hastening the work; (*ap* = *apas* = Lt. opus); *aptûrya*, zeal; *tura*, prompt. In some cases the word takes the meaning of, "to be stronger than, to overpower, conquer." Thus, *rajas-tur*, conquering the world; *viçvatur*, conquering all; *vṛtratur*, conquering the demon Vṛtra. Compare Rg. VIII, 88, 6—*Vṛtram yad Indra tûrvasi*, that thou, o Indra, overcomest V. More rarely, lastly the word seems to acquire also the meaning of "to wound, to hurt." This signification is assigned to the verb *tûryate*, in the Dhatupatha. Sâyana also explains *tura* in Rigveda, V. 28, by *çatrûṇâm hiṁsakan*, i. e., the destroyer of enemies. In the sense of hurt, wounded, the word occurs in Rig. VIII., 68, 2, *abhyûrnôti yannagnaṁ bhishakti viçvaṁ yatturaṁ*, "covers that which is naked, heals all which is sore." Hence the common word *âtura*, hurt, sore, sick, is probably from the same root. The signification to hurt, to destroy, which is rare in Sanskrit, is the common one of this root in Zend, where we have *tûr, tur*, blesser, tuer, as *tbaêsho taôurvâo*, celui qui anéantit la haine (*vid.* Burnouf, yaçna, p. 83), nominative from a base *taôurvat*, which seems a participle [present or perfect?] from root *tur* or *turv*, 1 ps. sing. imperat. *taourvayêni*, "I will destroy" (Journal Asiatique, 1845, Juin, pp. 428, 429). With preposition *aiwi* we have *aiwithûra*, potens, invictus, a name of the god Mithra, and also of the Fervers, literally, "conquering, destroying."

Of the Zend forms of this root the second, *taôurv*, is easily explained: the *aô* is the regular representation of an ancient diphthongal *ó*, the gunation of *u*, and *u* immediately preceding *r* is the u–infection caused by the following *v*. Both forms, therefore, point back to a root *tur*, or gunated, *tór*, which latter form in ancient Celtic would appear as *taur*. We may therefore safely assume that *taurios* is a derivative from this root, meaning, *destructive, destroyer*. *Dontaurio*, accordingly, will be the destroyer of the embryo. That there should be a special demon threatening the child in the womb of its mother, is consistent with the general notions of the Indo-Germans, as may be seen on comparing a hymn from the "Atharvaveda" (VIII., 6), in which, in spite of the great

obscurity of many passages, so much in general is clear, that it is directed against various demons desirous of destroying the unborn child, or of otherwise injuring women during their pregnancy. The translation of this hymn will be given in an appendix, together with another hymn of the same Veda (III., 23), that contains an incantation for making a woman conceive a male child.

The first sentence of the charm is, *Dontaurion anala.* As *Dontaurion* is clearly an accusative, *anala* can only be a verb; and the apparent absence of any personal termination leads us to suppose that it is a second person imperative of a verbal base ending in long *á,* corresponding in form to a Latin verb of the first conjugation. Such verbs must have existed in old Irish, and they are still recognisable by their infinitive in *adh, ath.* Compare *ber-th,* ferre, with *mol-a-th,* laudare; and on the whole subject of these bases, an article, by myself, in Kuhn's "Beiträge," I., 324. As the root of the word in question, the syllable *an* is easily recognised, which corresponds to Skr. *an,* to breathe = Gothic *anan,* whence Latin *animus, anima,* Gr. *ἄνεμος.* Also the Celtic has preserved this root in both its branches. Irish: *anál* (fem.) breath; *análaim,* to breathe (O'Reilly); *anál,* gen. *anála,* breath (Coneys); Gaelic (Armstrong), *anail* (f.) breath. Welsh: *anal* (id.) fem. pl. *analau, analu,* to breathe; *anadl,* fem. pl. *analau* (id.) (Pughe). Cornish, *anal.*

Breton (Legonidec), *anal* (f.), pl. *analou, analiou,* respiration; in the dialect of Vannes, *anal, hanal, énal; alana, halana,* respirer. The last forms are, perhaps, transposition from *anala;* and it is not quite impossible that the French *haleine,* It. *alena,* might be from this source rather than from Latin *anhelo,* with which Dietz connects them. The verb *analaim,* as given by O'Reilly, would at first sight seem to correspond most closely to the *anala* of our inscription. However, this connexion is not without difficulty. The *á* preceding the *l* is long in Irish, and as the corresponding Welch forms show in part a *d* (anadl), it would seem that this *d* has been lost in Irish, and the loss compensated for by the lengthening of the *a;* just as to the Irish *cenél,* family, corresponds to Welsh *cenedl,* where the originality of the *d* is raised beyond all doubt by the Greek *γενέθλη.* If that be so in this case also, we should expect in Gaulish *anadla,* rather than *anala,* since the Gaulish was not averse to joining *dl,* as proved by the word *canacosedlon,* in the inscription of Autun. Nevertheless, it is, perhaps, possible that the Welsh forms without *d* are independent of the *d*-forms, so that in Gaulish there might have existed two forms, both derivatives of the same root, ANADLI, and ANALI or ANALO, both meaning breath. From the latter would descend the imperative *anala* of our inscription. That there is nothing singular or irregular in the assumption of a noun, ANALO, is best proved by the existence in Sanskrit of a word closely corresponding in form, namely, *anala,* fire (so called because of its unsteady, and as it were, windy motion). The same language has a noun with a slightly different suffix, but with the meaning required by us—*anila,* wind. We may therefore safely assume a Gaulish ANALO, wind, breath = Skr. *anila* (out of ANALA), from this a derivative verb

ANALA–TI, to breathe, of which our *anala* is the imperative. Hence, the first short sentence of the spell is: *Dontaurion anala*, breathe on the Dontaurios. Breathing is a common means of driving away diseases, accompanying the employment of charms.

The second sentence, to be repeated twice, *Dontaurion deanala*, differs from the first only by having the syllable *de* prefixed to the verb, which is the well-known Irish preposition *di* or *de* (Z. 844), being identical in form and meaning with the Latin *de*, Ohg. *zi*—. The sense, therefore, is: "Breathe away the Dontaurios."

In the third formula we have the name of the demon in a different form of inflection, *Dontaurio-s*. This might be, as in other Gaulish inscriptions, a nominative singular; but as the word *datala* from its form is evidently, like, *anala*, an imperative, there is no place for a nominative in the sentence. Hence, we are driven to the conclusion that it is accusative plural, the termination of this case having been S in Gaulish, as proved by the *artua-ss* of the inscription of Todi (Stokes, in Kuhn's "Beiträge" (II., p. 72). To have the same name as a whole order of genii, and as one of them who is the spirit of this kind *par excellence*, is nothing uncommon. Thus Rudra, "Terrible," is with the Hindus a name of Çiva, but at the same time there is a whole host of Rudras.

The imperative *datala* points to a verb of similar formation as *anala*, a derivative from some noun DATALO. This seems to be preserved in the Welsh *dadl*, f. pl. *dadleu*, debate, dispute, controversy, strife, contention, case in law, argument; *dadleu*, to argue, dispute, reason, tattle; *dadleuad*, disputation; *dadleuaw*, to dispute, argue; *dadleuawr*, advocate; *dadleufa*, forum. In old Welsh there must have been a *t* instead of the second *d*, as results from the glosses in Zeuss; *dadlt* [sic] gl. curia. 1077; *dadl*, concio; *datl*, gl. forum, Z. 169; *datlocou*, gl. fora, Z. 291; *dadaleu*, *dadeleu*, *daetleu*, causæ, judicia, Z. 292, 785, 786. Breton; *dael* (f.), dispute, querelle, débat. The old Irish has lost the *t*; *dál*— (Z. 20) which occurs in composition; *dálsuide*, gl. forum; *dálde*, gl. forensis Z. 81; *dálta*, gl. curialis, Z. 84.

Combining all these forms, we come to an original form, DAT(A)L, meaning dispute, chiefly in a juridical sense, or else the place where cases are argued, just as the corresponding Teutonic word (Old Norse, Agls. *thing*, Ohg. *ding*) has the double meaning of a cause, and a court of justice. Now, as from the Latin *caussa* descends *caussari*, from Agls. *thing*, the verb *thingian*, to contend in a court, German *dingen*, to make a contract, so the verb DATALATI would be, to contend with, to accuse. Hence, *Dontaurios datala* is, "Accuse thou, bring thou to justice, the Dontaurii." Perhaps the sense still more strictly is, "Make them confess, convict them." Thus we find in the Atharvaveda (I., 7) a spell against certain demons, the Yâthudhânas, in which the god Agni is invoked to bring them chained, to make them lament, and to cause them to confess: (vs. 2). O Agni, eat of the sesam oil, make the Yâtudhânas to lament. (3). They may lament, the Yâtudhânas, the voracious Kimîdinas. Now, O Agni and Indra, accept this our sacrifice. (4). Agni in the front (?) may exert himself, Indra may drive them forward with

mighty arms. *Every Yâtumat shall say: It is I, as he goes.* (5). We may see thy power, O Jâtavêdas, speak thou against the Yâtudhânas; thou who hast the eyes of man. All of them, by thee tormented, may go before thee to this place, speaking out (*prabruvâṇa*)." Similarly, Atharv. VIII., 6, 10:—"Those [demons], O herb, destroy by thy spell, the convicted ones (*vishûḍ'inân**), vs. 15. O Brahmanaspati, annihilate those demons to her by conviction (*pratibôdhêna*)." See the Appendix for the whole hymn.

The Celtic *datl* has passed as a loanword into the Teutonic languages, English, *tattle*; Germ., Swedish, *tadel*, reproach, blame. Siegfried, as appears from a note in his papers, seems to have been inclined to connect it with the root *DhÁ*, to put, from which we have in Greek θε-σμός; and in Gothic, *dô-ms*, judgment, English, *doo-m*, in which case the original meaning would rather have been judicial sentence, and cause, court of justice, might be secondary significations. The suffix *tl* would naturally be identified with the Greek τρον, Lt. *trum*, Skr. *tra*, though differing in gender as far at least as the Welsh is concerned. DA-TL (O) would be "the means of deciding, judgment, action, court."

There remain now the words *ges.. uim danimauim* [*s.*]. It is clear at once that both have the same termination *uim*. Hence the character after the second word resembling an *s* must be considered either as a mere accidental scratch, or else as a mistake of the engraver. If we read the termination of the two words with V, *vim*, we see at once the resemblance with the Greek φιν. The Greek φιν is one of a numerous set of terminations, beginning in Sanscrit with *bh;* in the Teutonic, Slavonic, and Lithuanian, with *m;* in Latin, and other Italic dialects, with *b, f,* rarely *p;* in Greek, with φ. These terminations are remarkable for their fickleness both of form and of meaning. I shall briefly point out their various uses, merely observing with regard to their initial letter, that Siegfried's opinion is highly probable, according to which they would have originally begun with MBh, of which the Teutonic, Slavonic, Lithuanian, have kept the M alone. We find terminations of this kind employed in the following cases:—

Dual. Instr. abl. dat. Skr. *bhyâm* = Zend *bya;* Slavonic *ma* (inst. dat.); Lith. *m* (inst. dat.); Greek *-ιν* (gen. dat.).

Plural.—1. *Instrumental,* Skr. *bhis,* = Zend *bis,* Old Pers. *bish,* Lith. *mis,* Slav. *mi.*

2. *Dt. abl.* Skr. *bhyas* = Zend. *byô;* Lat. *bus, bis* (nobis, vobis); Gaulish, *BO;* Ir. *b, bh;* Lith. *mus, ms;* Slav. *mŭ;* Old Norse, *mr, m;* Gothic, Anglosaxon, Ohg. *m;* Germ. *n.*

3. *Locative.* Umbrian *fem, fe;* Greek, φιν, παρὰ ναῦ-φιν.

4. *Accusative. f* in Umbrian msc. fem.

5. In the form *bhyam* at the personal pronouns for the Dat. plur. in Skr. = Greek *-ιν,* ἡμῖν, etc.

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* Siegfried puts "die überführten," taking the word apparently in a passive sense. The root *sûḍ'* means "to declare openly." Hence, rather, "Those who confess."

Singular—1. *Instrumental.* Armenian, *bi;* Lithuanian, *mi;* Slav. *mi;* Greek, φι (ν), κρατηρῆφι βιῆφι.

2. *Dative.* Skr. pronouns, *bhyam,* tu-bhyam, "tibi;" Greek, ιν, ἐμιν, τεἰν; Lt. *bi,* tibi = Umbr. te *-fe.*

3. *Locative—a.* Greek φι (ν), frequently.

b. Latin, *bi;* Umbrian, *fe;* Oscan, *f, p,* as Lat. *ibi, ubi, alibi;* Umbr. *pu -fe, i -fe* = Osc. *pu -f, i -p.*

c. Umbr. *me* (*m*); Lat. *m,* in *oli -m, isti -m, illi -n -c,* etc. Osc. *n horti -n,* "in the enclosure."

It will have been observed that one principal form of these suffixes is *bhyam, bhyâm;* that this is mutilated in Greek both to *-ιν* and φι (ν), and that in signification the latter has both the force of a locative and of an instrumental. It is moreover employed both in a singular and plural signification; whilst the Slavonic and Lithuanian have a cognate suffix, ending originally in *s* (Lith. *mis*), for the instrumental plural, but being without any terminating consonant (Lith. *mi*), in the singular. The *vim* of the two Gaulish words must be evidently connected with either the singular or plural instrumental suffix; and it is a question not easy to be decided which view is to be preferred. Siegfried had not arrived at any fixed opinion on this point, when I spoke to him last about it. He even thought it possible that the scratch at the end of *danimauim* might be s, and *vims* the fuller form of the instrumental suffix plural *bhis.* However, he seems to have given up that view ultimately, and returned to the notion that it is singular, and the scratch meaningless. *Ges.. vim danimavim* is then a pair of instrumentals singular like κρατερῃφι βιῃφι (ν); and in the suffix *vim,* the original *bh* has been softened down to *v,* so that it corresponds most closely to Greek φιν.

The word GES is in existence in Irish; *geasa,* a religious vow, an oath, a charm, enchantment, a guess, conjecture, divination; *geasadoir,* wizard, charmer; *gesadoireachd,* divination, sorcery; *geasaim,* I divine, foretell; *geasán,* oath, vow; *geis,* fem. tribute, prayer, swan, vow, promise, protest, custom, order, prohibition, or injunction. These words are on the authority of O'Reilly; Coneys has for the fem. *geis,* gen. *geise,* the meaning: incantation, injunction, adjuration, restriction, vow, charm, guess, religious engagement, sorcery. So also has Armstrong, for the identical Gaelic *geas.* In the sense of "conjecture" the Irish *ge* (*a*) *s* coincides with E. *guess;* ON., *giska;* Swed., *gissa;* Dan. *gisse;* and with Lettish *geedu,* pr. act. *giddu* [root *gid*] to conjecture. But the Prussian *sen–gid–aut* to receive, has evidently the more original meaning. This Letto–Prussian root *GID* is most probably identical with the Teutonic *GAT,* to receive, to get, whence Agls. *getan;* Engl. *get, beget, forget;* comp. Greek ΧΑΔ (χανδάνω), Lat. *pre-hen-do.* If this etymology be true, the double s of the Teutonic words could only be explained as an assimilation from ST, TT, cfr. Gothic. *vissa,* I "know,"

Angls. *viste*, from root VIT, standing for *vitda*, *vitta*. Hence we must consider the German word as formed by a suffix with a *t*, *th*, or *d* at the beginning, most likely the suffix *ti* (thi, di) = Greek σι-ς, τι-ς, which makes nouns of action. The verb to *guess* would be a denominative of the substantive *guess*, for *gues-t* from the root GAT. The original meaning, accordingly, would be, action of taking, catching.

To return to the Irish word, all its significations could be very well explained from the notion of catching, holding, binding—oath, custom, incantation, all agree in this primary idea of holding fast. This being so, we may consider it as descended from a root, otherwise lost in Celtic, *ged*, with a suffix beginning with *t*, which letter suffers in Irish similar changes as in the Teutonic languages when joined to a root ending in a dental—cfr. O. I. *fiss*, scientia, from root FIT, FID. The s of *geas* being kept between two vowels in old Irish points to an original double s, as a single s is always lost in Irish in that position. The declension of the word would make it an *a* or *i* base. Hence we may fairly assume the existence of a Gaulish GESSA or GESSI, derived from a root GED by suffix TA or TI. Dr. Siegfried has preferred the first form, on account of its agreeing better with the [somewhat hypothetical] metre of the inscription. I should prefer the latter form, as it is very doubtful whether a suffix *tâ*—he would make it long and feminine—is ever primarily added to roots. On the stone there is, after the letters GES, room for two more which seem to have been obliterated. Filling this gap up, we get either GESSAVIM or GESSIVIM, i. e. through an incantation. Some such gap must be assumed, since the form GESVIM, as it stands, cannot be correct, because a simple s of the Gaulish, as already stated, would have been lost in Irish.

There remains the word *danimavim*, which of course must be an adjective qualifying *gessavim*, and standing, like it, in the instrumental. The meaning is determined by the Irish *dan*, strenuous; *dána*, bold; *dánaigim*, I dare, defy [all these from O'R.]; *dánatu* (Z. 20) audacia; *cesu dánatu dom*, quamvis audacissime (Z. 994). From this root Zeuss (994) and Glück (Gallische Namen, p. 91, 92), have derived *Danuvius*, *Danubius*, on account of its strong current. The Sanscrit has a word *dânu*, to which the Hindu grammarians attribute the meaning of courageous (*vikrânta*), and which is a name of the demons or Titans, the enemies of the gods, more commonly occurring in the derivative form *Dânava*, with which Dr. Siegfried thought it possible to connect the Greek Δαναος, Δαναη, Δαναιδαι, in spite of their first a being short, (in Δαναιδαι it is only lengthened through the necessities of the epic verse). Be that as it may, we have an Irish adjective *dán*, strenuous. Of this DANIMA is a superlative, The superlative is in old Irish commonly formed in *am*; but we have also forms in *em* (Z. 287), which point back to an original *ima*, *imo;* cfr. Oscan *nesimom*, nearest, and the old Irish double termination *imem*. Hence *danima* means "boldest;" *gess* [*av*] *im*, *danimauim*, with boldest charm (or charms) [vid. *supra*). The whole inscription translated runs, therefore:—

Breathe at the Dontaurios;
The Dontaurios breathe down upon;
Accuse the Dontaurii;
With boldest charms.
Pater nam esto;
Magi ars secuta te,
Justina quem
Peperit Sarra.

Dr. Siegfried seems to have been of opinion that the inscription runs in verses; for there is a note, alluded to above, to the effect, that the form GESSAVIM would agree better with the metre. But beyond this hint I find nothing further to clear up this subject.

In conclusion, I have to add that, as far as my ability goes, I have striven to reproduce what, to the best of my judgment, was Dr. Siegfried's opinion. I believe that for the most part I have succeeded; for I had as a guide through the labyrinth of his stray notes and jottings, the recollection of a conversation of four hours' length on the 26th of December, 1862, when the deceased scholar explained to me his entire views on this inscription. To have said what he would have said, had he been spared, though in a manner very inferior to himself, is my sole object. I cannot undertake to vouch for all his opinions. Both the responsibility and the merit of them must remain with him.

C. Lottner.

APPENDIX.

The following are Dr. Siegfried's translations of the hymns Atharvaveda III., 23; and Atharvaveda VIII., 6. I give them as I find them, leaving untranslated what the deceased did not venture to translate, lest by introducing conjectures of my own I should do injustice to him.

Atharvaveda III., 23.

Incantation for procuring male offspring.

1. "Since thou hast become a cow (that has taken the bull), we will destroy it from thee [?]. This same thing we put far away from thee elsewhere.

2. "An embryo may come to thy womb, a male one, as an arrow into the quiver. There he shall be reborn as a warrior, a son of ten months of thee.

3. "Bear thou a male son. After him a male be born. Be thou a mother of sons, of the born ones, whom thou bearest.*

4. "As many good seeds as the bulls generate, with these obtain a son. Thou here become a fruitful little cow.

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* *Janayâs;* lêt, imperf. therefore rather: "mayest bear," L.

5. "I make to thee the work of a lord of procreation. The embryo may go into thy womb. Obtain thou a son, O woman, that may be happiness to thee, and happiness be thou to him.

6. "The herbs, the father of which was heaven, the mother the earth, and ocean the root, those divine plants may help thee to the obtaining of a son."

Atharvaveda VIII., 6.

against female barrenness.

(This hymn is very obscure, and even seems to have gaps, as especially may be seen from str. 2. where we have a whole string of accusatives without a verb).

1. "Those two whom to thee the mother has wiped, the two that know the husband.

"There the Durnâman must not be greedy, nor the Alinça who protects the children.

2. "There the fleshy one (?) and the one that goes after flesh. The Sârku, the Kôka (i. e. wolf), the dirty setting (? Sun), the Palîjaka, the embracer, the Vavrivâsa.

3. "By no means connect thyself with her, do not crawl to the two loins, do not crawl down inside. I made to her a remedy, the Baja who chases the Durnâman away.

4. "Durnâman and Sunâman [i. e. Ανσώννμος and Εὐώννμος, L.], both desire connexion. We drive away the Arâyas. Sunâman may go to the womankind.

5. "He that is black, hairy, O Asura, born in a shrub, or endowed with a snout. We strike away the Arâyas. — — —

6. "Him who tries about by smelling, the flesh-eater, the licker, the Arâyas and dogcutters, them Baja, Pinga did destroy.

7. "Him who comes in a dream to thee as if he were thy brother or father, Baja may keep them off from here, the eunuch shaped ones with diadems.

8. "Who skulks up to thee when asleep, who would hurt thee when awake, those the Sun may annihilate like a shadow.

9. "Him who makes this woman with a dead child and with an abortion, him, O herb, destroy thou, her slippery lover (?).

10. "Those who dance about the houses at night, braying like asses, the Kusûlas, Kukshilas, Kakubhas, Karumas, and Srimas, those, O herb, destroy thou by thy smell, the convicted ones.

11. "Those Kukundhas and Kukurabhas who wear skins as woven clothes, who make a noise in the forest, dancing like eunuchs, those we annihilate from hence.

12. "Who bear not the sun, the shining one of heaven, the Arâyas that dwell with goats (?), the ill-smelling, the red-mouthed, the Makakas we destroy.

13. "Who by putting themselves too much [i. e. heavily, L.] on the shoulder carry themselves, pushing the loins of the women, Indra, those Rakshas destroy thou.

14. "Who go before a wife, carrying horns in their hand, that are in the oven, that mock, that make a light in the shrub, those from hence let us annihilate.

15. "Whose toes are back, whose heel before, — that are born on the threshing floor, that are born in çaka (?) and in smoke, the Uruṇḍas, the Maṭmaṭas, the Kumbhândas (i. e. having testicles like jugs), incapable of procreation, those, O Lord of prayer, annihilate in her by pratibôdha [i. e. conviction].

16. "Those with turned eyes, those without vision, may they be without womankind, eunuchs (?). O remedy, put him down, the unmarried one who wishes to be together with the woman who has a husband.

17. "The Upêshant, the copper-coloured, the Tuṇḍêla, and the Çâḍula, piercing the two feet, the two heels as a cow. — — —

18. "He who would touch thy embryo and who kills thy child, Pinga may pierce him through the heart, he of awful bow.

19. "Who in an unknown manner kill the born ones, who lie on the pregnant women, may Pinga (i. e. tawny), drive them away, the women-enjoying Gandharvas as the wind a cloud.

20. "— — — — may it not have been thrown down the loinband, and the bhâryu (?). The two remedies may protect thy fruit.

21. "Against the Pavînasa, against the Tangalva, against the Shadowlike, also against the Naked, may Pinga protect thee, in order that thou mayest bring children to thy husband, against the Kimîdin.

22. "Against Double-mouth, Four-eye, Five-foot, No-finger, against Vṛnta that comes forth, and against Varîvṛta protect thou.

23. "Those who eat raw flesh, and human flesh, the Kêçavas eat the embryos. We destroy them from hence.

24. "Who from the sun skulk away, as a daughter-in-law from her father-in-law, their Baja and their Pinga be killed in their heart.

25. "Pinga, protect thou the child that is being born. Let them not make a male into a female. The egg-eaters must not destroy the embryos. Beat away the Kimîdins.

26. "Thy childlessness, thy (quality of) bearing dead children, the âdrôda (?), the agha (evil), the non-conception, let it go away towards thy enemy, like taking a flower bunch from a tree."

The President, on behalf of the Rev. William Perceval, presented a note-book, containing the original minutes of the Neosophical Society, which preceded and gave rise to the Royal Irish Academy. These minutes were kept by the father of the donor, Dr. Robert Perceval, the first Secretary of the Academy, who was also Secretary of the parent Society. The Neosophical Society used to meet at the houses of its members in a fixed rotation; and the President observed that the first essay read was on the subject of Astronomical Observations.

H. M. Westropp, Esq., read the following paper:—

On the Pre-Christian Cross.

The wide dissemination of the cross through many countries, and at a period anterior to the Christian era, has been a subject of wonder, and has elicited various theories from many. Mysterious meanings have been given to these crosses; but, like all mysterious solutions, have had fruitless results. If there is any mystery anywhere, it is not in the thing or object itself, but in the nature of man, which is endowed with an universal instinctive principle, peculiar to man's common nature, by which almost similar objects in the various stages of man's development, in countries the most widely apart, are worked out and suggested to his mind, according as the necessities of his nature require, and according as the suggestive principle is awakened and developed in man to supply his wants. In the early stages of man's development, when written language was unknown, and there was no "reading public," emblems or symbols were used as the outward and visible sign of the thing signified: thus in India a cross was the symbol of resignation, in Egypt, the symbol of life, the meaning being derived from the root or germ from which the symbol took its origin. After a careful examination of the several crosses I have collected from countries the most widely apart, and unconnected with each other, I have come to this conclusion—that the various forms of crosses have a separate and independent origin in the different countries in which they are used, the germ or root of the cross being frequently found in the country where it took its origin: for example, in Egypt the crux ansata, which is the hieroglyphic sign of divine life and regeneration, is derived from the phallus, which is the symbol of life and prolific energy. In India, the cross or Swastika of the Buddhists is composed of two letters—उस, su. and ति ti, or suti—which is the Pali form of the Sanscrit swasti, which means, "it is well;" or, as Wilson expresses it "so be it;" it is a symbol of resignation. In Greece the form of the cross frequently found on Athenian vases was suggested by the impression of the punch mark on the reverse of the early Greek coins.

In ornamentation the cross is one of the simplest forms, and is one naturally suggested to the barbarous Indian, and to the intellectual Greek; for it is merely the intersection of two lines. Numberless examples of the cross used in ornamentation are to be found on the Greek painted vases. The crosses, squares, and other patterns, on the tomb of Midas in Phrygia, were, according to Mr. Stewart, intended as imitations of carpet work, for which Lydia and Phryia were anciently celebrated. There is a cross on the lintel of a subterraneous gate in the Pelasgic walls of Alatrium, in Latium; it is a combination of three phalli; the phallus ebing held in reverence by the early Greek colonists, as a symbol of the prolific powers of nature.* According to Müller ("Ancient Art," p. 627),

* *Vide* Dodwell's "Pelasgic Remains in Greece and Italy."

this sign on the gate at Alatrium was a kind of amulet to ward off the "dreaded invidia" (the phallus being used for that purpose at a later period), and is perhaps the oldest specimen of the kind. His editor adds that a similar one is to be found on a wall of the Homeric city Antheia. In Persia and Assyria the cross is the abridged form of the *feroher*, or emblem of the Deity, the outline of which gives the form of a cross. In Scandinavia the cross is the cruciform hammer or battle axe of Thor. The cross is also a distinctive sign on several Mexican hieroglyphs; and it forms the central ornament of a tablet at the back of an altar at Palenque. In Dr. Wilson's "Pre-historic Men" mention is made of an example of Peruvian black pottery brought from Otusco, measuring seven and a half inches high, which is decorated with a row of well-defined Maltese crosses; these are evidently for pure ornamentation. The sepulchral galleries in the mound at New Grange take the form of a cross; but this is merely on the same principle upon which the windows in the palace at Palenque are built in the shape of a cross.

The crosses found in Latium and Etruria are undoubtedly of Greek origin, as for the most part the arts and civilization of Etruria and Latium were derived from early Greek colonists. On Grecian and Etruscan figures, the cross is as common an ornamental pattern as the zigzag. The painted vases found in Etruria, on the ornamental borders of which many crosses are drawn, are almost all Greek—Greek in their subjects, Greek in their mythology.

Some further illustrations of crosses are to be found in Rosellini's; great work on Egypt. One cross is on the breast of a hostile chief, vanquished by one of the kings of Egypt; the others are on the breast of enemies of the Egyptians. These crosses I should consider to be nothing more than ornamental patterns on the opening of the vest; for the dress seems, like the modern shirt, open in front, that it might go over the head. In crosses 1, 2, the line down the centre would seem to show the opening of the vest. In Sir Gardiner Wilkinson's work, the Shari, an Asiatic people, a tribe of Northern Arabia, are represented with crosses on their robes. Sir Gardiner Wilkinson remarks that the adoption of the cross was not peculiar to them; it was also appended to, and figured upon the robes of the Rot-ri-n, and traces of it may be seen in the fancy ornaments of the Rebo, showing that this very simple device was already in use as early as the 15th century before the Christian era. The representative of the nation called by Sir G. Wilkinson the Rebo, whose country was in the vicinity of Mesopotamia, wears a long robe covered with crosses, and other fancy devices; crosses are also tattooed on his legs and arms. A black is also represented in the same work with a band of crosses alternating with circles round his neck; these are evidently all fancy ornaments. The cross is also found in the hieroglyphic sign for land. It is supposed, according to Gliddon, to represent bread, betokening civilization. It was a sign used particularly to designate the land of Egypt. It is said that a similar sign is used by the Africans; and that African women put the sign of the cross on their large earthenware urns, in which they store their corn, the cross

making the thing Taboo, private property of the party making it. This is only what any person ignorant of writing would do at the present day: when called on to sign a paper, and to show that it is his act and deed, he gives his mark thus:—John $\overset{\text{his}}{+}$ Smith, mark.

Human nature is the same all over the world; and man under similar circumstances must, of necessity, have recourse to similar expedients.

The Academy then adjourned.

MONDAY, APRIL 27, 1863.

The Very Rev. Charles Graves, D. D., President, in the Chair.

The Right Hon. the Earl of Belmore was elected a member of the Academy.

W. R. Wilde, V. P., made the following communication:—

I have asked formal permission from the Council to make the following presentations with which I have been intrusted, as I am anxious to have this particular branch of the antiquarian section of the Academy brought prominently before the members; because I think it due to the donors; and in the hope that by so doing it may induce other public bodies, noblemen, and gentlemen to assist in increasing our national Museum.

From the Commissioners of Public Works—The sculptured and inscribed stones which formed part of the monument that existed on the southern battlement of the old bridge of Athlone, and of which the following notice is not without interest:—

There was a natural ford on the Shannon at *Ath-luain*—"The Ford of Luan"—which was passable at low water, and was successfully crossed by the Williamite army in 1691. In later days it was occupied by an eel-weir. The Annals of Boyle state that, in 984, "the Connacians were defeated, and driven out of Athlone by the Westmethians;" in all probability over this ford. The earliest distinct reference to this crossing-place between the kingdoms of Meath and Connaught is given under the date A. D. 1000, when the kings of those two portions of the island agreed to build a *Toher*, or "causeway," as O'Donovan has very properly translated it, over the Shannon. "The causeway of Ath-luain was made by Maelseachlainn, the son of Domhnall, and by Cathal, the son of Conchobhar."—See Annals of the Four Masters, and also Annals of Boyle.

This *Toher* I believe to have been nothing more than a rude road or crossing, over large stepping stones; several of which structures I remember over the Suck, and other rivers in Connaught, before the recent drainage operations; and it was, in all probability, an erection of this nature which supported the hurdles at the ford from which the city of Dublin derived its ancient name. *Tohers* were also made across bogs and

swamps in many places, and the remains of several continue to this day—leading into cluans, wells, old churches, and castles, &c.; and the great road which ran from Tara, and that which divided Ireland, was in several places of this character. Our annals contain many notices of tohers, some of which give names to townlands, parishes, and other localities.

In 1120, Turloch O'Conor built the bridges (*Drochad*) of Ath-Luan, Lanesborough, and Ballinasloe.—See Annals of Boyle, and the Four Masters. Again, under the date A. D. 1129, it is stated—"The Castle and Bridge [*Drochad*] of Athlone were built by Turloch O'Conor in the summer, i. e. the summer of drought." This apparent anachronism may be explained by supposing that the works were completed in the latter year. This bridge was not of long duration, for in 1130 "the bridge and castle of Athlone were demolished by Murogh O'Melaghlin, and by Tiernan O'Rorke."

In 1140, Turlogh O'Conor erected a *Cliabh drochad*, or wooden bridge, at Athlone; but in 1153 it was torn down by Meloughlin, and its castle burned. It appears that the bridge and castle were connected; and, in our own day, several mills and houses stood on the bridge at either end.

The Connaughtmen, however, wishing to have access to the fat land and rich castles of Leinster, made another attempt to have a passage over the Shannon; and we read that, in 1153, a fleet of boats was brought by Turloch O'Conor, "and the wicker bridge of Ath-Luan was made by him for the purpose of making incursions into Meath."—See Annals of the Four Masters. But, in the same year, Donal O'Meloughlin destroyed and burned it and its fortress.

In 1159, Roderick O'Conor erected a *Cliabh drochad*, or wicker bridge at Ath-Luan, "for the purpose of making incursions into Meath."

The next reference is of rather a tragical nature: in 1170, O'Conor executed at Athlone (and tradition says, upon the bridge), the hostages of Dermod Mac Morragh, viz., Conor, his son, and Donnal Cavanagh, his grandson, and O'Kelly, his foster-brother. For many years it was supposed that the fresco painting on Knockmoy Abbey, in the county of Galway, and of which we possess a fac simile in the Academy, illustrated that event; but I have recently shown that it refers to the martyrdom of St. Sebastian.—See Museum Catalogue, page 315.

These notices lead us to believe that a stone bridge and a castle were erected at Athlone prior to the date of the English invasion, although the contrary has been stated by writers upon the architecture and civilization of Ireland. Many other stone and mortar structures were also, in all probability, erected about that time by the Irish. Yet the last historian of Athlone, Mr. Isaac Weld, writing in 1832, states in his Statistical Survey of the county of Roscommon:—"As to the state of the passage across the river, prior to the erection of this bridge in the days of Elizabeth, no very distinct information appears to exist."

In 1213, the English went to Athlone, and King John the following year built a castle there; and in 1279, Edward I. granted to St. Peter's Abbey the weirs and fisheries of Athlone, and also the tolls of the bridge.

What description of bridge existed at Athlone from that period to the building of the one recently taken down by the Shannon Commissioners, I have not been able to determine. That structure was erected by government, and completed on the 2nd of July, 1567; and on the centre of the southern parapet stood a richly-ornamented limestone entablature containing a long inscription, in relief, descriptive of the erection of the bridge in the ninth year of the reign of Elizabeth;—by the advice and order of Sir Henry Sidney, then thirty-eight years of age, and Lord Deputy of Ireland:—"In which yeare was begone and fineshed the faire newe wourke, in the Casthel of Dublin, besidis many other notable workis done in sondri other placis in the Realm; also the arch rebel Shane O'Neyl overthrown, his head set on the gate of the said Castel; Coyn and Livry aboleshed and the whole Realm brought into such obedience to her Majistie as the like tranquilitie peace and . . . . wh . . . in the memory of mane hath not bene sene."

Above and around this inscription were several well-executed bas-reliefs of figures and coats of arms, all of which are now in the Academy. Prior to the bridge being taken down by the Shannon Commissioners, in 1843–44, drawings of the monument and the bridge were made, and sent to Dublin Castle; but they cannot now be discovered. All the sculptured or inscribed stones were, however, forwarded to Dublin, and were by the Treasury placed at the disposal of the Lord Lieutenant (at that time Earl de Grey), who presented the stones containing the inscriptions to the Academy in April, 1844 (see "Proceedings," vol. ii., p. 576); but the effigies and coats of arms, &c., the most interesting portion of the monument, remained in the Custom-house until now, when I have been commissioned by the Board of Public Works to present them also to the Academy. They consist of:—A half-length figure of Sir Henry Sidney in bas-relief, but wanting the head (which had evidently been repaired at some time), in a stone, 25 inches high by 34 wide, in plate armour, with the right extended hand holding a drawn sword. In the top left-hand corner of this tablet are his arms—two lions rampant and two broad arrows, or pheons, within the garter.

A full-length bearded figure, in a stone 29 inches long by 24 broad, of the Rev. Sir Peter Lewys, chanter of Christ Church, in gown, cassock, and bands—"bi the good industri and delegence" of whom the bridge "was fineshed in les then one year." On the right extended hand, which holds a rope, there is the figure of a rat biting the thumb, to which a tradition (related by Dr. Strean, in his "History of the Parish of St. Peter's, Athlone," published in Mr. Shaw Mason's "Parochial Survey of Ireland," in 1819, vol. iii., p. 55), says used to follow the superintendent everywhere, until finally it bit his thumb, when he died of tetanus.

On a stone, 22 inches long by 21 high, is the full-length figure, in plate armour, kilt and peaked helmet—holding a halbert in the left hand, and supporting a broad arrow-head (still the arms of the Ordnance) in the right—of "Robarts Damport overseer of theys Workes." At his feet is a dog.

The royal arms, three lions and three *fleurs de lis*, on a shield within the garter, surmounted by the crown, ornamented with shamrocks; and at the bottom of the tablet, which is 28 inches by 21, the letters E R.

A small, headless, and somewhat defaced, bust of Queen Elizabeth, bearing on the breast the crown, with *fleur de lis* ornaments instead of the shamrock, and having below the letters E R. The stone now squares 11 inches.

A tablet, 27 inches by 19, contains a shield, encircled by the garter, and having below the letters H S. On this shield, in high relief, is the figure of a porcupine, with erect quills, and having a coil of rope hanging from a collar round its neck. To this stone, which was inserted in the wall of one of the mills that stood on the Leinster side of the bridge, was attached another legend, to the effect that it marked "the place where a wild boar was killed after a long chase and desperate conflict;" and the rope was, in the opinion of Mr. Weld, a serpent! There can now, however, be no doubt as to this stone being the crest of the Lord Deputy.

The seventh sculptured stone, 26 by 18 inches, bears a shield, crossed diagonally by a "ragged staff," and encircled with the garter; the arms of Thomas Ratcliffe, Earl of Essex, Sidney's brother-in-law, and for some time Lord Lieutenant of Ireland; but from what part of the bridge removed I have not been able to ascertain. There are also several other stones, containing inscriptions, most of which have been published by Strean and Weld. The total number of stones from Athlone bridge presented by the Board of Works and Shannon Commissioners is 43.

Anxious as I am to enrich our Museum, I cannot help regretting that this monument was not erected at Athlone, where it would possess a local as well as an historic interest. As, however, these stones have come into the possession of the Academy, I hope to see them erected in the crypt beneath our Library.

I have also to present, from the Board of Public Works, the following articles:—

A very ancient boat, 15 feet long, formed out of a single piece of oak, and differing from the six others already in our collection by the

flat, projecting beaks at prow and stern, and by means of which it could be easily carried, as shown in the above illustration. It is flat-

bottomed, 14 inches high in the side, 20 wide, and is in very tolerable preservation. It was found in 1856 in the drainage excavations, "from 6 to 8 feet below the surface, in a bed of sand and Lough Neagh clay," at Toome bar, on the Lower Bann, a locality almost as famous as the Ford of Meelick on the Shannon, for the quantity of antiquities found in it, and to which we have numerous references in the Museum Catalogue. With this boat were found three light, thin, black oak paddles, from 2 feet 3 inches to 5 feet long. Also an antique anchor, or grappling iron, 21 inches long, here figured; it is the only article of the kind yet discovered in Ireland. Mr. Hornsby, the Secretary to the Board of Works, has informed me that three boats were found at Toome bar, "one of which was sent to Lady Massereene, and the other was so rotten that it fell to pieces on being exposed to the air."

From the same locality, an antique oaken spade, 4 feet 6 inches long, and $7\frac{1}{2}$ inches broad in the blade, which is shod with iron for about 2 inches. Similar wooden shovels were in use in the West of Ireland within a very recent period.

During the excavations for the new Record Building to the west of the Four Courts in Dublin, there were found, at a depth of about 15 feet, traces of ancient foundations; and Mr. James Owen, the architect of the Board of Public Works, states there were also there "portions of a very carefully constructed foundation of oak logs about 6 inches square, placed as near each other as their twisted shape would permit, with a similar floor laid over them in a contrary direction, and a sort of hard concrete over that. The logs had been roughly squared by the adze, and were saplings or branches." In removing these foundations several specimens of ancient crockery, glass, horses' bones, and some few coins and tokens, were found, which I also present on the part of the Board of Works.

There have also remained over in the offices of the Board of Works from the time of the operations on the Shannon and the days of the drainage works a few antiquities, with the presentation of which I have likewise been intrusted. The most remarkable of these is an imperfect processional cross, about 16 inches high, of a single piece of yew, coated with plates of brass, which were evidently in many parts jewelled, or had inserted into their apertures enamelled studs. The figure on this cross is one of great beauty and antiquity, and the article is a most valuable addition to our ecclesiastical collection. It was found in June, 1853, in an old river course, opposite Woodford Castle, parish of Ballinakill, barony of Leitrim, and county of Galway.

A small, very perfect, copper battle-axe, $6\frac{3}{4}$ inches long, and 3 inches wide, with four rivets. The article is similar to those described in Fig. 356, Museum Catalogue, page 489, and belongs to a class of weapons

peculiarly Irish. It was found in Derrycassel Lake, barony of Tallyhaw, county of Cavan.

From the same locality an iron weapon-tool, adze-shaped on one side, and hatchet on the other, 9 inches long.

From Sruagh ford, on the Shannon, a stone hammer, $4\frac{3}{4}$ inches long; and from the excavations at Killeshandra bridge, county of Cavan, an oval punch of hard stone, $3\frac{1}{2}$ inches long.

Also, from Sruagh ford, the ferule and spike of a lance, 7 inches long, and the bronze end of the scabbard of an antique sword.

I beg to present to the Academy, on the part of Lord Farnham, a very perfect and elegantly formed antique bronze sword-blade, of the leaf-shape pattern, $23\frac{3}{4}$ inches long, and $1\frac{3}{4}$ broad in the widest portion of the blade, with four thorough and three imperfect rivet holes in the handle, which is 4 inches in length. It was found in the townland and parish of Kildallan, barony of Tullyhunco, county of Cavan, and is one of the finest specimens of this description of weapon now in the Academy's collection.

Also, from the same locality, two antique iron spurs, with angular rowel stems.

A bronze ring-brooch, with decorations of an early character, similar to those on mortuary urns of the pagan period, and having a stud for a jewel or enamel on each side of the pivot on which the pin plays. The ring, which is complete, measures $2\frac{1}{4}$ inches in diameter, and the acus is $6\frac{1}{2}$ inches long. It also was found in Kildallan.

An iron basket-hilted sword, found during the drainage operations in the townland of Derrigid, in the demesne of Farnham, the blade of which is very thin, and measures $30\frac{1}{2}$ inches long, by an average of an inch broad; the pummel is a knob of iron, and the tang or handle portion between it and the guard is not quite 3 inches long—thus showing, so far at least as the evidence derived from the size of the sword handle is concerned, that the modern hand is fully as small as the ancient. A smaller blade, with tang for the haft, two and three quarter inches in length. A globular piece of iron, two and three quarter inches in diameter, like a crotal, with an aperture on one side. The head of a small iron hammer. Three portions of rings, and eleven other iron fragments, the uses of which have not been determined.

An additional collection of articles found in the Tonymore crannoge, already described at page 274, and consisting of:—A piece of orpiment, probably used in dying.

From Andrew Armstrong, Esq., two antique, thin, hand-made, unglazed earthen pots, from Callernish, in the island of Lewis, Hebrides, and there called "crackens." These cooking utensils, which, says the donor, "are made by the women, then baked in a turf fire, and when red hot are saturated with milk, stand fire, and were used for boiling; but their use has now been quite superseded by the ordinary metal pot." Each is about 8 inches high, and 25 in circumference.

From Mons. R. S. Le Men, keeper of the records of the department of Finisterre, two bronze celts of a peculiar character, like some of those

figured in Part II. of the Museum Catalogue (see p. 385, fig. 283), and four casts of other celts, of flint, stone, and bronze, all of which were found in Brittany, and have been described in the "Archæologia Cambrensis" for June, 1860.

Casts of these were presented to the Museum in April, 1862, by the Rev. Mr. Barnwell. See "Proceedings," vol. viii., p. 153.

From Henry Cusack, Esq., an ancient bronze pot.

From Mr. F. Robinson, a specimen of a three-guinea note (£3 8*s*. 3*d*.), issued at Ross, county of Wexford, in 1811.

I also beg to exhibit to the meeting the Gahr Barry, or short crozier of St. Breagh, which I have lately procured for the Academy through the Government, under the treasure trove regulation. Although not much ornamented, it is in a state of great perfection, never having been lost, but handed down through the O'Hanlys, of Sliabh Bawn, in the county of Roscommon, the hereditary herenachs of St. Barry, the ruins of whose church at Termon Barry, on the Shannon, near Lanesborough, still exists.—See Annals of the Four Masters, under A. D. 1238.

The St. Berach or Barry to whom this ecclesiastical staff or crozier is said to have belonged, lived in 580 A. D. It is complete at both ends; is only 29 inches long. The staff is, as in all such cases, of yew, coated over with brass; but it wants the crest which surmounted the convexity of the crook. Much interest attached to this relic in former days, from its being used to swear upon; and it was sent for from great distances for this purpose in cases of stolen goods, or defamation, &c. I beg to present to the Academy the box in which it has lain for many years.

I also exhibit the most perfect square Irish bell of which we have got any notice, and which has just been procured, under the treasure trove regulations, from the neighbourhood of Dungannon, county of Tyrone.

The thanks of the Academy were unanimously voted to the respective donors—namely, the Commissioners of Public Works; Lord Farnham; Andrew Armstrong, Esq.; Mons. R. S. Le Men; F. Robinson, Esq.; and Henry Cusack, Esq.

W. H. Hardinge, Esq., read a paper on the

Application of Photozincography to the Production of Illustrations of Manuscripts.

The author adverted, as suggestive of the idea, to his narrative of the Civil, Gross, and Down Surveys recently read before the Academy, and ordered by Council to be published in the "Transactions."

He exhibited photographs, executed at the Irish Branch of the Ordnance Survey Establishment in the Phœnix Park, of a Down Survey Barony Map of Leyney, in the county Sligo; and of a Soldier's Map of

lands in the county Tipperary, allotted in 1656 to Colonel Henry Prettie, ancestor of the Dunally family, for military services rendered by him in this country.

He observed that the original maps, although on varying scales of 320 and 160 perches to the surface square inch, were by the photographic process, at will and without the necessity of any calculating medium, reduced to a size suitable for illustrating his paper in the "Transactions;" that the scales of the reductions cannot be represented in the usual way by numbers; that the paramount advantage of the photographic over all other methods of reduction is the ready facility it possesses of representing the original picture on any prescribed area, and that the accuracy with which that operation is performed far exceeds all other known methods, and amounts to perfection.

He further observed, that these photographs may be zincographed to any number; and that he hoped that, as the subject in reference to the publication of his MS. mapped townland survey narrative is, by an understanding between the Council of the Academy and himself, soon to be submitted to the Treasury for publication as a public document of much interest and value, the propriety and utility of illustrating the narrative with these photozincographed maps will be admitted; and that the Lords of the Treasury will authorize Colonel Sir Henry James, who so kindly supplied the photographic specimens exhibited to the Academy, to complete the requisite number for that purpose—a result that would be alike beneficial to science, literature, and the public service.

The following letter, addressed to the President, by Sir W. R. Hamilton, was read:—

Observatory, April 27, 1863.

My dear Mr. President,—I have been wishing for your permission to report, through you, to the Royal Irish Academy, some of the results to which I have lately arrived, while extending the applications of Quaternions, in connexion with my forthcoming *Elements*.

I. One set of such results relates to those *gauche curves of the third degree*, which appear to have been first discovered, described, and to some extent applied, by Professor Möbius, in the *Barycentric Calculus* (1827), and afterwards independently by M. Chasles, in a Note to his *Aperçu Historique* (1837); and for which our countryman, Dr. Salmon, who has done so much for the Classification of Curves in Space, has proposed the short but expressive name of *Twisted Cubics*.

II. A particular curve of that class presented itself to me in an investigation more than ten years ago, and some account of it was given in my *Lectures*, and (I think) to the Academy also, in connexion with the problem of *Inscription of Polygons* in surfaces of the second order. I gave its vector equation, which was short, but was not sufficiently *general*, to represent *all* curves in space of the third degree: nor had I, at the time, any aim at such representation. But I have lately

perceived, and printed (in the *Elements*), the strikingly simple, and yet complete equation,

$$\mathrm{V}a\rho + \mathrm{V}\rho\phi\rho = 0,$$

which represents *all twisted cubics*, if only a point of the curve be taken, for convenience, as the origin: $\phi\rho$ denoting that *linear and vector function* of a vector, which has formed the subject of many former studies of mine, and a being a constant vector, while ρ is a variable one.

III. It is known that a twisted cubic can in general be so chosen, as to pass through *any six points of space*. It is therefore natural to inquire, what is the *Osculating Twisted Cubic* to a given curve of double curvature, or the one which has, at any given place, a *six-point contact* with the curve. Yet I have not hitherto been able to learn, from any book or friend, that even the *conception* of the problem of the determination of *such* an osculatrix, had occurred to any one before me. But it presented itself naturally to me lately, in the course of writing out a section on the application of quaternions to curves; and I conceive that I have completely resolved it, in *three* distinct ways, of which *two* seem to admit of being geometrically described, so as to be understood without diagrams or calculation.

IV. It is known that the *cone of chords* of a twisted cubic, having its vertex at any one point of that curve, is a *cone of the second order*, or what Dr. Salmon calls briefly a *quadric cone*. If, then, a point P of a *given curve* in space be made the vertex of a cone of chords of *that curve*, the quadric cone which has its vertex at P, and has *five-side contact* with *that cone*, must *contain* the osculating cubic sought. I have accordingly determined, by my own methods, the *cone* which is thus *one locus* for the cubic: and may mention that I find *fifth differentials* to enter into its equation, *only* through the *second differential* of the *second curvature*, of the given curve in space. *This* may perhaps have not been previously perceived, although I am aware that Mr. Cayley and Dr. Salmon, and probably others, have investigated the problem of *five-point contact* of a *plane conic* with a plane curve.

V. It is known also that *three quadric cylinders* can be described, having their generating lines parallel to the three (real or imaginary) *asymptotes* of a twisted cubic, and wholly *containing* that gauche curve. My *first method*, then, consisted in seeking the (necessarily real) *direction* of *one* such *asymptote*, for the purpose of determining a *cylinder* which, as a *second locus*, should contain the osculating cubic sought. And I found a *cubic cone*, as a locus for the generating line (or edge) of such a cylinder, through the given point P of osculation: and proved that of the *six right lines*, common to the quadric and the cubic cones, *three* were *absorbed* in the *tangent* to the given curve at P.

VI. In fact, I found that this tangent, say PT, was a *nodal side* (or ray) of the cubic cone; and that *one* of the *two tangent planes* to that cone, along that side, was the *osculating plane* to the curve, which plane also touched the quadric cone along that *common side:* while the same

side was to be *counted* a *third time*, as being a line of *intersection*, namely, of the quadric cone with the *second branch* of the cubic cone, the tangent plane to which branch was found to cut the first branch, or the quadric cone, or the osculating plane to the curve, at an angle of which the trigonometric *cotangent* was equal to *half the differential of the radius of second curvature, divided by the differential of the arc* of the same given curve.

VII. It might then have been thus expected that a *cubic equation* could be assigned, of an algebraical *form*, but involving fifth differentials in its *coefficients*, which should determine the *three planes*, tangential to the curve, which are parallel to the three asymptotes of the sought twisted cubic: and then, with the help of what had been previously done, should assign the *three quadric cylinders* which wholly *contain* that cubic.

VIII. Accordingly, I succeeded, by quaternions, in forming such a cubic equation, for *curves in space* generally: and its correctness was tested, by an application to the case of the *helix*, the fact of the *six-point contact* of my osculating cubic with which well-known curve admitted of a very easy and elementary verification. I had the honour of communicating an outline of my results, so far, to Dr. Hart, a few weeks ago, with a permission, or rather a request, which was acted on, that he should submit them to the inspection of Dr. Salmon.

IX. Such, then, may be said briefly to have been my *first general method* of resolving this new problem, of the determination of the twisted cubic which *osculates*, at a given point, to a given curve of double curvature. Of my *second method* it may be sufficient here to say, that it was suggested by a recollection of the expressions given by Professor Möbius, and led again to a *cubic equation*, but this time for the determination of a *coefficient*, in a development of a comparatively *algebraical* kind. For the moment I only add, that the *second method* of solution, above indicated, bore also the test of verification by the *helix;* and gave me generally *fractional expressions* for the co-ordinates of the osculating twisted cubic, which admitted, in the case of the helix, of elementary verifications.

X. Of my *third general method*, it may be sufficient at this stage of my letter to you to say, that it consists in assigning the *locus of the vertices* of all the *quadric cones*, which have *six-point contact* with a given curve in space, at a given point thereof. I find this locus to be a *ruled cubic surface*, on which the tangent PT to the curve is a *singular line*, counting as a *double line* in the intersection of the surface with any plane drawn *through it;* and such that if the same surface be cut by a plane drawn *across it*, the *plane cubic* which is the section has generally a *node*, at the point where the plane crosses that line: although this node degenerates into a *cusp*, when the cutting plane passes through the point P itself.

XI. And I find, what perhaps is a new *sort* of result in these questions, that the *intersection* of this *new cubic surface* with the former

quadric cone, consists only of the *right line* PT itself, and of the *osculating twisted cubic* to the proposed curve in space.

XII. These are only *specimens* of *one set* (as above hinted) of recent results obtained through quaternions; but at least they may serve to mark, in some small degree, the respect and affection, to the Academy, and to yourself, with which I remain,

My dear Mr. President,

Faithfully yours,

William Rowan Hamilton.

The Very Rev. Charles Graves, D. D., P. R. I. A.,
Dean of the Chapel Royal, &c.

The following donations were presented to the Museum :—

1. A cinerary urn, of a peculiar form, ornamented with ribs and undulating lines, forming patterns, charged with sloping straight lines, made apparently with the teeth of a comb; height 4 inches, diameter $5\frac{1}{2}$ inches. Presented by R. H. Frith, Esq., C. E.

2. Three small cleft rings, from Thebes, in Egypt, composed of alabaster, cornelian, and bronze, or copper plated with gold, like certain cleft rings found in Ireland. Presented on the part of Arthur R. Nugent, Esq.

3. Four flint arrow-heads, said to be recently manufactured at Cambridge. Presented by F. J. Foot, Esq.

The thanks of the Academy were returned to the several donors.

MONDAY, MAY 11, 1863.

William R. Wilde, Esq., Vice-President, in the Chair.

On the recommendation of the Council, it was—

Resolved,—That the sum of £50 be placed at the disposal of the Council for the purchase of antiquities, and for the arrangement of the Museum, for the year 1863–64.

The Rev. William Reeves, D. D., read a paper "On Irish Ecclesiastical Shrines."

Mr. E. Clibborn, with the permission of the meeting, read the following paper :—

On the Sparks produced by the Iron Induction Coil used by the Rev. Dr. Callan, of Maynooth.

Having had an opportunity given me on Tuesday, the 21st ult., by the Rev. Dr. Callan, professor of natural philosophy in St. Patrick's College, Maynooth, of seeing his gigantic induction electro-magnetic helix in full action at his lecture on that day, and having then noticed

certain phenomena which are not, I believe, generally known, I venture to call attention to them.

Those I propose to notice here relate altogether to the action of the secondary or induction helix, composed, as Dr. Callan explained to his class, of thirty miles of iron wire, of about the hundredth of an inch in thickness. The wire was wound up into three flat rolls or block wheels, which were placed at equal distances on the central facies of iron rods composing the core. These rods, about three feet long, were bound round by a helix of thick copper wire, laid on in three strata, extending from about three inches of their ends.

The secondary helix was in connexion with a multiplying apparatus, composed of several hundreds of sheets of a large quarto paper with tin foil between them, which was, like the coating on the iron wire, all insulated by means of varnish invented by the professor.

The primary or thick copper wire helix, at the time the experiments I here refer to were performed, was in connexion with from one to six four-inch plates of Dr. Callan's galvanic battery ;* and the action, though extraordinary in producing sparks or miniature flashes of lightning, in some cases sixteen and a half inches long, between the ends of the secondary helix, on breaking the contact of the ends of the primary helix, was inferior, it was stated, to that of a larger apparatus, lately exhibited in London, the cost of which, compared with that constructed by Dr. Callan, was said to be exorbitant.

In Dr. Callan's apparatus, every care has been taken to produce the greatest philosophical results at a minimum cost. Wood, iron, zinc, tinfoil, and paper, are the chief materials. Brass is used only in the break of the primary helix, and the nice works connected with it, but otherwise everything indicated the greatest economy, combined with complete operativeness, equal to any elaborate instrument that could be produced in the workshop of the most fastidious electrician.

The sparks produced by the secondary helix passed, either between its two terminal points, or from one point to a large slightly concave circular disk, to which the other end of the helix was attached. Under certain circumstances, these sparks differed from each other, and also from any other electric sparks I had seen before ; their apparent difference becoming less and less with the decrease of the distance of the point between which the sparks passed.

When the sparks were over six or seven inches in length, the shape of no two of them appeared to be the same. They were all contorted more or less ; and when the distance was the greatest, and when the spark would hardly pass, its zigzag or broken character gave it the appearance of a miniature flash of lightning. In every case the spark

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* Dr. Callan has communicated the following details :—One cell gave sparks $7\frac{1}{2}$ inches long ; two cells gave sparks $12\frac{1}{2}$ inches long ; and six cells gave sparks $16\frac{1}{2}$ inches long.

was accompanied with a peculiarly sharp disagreeable crack noise, as if two extremely hard things had been struck together; but no two of the reports, when the spark was very long, appeared to my ear to be exactly the same, some being a little louder or sharper than others. In ordinary electric machine sparks, taken from the prime conductor with a ball placed at a certain distance, the sounds are, I believe, uniformly the same, and to my ear more distinct; but such is not the case with the sparks produced by this great induction coil, when they are long. It appears as if they must be different also when they are short; but my ear failed to notice it, while the eyes of some other observers appeared not to notice a difference of another kind in the sparks.

This is the occasional difference of colour between the right and left halves of the sparks produced by the induction helix, when they are about from three to five inches in length. Supposing an observer to stand in front of the apparatus, the half of the spark to his left hand, coming from the inside terminal, always exhibited more or less a bluish-white light, similar to that of sparks produced by approaching some conducting substance towards the prime conductor of a common electric machine when in good working order; but the half of the spark towards his right hand, or outside terminal of the helix, had always a different colour. It was a sort of orange-red or salmon-colour, and fainter than the other, and less luminous,—suggesting to a believer in the doctrine of two electric fluids an essential difference in the colour of each, the bluish-white being the proper colour of one electricity, the orange-red or salmon-colour, the peculiar colour of the other electricity.

I here merely indicate the difference of colour observed between the different ends of the sparks produced by the secondary helix, without proposing any theory to account for it. I state the fact as one I observed, which indicated a characteristic difference between the electric sparks produced by this helix and electric sparks produced by another agency.

If one carefully watched the sparks composed of a left half of whitish-blue, and a right half of salmon-coloured light, they would see very often the salmon-coloured light form a fringe, or rather a case, to the other, extending itself towards the left, beyond the medial point, up to, if not to the starting-place of the white spark; which would in cases of this kind pass, as it were, through the centre of the salmon-coloured spark to the place it issued from: yet the eye could not detect a difference in the moments of departure of the sparks. The spark thus appeared to be one composed of two colours; and to me it appeared to always start from the right point. To other observers it appeared to pass from the left. Hence this apparent difference may be due to peculiarity of vision, peoples' eyes having different sensibilities, like their ears—a fact well known to astronomical observers. In every case the duration of the spark may have been so short that it was nearly instantaneous, though the impression of it on the eye might have endured as long as any other flash of light of the same intensity. Thus, no

doubt, it appeared to exist or give light much longer than it did, we judging by our sensations only.

The character of the short spark sometimes differed from that just noticed, the colours extending only half way; still the two colours continued the same, and each held its peculiar character, the blue-white light appearing to be compact and uniform, like the centre of a sheet of perfect flame, while the salmon-colour appeared like the edge of the flame of a lamp of impure hydrogen, having a character like hair or luminous filaments, striking away in all directions into space, but of its own peculiar colour.

In some cases where the difference of colour of the halves of the spark were most distinctly observable, as if they did not mix or overlap each other, a knob or ball excrescence appeared in the centre of the spark. Its core was always composed of the bluish and white light, surrounded with the salmon-coloured. Here in the centre of the space between the two points, the advocate of the doctrine of the two electric fluids might tell us, they met and fought; and that while the salmon-coloured fluid devoured the blue and whitish fluid, the latter exploded, totally destroying all appearance and trace of its enemy.

When the sparks were long, we could notice a difference in their colour, and in intensity or quantity, no two sparks appearing to be exactly alike, but I did not notice any knobs on those sparks; yet I suspect that there may have been such lumps at every joint, angle, or break, in the continuity of the line which these long sparks made in their passage through the air, though we did not notice them.

In machine electricity it is generally said that sparks pass between the nearest points, or shortest distances, but this statement is to be received under correction; for sparks taken from prime conductors of different shapes are themselves different to each other. And if a prime conductor of an electrifying machine be very long, the sparks taken from different parts of it are found to strike at different distances; so that, though we may, in general terms, adopt the rule that machine electric sparks prefer the shortest distances, yet the long sparks produced by the induction coil of Dr. Callan, in not one instance, that I observed, adopted that law. On the contrary, they appeared to most carefully avoid it, when taken between a point on the right hand and the slightly hollowed tin disk on the other.

According to the eye, the sparks started from the point, and struck indiscriminately on every part of the disk; and some of them, more wild or eccentric than the others, and as it were to set old-fashioned theories at defiance, actually jumped over its edge, and turned about, and struck the back of the disk,—thus imitating some well authenticated freaks of real flashes of lightning, which have been seen to go beyond, and, as it were, turn about and strike objects which they had apparently attempted to hit, but failing, turned round, and thus accomplished their original purpose in this most extraordinary or unscientific manner, as an old electrician might say.

Measured from the right-hand point to the striking spot on the left-hand disk, or another point used in place of it, the theoretic lengths of these sparks might be from fifteen to seventeen inches; but if we considered the twists and differences of direction of their several zig-zags, their real length in every case was much more; and in some instances it must have been, at least, twice as great as the distance from the point to the spot struck on the disk.

In several instances the long sparks appeared to the eye to form loops, but this was evidently due to their adopting a somewhat spiral form. This peculiarity of form has been also noticed in lightning. As equivalents of flashes of real lightning, these long sparks should possess great interest to electricians.

Though their motion in space appeared to us to be due to blind chance, yet that notion cannot be adopted by physicists, who must work out reasons for the whip-lash appearance of these sparks, instead of the taut cord or right line direction of other electric sparks. The long forked sparks produced by frictional electricity differ materially in their form and colour from those produced by the induced helix. The two kinds of sparks should be compared together at the same time, and as much as possible under similar circumstances.

No doubt the application of photography to real lightning on the great scale, and to these long induced electric sparks on the small scale, may lead us to the exact knowledge of their likeness or unlikeness in form, which the human eye cannot perceive. This application may have been made already; but, if it has, I am not aware of the fact. The suggestion will occur to any one who takes the same view of this subject with the author.

Hitherto the freaks of flashes of lightning in apparently avoiding conducting rods, and iron chimneys of steamers, and in striking objects near them, whether composed of good or bad conducting material, are facts which throw a great doubt on the advisability of using metallic conducting rods to buildings and ships. Theory in these cases is at fault: something remains to be worked out, to account for apparent exceptions to the law of "least distance;" and as these sparks appear to be flashes of lightning on a small scale, and perfectly manageable by the experimental philosopher, I notice them here in the hope that the law of their forms and directions may be studied by parties who have the means at their command for thoroughly sifting and tracing the causes of the phenomena noticed in this communication.

It was observed by Mr. Yeates, who was present at the lecture, that though there is a wonderful likeness in the forms of the long sparks produced by the induction coil and zigzag flashes of lightning, they were not accompanied with the smell of ozone, which is common to lightning and machine electric sparks; and that, consequently, there may be a real difference between the induced electric discharges and those which accompany ordinary electric phenomena. Indeed, theory would lead to the conclusion that these induced sparks are double, an

insensible or almost infinitely small interval of time separating them; for otherwise they would neutralize each other at the moments of break of contact of the original helix connecting the electrodes of the battery.

To Dr. Callan we must all feel deeply indebted for the amount of labour, care, and intelligence he has devoted to chemical electricity, and its extension to the induced electric helix. We must congratulate him, also, on the great success which has attended his improvements and modifications of galvano-electric instruments; which have, by economizing their production, brought them within the means of many experimentalists who, otherwise, could not expect to use or get access to such instruments; and, finally, we may hope that he will continue his exertions, and his liberality in allowing scientific and curious people to see his great instruments in action—a favour which has led me to make this communication, in the hope that it may call more attention to the subject of induced electric action, on the great scale realized by Dr. Callan's *iron* helixes and galvanic batteries.

Mr. John Purser, Jun., M. A., read the following paper:—

On the Application of Corioli's Equations of Relative Movement to the Problem of the Gyroscope.

In treating the problem of determining the apparent* motion of Foucault's gyroscope, different methods have been adopted.† Probably the most satisfactory is that of deducing the equations from the consideration of Corioli's "forces fictives" in relative motion. Corioli has shown that if the co-ordinate axes to which the movement of a system is referred are not fixed, but have a motion of their own in space, we may treat the question in all respects precisely as if these axes were fixed, provided we suppose superadded to the force (P) which acts upon any molecule two others, the first a force (P') equal and opposite to that which would impress on the molecule accelerations equal to those of a point coinciding at the instant with the molecule, but invariably connected with the moving axes—the second force (P'') perpendicular to the relative path of the molecule. Into the value or direction of this last it is unnecessary for the present purpose to enter more particularly.‡

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* By apparent motion, here and afterwards, is meant the motion that would be apparent to a spectator on the earth's surface—that is, the motion with respect to co-ordinate axes invariably connected with the earth; by absolute motion, the motion with respect to axes whose direction is fixed in space.

† This is the course taken by M. Quet, in a memoir that appeared on the subject of relative motion, in Liouville's Journal. My apology for reopening the question is, that in that paper the author seems to me to have needlessly complicated the problem by an assumption which, at first sight, appears calculated to simplify it. This will be explained in the sequel.

‡ For the deduction of the expressions for these forces in magnitude and direction, see "Duhamel, Cours de Mecanique," or Corioli's original papers in the "Journal de l'Ecole Polytechnique."

If the connexions of the moving system expressed in relative co-ordinates do not involve the time, we deduce the equation of relative *vis viva* precisely in the same way as that of absolute *vis viva* is obtained when the co-ordinate axes are fixed,—i. e.,

$$\Sigma(mv^2) - \Sigma(mv_0^2) = 2\int_{t_0}^{t} \Sigma(mPdp) + 2\int_{t_0}^{t} \Sigma(mP'dp'),$$

the $\int \Sigma(mP''dp'')$, the work done by the second set of "forces fictives" vanishes, inasmuch as these forces are perpendicular to the displacements of the particles to which they are applied.

When the motion of the moving axes is one of uniform rotation round a fixed line, (P') is evidently a force $(\omega^2 r)$ along the shortest distance from the molecule to the fixed line, and directed outwards from this line, $P'dp' = \omega^2 r dr$,

$$2\int_{t_0}^{t} \Sigma(mP'dp') = \omega^2 \Sigma m (r^2 - r_0^2),$$

and the equation of relative *vis viva* assumes the very simple form

$$\Sigma(mv^2) - \Sigma(mv_0^2) = 2\int_{t_0}^{t} \Sigma(mPdp) + \omega^2 (I - I_0),$$

where I and I_0 are the moments of inertia of the moving system round the fixed line at the time (t) and at the origin of time (t_0).

The problem to be solved may be stated as follows:—

A solid of revolution turns round its axes of figure with an angular velocity (n). Its centre of figure being fixed relatively to the earth, and the resultant of the earth's attraction being supposed to pass through this fixed centre, it is required to determine the motion of the axis,

1°. When the axis is restricted to a plane;

2°. When the axis is restricted to a right circular cone;

3°. When the axis is unrestricted.

If we choose for co-ordinate axes three lines at right angles through the centre of the gyroscope moving with the earth, the motion of these axes may evidently be resolved into two—a motion of translation of the origin in a complicated curve in space, and a uniform angular rotation (ω) round an axis* drawn through the origin parallel to the earth's axis. The former evidently does not affect the relative motion of the gyroscope, and may be (as far as the present purpose is concerned) considered as non-existent.

For the complete determination of the motion of a solid body round a fixed point, three equations must be deduced from the dynamical conditions of the problem. In the present instance, the simplest that present themselves are the following:—

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* This axis we shall call, for shortness, the polar line.

I. The component round the axis of figure of the [absolute] angular velocity = Constant = n. This follows directly from Euler's well-known equation for the motion round a principal axis,—

$$C\frac{dr}{dt} = (A - B)\,pq + N.$$

In the present case,

$$A = B \qquad N = 0 \qquad \therefore \frac{dr}{dt} = 0 \qquad r = n.$$

Since component of the absolute angular velocity round any line = component of apparent angular velocity + component of angular velocity of the earth, the apparent angular velocity round the axis of figure

$$= n - \omega \cos \theta, \tag{1}$$

where (θ) = angle between axis of figure and polar line.

II. The equation of relative *vis viva*, which in this case assumes the simple form.

$$\Sigma\,(mv^2) - \Sigma\,(mv_0^2) = \omega^2.\ (I - I_0).* \tag{2}$$

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* It is at this point that my course and my results differ from those of M. Quet. He writes this equation, $\Sigma\,(mv^2) - \Sigma\,(mv_0^2) = 0$. To explain the origin of the discrepancy—instead of choosing our co-ordinate axes passing through the centre of the gyroscope, let us choose them passing through the centre of the earth. The equation of relative *vis viva* would then be

$$\Sigma mv^2 - \Sigma mv_0^2 = 2\int \Sigma m\,Pdp + 2\int \Sigma m\,P'dp'.$$

Where P = force of earth's attraction, P' = centrifugal force due to earth's diurnal rotation. These two forces might be combined for each element into their resultant (R), the force generally understood when we speak of "gravity," and the last member of the equation might be writtten $2\int \Sigma mRdr$. Now, in strict accuracy, neither of these forces P and P' is uniform in magnitude and direction throughout the body of the gyroscope, and, therefore, neither of these integrals vanish. But in seeking to simplify the problem by an assumption sufficiently near the truth, two courses are open to us:—One, that taken by M. Quet to assume the compound force (R) as uniform in magnitude and direction, and that its resultant, accordingly, passes through the centre of figure. He thus gets rid of the second member altogether. The other course, which I have followed here, is to treat the earth's attraction only as uniform, and make no such assumption about the centrifugal force, but to replace $2\int \Sigma mRdr$ by its accurate value, $\omega^2(I - I_0)$. This hypothesis, the uniformity of the earth's attraction, requires only to give it validity that the dimensions of the gyroscope be small compared with the earth; while M. Quet's assumption requires, in addition, that the earth's angular velocity be small compared with that of the gyroscope. Now, it seems more logical, in discussing phenomena arising from the earth's rotation, to include all terms springing from that source. The differential equations so found possess this advantage, that they would not cease to hold good were the earth's angular velocity supposed of co-ordinate magnitude with the gyroscope's. Moreover, applying the equations to the case where the axis of the gyroscope is unconstrained, we obtain on this hypothesis an exact solution; while M. Quet, after an elaborate analysis, has to remain satisfied with an approximation, the simplifying assumption which he made at the beginning precluding him from obtaining a solution in finite terms.

III. The equation of relative moments round the polar line,

$$\Sigma\left(mr^2\frac{d\psi}{dt}\right)-\Sigma\left(mr^2\frac{d\psi}{dt}\right)_0=-\omega(I-I_0). \tag{3}$$

Where r = projection of radius vector from the origin to any element on a plane perpendicular to the polar line,

$$\frac{d\psi}{dt} = \text{angular velocity of this projection.}$$

This equation can be very easily proved from the consideration of Corioli's forces; but it is unnecessary to resort to them, for it is evidently but another form of the equation of the conservation of absolute moments round the same line,

$$\Sigma\left(mr^2\frac{d\psi}{dt}\right)-\Sigma\left(mr^2\frac{d\psi}{dt}\right)_0=0,$$

since

$$\text{absolute}\frac{d\psi}{dt}=\text{relative}\frac{d\psi}{dt}+\omega.$$

Now, let C = moment of inertia round axis of figure,
A = same round any axis perpendicular to this,
$\frac{C}{A}n=m$;

then, since the relative motion of the gyroscope may always be resolved into two, its [apparent] rotation round its own axis, $n-\omega\cos\theta$, and an angular velocity $\frac{ds}{dt}$ round an axis at right angles to its own axis,

$$\text{the relative } \textit{vis viva}=A\left(\frac{ds}{dt}\right)^2+C(n-\omega\cos\theta)^2.$$

$$\text{Also } I=C\cos^2\theta+A\sin^2\theta=(C-A)\cos^2\theta+A;$$

$\therefore$ equation (2) assumes the form

$$A\left(\frac{ds}{dt}\right)^2+C(n-\omega\cos\theta)^2=\omega^2(C-A)\cos^2\theta+\text{Const.}$$

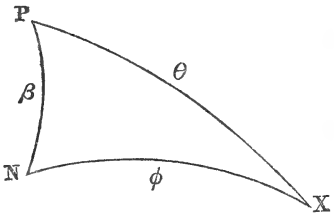
Or,

$$\left(\frac{ds}{dt}\right)^2=2m\omega\cos\theta-\omega^2\cos^2\theta+\text{Const.} \tag{4}$$

If the axis is restricted so as to be compelled to trace out a particular curve on the unit sphere, the equation of this curve gives another relation between (s) and (θ), which combined with this determines the motion.

First Case.—*The Axis is restricted to move in a given Plane.*

Let (P) be the trace of the polar line on the unit sphere, (NX) that of the fixed plane; (X) that of the axis of the gyroscope; or, to define it exactly, of that end of the axis on looking down which the rotation of the gyroscope would appear contrary to the movement of the hands of a watch—that is, would appear in the same direction as the earth's rotation.



Draw the arc PN perpendicular to NX, let $NP = \beta$, $NX = \phi$;

$$\text{then } \cos\theta = \cos\beta\cos\phi, \text{ and } \frac{ds}{dt} = \frac{d\phi}{dt};$$

$\therefore$ by equation (4)

$$\left(\frac{d\phi}{dt}\right)^2 - \left(\frac{d\phi}{dt}\right)_0^2 = 2m\omega\cos\beta(\cos\phi - \cos\phi_0) - \omega^2\cos^2\beta(\cos^2\phi - \cos^2\phi_0). \qquad (5)$$

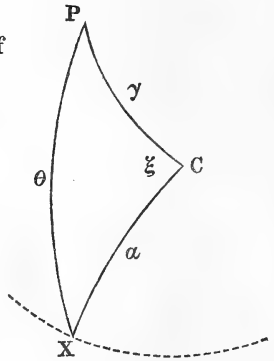
Such is the rigorous differential equation for determining the motion. In its complete form it is unintegrable.

If we confine ourselves to terms of the first order, and suppose the axis of the gyroscope started at relative rest, it becomes

$$\left(\frac{d\phi}{dt}\right)^2 = 2m\omega\cos\beta(\cos\phi - \cos\phi_0).$$

The motion is therefore identical with that of a simple pendulum whose length, $l = \dfrac{g}{m\omega\cos\beta}$ oscillating about the line (N). When the vibrations are small, the period of a double vibration $T = \dfrac{2\pi}{\sqrt{m\omega\cos\beta}}$ $= \sqrt{\dfrac{A\sec\beta}{C}}\ .\ T'$ where T' is a mean proportional between the earth's period of rotation and the gyroscope's.

SECOND CASE.—*The Axis is restricted to a right Circular Cone.*



Let (C) be the trace on the unit-sphere of the axis of the cone (P) and (X) as before.

Let (CX) the angular radius of cone $= a$, $(PC) = \gamma$ angle $PCX = \xi$;

$$\text{then } \frac{ds}{dt} = \sin a \frac{d\xi}{dt},$$

$$\text{Cos } \theta = \cos a \cos \gamma + \sin a \sin \gamma \cos \xi.$$

Equation (4) becomes, on substituting these values, and dividing by $\sin^2\gamma$,

$$\left(\frac{d\xi}{dt}\right)^2 - \left(\frac{d\xi}{dt}\right)_0^2 = 2\omega \frac{\sin a}{\sin \gamma} (m - \omega \cos a \cos \gamma)(\cos \xi - \cos \xi_0) - \omega^2 \sin^2 a (\cos^2 \xi - \cos^2 \xi_0) \quad . \quad . \quad . \quad (6)^*$$

Confining ourselves to terms of the first order, and supposing, as before, the axis started at relative rest, we have

$$\left(\frac{d\xi}{dt}\right)^2 = 2 \frac{\sin a}{\sin \gamma} m\omega (\cos \xi - \cos \xi_0).$$

Hence it follows that the axis (X) does not go all round the cone, but vibrates about that edge of the cone which makes the least angle with the polar line, that edge for which $\xi = 0$. The length of the equivalent simple pendulum and the period of a double oscillation, when the vibrations are small, may be found, as in the last case [which is, indeed, included in this as a particular case] to be

$$l = \frac{\sin \gamma}{\sin a} \cdot \frac{g}{m\omega} \qquad T = 2\pi \sqrt{\frac{\sin \gamma}{m\omega \sin a}} = \sqrt{\frac{A \sin \gamma}{C \sin a}} \cdot T'.$$

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* Not long since, Professor Curtis, of Queen's College, Galway, published an interesting paper on this subject. In his investigation of the question he has followed an entirely different method from that here adopted. The origin of the present paper was an endeavour to trace out the cause of the difference between Professor Curtis' results and those arrived at by Professor Price, of Oxford, in the chapter on the gyroscope, in the lately published fourth volume of the Infinitesimal Calculus.

The differential equations (5) and (6) for the motion of the axis, in the last two cases, precisely agree with those given in Professor Curtis' pamphlet, and differ from the corresponding equations in Professor Price's work,—the reason being that the latter follows M. Quet in his assumption, and writes the relative *vis viva* = Const.

THIRD CASE.—*The Axis is unrestricted.*

Denoting as before the polar line and the axis of the gyroscope by P and X, let the angle which the arc (PX) makes with a fixed arc through $(P) = \psi$; the relative angular motion of the gyroscope may be resolved into three rotations:—

$$\begin{cases} n - \omega \cos\theta \text{ round } X; \\ \sin\theta \dfrac{d\psi}{dt} \text{ round an axis in plane } PX \text{ at right angles to } (X); \\ \dfrac{d\theta}{dt} \text{ round an axis perpendicular to plane } (OP). \end{cases}$$

Now, by the equation (3) of relative moments round (O),

$$\sin\theta \,.\, A \sin\theta \frac{d\psi}{dt} + \cos\theta \,.\, C(n - \omega\cos\theta) + (C - A)\,\omega \cos^2\theta = \text{Const.};$$

or, if the axis be started at relative rest,

$$\text{Sin}^2\theta \frac{d\psi}{dt} = -m(\cos\theta - \cos\theta_0) + \omega(\cos^2\theta - \cos^2\theta_0, \tag{7}$$

and by the equation (4) of relative *vis viva*,

$$\text{Sin}^2\theta\left(\frac{d\psi}{dt}\right)^2 + \left(\frac{d\theta}{dt}\right)^2 = 2m\omega(\cos\theta - \cos\theta_0) - \omega^2(\cos^2\theta - \cos^2\theta_0) \tag{8}$$

multiplying (7) by (2ω), adding it to (8), and writing ψ' for $\psi + \omega t$, we obtain

$$\left(\frac{d\theta}{dt}\right)^2 + \sin^2\theta\left(\frac{d\psi'}{dt}\right)^2 = \omega^2 \sin^2\theta_0; \tag{9}$$

On making the same substitution in (7), it becomes

$$\text{Sin}^2\theta \frac{d\psi'}{dt} = m(\cos\theta_0 - \cos\theta) + \omega \sin^2\theta_0. \tag{10}$$

(ψ') evidently represents the angle the arc (PX) makes with an arc through P retreating with an angular velocity (ω); and the equations (9) and (10) between (θ) (ψ') and (t), are those of the curve described by the axis of the gyroscope with respect to this retreating co-ordinate

arc. A very ready way of integrating these equations is to throw them into the following somewhat different form :—

Let (p) = perpendicular arc let fall from (P) on the great circle tangent to the spherical curve whose running co-ordinates are (θ) and (ψ'); then, by an easy application of Napier's rules for the solution of right-angled spherical triangles,

$$\text{Sin } p = \sin^2\theta \cdot \frac{d\psi'}{ds},$$

$\therefore$ equations (10 and (11) may be written

$$\frac{ds}{dt} = \text{const} = \omega \sin \theta_0, \tag{11}$$

$$\text{Sin } p = \frac{m}{\omega \sin \theta_0} (\cos \theta_0 - \cos \theta) + \sin \theta_0. \tag{12}$$

Equation (12) answers to that of a curve in plano in terms of the radius vector and the perpendicular on the tangent. The expression for the radius of spherical curvature corresponding to the well-known formula

$$R = \frac{r dr}{dp}$$

is

$$\text{Cot } R = -\frac{d \sin p}{d \cos \theta}.$$

[See Graves' translation of Chasles on "Cones and Spherical Conics."]

Applying this expression to the equation of the present curve, we get

$$\text{Cot } R = \frac{m}{\omega \sin \theta_0}, \text{ or } R = \text{const} = \tan^{-1} \frac{\omega \sin \theta_0}{m};$$

$\therefore$ the axis of the gyroscope describes a circular cone of a semi-angle $\tan^{-1} \frac{\omega \sin \theta_0}{m}$, with an angular velocity $\frac{1}{\sin R} \left(\frac{ds}{dt} \right)$

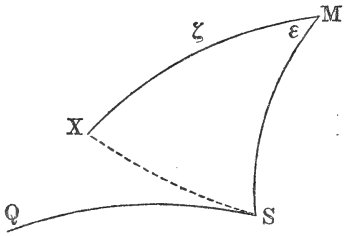
$$= \sqrt{m^2 + \omega^2 \sin^2 \theta_0};$$

while the axis of the cone revolves round the polar line in a direction opposite to the earth's rotation with an angular velocity (ω); in other words, constantly points to the same fixed star.

For completeness, I have thus solved the case where the axis is unconstrained by the same methods as the other two.

A more rapid solution may, however, be obtained by the ordinary equations of [absolute] *vis viva* and absolute moments thus :—

Tracing the absolute motion of the axis in space on the unit-sphere, let (S) be the starting position of the axis, SQ the direction in which from its connexion with the earth, or any other cause, this axis begins to move, (X) any other position of the axis; M, a fixed line in a plane perpendicular to SQ; let $MX = \xi$, $XMS = \epsilon$, γ = starting angular velocity of (X); then, by equation of absolute *vis viva*,



$$\left(\frac{d\xi}{dt}\right)^2 + \sin^2 \xi \left(\frac{d\epsilon}{dt}\right)^2 = \gamma^2;$$

and by equation of moments round M,

$$\mathrm{Sin}^2 \xi \left(\frac{d\epsilon}{dt}\right) = m(\cos \xi_0 - \cos \xi) + \gamma \sin \xi_0.$$

Eliminating $\left(\frac{d\epsilon}{dt}\right)$,

$$\sin^2 \xi \left(\frac{d\xi}{dt}\right)^2 = \gamma^2 \sin^2 \xi - \{m(\cos \xi_0 - \cos \xi) + \gamma \sin \xi_0\}^2;$$

or, if M be chosen, so that $\tan MS = \tan \xi_0 = \frac{\gamma}{m}$

$$\sin^2 \xi \left(\frac{d\xi}{dt}\right)^2 + (m^2 + \gamma^2)(\cos \xi_0 - \cos \xi)^2 = 0,$$

which necessitates

$$\left(\frac{d\xi}{dt}\right) = 0; \text{ and } \xi = \xi_0 = \tan^{-1} \frac{\gamma}{m}, \text{ and } \frac{d\psi}{dt} = \text{const} = \frac{\gamma}{\sin \xi_0} = \sqrt{m^2 + \gamma^2}.$$

If the starting velocity of the axis is solely due to its connexion with the earth before it was set free,

$$\gamma = \omega \sin \theta_0;$$

$$\xi = \tan^{-1} \frac{\omega \sin \theta_0}{m};$$

$$\frac{d\psi}{dt} = \sqrt{m^2 + \omega^2 \sin^2 \theta_0};$$

or the axis describes a small circular cone, whose semi-angle = $\tan^{-1}\left(\frac{\omega \sin\theta_0}{m}\right)$, with a uniform angular velocity in a period

$$\frac{2\pi}{\sqrt{m^2 + \omega^2 \sin^2\theta_0}}.$$

Still more briefly, the same results may be arrived at by the consideration of Poinsot's resultant couple; for it is evident on inspection that the axis M thus chosen is the axis of the resultant couple of all the motion with which the gyroscope is started. Now, the axis and magnitude of the resultant couple remain fixed; therefore M is always this axis, and G its moment,

$$= \sqrt{C^2n^2 + A^2\omega^2 \sin^2\theta_0},$$
$$= A\sqrt{m^2 + \omega^2 \sin^2\theta_0};$$

and since (Cn), the component of the resultant couple round the axis of figure $= G \cos\zeta$, it follows that

$$\cos\zeta = \text{const} = \frac{Cn}{G} = \frac{m}{\sqrt{m^2 + \omega^2 \sin^2\theta_0}}, \text{ or } \tan\zeta = \frac{\omega \sin\theta_0}{m}.$$

Again, the component of the resultant couple round an axis in the plane (XM) perpendicular to $(X) = G \sin\zeta = A \sin\zeta \frac{d\epsilon}{dt}$,

$$\therefore \frac{d\epsilon}{dt} = \frac{G}{A} = \sqrt{m^2 + n^2 \sin^2\theta_0}, \text{ as before.}$$

The result in the unrestricted case may be thus recapitulated:— If the axis of the gyroscope could be started in a position of absolute rest, no angular motion being communicated to the axis either by the earth or the experimenter, it must always continue so, pointing to the same fixed star. When it is not so started, but the axis at the moment of detachment has a velocity (γ) in a given plane, it describes a circular cone round a fixed line in space, the semi-angle of the cone being

$$\tan^{-1}\frac{\gamma}{m},$$

and the period of description

$$\frac{2\pi}{\sqrt{m^2 + \gamma^2}}.$$

When this starting velocity (γ) is solely due to its connexion with the earth before detachment, $\gamma = \omega \sin\theta_0$, a quantity generally so small compared to (m), that the minute arch described by the extremity of the axis would appear an absolute point under the most powerful microscope.

It might be supposed that if this infinitesimal nutation were prevented by restricting the axis to a circular cone round the polar line, the axis would still, as before, follow a fixed star. But this is not so: the relative curve described by its extremity is a spherical cycloid, and the initial tendency of the axis, when set free, being to move towards the polar line, it follows that when this motion is prevented, it remains at relative rest.

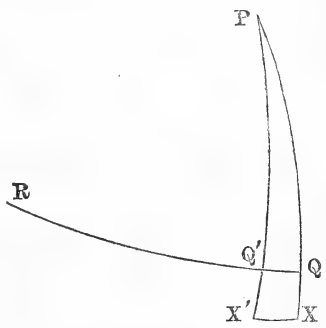
There are one or two points connected with this problem which it may be interesting to examine into.

1°. Supposing the axis of the gyroscope fixed so as to be compelled to move with the earth, what force would it exert to break its bonds?

Let P be the polar line;

XX' two consecutive positions of the axis of the gyroscope;

QQ' the axes of the resultant couple of all the motion the gyroscope has at X and X', then $G = \sqrt{C^2n^2 + A^2\omega^2 \sin^2\theta_0}$, the axis of the couple added by the connexions in the time (dt), which changes the position of G from Q to Q', must lie in the plane QQ' at right angles to Q, the plane of the couple being the plane OQ, let its moment $= Ndt$,



$$\text{then } \frac{Ndt}{G} = \frac{\sin QQ'}{\sin\left(\frac{\pi}{2} - QQ'\right)} = QQ' = XX' \text{ quam proxime,}$$

$$= \omega \sin\theta_0\, dt,$$

$$\therefore N = G \,.\, \omega \sin\theta_0 = Cn\omega \sin\theta_0 \text{ quam proxime,}$$

that is, the moment of the couple of constraint (N) = that of couple, which, if acting round the axis to stop the spin, would bring the gyroscope to rest in the time $\frac{1}{\omega \sin\theta_0}$, or that of a sidereal day divided by $2\pi \sin\theta_0$.

This will serve as a measure of the friction to be overcome before the apparent motion of the axis could take effect.

2°. In the preceding investigation the resultant of the earth's attraction has been supposed to pass through the centre of the gyroscope, and therefore to exercise no influence on its motion.

In strict accuracy, of course, this is not so, inasmuch as the earth's attraction upon the different parts is neither uniform in magnitude nor direction. The question arises, what is the error induced by supposing it so? Assuming the earth a sphere, it is evident that its attraction has no moment either round the axis of figure, or round the vertical through the centre of the gyroscope.

Choosing this vertical for axis of (z) and the axis of (x) in vertical plane through the axis of the gyroscope, the components of the earth's attraction on any element dm are easily seen to be

$$-\frac{g}{R}x, \quad \frac{-g}{R}y, \quad g+\frac{2g}{R}z,$$

where R = the radius of the earth.

$$\left(\text{Neglecting terms with coefficients } \frac{1}{R^2}.\right)$$

$$\therefore \text{ moment round the axis of } (y) = \Sigma \{ (z X - xZ)\, dm\}$$

$$= -\frac{3g}{R} \Sigma\, zx dm.$$

To determine this, let $z'x'$ be the co-ordinates with respect to the axis of the gyroscope, and a line at right angles to it in the same vertical plane, the axis of (y) being left unaltered; then

$$\begin{cases} z = z' \cos \nu - x' \sin \nu, \\ x = z' \sin \nu + x' \cos \nu, \end{cases}$$

when ν = inclination of the gyroscope to the vertical;

$$\therefore M = -\frac{3g}{R} \sin \nu \cos \nu\, \Sigma dm\, (z'^2 - x'^2),$$

since $$\Sigma dm\, (z'x') = 0,$$

or $$\frac{3g}{R} \sin \nu \cos \nu\, (C - A),$$

this moment (M), acting downwards in the vertical plane passing through the axis of the gyroscope, will be the sole effect of the earth's attraction. It will produce terms in the equations with a coefficient

$$\left(\frac{g}{R}\right).$$

These terms will be, of course, inappreciable when compared with the terms whose coefficient is $(m\omega)$; but they will be far greater than the terms which have (ω^2) as a factor. We cannot, therefore, in these equations make (m) equal cypher, and assume that the result will represent what happens when the gyroscope is started without any motion round its axis.

All such conclusions would be based on the imaginary hypothesis of the equality of the earth's attraction at different points of the gyroscope.

That the inequality of attraction would materially affect the result when the velocity of the spin is of the same order as (ω) may be shown as follows:—Supposing the gyroscope placed in its frame without spin,

and leaving out of consideration the rotation of the earth, its motion would be that of an oscillation in a vertical plane, determined by the equation

$$A\frac{d\nu^2}{dt^2} = \frac{3g}{R}(C - A)\sin 2\nu.$$

When the starting position of the axis is but slightly inclined to the vertical, and the oscillations are small,

$$\text{the period of vibration} = \sqrt{\frac{R}{6g}} \cdot \sqrt{\frac{A}{C-A}}$$

$$= \sqrt{\frac{A}{C-A}}\ 5\tfrac{1}{2} \text{ minutes, nearly,}$$

a motion far more rapid than in this case (i. e., when the gyroscope is placed in its frame without spin) could arise from the earth's rotation.

3°. In the preceding analysis the problem discussed has had a purely theoretical significance, the rings which realize the conditions proposed being left out of consideration. How will their inertia modify the results? In the first two cases treated there is no difficulty in including them in the moving system. Suppose in Case I. the axis confined to a plane by rendering immoveable the outer ring; let $C_1\ A_1$ be the moments of inertia of the inner ring round an axis perpendicular to its plane, and an axis in its plane; applying the equation of relative *vis viva* to the whole moving system, the equation which replaces (5) will be

$$\left(\frac{d\phi}{dt}\right)^2 - \left(\frac{d\phi}{dt}\right)_0^2 = 2\frac{C}{A + A_1}\cos\beta \cdot \omega(\cos\phi - \cos\phi_0)$$

$$- \frac{A + C_1 - A_1}{A + A_1}\omega^2\cos^2\beta(\cos^2\phi - \cos^2\phi_0).$$

If we compare this with equation (5), it is evident that, omitting terms in (ω^2), the only change to be made in the solution of that case is to suppose (m) to represent

$$\left(\frac{C}{A + A_1}n\right), \text{ instead of } \left(\frac{C}{A}n\right), \text{ as before.}$$

Again, the axis may be restricted to a right circular cone (as in Case II.), by connecting together the two rings, their planes being set making with each other an angle (α) equal to the angular radius of the required cone, and leaving the exterior ring free to revolve round one of its own diameters. Neglecting terms in (ω^2), the results already obtained hold, supposing (m) now to stand for

$$\frac{Cn\sin^2 a}{A\sin^2 a + A_2 + A_1\cos^2 a + C_1\sin^2 a}.$$

Lastly, in "the unrestricted case," where both rings must be left free to move, let the line round which the outer revolves be placed parallel to the earth's axis. Including the rings in moving system in this case, and applying as before the equations of relative *vis viva* and relative moments, I have reduced the determination of the motion of the axis to the following pair of equations:—

$$\left\{\begin{array}{l} (A + A_1)\left(\dfrac{d\vartheta}{dt}\right)^2 + \dfrac{\{Cn\ (\cos\theta_0 - \cos\theta) + \omega H_0\}^2}{H} = \omega^2 H_0 \qquad (15) \\ \dfrac{d\psi}{dt} + \omega = \dfrac{Cn\ (\cos\theta_0 - \cos\theta) + \omega H_0}{H} \qquad (16) \end{array}\right.$$

where $H = A \sin^2\theta + A_1 \cos^2\theta + C_1 \sin^2\theta + A_2$.

It will be at once seen that an exact solution to correspond with a solution of this case, when the rings are not included, is not to be hoped for. It may, however, be readily shown that, to a very high degree of approximation, the motion of the axis is still that of a retrograde rotation (ω) round the polar line, combined with an infinitesimal conical nutation; for, equating $\dfrac{d\theta}{dt}$ to cypher, and neglecting terms in (ω^2), the limiting values of θ will be found to be θ_0 and $(\theta_0 - 2p)$, where

$$p = \frac{\omega H_0}{Cn \sin\theta_0}.$$

Assuming θ = its mean value $[\theta_0 - p] + y$, and omitting terms of a higher order than (y), we get on substituting in (15)

$$(A + A_1)\left(\frac{dy}{dt}\right)^2 + \frac{C^2 n^2 \sin\theta_0}{H_0}\, y^2 = \omega^2 H_0,$$

or writing

$$q = \frac{Cn \sin\theta_0}{\sqrt{(A + A_1)\, H_0}}$$

$$\frac{dy}{dt} = -q\sqrt{p^2 - y^2} \qquad y = p\cos(qt), \qquad (17)$$

the arbitrary constant vanishing, since $y = p$ when $t = 0$.

Again, $\dfrac{d\psi}{dt} + \omega = \dfrac{Cn \sin\theta_0}{H_0}\, y = \omega\cos(qt)$, $\sin\theta_0\left(\dfrac{d\psi}{dt} + \omega\right)$

$$= \left(\frac{dx}{dt}\right), \text{ say} = \omega \sin\theta_0 \cos(qt);$$

$$\therefore\ x = p' \sin(qt), \tag{18}$$

$$\text{where } p' = \frac{w\sqrt{(A + A_1)\, H_0}}{Cn}.$$

These equations (17) and (18) evidently answer to a nutation of the extremity of the axis, not in a circle, as when the rings are left out of consideration, but in an ellipse whose semi-axes are (p) and (p'), and the period of nutation

$$\frac{2\pi}{q}.$$

MONDAY, MAY 25, 1863.

The Very Rev. Charles Graves, D. D., President, in the Chair.

The Secretary read the following extract of a letter from F. J. Foot, Esq., to the Rev. Professor Haughton :—

"*Athlone, May* 13, 1863.

"On the evening that I read my botanical paper at the Academy, in reply to a question put to me by Dr. Osborne, I stated positively that digitalis grows on the limestone of Burren. Since then I mentioned, at the Natural History Society, of its occurring plentifully in the neighbourhood of Mullingar, and also near this. Now, most of the Floras say of digitalis, that it *does not occur in limestone districts.*

"I find that candour demands of me to modify my statement a little. Quite true that digitalis grows in Burren and in the midland counties; but it always grows on *cherty limestone, or its debris.* I must allow that I never saw either *digitalis* or *heather* growing on *pure unsiliceous* limestone. In Burren there are many very siliceous beds of limestone, and on them, in shady places, digitalis is by no means uncommon. Where it occurs at Mullingar and in this neighbourhood, the beds are what has been called *calp,* i. e. black earthy limestone, with bands of chert and shale.

"In fact, if one meets digitalis in a limestone district, they may feel pretty certain that they are on, or very near to, the black calpy limestone."

The Rev. Samuel Haughton, M. D., read a paper "On the Chemical and Mineral Composition of the Granites of Donegal."

MONDAY, JUNE 8, 1863.

The Very Rev. Charles Graves, D. D., President, in the Chair.

Charles Neville Bagot, Esq., was elected a member of the Academy.

R. R. Madden, M. R. I. A., read the following paper:—

On Ancient Literary Frauds and Forgeries in Spain and Italy, and their bearings on events recorded in Irish and other Celtic Annals.

1. Joannes Annius de Viterbo, a Dominican friar:—His pretended discovery of long lost works of Berosus and Manetho, and of various fragments of celebrated writers of antiquity; his fabrication of inscriptions purporting to be ancient, on marble slabs, in the latter part of the fifteenth century.

2. Curzio Inghiramio:—His pretended discovery of Etruscan inscriptions in the seventeenth century.

3. Forged predictions and remarkable literary frauds connected with the discovery of the remains of St. Cathaldus, in Naples, in the fifteenth century.

4. Father Higuera:—His fictitious Ecclesiastical Annals of the Church of Spain, ascribed to Flavius Lucius Dexter, a cotemporary and friend of St. Jerome, of the fifth century.

5. *Fabulosas Historias*, not solely products of foreign lands and of former ages.

The migration from Spain into Ireland, and the establishment, in the latter country, of a Spanish colony some centuries prior to Christianity, and the alleged descent from that colony of a long line of rulers of Scytho-Iberian origin, referred to in Irish annals, and largely treated of by Keating, O'Flaherty, M'Geoghegan, and O'Connor, find strong confirmation in Spanish chronicles, and the writings of several historians of Spain. We find in these Spanish references (which I insert *in extenso* in another paper), many important notices of this migration, and the protracted and widely-spread calamity of a great drought and dearth in Spain which preceded it, of which, strange to say, little is known, or at least noticed, in our historical literature.

Of the great drought and dearth which prevailed over Spain for a period of twenty-six years, and the consequent migrations from the north-western shores of Spain (according to several of the Spanish historians), we find accounts, more or less detailed, in the works of Florian D'Ocampo, Garibay, Escolan, De la Huerta y Vega, Gandara, Fray Francesco Diago, Fray Francesco Sota, Doctor Francesco de Pisa, Mariana, Mohedanno, &c.

But in several of these chronicles we find the fabulous histories of Joannes Annius de Viterbo have corrupted the Spanish annals from the fifteenth century to an astonishing extent. Suppositious lines of kings from Tubal down to the time of the Romans, and chronological data

connected with them, have been adopted from the pages of the author of the spurious Berosus; so that the ascertainment of the data of any important event, such as the great drought and dearth in Spain, and subsequent migrations into Ireland, has been rendered extremely difficult.

This difficulty, in reference to affairs connected with Ireland, has induced me to devote some attention to the subject of the fabrications of fabulous history of Annius de Viterbo, and some other writers of a later period.

Annius must have spent a large portion of his life in the concoction of his gigantic literary forgeries. He was not impelled by poverty to perpetrate them; nor was he induced by the obscurity of a low condition to seek literary notoriety by means that were unworthy of a man of letters. The perversion of mind which leads to a total oblivion or unconsciousness of the difference between truth and falsehood is a form of monomania, with which persons who have to do with the care and supervision of lunatics are conversant.

It is true, we do not find the ruling passion of a perverted mind entirely devoted to one exclusive object,—the delight and labour, perhaps, of a whole lifetime,—the concoction of forged documents, and the reduction of the fabulous materials into the order, method, form, and appearance of genuine history, described in medical books as one of the many existing kinds of partial insanity that physicians have to deal with.

But this form of monomania, nevertheless, does exist. On what other grounds but those which partial insanity furnish, would it be possible to account for men of great erudition,—ecclesiastics of a high position and of good repute; persons well considered in society, in easy circumstances; men like the author of the fabulous historical fragments of Berosus, and of the equally fabulous Annals of Flavius Lucius Dexter, devoting a large portion of their lives to the perpetration of great literary frauds, requiring long-continued intellectual labours, by means of which no pecuniary advantage was to be gained, nor personal interest to be promoted.

There is one thing very evident in the insanity of literary forgers and fabricators of "fabulous histories:" that the predominant idea in the minds of all these impostors is the assertion of the antiquity of the origin of their nation, or the glorification of the character and achievements of the inhabitants of the city or town to which they belonged, or of the Church most immediately connected with it.

LITERARY FRAUDS OF JOANNES ANNIUS DE VITERBO.

No fabricator of documents purporting to be ancient historical records ever attained the same unenviable notoriety as this member of the Dominican order. He was born, some say, in 1432, others, in 1437, in Viterbo—became a person of considerable eminence and erudition—was held in high estimation in his order—was made a doctor of theology—obtained a high official position in the court of Pope Alexander VI. He

possessed a very extensive knowledge of ancient history, and especially that of Eastern countries. His native place of Viterbo was an ancient town of Etruscan origin and celebrity, and in very early life he devoted himself to the study of Etruscan antiquities with great zeal and enthusiasm. It is admitted, even by those who consider him an impostor, that he was a man of vast oriental and antiquarian erudition. He died in Rome, in 1502.

Two editions of his historical fabrications, entitled "Antiquitatum Variarum volumina octodecim," are in my possession, both in 4to, one published by Joannes Petit, in Jodoco Badio, 1512; the other, by the same Petit, in 1515. The work is divided into seventeen books. The fifteenth book, headed "Super Berosum," contains the historical fragments ascribed to Berosus, entitled "De Antiquitatibus Berosi,"* of which the commentaries of Annius form the principal part.

In the introductory chapter to Berosus, Annius says:—"In laudem Berosi"—he knew the Greek tongue, and "taught the Athenians the Chaldean sciences, especially astronomy, in which they excelled." He quotes Pliny in confirmation of the account given by some ancient writers of the great honour in which Berosus was held by the Athenians. "The cause," says Annius, "of Berosus writing and transmitting these Chaldaic traditions was because the Greeks traced back their history only to the time of the King of Greece, Phoroneus Priscus, and that their history was mixed with many errors concerning ancient matters.

"Berosus (according to Annius) divided this work of his into five books:—

"In the 1st, he relates what the Chaldeans wrote of the times before the first deluge.

"In the 2nd, he treats of what they wrote of the genealogies of the primæval gods—*Primorum Deorum*—after the deluge.

"In the 3rd, what they wrote concerning the ancient father *Janus*, whom they call Noah.

"In the 4th, what was written of the antiquities of the kingdoms of the whole world in general.

"In the 5th, explanations of each kingdom referred to."

The sixteenth book of the "Antiquitates" of Annius contains the fragment of Assyrian history ascribed to Manetho the Egyptian, and is headed, "*Super Supplementum Manethonis ad Berosum.*" The text and commentary occupy fourteen pages. The text hardly extends to a tenth part of the matter of this book.

Not one word is said by Annius in the introduction to either of "these long lost works" of Berosus and Manetho, of the mode in which they were discovered by him. There are very conflicting accounts as to the way in which Annius pretended to have come by these alleged ancient historical treasures. Some writers assert that he declared these

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* Annius says the ancient title of the Chaldaic fragments was "Defloratio Babyloniæ Berosi Chaldaici."

fragments were inscribed on metallic plates, which he discovered in the vicinity of Viterbo; others say the inscriptions were on marble; but Touron, the Dominican historian of the notabilities of his order, flatly contradicts both, and says the documents which contained this historical matter came into the hands of Annius from an Armenian priest. The *esprit de corps* of members of all societies prevails not unfrequently in their literature over scrupulosity and the exercise of critical acumen.

If Touron had read the commentary of Annius on the so-called fragment of Manetho, or supplement of his to Berosus, he must have found in the concluding lines of the fifteenth book, at the termination of the commentary on Berosus, page 145, and in the concluding lines of the sixteenth book, likewise at the termination of the commentary on Manetho, page 152, positive evidence that Annius relied on the alleged discovery of inscribed stones for the interpretation he has given of certain names which occur in the text of his alleged Chaldaic and Egyptian authors.

By means of an Etruscan inscription, Lucumonus is proved to be a place whose population, as well as that of Vetulonia, was comprised in the ancient Viterbum or Volturna. The ancestors of Annius are made out of Etruscan origin—in Veia, Verissa, Vetulonia, Volturna, or Viterbum—and are given an origin as early as the Theban Hercules. By this illustrious founder a celebrated tower, it is shown, was built at Viterbum.

And at the end of the work of Annius (lib. xvii. Questiones, p. 171), the veracious author says that his "veracissimus Berosus" expressly states that Isis came into Libyssum, "Latii Campum," from Libya, and was present at the nuptials of Cybele and Jasius. And the first bread, says Berosus, that was made in Etruria was at the nuptials of Jasius, in Vetulonia. And then "Vetulonia est Viterbum," says Annius. But what is to be done with Lybissus? The Lybissus of notoriety, "ubi primum constitit Ceres," was in the Roman territory. Annius at once solves the difficulty, as he does in numerous other places, with a discovery of an ancient inscribed stone. "What if it should prove Lybissa is a Vetulonian region?" And then another difficulty is similarly surmounted. Vetulonia was a regal city, and Vetulonia is now proved to be Viterbum. Then Veiura is found by an inscription to be a town of the Viterbans, "Porro subscriptio ita dicit," &c. Then, again, a place has to be sought for, named by Berosus from the father of Cybele, one Sypo; this has to be identified with Sypalis, a place in the region of Vetulonia. And all that is desired is effected by another inscription:—

"Cybelarium excisum marmor: ubi hæc ad sententiam scribuntur."*

In the 2nd book, page 15, of the "Institutiones" of Annius, there is an account of six ancient marble slabs, with inscriptions which treat of the antiquities of Etruria. These, the author states, were dug

* Lib. xvii., Questio 40.

up out of the ground, and have reference to Viterbo, and its dependent towns and their divinities.

At page 17, same book, he states a most ancient inscribed stone was found in Vetulonia, with certain words setting forth the foundation of some Etruscan colonies by the Egyptian Hercules.

He states that, although the Etruscans held the Greeks in great abhorrence, they used their letters recording their antiquities. But dates of discovery and names of discoverers of those inscribed stones are not given; and all particulars as to the mode by which the long-lost writings of Berosus and Manetho came into his hands are eschewed.

But the concocter of fabulous histories has found an advocate in our own times. A French writer, well versed in ancient literature, connected with Celtic history and antiquities, Mons. D'Urbain, of the Celtic Academy of Paris, and other societies, in his "Histoire des Premiers Temps de la Gaule," &c.,* gives the entire text of the "Defloratio Berosi Chaldaica," and also a French translation of it. Mons. D'Urbain introduces the "Defloratio" with these observations: — "That which we have of the highest antiquity relating to the Celtes is found in the extracts from Berosus, published by Annius of Viterbo, which he had received from an Armenian priest, a native of a country where the work of this author, Berosus, might easily have been preserved. It appears that the extracts (from Berosus, as alleged) were composed by a Christian monk, *who, perhaps, had corrupted the text.* But it is at least certain, that this work is ancient, and I think I have proved this in the volume which I have published, under the title of Berosus and Annius of Viterbo, which forms the seventh of my collection on the history of the globe. As these extracts from Berosus contain, in some respects, the rudiments of our origin, it deserves a more profound examination than it has received. But before examining the authenticity of this work, now almost generally regarded as spurious, it is right it should be made known. It has never been translated in French. It is very short, and many chronologists have adopted the data which are given in it."

M. D'Urbain is evidently carried away by the erudition of Annius, and his profound acquaintance with the ancient history of the oriental nations and their European offshoots. But I think it is in the comments of Annius, and his several antiquarian writings bearing on the early history of Etruria, and not in the farrago of suppositious records, purporting to be Chaldaic, manufactured by Annius, entitled, "Defloratio Berosi Chaldaica," that the valuable matter which M. D'Urbain speaks of is to be found.

Throughout the "Institutiones" of Annius, whenever he wants to apply names of places or individuals which occur in the fragments ascribed to Berosus, to places or persons connected with Viterbo or

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* Paris, 1844, 12mo, pp. 72.

other Etrurian localities or historical persons, he has recourse to an inscribed stone dug out of the ground, and then he says the application is proved "inexpugnabile argumento."*

In a work of Antonio Augustinus, Archbishop of Tarragona, it is stated by the author that a certain learned person of Viterbo, worthy of credit, used, when speaking of Annius, to tell him (Antonio Augustinus) good humouredly ("solebat narrare jucunde") that he was charged with sculpturing the letters of an inscription which, by the orders of Annius, was buried in a vineyard not far from Viterbo, and dug up before witnesses, when *the sarcophagus* in which it was enclosed was taken to the senators of the city, and received with public honours; for Annius had taken care to make the city far more ancient than Rome, and dated its foundation from Isis and Osiris.†

On the other hand, in Touron's "Histoire des Hommes Illustres de l'Ordre de Saint Dominique" (tom. iii., p. 655, *et seq.*), there is an eulogistic memoir of Annius. Touron states that this learned member of his order died, it is said, by poison, in 1502, in Rome, in the office of Master of the Sacred Palace, Cæsar Borgia being suspected of having been his murderer. Touron makes mention of the several fragments of the lost writings of the ancients that he claimed the discovery of, besides those of Berosus and Manetho, namely, of Myrsylus of Lesbos, Cato, Sempronius, Archilochus, Zenophon, Metasthenes, Pictor, Philon, Frontinas, and a fragment of the "Itinerary" of Antoninus.

On many of these works, Touron adds, he wrote learned commentaries, especially concerning the first twenty-four kings of Spain, and declared that he had obtained several of the old MSS. from which he had taken the matter of his publications from Père Mathias, a Provincial of his order in Armenia, when the latter was passing through Genoa, and especially the manuscript of Berosus. Touron admits the manuscripts in question were spurious; but that Annius was guilty only of credulity, not of fraud, with respect to them. He relies chiefly on the defence of the Bishop of Guevara—a writer who, however, was one of the most celebrated literary impostors of his age—witness his "Life and Conversations of the Emperor Aurelian."

Touron insists that Annius's original of Berosus was a MS., not inscribed plates or stones, as others assert; and that the account of the Spanish writer, Antonio Augustinus, is on the authority of one Latinius of Viterbo, who said *that he had engraved the marbles* secretly with the inscriptions, and had concealed them after, by the directions of Annius, in a vineyard. This statement Touron calls a puerile story, for Latinius was born several years after Annius's death.

Whether the story of Latinius is puerile or not, the intrinsic evidence cannot be got over of imposture in the commentaries of Annius

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* *Vide* "Institutiones Annii," p. 25.

† Antonio Augustino—"Dialogus Antiquitatum Romanorum et Hispaniorum apud Vos. De His. Lat.," p. 610.

on the alleged fragments of Berosus and Manetho. The great mischief done by Annius to Spanish history, especially, was in destroying the authentic character of that portion of the early Spanish annals which might be worthy of some credit and authenticity, as brief though imperfect notices of early historical events and personages.

Those brief notices and data were woven by him into a regular system of chronology, making out of the mention of a few of the primitive sovereigns a complete series of kings in chronological order, from Tubal downwards to the fusion of the Iberian races in the nation of their Roman victors.

The Cavalier Don Joseph Pellicer was the first Spanish writer to expose effectually the imposture of Annius; and this task he effected very successfully in his work entitled "Beroso de Babilonia in Chaldea, distinguido del Beroso de Annio de Viterbo en Italia."

Pellicer observes that the true Berosus is thus made mention of by Eusebius in his "Evangelical Preparation:"—Berosus, the Babylonian, a priest of Belus, who flourished in the time of Alexander the Great, and dedicated to Antiochus the Third, the successor of Seleucus, the History of the Chaldeans, in three books; and who recorded the exploits of their kings, amongst whom he makes mention of one named Nabuchadonosor.

The works of Berosus exist no longer, except in fragments preserved in some ancient authors. His histories of the Babylonians of Chaldea, of the Medes and Persians, and of the Assyrians, as they are called, are referred to by Josephus, Athenæus, Tacianus, Clemens Alexandrinus, Polyhistor, and some early monkish writers.

There are numerous evidences of fraud, according to Pellicer, in the references of the Berosus of Annius to the Celts.

In the reign of the fourteenth Assyrian monarch, he says, the Celts of the country subsequently called Gaul were ruled over by Lugao; and at that time Celtica began to be called Lugdunense, and its inhabitants Ludovicos. The former name is feigned, and the latter is not Celtic, but German. Lugduno, or Lyons, was hardly known till the time of Augustus. The third European nation of the spurious Berosus is Kethim, as he calls Italy, the Ketim of Moses, which in the Scriptures is plainly described as being in Greece; and in the First Book of the Maccabees is said to be in Macedon, from which "land of Ketim Alexander marched to encounter Darius."

His fourth nation of the Tuyscones, or Germans, Annius evidently borrowed the name of from Tacitus, as, in his account of the manners of Germans, he makes mention of a people called Tuystanes. But in the time of Berosus, neither this name nor that of Germania was known. He describes a fifth *European nation*, but without giving its series of kings, that of Ionia in Greece. The true Ionia, says Pellicer, was in Asia Minor, in Caria of Æolia; it was not a kingdom, but a region divided into twelve remarkable cities. It was the colonies of this Ionia which were established in Peloponnesus, Attica, and Thebes, which pro-

duced great warriors and princes—the Battidas, amongst others, kings of Thera, whose monarch, Batto the First, Herodotus says, came to Tartessus in Spain, and founded also the kingdom and city of Cyrene, in Africa, which was governed 200 years by kings of his line.

The fabulous Berosus, continues Pellicer, in the third book of Annius, gives an account of the peopling of the world after the flood, the women of the sons of Noah being blessed continually with twins, and at each birth a male and female child being born. Noah was employed in writing books on sacred subjects, astrology, and other sciences. He abandoned his book to take on him the government of Italy, Ketim, where he died, and received divine honours after death. He was the first who planted the vine, and got drunk from the juice of it. Not a word of these details is to be found in the third book of the true Berosus.

Annius makes the Scythians the parent stock of the Armenians; he refers to the books of the Scythians, which were never heard of in any other book.

The real Berosus wrote in three books his Chaldaic Assyrian History. Annius of Viterbo made his Berosus the author of five books. In the first book of the fabulous Berosus the author gives an account of the deluge, and of Noah's preservation, and that of his three children, Shem, Ham, and Japhet, quite conformable to the Mosaic account. The true Berosus makes no mention of Noah and his children; he speaks of Xisuthro being preserved in a great inundation. Sanchoniathon makes no mention of a deluge, but Bishop Cumberland supposes Ouranus must be Noah.

Annius makes Berosus give a detailed series of the kings of four European nations—*the Celtiberi, the Celts, the Italians, and the Tuyscones.* By the nation of the Celtiberi is meant Spain, by which name it was unknown in any ancient work.

The fabulous Berosus describes the state of Scythism as one of barbarity, existing from the time of the deluge to the building of the Tower of Babel, and thence to the time of Seruch; from the latter period to that of Abraham, the state of society was that of Grecism, which was a state of erudite idolatry. Judaism then commenced, and merged in Christianity, in which was the state of regeneration St. Paul has referred to. His account of the origin of the Scythians is curious. After describing the first state of the human race to the period of the deluge:—"Previously (he says) there was no diversity of opinion, no discord among tribes, no man dreamt of heresy nor idolatry, each person lived after his own opinion; there was no established law; each was a law to himself, and lived in conformity with his reason; and this condition was called barbarism during the generation from Adam to Noah."

He then proceeds with the narrative of Noah's descent on Mount Lubar, or Ararat, in Armenia. "The people (he says) of the four first generations lived in barbarism, without impiety, however; but those of the next generation, under seventy-two princes and captains, betook

themselves to the plains of Senaar, which in former times was a region of Assyria, *where they undertook the building of the Tower of Babel, where the dispersion took place, and those who quitted that region for Europe and Asia began to be called Scythians.*" . . .

God divided them into people of different languages, making of one tongue seventy-two dialects, conformably to the number of captains or leaders of the nations, from which circumstance they were called Meropes, on account of the division of languages.

From the Ionian stock, says Annius, sprung Alcides, the Grecian Hercules, and the kings of Arcadia, a branch of which was the kings of Ætolia. But Ionia was never called a kingdom, as Annius makes his Berosus describe it, "as the fifth kingdom in Europe." But Annius never informs his readers what took the old Chaldean priest into these European countries, or what had their history to do with that of Assyria.

In the second book of the Berosus of Annius, the genealogies of Noah (*alias* Father Janus, *alias* Ogyges) and his descendants are treated of, and in this portion of his work the Sacred Scriptures are profaned, and very largely added to.

It would be needless to make further reference to the abundant proofs of the literary frauds of Annius of Viterbo, brought forward in the admirable work of Don Joseph Pellicer.*

There can now be no doubt of the imposture; but unfortunately the fraud was entirely successful for a long time, not only in Italy, but in Spain, and in the latter country especially, and the evidences of that success we have in nearly all the Spanish chronicles and histories of the sixteenth and part of the seventeenth centuries.

What is most worthy of observation in this performance of Annius of Viterbo is the extraordinary success of a literary imposture, the most singular on record—one that required more erudition and industry to accomplish than would have sufficed to make a man famous in any honest literary pursuit.

EXTENSIVE LITERARY FRAUDS AND FORGERIES OF DOCUMENTS PURPORTING TO BE ETRUSCAN. BY CURZIO INGHIRAMIO.

Curzia Inghiramio, an antiquary of some erudition and great enthusiasm in all matters connected with Etruscan remains and historical notices of that ancient country, was born at Volterra, in 1614, and died in 1655. His unenviable fame rests on a work of extraordinary labour and extensive reading, entitled "*Ethruscarum Antiquarum Fragmenta, quibus urbis Romæ aliorumque gentium primordia mores et res gestæ indicantur:*" Francofurti, 1637, in folio.

This work must have cost the author enormous labour, and an enormous outlay.

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* "Beroso de Babilonio in Chaldea distinguido del Beroso de Annio de Viterbo in Italia. Par Don Josefo de Pellicer."

The inscriptions alleged to be Etruscan are very numerous, and a vast number of considerable length, *fac similes* of the pretended Etruscan writings. In a typographical point of view, the work is of much interest, for a very large portion of it may be said to consist of block-engraved printing. The falsity of those records has been clearly demonstrated, and Inghiramio figures in the category of literary impostors. Had they been authentic, all received ideas as to the origin and early history of Rome would have been entirely changed.

FORGED PREDICTIONS AND REMARKABLE LITERARY FRAUDS CONNECTED WITH THE DISCOVERY OF THE REMAINS OF ST. CATHALDUS.

St. Cataldus, or Cathaldus, of whom mention is made by Irish as well as Italian historians, was celebrated for his learning and piety on the continent; he was born in Munster, was Bishop of Ratheny, and afterwards of Tarento, in Italy. Archbishop Ussher had the trouble of rescuing him from Dempster's Catalogue of Scotch Saints. He flourished, his biographer states, late in the second or early in the third century; but, MacGeoghegan says, more probably in the seventh century.

There is a very singular account given by Alexander ab Alexandro,* of an alleged apparition of St. Cataldus, nearly 1000 years after his death, and of a prediction of his, foretelling the devastations of Naples, which was literally accomplished.

This alleged prediction is the subject of much curious literary controversy, and of an elaborate article in Bayle's Historical Dictionary. A passage is cited in it from a work of the celebrated Jovian Pontanus, intended to show that the alleged apparition, and prediction written on leaden plates, were pious frauds. If it were so, it was as egregious an imposture as the similar scientific one of the friar, Annius of Viterbo, in the fifteenth century, who published a work which he ascribed to Berosus the Chaldean, that was likewise stated to have been found written on inscribed plates. Alexander's account is to the following effect:—"About 1000 years after the death of St. Cataldus, he appeared to a priest in Naples, and told him to go dig up a book he had composed and hid in a certain place, which, when found, was to be carried immediately to the King of Naples, for it was a work which contained the secrets of heaven."

The priest averred the apparition was repeated several times, and, having paid little attention to it, the order was not obeyed. At length St. Cataldus appeared to him in church, dressed in his episcopal garb, and commanded obedience to his orders, on pain of grievous punishment. The priest went next day, in procession with the people, to the place indicated, the ruins of an old church, where, on digging under one of the walls, a box was found, and certain plates of lead with writing

* "Genialium Dierum," ed. 1696, lib. iii., p. 137.

on them containing predictions of fearful impending evils on the kingdom of Naples. Bayle says there was a clause, according to some, to this effect—"Unless the king obeyed the injunctions of St. Cataldus," &c., which clause he, Bayle, considers a proof of fraud.

Philip de Comines, referring to this subject, says:—"A writing was found, as those about the king assured me, on throwing down a chapel, with the words, 'Truth, with its secret counsel,' professing to tell him of all the evils which were to befall him. Three persons only had seen it, and he (the king) threw it into the fire."

Pontanus Jovianus* states that the priest who figured in this business was a Spanish friar—ill-instructed, but bold in the pulpit, and a pretender to celestial communications. He had endeavoured, ineffectually, to induce Ferdinand to banish the Jews out of Naples, and then adopted the plan in question to work on his fears. He engraved some words on a leaden plate, which he made St. Cataldus author of, and buried it; and after three years, having suborned a priest to pretend to a communication with the saint, caused it to be dug up. The words were enigmatical, and pointed to the extirpation of Judaism; but the king was enjoined not to read the writing except with the assistance of a very virtuous servant. The king, suspecting the cheat, did not employ the monk to decipher it; the latter was incensed, and raised a clamour which spread all over the states of Italy.

Goulart, in his edition of the works of Camerarius,† gives forty-two French verses, purporting to be a translation of the prophecy of Cataldus, wherein the French poet makes the saint, who menaced Ferdinand with such awful evils, promise some future king of France all kinds of blessings.

Anthony Caraccioli published a chronology, in which he says the plates were dug out of the ground in 1494, in which the sudden death of the king was spoken of, and that the king soon after died. Ferdinand certainly died that year; but other writers state the digging up of the leaden box took place in 1492; at all events, the evils foretold in the writings did occur, and the death also within a period of two years. (See Vossius, "De Historicis Latinis," lib. ii., p. 609.)

The question of the truth or falsehood of this prediction is not put by Bayle fairly before his readers—the first question is of the two contemporary writers who treat of this affair, Alexander and Pontanus, which of these writers is entitled to the most credit? Alexander was a celebrated Neapolitan jurisconsult, who died in 1523. Pontanus was a celebrated scholar, an astronomer, astrologer, a poet, and historian. Erasmus describes him as equal to Cicero in the elegance and dignity of his style; he died in 1503.

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* "Jovianus Pont. De Sermone," lib. ii., cap. ult., p. 623, ap. Bayle, art. Cataldus.

† "Hist. Camerarii," p. 48, ap. Bayle, art. Cataldus.

THE LITERARY FRAUD AND FORGERY OF DOCUMENTS PURPORTING TO BE THE ECCLESIASTICAL ANNALS OF THE SPANISH CHURCH OF THE FOURTH CENTURY, ASCRIBED BY FATHER HIGUERA TO FLAVIUS LUCIUS DEXTER, A COTEMPORARY AND FRIEND OF ST. JEROME.

The grand literary forgery of Spanish erudite impostors, of an ecclesiastical kind, is coupled with the name of Father Higuera of Toledo, a friend of the celebrated and eminent historian Mariana. A collection of fragments of ecclesiastical Spanish history, said to have been written by Flavius Lucius Dexter, a Christian friend of St. Jerome, of the fourth century, was first published by Father Higuera, in 1610, and these documents were said to have come from the monastery of Fulda, near Worms, in 1594.

The first formally defended promulgation of the "fabulous histories" ascribed to Flavius Lucius Dexter, in a work (small 4to, printed in Madrid, in 1624), was entitled "Flavio Lucio Dextro, Caballero Espanol de Barcelona, Prefecto, Pretorio De Oriente Governador de Toledo Par los Anos del Senor de 400, Defendido por Don Thomas Tamaio de Vargas." In this volume not only F. L. Dexter is made to introduce into Spain St. James, but also Sts. Peter and Paul.

In the course of forty-five years these "fabulosas historias" had gained not only an immense popularity, but a vast extension of details and commentaries on them.

Perhaps the greatest body of literary falsifications and fabrications of documents purporting to be historical that was ever put together, though not so erudite an imposture as that of Joannes Annius de Viterbo, is that which is to be found in the four 4to volumes of the work entitled "Poplacion Ecclesiastica de Espana y Noticia de sus Primeras honras Hallado en los Escritos de Hauberto, Monge de san Benito (tom. i., ii.), el Chronicon de Flavio Lucio Dextro (tom. iii.), Los Escritos de Marco Maximo Obispo de Zaragoça y el Chronicon de Liberato Abad." (tom. iv.).

This ponderous compound of literary forgeries and ecclesiastical frauds was edited, and some portion, in all probability, if not manufactured as well as commented and eulogized by a learned Benedictine monk, chronicler of his order, El Maestro Fray Gregorio de Argaiz, was published in Madrid, in 1669. These pretended ancient chronicles have been, however, denounced as "fabulous histories," not only by the most learned critical men, such as Antonio Augustinus, but also by most competent authorities of the Church of Rome. And yet these forgeries have had an astonishing success up to the end of the seventeenth century. The catalogues of Spanish martyrs, and Spanish bishops of the different sees, found in them, have been received and dealt with as genuine documents, in most of the several chronicles and histories of the latter part of the sixteenth century.

And, what is still more surprising, the extensive work of Argaiz (in my possession), in which all these fictions, frauds, and forgeries, are

embodied, is dedicated "To The Sovereign Majesty of God: To The Uncreated Eternal Wisdom: To The Ineffable and Divine Love and Grace: To The Origin of all Felicity: To The Substance and Existence of all Visible and Invisible Beauty: To The centre and Recreation of Souls in the Glorious Throne of His own Being: To whom all Benediction and Enlightenment be attributed, the Wisdom, Honour, and Virtue, and eternal fount of Grace."

Other frauds connected with those forgeries are noticed by Ticknor in his "History of Spanish Literature." "The Granada forgeries of ecclesiastical records," he tells us, "were connected with certain metallic plates, sometimes called 'The Leaden Books,' which, having been prepared and buried for the purpose several years before, were disinterred near Granada between 1588 and 1595, and, when deciphered, seemed to offer materials for establishing the great corner stone of Spanish ecclesiastical history, the coming to Spain of the Apostle St. James, the patron saint of the country. This gross forgery was received for authentic history by Philip II., Philip III., and Philip IV., each of whom, in a council of state, consisting of the principal personages of the kingdom, solemnly adjudged it to be true. The question, however, was in due time settled at Rome; and the forged inscriptions were believed by the highest tribunal of the Church to be false and forged, in which decision Spain soon acquiesced."

"Another fraud (he adds) was connected with this one of the 'Leaden Books,' whose authority it was alleged to confirm, but was much broader and bolder in its claims and character. It consisted of a series of fragments of chronicles circulated earlier in manuscript, but first printed in 1610, and then represented to have come, in 1594, from the monastery of Fulda, near Worms, to Father Higuera, of Toledo, a Jesuit, and a personal acquaintance of Mariana. They purported on their face to have been written by Flavius Lucius Dexter, Marcus Maximus, Heleca, and other primitive Christians, and contained important and wholly new statements touching the early civil and ecclesiastical history of Spain. They were, no doubt, an imitation of the forgeries of John of Viterbo, given to the world about a century before, as the works of Berosus, and Manetho; but the Spanish forgeries were prepared with more learning, and a nicer ingenuity. Flattering fictions were fitted to recognised facts, as they both rested on the same authority; new saints were given to churches that were not well provided in this department of their hagiology; a dignified origin was given to noble families that had before been unable to boast of their founders; and a multitude of Christian conquests and achievements were hinted at, or recorded, that gratified the pride of the whole nation, the more because they had never till then been heard of. Few doubted what it was so agreeable to all to believe. Sandoval, Tamayo de Vargas, Lorenzo Ramirez de Prado, and for a time Nicholas Antonio—all learned men—were persuaded that these summaries of chronicles, or *chronicones*, as they were called, were authentic; and if Arias Montano, the editor of the Polyglott; Mariana, the historian; and Antonio Augustin, the cautious and critical friend of

Zjurita, held an opposite faith, they did not think it worth while openly to avow it. The current of opinion, in fact, ran strongly in favour of the forgeries; and they were generally regarded as true history till about 1656, or a little later, and therefore till long after the death of their real author, Father Higuera, which happened in 1624. The discussion about them, however, which is evident was going on during much of this time, was useful. Doubts were multiplied; the disbelief in their genuineness, which had been expressed to Higuera himself, as early as 1595, by the modest and learned Juan Bautista Perez, Bishop of Segorbe, gradually gained ground. Writers of history grew cautious; and at last, in 1652, Nicolas Antonio began his 'Historias Fabulosas,' a huge folio, which he left unfinished at his death, and which was not printed till long afterwards, but which, with its cumbrous, though clear-sighted learning, left no doubt as to the nature and extent of the fraud of Father Higuera, and made his case a teaching to all future Spanish historians, that does not seem to have been lost on them. See the Chronicle of Dexter, at the end of Nicolo Antonio's 'Bibliotheca Vetus,' the 'Historias Fabulosas' of Antonio, with the life of its author prefixed by Mayans y Siscar (Madrid, 1742, folio), to show the grossness of the whole imposture; and the 'Chronica Universal' of Alonso Maldonado (Madrid, 1624, folio), to show how implicitly it was then believed and followed by learned men. The man of learning who was the most clear-sighted about the 'Leaden Books' and the *chronicones*, and who behaved with most courage in relation to them from the first, was, I suppose, the Bishop of Segorbe, who is noticed in Villanueva, 'Viage Literario à los Iglesias de Espana.' (Madrid, 1804, 8vo, tom. iii., p. 166); together with the document (pp. 259, 278), in which he exposes the whole fraud, but which was never before published."*

"The Leaden Books of Grenada," and the "Chronicones" of Father Higuera, were deliberately fabricated with a view to the introduction of false records of events in connexion with the early Spanish Church, tending to flatter national pride and to exalt the character of the Spanish hierarchy, into the ecclesiastical history of the kingdom. These pious literary frauds and forgeries were at the height of their success from the beginning of the sixteenth to the middle of the seventeenth century.

The coming into Spain of St. James the Apostle, and his becoming the founder and patron of the Spanish Church, crept from them into all the cotemporary Spanish chronicles and ecclesiastical histories and annals.

FABULOSAS HISTORIAS NOT SOLELY PRODUCTS OF FORMER TIMES AND OF FORMER AGES.

The alleged apostleship of St. James in Spain was of a much earlier origin than the pious frauds of Higuera. Whoever takes the trouble of

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* Ticknor, "Hist. of Span. Lit.:" Lond., 1849, vol. iii., 140, 141.

referring to Ussher's "Antiquitates Ecclesiæ Britannicarum Ecclesiarum" 4to, January, 1687, p. 13, will find the particulars given of a great controversy at the Council of Constance in 1417, between the *oratores* of the sovereigns of England and Spain for precedence having been carried on; and the main argument of the English *orator* or ambassador was the greater dignity of the English Church, on account of the earlier apostleship of Joseph of Arimathea claimed for England, as prior to that of St. James claimed for the Spanish Church by the Spanish ambassador.

The foundation of both claims rested, no doubt, on very untenable arguments and unreliable evidence; and eventually we find by the report of a renewal of this controversy concerning precedence between the French and English representatives of the English *orator* or ambassador in the same council, which is to be found in Hardt's "Magnum Œcumenicum Constantiniense Concilium de Universali Ecclesiæ Reformatione unione et fide" (in vi. tom. fol. Helmstadt, 1700), that the ultimate decision in favour of the English claim to a place in the council as a separate nation was quite irrespective of the traditionary apostleships of Joseph of Arimathea in England, and of St. James in Spain. The decision was mainly on the grounds of the connexion then existing of England with Ireland, the latter country being acknowledged as one of the four Christian Churches of the highest antiquity of origin, the first being that of Rome, the second that of Constantinople, the third that of Ireland, the fourth that of Spain. See also Ussher's "Religion of the Ancient Irish," cap. ult., p. 95.

L'Enfant, in his "Histoire du Concile de Constance," 4to, 1727, tome ii. p. 37, tells us that "Sir Robert Wyngfield, ambassador of the King of England at the court of the Emperor Maximilian, found in Constance the original pieces of this process of the renewed controversy of the ambassadors of the King of England with those of France, for precedence at the Council of Constance, in 1417, about the beginning of the sixteenth century, and caused it to be printed at Louvain, in 1517; but the printed document was full of faults. Von der Hardt, having fortunately found a more correct copy of the MS. in the public library at Leipsic, published it in the 5th vol. of his collection of documents relating to this council."

I have been fortunate enough to find this rare and valuable work in the Library of Trinity College, Dublin. The account of this controversy is in the 5th vol., and commences at page 99. It is headed—"*Anglorum Vindiciæ contra Gallos pro jure nationis ex antiquissimo codice Academiæ Lipsiensis.*"

In the reply of the English orators before the council to the objections of the French, it was clearly shown that, according to the ancient division of Europe into four nations, Ireland being one of the four recognised nations, the right claimed for England in virtue of the connexion then existing of Ireland with that country was placed beyond dispute. And this argument prevailed:—

"Satis etiam constat secundum Albertum Magnum et Bartholomæum

(Glanville) De Proprietatibus Rerum quod toto mundo in tres partes diviso, viz., Asiam, Africam et Europam.

"Europa in quatuor dividatur regna: primum, viz., Romanum; secundum Constantinopolitanum; tertium ipsius regnum Hiberniæ, quod jam translatum est in Anglicos; et quartum regnum Hispaniæ; ex quo patet quod Rex Angliæ et regnum suum sunt de eminentioribus et antiquioribus regibus regnos totius Europæ; quam prærogativum regnum Franciæ infertur (non fertur) obtineri." (See tom. v., p. 99.)

The Council decided that England, in accordance with this view, "*De antiqua divisione Europæ in quatuor regna*,—merito debeat representare et habere in concilio generali tantæ auctoritatis vocem sicut quævis alia natio." (See Von Hardt. Collect., tom. v., p. 101.)

Another document, to the like effect, is likewise given by Von Hardt, entitled "*Advisamente ex codice MS. recensione Robert Wingfield de commoda divisione orbis Christiani in concilium 2dum Constantiniensis quatuor terræ plagæ.*" (*Vide* Von Hardt. Collect., tom. v., p. 102.) Of this singular controversy I have elsewhere treated extensively.

The importance attached to the claim set up in the Council of Constance, by the Spaniards, in 1417, for the apostleship of St. James, we see plainly upwards of a century later exhibited in the forgery of Father Higuera, for the establishment "of that great corner stone of Spanish ecclesiastical history, the coming of St. James the Apostle into Spain."

But we need not travel out of our own dominions for "fabulous histories;" we will find a very remarkable one of this class of fictions that has a curious reference to the alleged Spanish migration of the sons of Milesius into Ireland* in our statute book. The one I refer to I think it right to give *in extenso*, and in the exact words of the original, from an official work, in black letter (in my possession), the authenticity of which cannot be called in question, entitled—"*A Collection of all the Statutes now in use, to the Reign of King William and Queen Mary of ever blessed memory*," &c.

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* Dr. Lynch, in his "Cambrensis Eversus" (vol. i., p 421, edited and translated by the Rev. M. Kelly), informs his readers that the above-mentioned event occurred before the Christian era 1015 years:—"In the year of the world 3500, and 1250 years after the Deluge," he observes, "the sons of Mileadh obtained possession of the kingdom of Ireland after the destruction of the power of the Tuatha de Danaans. Eiber, as being the eldest son, was appointed king, with his brother Evreamon as colleague in the throne."

In a note to the above passage, the editor observes—"Dr. Lynch, on the authority of the Four Masters and a few other writers, adopts the chronology of the Septuagint, allowing 5199 from the creation to the birth of Christ."

Lynch's chronological list of Irish kings is mainly constructed on the chronological series of Tighernach, one of the best reputed of the ancient Irish annalists; and it is well to bear in mind that, with all the materials of Irish history before him, this eminent annalist had said, upwards of 800 years ago, as the editor of "Cambrensis Eversus" observes, "that all the monuments of the Scots (the Irish) previous to the reign of Cimboath (before the Christian era 305 years) were uncertain."

"*Cum gratia et privilegio Regiæ Majestatis.*" (Fol. Dub.: Crook, King's Printer, 1723.)

At page 171 we find an act of parliament of Queen Elizabeth, in the eleventh year of her reign, cap. i., passed in Dublin, entitled—"An act for the attainder of Shane O'Neill, and the extinguishment of the name of O'Neill, and the entitling of the Queen's Majesty, her heyres and successours, to the countrey of Tyrone, and to other countries and territories in Ulster:

"And now, dear soveraigne ladye, least that any which list not to seek and learn the truth might be ledde eyther by his own fantasticall imagination, or by the sinister suggestion of others, to thinke that the strene or line of the O'Neiles should or ought, by prioritie or title, to hold and possesse anie part of the dominion or territories of Ulster, before your majestie, your heyres and successours, we, your Grace's said faithfull and obedient subjects, for avoyding of all such scruple, doubt, and erroneous conceit, doe entend here (pardon first craved of your majestie for our tedious boldnesse) to disclose unto your Highnesse, your auncient and sundry strong authentique titles conveyed farre beyond the sayde lynage of the O'Neyles and all other of the Irishrie to the dignitie, state, title, and possession of this, your realme of Ireland. And therefore it may like your most excellent Majestie to be advertised that the ancient chronicles of this realme, written both in the Latine, English and Irish tongues, alledge sundry and auncient titles for the Kings of England to this land of Ireland. And first, that at the beginning, afore the coming of Irishmen into the said land, they were dwelling in a province of Spain, the which is called Biscay, whereof Bayon was a member, the chiefe city. And that at the said Irishmen's coming into Ireland, one King Gurmonde, sonne to the noble King Belin, King of Great Britaine, which is now called England, was Lord of Bayon, as many of his successours were, to the time of King Henry II., first conqueror of this realme; and therefore, the Irishmen should be the King of England his people, and Ireland his land. [*Sic* in original.] Another title is that at the same time that Irishmen came out of Biscay, as exiled persons, in thirtie ships, they met with the same King Gurmond upon the sea, at the yles of Arcades, then coming from Denmark, with great victory, their captains, called Hiberus and Hermon, went to the King, and him tolde the cause of their comming out of Biscay, and him prayed with great instance that he would grant unto them that they might inhabit some land in the West. The King at the last, by advise of his council, granted unto them Ireland to inhabit, and assigned unto them guides for the sea, to bring them thither, and therefore they should and ought to be the King of Englands men."

So, we find, all the Historias Fabulosas were not of foreign nations of former times. The original fiction above referred to is to be found in Polydore Virgil's "History of England," lib. v., and in Cambrensis also. Of the reference by the latter to King Gurgundius (the Gurmonde of the act), Keating says, "The Milesians were in Ireland 900 years before Gurgundius became King of Britain."

In our own times, too, we have the same monomania as that of John Annius de Viterbo and Father Higuera forcing itself obtrusively on public attention, and manifesting openly and shamelessly the same perversion of moral feeling, the same utter unconsciousness of all difference and distinction between truth and falsehood. We have all the ancient devices of literary impostors imitated by modern ones. We have the fabrication in America within the last quarter of a century, of "The Book of Mormon," by Mr. Joseph Smith; and we have the concoction of literary frauds in Ireland within the same period, by another monomaniac, half lunatic, half knave, Mr. Roger O'Connor, in "The Chronicles of Eri."

We have the still later impudent forgeries of prophecies ascribed to Columbkille—adapted to the political circumstances of our own times, and the agencies of the leading actors in them. To be enabled to expose these scandalous impostures in the pages of a periodical of this city, in 1858, I was indebted to the invaluable aid of the late John O'Donovan, whose generous services were ever readily and gratuitously given for any similar legitimate object.

At the close of the last century, we had Chatterton, whose name can never be recalled without feelings of emotion very different from those which are excited by recollections of any others of those concocters of literary frauds I have referred to. In the early part of this century we have the younger Ireland and his laborious literary frauds; but these must be classed in a different order from those ancient ones I have dealt with—they were perpetrated evidently for gain, and the perpetrators were sane enough to pursue their unscrupulous occupations successfully for some time.

It is impossible, however, to doubt the insanity of the class of impostors I have referred to in the preceding pages. I by no means desire to be understood as being of opinion that persons of a low order of intellect, and destitute of moral principles, giving themselves up to lying habitually for the pleasure of lying, or the object merely of falsification of facts, with a view to the embellishment of the circumstances that surround them, for the sake of notoriety or of some unfair advantage, are necessarily monomaniacs. My wish is to express the strong conviction on my mind that men of considerable abilities and acquirements, who make forgery and falsehood the great business and labour of their lives, not for the sake of pecuniary gain—not for the accomplishment of any political purpose or ambitious project—but for the gratification of morbid feelings of pride and vain-glory—that seek no better triumph than over truth, and no greater achievement than an imposture by which considerable numbers of intelligent and erudite people are deceived—labour under that form of insanity which is called monomania.

MONDAY, JUNE 22, 1863.

The Very Rev. Charles Graves, D. D., President, in the Chair.

His Royal Highness the Prince of Wales was elected an Honorary Member of the Academy.

R. R. Madden, M. D., read the following paper:—

References in Spanish History to Migrations from Spain into Ireland.

An opinion has long had possession of my mind that Irish archæologists were interested in the antiquarian lore of Spain and Portugal, and that it was very desirable to become well acquainted with that literature, with the view of throwing light on the early colonies which came to Ireland from Spain, or from countries whose people were of a cognate race, at early periods not well defined.

A residence of many years in the Spanish and Portuguese dominions has made me somewhat familiar with Spanish literature; and during that residence I turned my knowledge of the Spanish and Portuguese languages to the account of Irish antiquarian interests, to the best of my ability, by collecting all the old chronicles and histories of Spain and Portugal in which mention is made of migrations to Ireland from those countries, and extracting those references with a view to giving publicity to them.

Spanish history is certainly calculated to throw some light, not only on the origin, language, customs, and social state of the early inhabitants of Ireland, but also to afford some knowledge of the people of those countries from which at an early period there were migrations into Ireland. I am of opinion that archæology has been retarded in its progress by the tendency of those who pursue it to narrow too much the sphere of their researches, and to confine their inquiries to subjects which are connected solely with the monuments or antiquities of their own land, to the exclusion of those countries which they have reason to believe were connected at some early period with their own.

It seems to me that persons of all countries, engaged in antiquarian pursuits, would render them more advantageous to the archæology of each nation, if a more comprehensive spirit prevailed in the prosecution of them. This was evidently the opinion of one of the most enlightened English archæologists of his day—a man of truly liberal and enlarged views, and of a lucid and comprehensive mind—the late Mr. J. M. Kemble. At a meeting of the Royal Irish Academy, February 9, 1857, Mr. Kemble delivered an address on the prosecution of antiquarian researches and their results in various European countries, from which the following passages are taken:—

"Now, gentlemen, let us, with the full spirit of enlightened patriotism, devote ourselves to the illustration of our own antiquities; let us love them, and, loving them, labour to bring them to light; but let us not believe that they are all we have to learn, or that they convey all that can be taught. Let us look upon them only as links in one great chain, which embraces many nations and many periods of human culture—which has no place of its own, unless considered in co-ordination with other links in a still greater chain, but the full elaboration of which is necessary, before its cosmic relation can be well and thoroughly comprehended. Let us be sure that we are not exclusive, but comprehensive, in what we do; let us, above all things, never lose sight of this great truth, that the interests of man have at all times led to a close communion between the several divisions of his race; that nothing can be dissociated in the study of archæology."

In a preceding paper, I have noticed fabulous histories of celebrity of the sixteenth and seventeenth centuries; and one of them, especially, earliest in point of time of appearance, of greatest notoriety, and most pernicious influence over Spanish literature of an historical kind—the work of John Annius de Viterbo, a learned member of the Dominican order, of the early part of the sixteenth century. In that paper it was shown, that in the fabulous historical fragments of that writer, purporting to be the productions of Berosus and Manetho, long lists of early Spanish sovereigns, beginning with Tubal, and brought down in regular chronological order for several centuries, are to be found; and that they have been adopted generally by the historical writers of Spain and Portugal of the same century, and to nearly the end of the succeeding one.

It must be observed that the starting point of all colonization in Spain and Portugal, in Spanish and Portuguese history, is the confusion of tongues, and the dispersion of the sons of Noah, at Sennaar.

Antediluvian migrations from Spain to Ireland are not to be found noticed in Spanish chronicles; but, unfortunately, some scanty records of them have been discovered by O'Flaherty in ancient Irish annals, and the most that could be made of them by the latter has been done in the "Ogygia," in a notice of certain Spanish fishermen, named Cappa, Lagne, and Luasat, driven from the coast of Spain in tempestuous weather on the coast of Ireland. See chap. i., vol. ii., p. 2.

"I do not pledge myself," says O'Flaherty, "to inform you how the history of them has been recorded and transmitted to posterity. This only I affirm, that the antiquities and primitive archives of other countries have not been supported by a stronger or more permanent basis; which antiquities are still handed down to us with an air of probability by their respective historians . . .

"Therefore, according to the most ancient histories of Ireland, Cappa, Lagne, and Luasat, three fishermen, being driven by adverse winds from Spain to Ireland, landed at the mouth of the River Muad. They were afterwards overwhelmed in the Deluge at Tuathinbhir. And forty days before the Flood, on the 15th of the moon, being the sabbath, Cæsarea, Baronna, and Balba, with fifty women and children, Bith, Ladra, and

Fintan, put in at Dun-nambarc.* The mountain of Sliawbeatha, in Ulster, was called after Bith, Ardladram, in the county of Wexford, was denominated after Ladra; Fintan gave the name Feartfintain to his burial place at Tultuinne; and Cuil Keasrach and Carn Keasrach, in Connaught, obtained their names from Cæsarea. Knockmèa, a hill in the barony of Clare, and county of Galway, is thought to be this Carn Keasrach, and near it is the Cuil Keasrach, above mentioned.†

REFERENCES TO IRELAND IN SPANISH CHRONICLES.

Florian D'Ocampo's "Cronica General de Espana," 4to, Alcala, 1578.—Of post-diluvian migrations from Spain into Ireland, we have several accounts and references in Spanish chronicles. The most important of them is that which is to be found in the work of great labour and research, of Florian D'Ocampo, in his work, "Cronica General de Espana."

This volume contains all that was written by D'Ocampo of his projected general History of Spain, which Vaseus tells us was intended to have been comprised in four volumes. The author, however, completed only one volume, and the work was continued and completed by Morales. D'Ocampo was a native of Zamora, a disciple of the celebrated Nebrija. He is said to have ransacked all the ancient convents and libraries of Spain for his materials. The title of historiographer of Charles V. was conferred on him for his great merits as an historical archæologist. Morales, Vaseus, Matamorus, and the celebrated Nicolas Antonio, greatly commend him for his erudition and research. Resendius and Mariana depreciate him, the latter virulently and unjustly. He died in 1590. The great calamity that has befallen his chronicle, that which has been the bane of nearly all the Spanish annals and histories of the sixteenth century, is the introduction into it of the fabulous chronological data fabricated by Annius de Viterbo.

But this subject of the fabulous chronologies of Spanish chronicles, derived from the work of Annius and Higuera, do not affect the authenticity of their own old genuine records and well-established traditions. We may safely get rid of all the rubbish about Tubal and his descendants, the African tyrants and giants, the Geriones and Hercules and his labours, but remain satisfied that there is some truth, nay, a great deal, in the statements that are to be found in old Spanish chronicles, to the effect that, subsequently to a great drought and dearth which prevailed all over Spain for twenty-six years, as it is asserted, there was a migration from Gallicia and the northern shore of Spain to Ireland, at a very early period. In various Spanish chronicles and histories of the sixteenth and seventeenth centuries, references are to be found to such

* "A dunum, or fortified position for small vessels, which Cambrensis calls the shore of small ships, in Corcodubuia, in the west of Munster."

† "Ogygia," part III., ch. i., p. 3.

migrations from Spain into Ireland, and especially to one migration from the western coast of Spain to Ireland, which was subsequent to that great drought above referred to. These references in Spanish history have a very important bearing on our Irish annals, in relation to the Spanish colony absurdly called Milesian, which Heber and Heremon are said to have established in Ireland.

It must be borne in mind that Florian D'Ocampo generally adopts the chronology of the spurious Berosus, or rather of Annius de Viterbo, in his references to early events in Spanish history. The dates of those references, therefore, cannot always be depended on.

In the first book, at page 20, of the "Cronica General de España," Florian D'Ocampo, referring to the time of the Spanish ruler, Brigo, says:—

"Others certify, moreover, that this Brigo of Spain placed inhabitants on a great island which is now called Yrlanda, and of old was named Ybernia, and had also another name, Yerna, near to England, which island of Yrlanda was not only peopled but ruled over by Brigo; and those who came to the place after their arrival there were called Brigantes, and a principal river that run through that place was called Brigo. I remember that, having been driven by stress of weather on that coast of Yrlanda, and having landed in a city of that island named *Catafurda* (in all probability, Waterford), the inhabitants of the city, with others who came from the interior, manifested much pleasure at meeting us, and took us by the hand in token of welcome, telling us that they descended from Spanish ancestors, which intelligence seemed new to me, but afterwards I remembered, in conformity with what they said to me; I had read in the chronicles and commentaries of Joannes Annius de Viterbo, that when the Arabs and African Moors had got possession of Spain, in the time of Don Rodrigo, King of the Goths, many Spaniards had abandoned their country, flying to various parts of the world—many had gone to Greece, France, and Germany, seeking succour which none gave them; and some of them had betaken themselves to that island of Yrlanda, as we shall set forth in the third volume of this history; and, although some may have returned to Spain, probably many remained there, and mingled with the natives, while the persecution of the Moors endured. From which results the relationship between the *Yrlandescos* and the *Espanolas*. There is a tradition in connexion with this relationship preserved from father to son, that in the most ancient times a certain Spanish personage named Yberno or Hierno (Heber or Heremon, sons of Milidth?), who dwelt on the coast on the fourth side of Spain (*quarto ladode Espana*), who, being embarked on the sea, was overtaken by a violent gale of wind which he could not resist, and was carried with other companions of his to that island above mentioned (then depopulated), in three days only of navigation. There his ship being broken to pieces by the late tempest, he (Yberno) landed with his companions, and also some women they had brought over with them. And on account of that Spanish Hierno or Yberno, it is asserted, the name was first given to that island of Hierna or Yberno, which afterwards the na-

tives, in their language, gave the name to of Yrlanda. So that by these means the relationship between the Ybernans and the Spaniards may have arisen and been continued, which the *Yrlandescos* so much prized, as has been previously stated, and will be further referred to in the eighth chapter of the third book. These *Yrlandescos* at this time (1578) are of a very humble condition, badly treated and circumstanced, *for the earth has no fertility whatever*. The most of them live in the country, without other substance or riches except their wives and children; and yet, notwithstanding all their privations, there are persons of distinction amongst them, whom they look on with veneration as superiors, so that in no corner of the world are we not sure to find vain-glory more or less. They breed a race of dogs of a very good kind, Irish greyhounds (*Lebretes*), with which they kill many cows and many mountain animals, and other kinds of game which abound throughout the country. Very few people dwell in towns and villages, for all live scattered among the mountains in miserable huts and cabins. But there are some living on the coast, where there is some trade carried on by Englishmen, who maintain their intelligence and manners. For all these causes, as I have said, it may well have happened that these *Yrlandescos*, who are so much separated from other nations, may have heard from their forefathers of their ancient lineage and descent from the Spaniards, tracing the same from the times of the alleged King Brigo, and at a later period from the Spaniards who came into Ireland during the persecution of the Moors in Spain, of which traditions we in Spain have preserved no other particulars of the times of this King Brigo, on account of the many revolutions which have taken place in this land in past times, in which perished the records of our ancient chronicles, so that we scarcely know more of these times than that which other nations have left written about us."*

It is hardly necessary to say that the principal Spanish migrations into Ireland were long prior to our era.

Florian D'Ocampo begins his second book of the "Cronica General de Espana" with an account of the great drought of twenty-six years—"*La Gran Sequedal*"—which all the Spanish chronicles, he says, assert, "caused the greater part of Spain to be depopulated" by reason of the dearth, famine, and disease which were the results of it.

"The Spanish chronicles," says D'Ocampo, "which I necessarily follow, do not specify in what time the great drought took place; for, with respect to all historical occurrences in their annals, they fail to state the times of those ancient events which they record, from which omission no slight labour is occasioned to me, to be enabled to discover and assign those data, which all good authors, Greek and Latin, look upon as the life and soul of history. But, however that may be, it is certain that the period when the great drought commenced was about 1030 years before our era; and that it was only at the expiration of

* Florian D'Ocampo, p. 20.

twenty-six years this scourge endured, that our forefathers, who had fled from the country, returned to it."*

It would appear, in this instance, that D'Ocampo was not indebted to Annius de Viterbo for the date assigned to the commencement of the great drought.

The 2nd chapter of the 4th book of D'Ocampo's "General History," is taken up principally with "an account of certain natives of Spain, called Siloros (the Siluri), a Biscayan tribe speaking the Biscayan language, joined with another, named Brigantes, who, having migrated to Britain (about 265 years before our era), obtained possession of territory there, where they settled, and they and their descendants were permanently established."†

But, long previously to this expedition, D'Ocampo tells us, "there were Spanish Brigantes established in Bristol and Wales." But, "of these Brigantes," he observes, "we neither know the time, nor the cause, nor the means of their migration into Britain. Solely we know it has been affirmed that by them, and also the Siloros above mentioned, after having long been settled, and greatly augmented in Britain, they dispatched numbers of their people into Yrlanda, by whom that island was populated; and that the tradition of this migration endures to this day amongst them, and that they publicly confess to all who speak with them on this subject that they are descended from Spaniards, as I have previously stated."‡

Estevan Garibay, in his extensive work, "Compendio Historial de las Chronicos y Universal Historia de todos los Reynos de España." Barcelona, 1628, tom. i., chap. 8, page 83, refers in a remarkable passage to Spanish migrations to Ireland:—

"This chapter treats," says Garibay, "of Brigo, fourth king of Spain, and how the Spanish peopled the island of Ireland, and were in the habit of giving to their towns the name of Briga (as Cantabriga, Mirabriga, &c.), and also furnishes examples from divers nations in proof of this custom, and other notable circumstances, and treats of the death of King Brigo.

"Brigo, the only Spanish sovereign of that name, it is recorded, succeeded his father, Idubeda, the year before Christ one thousand eight hundred and five. This King Brigo was, by the male line, a grandson's grandson of father Noe. He is spoken of in the accounts given of him as a very good prince, fond of founding and peopling towns, and constructing fortresses, the existence of which shows wars and factions had already commenced amongst the Spaniards, inasmuch as fortresses are only for those who are at strife. Some authors affirm that the King Brigo sent an expedition to Ireland to people the island of Ireland, *adjacent to Scotland, primitively* called Hybernia, the natives of which country, though in many places rude and uncivilized, and having wretched habi-

* Florian D'Ocampo, "Cron. Gen. de Espana," p. 54. † Ocampo, ib., p. 140.
‡ Florian D'Ocampo, ib., p. 141.

tations, have always, from father to son, so efficaciously preserved this tradition in memory, that to the present day they esteem and pride themselves on being Spanish in their origin and dependence. The same is the opinion of Polydore Virgil, expressed in the 13th book of his English history, in the description which, in the life of Henry, King of England, the second of this name, he gives of the island of Ireland, about which he writes that it took its first name of Hibernia from a Spanish captain named Ibero, who, with a great number of people, passed over to that country to form its first population; or, according to others, it took its name from the river Ebro, called Ibero, and from it was called Hibernia."* . . .

"Forty years," says Garibay, "after the death of King *Abides*, the Habidi of other writers, about 1030 years before our era, according to the computation of Florian and others who follow him, a great scourge and affliction visited Spain, greater than any that had befallen it since the deluge. For this calamity commenced with excessive, and till then unexperienced, heat and drought, so that for the space of twenty-six years there was no rain, and thus Spain was depopulated, as previously by the deluge, by the violent gales, and extraordinary heats, so that the earth was dried up, and the rivers, with the exception of the Ebro and the Guadalquiver; and trees and plants perished, except some olives, and pomegranates on the borders of the Guadalquiver. In this great calamity it was not the poor alone who suffered; and soon all who could get away from the country fled; some went to Africa, others to France and Italy, and to other parts, to Asia even, and many more to the regions of Cantabria, Asturias, and Gallicia, which, lying northwards, escaped better than other parts of Spain, and the same is said of several places in the Pyrenees."†

It is right to state, however, that Garibay says—all men of letters, and those conversant with the ancient records of Spain, do not consider it a thing sure and certain that this great drought was so general, and of such long duration, as has been represented; for many of the best and most ancient Spanish authors make no mention of it, neither do any foreign historians, nor any Greek and Latin writers refer to it.

It must also be observed that Garibay's special reference to Spanish migration into Ireland is to the time of King Brigo, who began to reign, it is said, 1805 years before our era.

Doctor Francisco de Pisa in his "Descripcion y Historia de Toledo y Discurso cerca la Antiquedad de Espana y de sus Principios" (4to, Toledo, 1605, page 4), thus refers to the Gran sequedad de Espana:—"Some of our Castilian chronicles," says De Pisa, "state that about those times (of Siculo, Rey de Espana) there was a general and frightful drought, which lasted for twenty-six years, which occasioned the depopulation of the country, and its remaining uncultivated. The writers

* Garibay, tom. i., p. 83.

† Garibay, "Hist. Univer. de Espagna," p. 102.

of those chronicles do not assign any date for this calamity, nor do they agree in their relations of it."*

De Pisa remarks that it is singular no mention should be made of it by any Greek or Latin writer, and doubts if the great drought was as extensive and of such long duration as it is said to have been. He makes no mention of any migrations from Spain at this period; but at the termination of the calamity, he says, vast numbers of people of several nations came into Spain—Celts, Rhodians, and Assyrians (Syrians no doubt of Phœnicia?).

In the "Annales del Reyno de Valencia," by Fray Francisco Diago, Ord. Predic., 4to, 1613, we are told:—"The city of Saguntum (the modern Murviedro) having reached the pinnacle of its greatness, by means of the Rutuli Ardeatini, the calamity of the great drought fell on Spain, of which all historians agree in saying it lasted for twenty-six years; and it appears the date of its occurrence must be assigned to 1500 years before our era; for to presume, as Florian D'Ocampo did, that it occurred about 1302 before Christ, is a mistake."†

In one of the best of the Spanish chronicles, "Chronica de los Principes de Asturias y Cantabria," por Fray Francisco Sota, a learned Benedictine friar, 4to, Madrid, 1681, page 168, we are informed that "the great drought in Spain was not so general as was commonly imagined. According to Don Servando, Bishop of Orense, in the province of Gallicia, all along the sea coast there was no want of rain. That statement is confirmed by the fact of King Abidis, in the time of that calamity, having sought a refuge and place of safety in Cantabria, a region included in that province. And, moreover, as Spain was at that time the name given to that territory only which is now called Andalusia, it is probable that the great drought was confined to that territory. Beyond its limits, those inhabitants of the country who had fled were the first to return to their native places, accompanied, too, by some of the inhabitants of the countries they had sought an asylum in, as we are likewise informed by the Bishop of Orense. And it must be observed the flight of the Spaniards at that time was not to the most remote regions of the earth, but to the adjacent countries, such as France, Italy, Flanders, England, Ireland, and Africa, from which they could return in a short time, whenever it should please God to stay the execution of the Divine retribution. And when that time arrived, and the fugitives returned, accompanied as they were in some instances by foreigners of the countries they had sojourned in, we have no knowledge of any Spanish province having had its name then changed, except in that region named Iberia, which, on account of the Gauls who accompanied the Spaniards on their return to their own land, had a new mixed name given to it of Celtiberia, and this was an alteration only, and not an entire change of a name. But in after times the Celtiberians were named Aragoneses."‡

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* De Pisa, "Hist. de Toledo," p. 3. † Diago, "Annales de Valencia," p. 41.
‡ Sota, "Chron. de las Prin. de Asturia y Cantab.," p. 169.

Sota observes, "that some Spanish historians had made a great mistake in respect to the name of that most ancient portion of the Spanish territory, Gallicia, which name they stated was an abbreviation of one more ancient, of Gallo-Grecia. But they who made that mistake had not read Pausanias, and were ignorant of the fact that the name Gallo-Grecia was the name first given to the colony founded in Asia Minor by the Gauls who fled from Greece after Brennus had died, and the invading army of the Gauls was routed at Delphos. And at that period the Spanish Gallicia was a very old settlement, and bore the same name then that it does now, derived from the name of its founder, the son of that Hercules so famed in Spain, the Prince Galate.*

Sota has treated very extensively of the ancient history of Cantabria, and collected with great labour all references to that region and its people that are to be found in the more common MSS. of Latin and Greek historians, geographers, and early ecclesiastical writers. He repudiates the fabulous Chaldean histories of John Annius de Viterbo, but adopts the forged ecclesiastical annals of Father Higuera, ascribed to Flavius Lucius Dexter.

The first illustrious stranger he brings from the East into Spain is the most ancient Egyptian sovereign Osiris, *alias* Dionysius Bacchus, antiquissimo Rey Osiris Dionysio Baccho. Osiris, he states, made only a passing visit to Spain, when he was on a benevolent mission of civilization, visiting all the countries of the world, teaching the inhabitants the art of making bread, of cultivating the vine, and of producing in general all things fit for the food of man.

On the arrival of Osiris in Spain, Sota informs his readers of a great achievement of his, by other Spanish chroniclers ascribed to Hercules. Osiris, we are told, found the country tyrannized over by the giant King Jerio (the Gerione of other writers). He therefore slew the tyrant, and departed from the Spanish shores to the opposite ones of Africa.† The region visited by Osiris, and subsequently ruled over by his descendants, was that part of Spain now called Andalusia.

Of the sons of Osiris who came into Spain and colonized the country, we are informed one was named Horus, and surnamed Hercules; the other was Astur, also called Anubis and Mercury. There were three heroes of celebrity for their valour named Hercules, the most ancient the Hercules of Mount Ida, afterwards styled of Crete—this was the brother of Osiris; the second Hercules was Horus, the son of Osiris, called the Egyptian, and also the Lybian Hercules; the third Hercules was the Greek hero, more properly designated Heraclius, to whom the Greeks falsely attributed many of the exploits of the two preceding celebrated personages. It was the second Hercules, Horus, son of Osiris, who came into Spain as a conqueror and colonizer, died in that country, and was buried in Cadix.‡

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* Sota, "Chron. de y Cantab.," p. 172. † Sota, ib., p. 62.
‡ Ib., p. 155.

"The great glory," says Sota, "of our Spain is, that at the commencement of its establishment and foundation by Tubal (the grandson of Noah) and his family, the sciences so flourished, and with universal fame, that princes came from all regions of the globe to be instructed in them."*

"Astur, son of Osiris," he adds, "was the founder of the sovereignty and colonizer of the region north of Spain, including Gallicia and Biscay."

Horus was the ruler over Arragon, Catalonia, and Valencia; and after he had "extinguished" the three brothers Jerones (Geriones), kings of Spain, who had been spared by Osiris when he slew their father, the giant King Jerone (Gerione), he died with great glory.

A Spanish ecclesiastical dignitary, and doctor of exalted station, Don Gabriel Pasqual y Orbaneja, in a work entitled "Almeria Illustrada en su Antiquedad Origen y Grandeza y Vida de San Indalesio" (fol., Almeria, 1699), in his introduction states that his work is mainly based on the ancient Spanish ecclesiastical annals of Flavius Lucius Dexter.

In a previous paper I have shown that these spurious annals were fabricated by Father Higuera, and were condemned eventually by the authorities of the Roman Catholic Church.

Orbaneja sets out with the foundation of Almeria, the Puerto Magno of the Romans, by Tubal, and his coming into that part of Spain now called Andalusia, in the year of the world 1799, after the deluge 143 years.

Tubal was succeeded by Tago, son of Gomer, eldest son of Japhet. Tago was succeeded by the Libyan Hercules, son of Osiris.

After Hercules fourteen kings reigned in Spain, to whom succeeded Alceo.

Alceo was succeeded by Erithreo, and the latter by Melicola; and then came Abidis, "in whose time occurred the great drought, which lasted twenty-six years, depopulating the country almost entirely, and causing its people to fly into foreign distant lands."†

"It is a constant tradition," says the author, "that when the calamity ceased, many and diverse people came into Spain to people it, and amongst the newcomers the principal were the Phœnicians."

He then proceeds to notice another great calamity of continuous earthquakes that involved a great part of the nation in ruin, and compelled its inhabitants to fly to various regions, which calamity occurred, as Florian de Ocampo mentions, 500 years before Christ.‡

The Licenciado Geronimo Quintana, in his work, "La Muy Antiqua Villa de Madrid; Historia de su Antiquedad Nobleza y Grandeza" (fol., Mad., 1729), says—"The death of the King Abidis occurred in the year 1709 before the Christian era. He was the last king of Spain, with whom closed the long line of Spanish kings . . . . The King Abidis then being dead, and having left no successor, great vicissitudes that changed the face of the country occurred, the punishments of ambition

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* Sota, p. 160. † Orbaneja, "Almeria Illustrada," p. 13. ‡ Ib., p. 25.

and the crimes of rulers; and to these may be added others productive of an unusual calamity—a great drought, which lasted twenty-six years, during which time no rain fell.*

"The holy King Abidis," as he is designated by Fra Geronimo in his work, "Cadix Illustrada Emporio de el Orbe" (fol., Amster., 1690, p. 16), is said to have succeeded the King Gargaris, and to have occupied the throne of Spain to the year 1122 before the Christian era. . . . "It was after his death took place the great drought for the space of twenty-six years, during which time reigned David in Jerusalem. No rain having fallen in Spain during this time, all the rivers were dried up, with the exception of the Ebro and Guadalquivir. The calamity having ceased, the people who had fled returned, and came back accompanied by people of several countries, attracted by the rumours of precious metals having been found in the Pyrenean mountains, in which great conflagrations had occurred at that time, and left the ore exposed in the burned soil."†

The "Annales de El Reyno de Gallicia," by Don Francisco Huerta y Vega (4to, Santiago, 1733), contains the history of Gallicia from the entrance of the Romans into Spain to the end of the domination of the Suevi, and commences at the period that the chronicle of St. Isidore terminates. Strange to say, this author discards *in toto* the fabulous Berosus and Manetho of John Annius de Viterbo. His work is the most valuable of all the Spanish chronicles.

"We have here," says Huerta y Vega, "to point out a grave error of Hector Boetius, historian of the Scots, who states that a certain Gatelo, son of Cecrops, King of Athenas, having come into Spain, had established himself at Braga, which he called Porto Gatelli, thus designating it as being the place of his arrival; from which name that province and the rest of Lusitania in subsequent times was called Portugal. Gatelo founded the city of Brigantia and Novio, which the same author, Hector Boetius, further proceeds to inform us, is now named Compostella.‡ . . .

"On the subject of the colonization of Escocia (Ireland), various fabulous relations have been put forth by Hector Boetius (lib. i., "Hist. Scot."), who asserts that a certain Gatelo, son of Cecrops, King of Athens, had gone into Egypt, and from that country had passed into Spain, accompanied by his wife, Scota, daughter of Pharoah, King of Egypt.

"This writer, Hector Boetius, says, 'that the people of Gallicia having chosen Gatelo for their king, he governed with great rectitude; and that the said Gatelo having two sons, Emeco and *Ibero*, he sent them into Ireland, in which country Emeco remained, and Ibero returned to Spain to succeed his father, then recently deceased.' He adds, moreover, 'that to Ibero succeeded his son Metelo, who had two sons, one named Hermoneo

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* Quintana, "Hist. de l'Antiquedad de Madrid," p. 5.
† "Cadix Illustrada," par Fra Geronimo, p. 16.
‡ Huerta y Vega, "Annales de Galicia," p. 7.

(the Milesian Heremon?), who succeeded him in Spain, and the other *Simon Breco* (Simon Breac, King of Ireland, 483 years before Christ, according to O'Flaherty?), who, after the death of Emeco, passed over into Ireland to succeed the latter; and with an army of his people he colonized and governed Escozia, calling that country thus after the daughter of Pharoah named Scoto;' all which fable we have elsewhere exposed."*

The same author observes it was the Brigantines of Gallicia who sent colonies in ancient times into England. But the country referred to was then named Britain; and the probability is that the migrations from Gallicia into Ireland, though not specified, were intended to be included in this notice.

"That in England (observes Huerta y Vega) Spaniards had established colonies all writers agree, but from what province of Spain they came there is a variety of opinions. Polydore Virgil enters largely into this subject (lib. v., "Hist. Angl."). He says that in the time that Gurgundius reigned in England, who was the son of King Belinus, there came into that island a certain Spanish captain, a native of Cantabria, a man very learned in all the sciences, who, being patronized by the king, founded a university, and having given the king a daughter named Chèbrigia in marriage, in compliment to her, the name was given to the university of Cantabrigia. And Polydore Virgil adds, that this Cantabrian captain was called Bartholomeo. (The Partholanus of Irish Annals?)

"There is no doubt that Spaniards peopled England and Ireland, as we are assured by Tacitus (in 'Vit. Agric.,' lib. ii., Annales), and Seneca (in 'Lud Claud.'), and Ptolemy (lib. ii., cap. 2).

"But long previously to that period," the author observes elsewhere, "there was Spanish colonization in Ireland, we know, on the authority of Dionysius Alexandrinus (De Hesper), who affirmed the fact, and that author was anterior to the time of the loss of Spain and the invasion of the Moors. . . . .

"The time of the migration from Spain (following the great drought) it is not easy to assign. We can only say it appears to have been carried into execution by Gallicians. But this we can assert, on the authority of Pomponius Mela, that the people called *Yernos* inhabited the Cape Mungia (in Gallicia) and the adjacent coast, and by those people the cape or promontory was named *Yerna*. In the most ancient times, moreover, it is certain that the island of Ireland was so called, as by Orpheus (in 'Argon'), and by Aristotle likewise, 'Lib. de Mun.,' cap. 3; and, as Thomas Walsingham also asserts (in Flor.), and as Claudian states (see 'Paneg. Consul Honorii,' lib. xxxiii.), in the ages less ancient the Romans gave it this name. Ptolemy mentions a river of Ireland by the name *Yerno*. From these circumstances, as it is evident that Ireland had been peopled by Spaniards, we presume that

* Huerta y Vega, "Annales de Galicia," p. 17.

the colonizers of that island were the *Yernos* of Galicia, finding no other people of the peninsula with corresponding names."*

The same author informs us that "the people who inhabited the territory in the vicinity of Cape Finisterre were the Celts and Nerios. The principal towns of the Celts west of the cape were Cea and Corcubion. . . In a parish church in a small town near Cape Finisterre there was a celebrated image of the Blessed Virgin, venerated alike by pilgrims from all nations, who came to visit the shrine of the apostle St. James. The Romans had erected there a temple which was dedicated to the sun. The Nerios inhabited the country north of the cape as far as the town Mungia. The Yernos occupied Mungia, and thence as far as the town of Vimianzo. In Himilcon's record of his navigation in those seas the Yernos are mentioned, as they are likewise by Pomponius Mela and Ptolemy. In that part of Gallicia the Brigantes, so well known to the Romans were settled; and in this region was situated the port and city of Corunna, to which the Romans gave the name of Flavius Brigantius, or Portus Brigantinus, and which has continued to our times to be a much frequented port. The capital of the Brigantes was called by the Romans Brigantius; its modern name is Betanzos.

"In Corunna was situated the famous tower or fanal named the Tower of Hercules, erroneously supposed to be of Phœnician origin, but which was really constructed by Augustus at the termination of the Gallic war, twenty years before Christ. The city is now a quarter of a league distant from the tower, and near it was preserved, in the time of Flavian D'Ocampo, the stone of dedication, with an inscription on it bearing the name of Augustus, of which he has given a transcription in his work."†

"Some assert (says Huerta y Vega) that the Gauls who peopled Gallicia were of the same race who, after the great dearth in Spain, had flocked into that country and peopled its then deserted lands; which statement they confirm by the tradition that a portion of the inhabitants of this province, those who were settled in the vicinity of Cape Finisterre, were called Celticos by the old geographers.

"Others are of opinion that those Gauls who peopled Gallicia were the Galates, whom Hercules brought over with him from Greece when he passed into Spain. . . . .

"Both opinions, however, are without foundation."‡ . . .

The same author, entering largely into the origin of Gallicia and etymology of its name, informs us:—

"That this kingdom of Gallicia owed its first inhabitants to the descendants of Japhet, son of Noah, and that to the same source the rest of Spain owes its original inhabitants there is no doubt. But that the whole account in the history of the Bishop of Orense, of the coming of Hercules into Gallicia, of the existence of the Geriones, and of the

* Huerta y Vega, "Annales de Galicia," p. 17. † Ib., tome i., pp. 8, 9.
‡ Ib., p. 12.

son of Hercules, Galacte, giving his name to that territory is a fable, the author is no less persuaded."*

The author then enters into extensive details to show that Gallicia derives its name from a small town of great antiquity, situated at the mouth of the Douero, named Calle, which afterwards gave its name to the modern kingdom of Portugal, and of Gallicia being derived from this ancient town of Calle. Pliny, Strabo, Pomponius Mela, Ptolomy, Livy, Florus, Orosius, and others, he states, confirm this opinion. "All these testimonies," says the author, "prove the certain etymology of this name Gallicia, in which, as we find in Hebrew the C changed into G, so it is found in the Spanish tongue; and thus the ancient name of this territory Calicea was first pronounced, and then transmuted into Gallicia.†

"At the distance," the same author observes, "of one league from the coast, in front of Bayonne, are two islands which now are called the Islands of Bayona, but to which the Romans gave various names. Ptolemy called them 'the Islands of the Goddesses;' Pliny named them 'Cicas.' One bears the name of *Lancia* and the other *Albiano*. . . .

"Of the river Yerno which Pomponius Mela speaks of, there is nothing now known. . . .

"On the coast of Cantabria, and at no great distance from the town of Caldas, which was called of old *Aque Celene*, on account of some thermal springs there, and so named Caldas from Calidas, there are some islands very celebrated in ancient times, and greatly considered by the Romans on account of the tin which was found there in prodigious quantity, and of so good a quality that it exceeded in goodness the product of all other mines in the world. On which account the Romans gave those islands the name of Cassiterides. The first, called Aroza, the Romans named Aunios; the second island, called formerly Corticata, is now known as Cortegata."‡

This notice is deserving of attention, and in several other old Spanish and Portuguese chronicles the same claim for Spain is set up for the Cassiterides.

Pliny, in reference to the Cassiterides, says:—

"In adverso Celtiberiæ complures sunt insulæ, Cassiterides, dictè Græcis, à fertilate plumbi et a regione Arrotrebarium promontorii deorum sex, quas aliqui fortunatas appellere."—C. Plinii Nat. Hist., lib. iii., cap. xxii., p. 63.

This reference is evidently to the Dioses Islands, in the Bay of Vigo, from the mention of the promontory.

Solinus, on the same subject, says:—"Cassiterides Insulæ Hispaniæ spectant adversus Celtiberiæ latus, plumbi fertiles," &c.§—Solinus Pol., cap. xxiii., p. 45.

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* Huerta y Vega, "Annales de Galicia," lib. i., cap. iii., p. 15.

† Huerta y Vega, "Annales de Galicia," p. 14. ‡ Ib., pp. 4, 5.

§ There is a very curious notice of these islands in the work "Hist. Litteraria de Espana," tomo iv.: Mad., 1672, 4to, p. 378.

Padre Mariana, in his "Historia Generale de Espana" (4to, Paris, 1725, tom. i., p. 31), speaks of the great drought as having occurred centuries after the period assigned to the reign of the fabulous King Habidi (or Abidis).

Mariana says:—"For several ages nothing remarkable occurred in Spain of which our historians make mention, except a long and extraordinary drought, which lasted twenty-six years: it was such, according to the account of our authors, that all the fountains and rivers were dried up, with the exception of the Ebro and the Guadalquivir. The ground had become so hard that it had opened in many places; deep gulfs alone were to be seen, so much so, that no one could go forth to look for necessary provisions. . . .

"Men and animals alike perished, for this drought was followed by a general famine and mortality. Spain became one vast desert and a frightful solitude; princes and the richest people died, as well as the multitude. There were only a few of the poorest who got away from this public calamity; for, as they had no means, and that they could not pick up sufficient food to support themselves any length of time, they did not wait for this last extremity, but they dispersed themselves betimes amongst the neighbouring provinces, and along the borders of the sea, where they found sufficient food to maintain themselves. This drought was followed by such furious storms, that the trees which still remained were torn up by the roots. At length a great abundance succeeded these unhappy times; there followed soft rains, abundance, and fertility, which repaired the terrible evils that had been occasioned by the drought. Other people, having joined themselves to the Spaniards who had retired from the country, came with them to repeople Spain and to revive the Spanish nation, whose name was nearly extinct. It is thus that our writers speak of those years of sterility; I leave my readers the liberty of believing what they please.

"I will not dissimulate that many other authors of profound erudition treat all this as a fable; 'for,' say they, 'there will not be found any author, Greek or Latin, who makes the slightest mention of a similar drought.' Some even of our ancient historians do not speak on this point, although they recount events not much less wonderful; moreover, nowhere are there to be seen traces of the Spaniards going away, or of their return. . . .

"For my own part, I do not think we ought to reject altogether so ancient and often repeated a tradition, confirmed by the unanimous testimony of almost all history. I conceive, nevertheless, that this event, such as it is related by our authors, has little probability in it; but we must not exact a rigorous accuracy about things that happened centuries so far back; it is even much to find the historians record the principal events, and they ought to be pardoned if they sometimes confound the order of time, the places, and the persons—if they attribute to one party what another may have done—if they augment, diminish, and embellish what they have heard by tradition. The essential thing is, to preserve the main point. History very much resembles those great rivers

which always retain their first name, though the waters which run from it may be greatly augmented in their course, and very different from that which they received from their source. Let us judge them by that of the drought of which we have just spoken; without doubt it was neither so long nor so great as our historians say."

Then Mariana proceeds to inform us, that at the cessation of the great drought, the Celts from Gaul and Lusitania poured into Spain.*

Colmenar, in the "Annales D'Espagne et du Portugal" (4to, Amster., 1741), in reference to Spanish migrations and colonization, says:—"The opinion most likely to be true (of the many opinions expressed on this subject of Spanish colonization) is that the Celtes, descended from Japhet, eldest son of Noah, peopled the Gauls, the British Isles, and Spain about 200 years after the Deluge.† . . .

"History informs us that, 200 years before Jesus Christ, the Biscayans plied on the sea, in vessels made of the trunks of trees hollowed and covered with leather, and with a fleet thus constructed they went to Hibernia, now called Ireland, and took possession of it."‡

Gallicia in ancient times, as I have before observed, was included in the territory of Spain. That part of ancient Spain, formerly as well as at present, known as Estramadura, was of old called Lusitania, as we are informed in the Portuguese work of Fray Bernardo de Brito, of the Royal Monastery of Alcobaca, "Geographia Antiqua de Lusitania" (4to, Lisboa, 1689). This name was given to the country (one of the three provinces into which the Romans divided it), the author tells us, on the authority of Pliny, lib. iii., cap. xi., and M. Varro, in honour of Luso, son of Bacchus, and one of his associates, who came with the latter into this region on the western coast of Spain. And then, as usual with all the annals of the time, Portuguese as well as Spanish, the fictions of Annius of Viterbo and the fabulous Berosus are dragged into early history. "Florian D'Ocampo, following Berosus," says Fray Brito, "attributes the name Lusitania to the King Lusa, who flourished long previously to Bacchus. And within the ancient limits of this province of Lusitanos in the time of Strabo, we are told by Brito, was the city of Braganza, and also the region which is now called Gallicia."§

And elsewhere it is asserted that from two ports on its shores, now named Corunna and Vigo, Spanish intercourse with England and Ireland was chiefly carried on.

The arch literary impostor and forger of historical relations, Annius of Viterbo, in his fictitious Berosus, makes Corunna the theatre of the grandest of the exploits of the Phœnician Hercules against the fabulous Geriones, the gigantic tyrants of Gallicia. In the immediate vicinity of Corunna, we are told by Don Servando Obispo de Orense, on the authority of the fictitious Berosus, Hercules offered battle to the Geriones, and slaughtered them in that engagement. It was in memory

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* Mariana, "Histoire General D'Espagne," tom. i., pp. 51, 53, 54.

† Colmenar, tom. ii., p. 55. ‡ Ib., p. 51.

§ "Brito Geogr. Lusitan," p. 561.

of this achievement, says Don Servando, that Hercules constructed the celebrated tower, and in the foundations deposited the head of the principal tyrant Gerion, and therefore the tower was called the Tower of Hercules, and founded the city of Corunna.

All this farrago of fiction and fable the worthy Bishop of Orense, in his MS. history of Spain, has given a degree of currency to that its original concocter might not have been able to have effected for it.

"To whatever place our Brigantes went to colonize," says Lopez Madera, in his "Excelencias de La Monarquia de España" (Madrid, folio, 1625, p. 26), "they retained and used this name, derived from our King Brigo, as appears from the accounts of those who passed into England, and the mode in which Juvenal makes mention of them (in Satir. 14); and Polydore Virgil names those who passed into Ireland and Scotland. And notwithstanding that in some places they had corrupted and improperly used this name, taking it for the name of the suburbs of the chief cities; but in the greatest part of Flanders, Germany, and those northern countries, they retained this name in its proper and original signification."*

The Padre Mohedano, in the "Historia Litteraria de Espana, desde su Primeira Poblacion" (8vo., Madrid, 1766), in reference to various early migrations from Spain, observes:—"Some of those Iberians who fled from their own country in consequence of the incursions and ravages of the Celts (Gauls) settled ultimately, there is reason to believe, in Cantabria, which we know in ancient times had more extended limits than in later times. Other circumstances may have led to the frequent passage of Gauls and Iberians across the Pyrenees. For example, the great dearth and famine which Palestine suffered, and Egypt, in the time of the patriarch Jacob, which, according to the expression of Scripture (Genesis, xlvii. 13), was universal over all the world. This might explain the nature of the sufferings said to have been caused in Spain (by the great drought), and which we are told compelled many of its inhabitants to fly to other countries. Of another great drought Strabo makes mention, and cites many authors in reference to it, although of a much later date than that of Spain, having occurred, it is said, in the reign of Artaxerxes, in which drought rivers and lakes, as well as wells, were dried up. By these testimonies we do not intend to confirm the general belief in the statements of our chronicles of a prodigious drought, which some writers extend to a period of twenty-six years, others to a shorter period; because we do not find authentic grounds in the writings of ancient times to confirm these statements, which for other reasons appear to us unlikely to be true. Neither can we approve of the statement made by Ferreras on the authority of Eratosthenes, cited by Strabo (lib. i.), and also by Pliny (lib. iii., cap. i.), to the effect 'the great drought' which prevailed in Spain was the cause of the passage being opened to which the name has been given of the Straits of Gibral-

* "Greg. Lopez Madera Excellen. de la Mon. de Espana," p. 26.

tar, communicating between the Atlantic Ocean and the Mediterranean. These relations are forged statements made *ad libitum* to amuse credulous people."*

This mode of dealing with a national tradition of universal acceptance with all the old annalists of a country may appear to modern Spanish writers infected with modern French philosophical opinions very liberal and enlightened; but literary men with any pretensions to critical or scholarlike acquirements will judge differently of this sweeping denial of all truth in a very old and widely-spread tradition, and discriminate between the embellishments and exaggeration of ancient writings and the facts they had erroneously intended to improve.

Of the great mischief done to Spanish history by the forgeries and fabrications of Annius of Viterbo, Mohedano, in the "Historia Litteraria de Espana," has given a just account. He states that when Mariana wrote his history, the fictions invented by that great impostor Annius had been so long received as solemn truths promulgated by an eminent scholar and exalted ecclesiastic, and had taken such firm hold of the public mind throughout Spain, he (Mariana) looked upon these fables as established by prescription, though no length of time or permanence of an imposition is a prescription against truth. So he allowed the story of Tubal's coming into Spain, founding a kingdom, and of a long line of kings having descended from him, to pass current as indisputable facts. Of the founding also of several cities, and peopling of several territories in Spain by Tarsis, the same observations are made by Mohedano.

"We may acknowledge," says this author, "that Spain, or at least Andalusia, was called Tarsis in the Scriptures. It may be conceded also that it was sometimes designated the country of Tarseyo, and that it is thus not erroneously mentioned by Polybius. But it is not necessary that Tarsis came to Spain to people that country because his name was given to it. It would be sufficient for that purpose that his descendants came there and established themselves. There is no sufficient proof in history that countries or populations are called after their first founders, kings, or inhabitants. The most that can be said in the matter, without prejudice to sound criticism and *verisimilitude* is, that Tubal being established in Asiatic Iberia, and Tarsis in Cilicia, some immediate descendants of both brought colonies into Spain. The descendants of Tubal established themselves in that part of Spain to which the name was given of Iberia, and from the name of his father the principal river of that region got the name of the Ebro. The descendants of Tarsis entered Spain probably by Gallia Narbonensis, and, colonizing from east to west, they extended and fixed themselves eventually in the south-west of Spain, in Betica, giving to that province the name of Tarsis, their progenitor, calling it Tarsis, or Tarseys, or Tarteso. Thus it is true what is asserted on the authority of Eusebius, that the Spaniards had their origin from Tarsis, without clashing with the opinion

* Mohedano's "Hist. Litt. de Espana," tom. i., p. 424.

of those who believed that the Iberians are the descendants of Tubal. This accordance, by no means an unlikely one to be true, appears to conciliate the different views adopted on this subject, the several authorities that seem at first sight in contradiction, and even the varieties of etymologies that exist. *Nevertheless we do not hesitate to affirm, with the best critical writers who have treated of Spanish history, that we ignore* not only the first inhabitants of Spain, but those even of all Europe."*

Mohedano, further, inveighing against the fabulous chronology of the fictitious Berosus, which assigns 142 years after the deluge for the epoch of the first population of Spain, and also against Garibay and D'Ocampo, who have adopted the same date evidently from the same fabulous source, justly observes, that within a period of forty years after the dispersion at Sennaar, the population of so remote a region as that of Spain was an impossibility; and he cites a passage from Shuckworth in his "History of the World, Profane and Sacred," to show that the human race could not have multiplied sufficiently in 130 years, the time allowed according to his estimate for this great peopling of Asia Minor, so as to admit of such extensive migrations from the East as we are told took place.

In the opinion of Shuckworth the most that can be admitted is that, immediately after the dispersion, some of the scattered people had proceeded to the distant regions of Europe, settled there, and in course of time were followed by colonies of their race from the East.

"The period, then, of the arrival of the first peoplers of Spain," observes Mohedano, "cannot be antecedent to the birth of Phaleg, in whose time, according to the Scriptures, the dispersion at Sennaar took place. The deluge took place in the year of the world, 1656. The birth of Phaleg was in the year 1757. The confusion of tongues, and dispersion at Sennaar, cannot be of a date very distant from that year, and in all probability the date of those events was the year of the world 1770 (or 114 years after the deluge); before the Christian era 2230 years."

In the same work, "Historia Litteraria de Espana desde su primeira Poblacion," we find in the 1st book of the first volume this very candid summary of its contents:—

"We ignore the first inhabitants of Spain. The primitive people of it were neither civilized nor enlightened. The several provinces of Spain did not form one common state. The government of the principal persons was a kind of monarchy of those small territories. We ignore the laws, religion, and customs of the primitive inhabitants.

"The only historical documents we possess in relation to the ancient Spanish people consist of scanty notices scattered over the works of Greek and Latin authors. If the sages of the French Academy of Inscriptions and Belles Lettres complain of want of knowledge on the same subjects, in relation to the ancient inhabitants of Gaul, how much more reason have Spaniards to lament their utter ignorance on these

* Mohedano's "Hist. Litt. de Espana," tom. i., sec. 37.

matters! And, however sapient and well acquainted with some kinds of ancient learning their Druids may have been, we know they committed nothing to writing; and, in fact, that all their science was dependent on their memory. It was otherwise in Spain. The Turduli and Turdetani, who inhabited Andalusia, possessed books of an extraordinary antiquity. In them were written in verse their ethics and their laws, which were of an antiquity, as it was believed, of 6000 years. No doubt, that extreme antiquity was fabulous. But the tradition preserved through ages in Andalusia, as to the antiquity of those writings, justifies our inference that science was not a stranger to these people."*

From all the preceding extracts from Spanish chronicles and histories, and especially from the work of the Mohedanos last cited, it is obvious that no ancient Spanish annals in MS., no written records of the very early history of Spain, no compilation of such records analogous to those Irish ones of the "Annals of the Four Masters," the "Book of Lecan," &c., are extant in Spain; and from long-continued research in Spanish and Portuguese literature, during a residence of several years in those countries, I am fully competent to assert that no ancient Spanish or Portuguese annals in MS., or compilation of them similar to our Irish annals, are extant in Portugal.

There are ecclesiastical records, indeed, relating to the Spanish and Portuguese churches—to councils, especially, of both countries—of an ancient date, and of high interest in religious matters, reaching even to a period antecedent to the Moorish domination in Spain, the origin of which was A. D. 713, to the period of the domination of their predecessors, the Visigoths, who entered Spain with their great army, A. D. 472.

Ticknor states truly in his great work on Spanish literature that there is not a single ancient historical record in the Spanish language in existence previous to the eleventh century.

It is well to bear in mind that Annius de Viterbo says the great migrations from Spain, consequent on the drought which prevailed for twenty-six years in that country, took place long anterior to the date assigned to that event by several other Spanish historians, who assert the date of that event was about 1030 years before the Christian era, or the year of the world 2974. In the "Annals of the Four Masters," the coming of the Gadelians, or Milesians, from Spain into Ireland, is said to have taken place in the year of the world 3500. But it must be remembered that the chronology of the Septuagint is the one followed in the "Annals;" and the equivalent of that date, according to the Hebrew computation, would be the year of the world 2500, a period of 1504 years before the Christian era.

O'Sullivan Beare, in his "Compendium of Irish History," assigns to the same event the age of the world 2662, a period of 1342 years before our era.

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* "Hist. Litteraria de Espana," tom. i., lib. i., pp. 1, 2.

Keating, in his "History of Ireland," assigns to the same event the year of the world 2704, on the authority of the "Book of Invasions," and Cormac M'Cullinan. "Both assert it was about 1300 years before Christ the sons of Milesius came into Ireland."*

It is in vain that we look in Spanish chronicles for such names, or any obvious corruptions of them, as Milidh or Milesius, and his sons, Donn Aireah, Heber, Fion, Amerghin, Ir, Colpa, Aranan, and Heremon. Neither will we find any mention there of Gaodhal or Gadelius, Lughadius, Fennius Farsa, Partholanus, &c. On the contrary, we find from a preceding extract from one of the Spanish chronicles of best repute, that the accounts we have of all those personages of Spanish origin, or connected with Spain, who figure in our Irish annals as chiefs or rulers of Ireland who had passed over to Ireland from Spain, are declared fabulous; and, I may add, the names of those personages are utterly ignored by all the Spanish historical writers.

Cæsar was the first commander of the Romans who ventured so far along the northern coast of Spain as the Cape Finisterre, then called the Promontorio Celtico. In that part of Spain the Roman eagles had not been yet seen when Cæsar arrived there. The first port at which he landed was that from which he departed. Most of the several colonizing expeditions of which mention is made in the Spanish chronicles were from the ports now called Vigo and Corunna. There Cæsar found admirable ports, such as Ptolemy has described, remarkable for capacity, security, and commodity, and for another quality not of little value in Cæsar's estimate of such advantages—proximity to Britain. "The natives of the adjacent territory (we are told by Garibay) had formerly been an enterprising people, for they had dared to traverse the ocean on whose shores their country was situated; they had carried colonies into England and Ireland; but at the period of Cæsar's visit to the shores, they were so reduced in their resources that they only were able to equip some small barks, on the frame of which skins were stretched to keep out the waves and protect them from their violence. Astonished at the sight of the various appliances to navigation of the Roman galleys and their gigantic size, the natives speedily submitted to Cæsar."†

"It was chiefly from Gades (says Moore), according to Strabo, that the Phœnicians fitted out their expeditions to the British Isles. But the traditions of the Irish look to Gallicia as the quarter from whence these colonies sailed; and vestiges of intercourse between that part of Spain and Ireland may be traced far into past times. The traditionary history of the latter country gives an account of an ancient pharos, or lighthouse, erected in the neighbourhood of the port now called Corunna, for the use of navigators in their passage between that coast and Ireland." Mr. Moore adds, in a note, a remarkable coincidence between this tradition

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* Keating's "History of Ireland," transl. by Halliday, p. 283.

† Garibay, tomo i., p. 57.

and an account given in Ethicus of "a lofty pharos, or lighthouse, standing formerly on the coast of Gallicia, and serving as a beacon in the direction of Ireland."

The Rev. C. O'Connor, the author of "Columbanus's Letters," observes that, in the remote ages of Phœnician commerce, it was the custom to consecrate all the important promontories in the course of their navigation "by the erection of pillars, or temples, and by religious names of Celtic and primæval antiquity.

"This is expressly," Moore adds, "stated by Strabo." And he further observes—"The 'Sacrum promontorium,' or south-western highland of Iberia Antiqua, was Cape St. Vincent. That of Ireland was Carnsore point, as stated by Ptolemy."*

Carnsore is on the Wexford coast, opposite the Tuscar light.

The facilities for intercourse between Ireland and Gallicia are obvious. The distance from Cape Ortegal to Cape Clear, Moore says, is above 450 leagues—that is to say, about 1350 miles. He might deduct a third from that amount, and the remainder would still exceed by a hundred miles the actual distance between the nearest points of Gallicia and Ireland.

In conclusion, I have to observe that, although fabulous histories have indeed tainted Spanish history, both general and ecclesiastical, to a great extent, in the sixteenth and middle of the seventeenth centuries, the latter has suffered least, because many ancient records of Spanish Church history still exist in MS. But, although no such early authentic records of general history exist, either in MS. or print, of an emigration from Spain to Ireland, there is a regular and unbroken transmission in Spanish general history, as we have seen, of a tradition that has never varied, and seems to have been sent down from one chronicler or historical annalist to another, with undeviating details. But among the latter we look in vain for fixed or corresponding dates. Still, Spanish history is not without considerable use and importance to those who make a study of early Irish history.

In several other Spanish works, besides those I have quoted, notices are to be found of migrations from Spain into Ireland. I refer, in particular, to the great work of Isidore Hispalensis, wherein he speaks of Ireland being peopled by Iberians from Spain, lib. i., cap. xxxix.; lib. xix., c. xxiii.; lib. xiv., c. xxvi.; and to the "Hispania Illustrata," by Andreas Schotta. And, finally, let me observe, that I had made extensive collections of singular references to migrations from Spain into Ireland from Portuguese chronicles—references that necessitated a great deal of research—but they differ so little from those which we find in Spanish chronicles, that it seemed to me unnecessary to trouble my readers with them.

May I venture to hope my labour has not been entirely thrown away?

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* Moore's "History of Ireland," vol. i., cap. i.

Sir W. R. Hamilton, LL. D., read a paper (previously communicated to the President)—

On a General Centre of Applied Forces.

Observatory, May 25, 1863.

Sir W. R. Hamilton wishes a note to be preserved in the "Proceedings" of the Royal Irish Academy, that on recently reconsidering an application of Quaternions to the Statics of a Solid Body, some account of which was laid before the Academy many years ago (see the "Proceedings"* for December, 1845), he has been led to perceive the *theoretical* (and to suspect the *practical*) existence of a certain *Central Point* for *every system of applied forces*, not reducible to a *couple*, nor to *zero:* which *generally new point*, for the case of *parallel forces*, coincides with their well-known *centre*.

An *applied force* AB, acting at a point A, being said to have a *quaternion moment*, equal to the quaternion *product* $OA \,.\, AB$, with respect to any assumed point O, the *sum* of all *such* moments, or the quaternion, $Q = \Sigma\,(OA \,.\, AB) = OA \,.\, AB + OA' \,.\, A'B' +$ &c., is called the *total quaternion moment* of the applied system with respect to the same point O.

This *total moment* Q *varies* generally with the *point* to which it is referred; and there is *one* point C, or *one position* of O, for which the condition

$$TQ = a\ minimum,$$

is satisfied, with the exceptions (of *couple* and *equilibrium*) above alluded to.

It is *this point* C, which Sir W. R. H. proposes to call *generally* the *Centre of a System of Applied Forces.*

In the most general case of such a system, he finds it to be situated *on the Central Axis*, the *minimum* TQ representing then what was called by Poinsot the *Energy of the Central Couple.*

For the less general case of an *unique resultant force*, the quaternion Q reduces itself to *zero* at the new Central Point C, which is now situated *on the resultant*, and determines its *line of application.*

Sir W. R. Hamilton read a communication "On the Locus of the Osculating Circle to a Curve in Space."

The President exhibited a copy of Letters Patent granted by Queen Elizabeth, in the 37th year of her reign, to the Provost and Fellows of the newly founded University of Dublin, committing to them the custody of the temporalities of the See of Tuam, then seised to the Crown, by reason of the death of Archbishop William Lally, or Mulally, and to be accounted for into the Exchequer according to the true annual value.

John Anster, LL. D., on the part of Lieut.-Colonel French, presented to the Academy a large collection of East Indian musical instruments.

The thanks of the Academy were voted to the donor.

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* See "Proceedings of the Royal Irish Academy," vol. iii., Appendix, pp. lvii., lviii.

SPECIAL GENERAL MEETING.—Monday, July 6, 1863.

The Very Rev. Charles Graves, D. D., President, in the Chair.

Read the following extracts from the "Report upon the Royal Dublin Society, the Museum of Irish Industry, and the System of Scientific Instruction in Ireland" (pp. 33, 34), which apply to the Royal Irish Academy:—

"Other Grants in Aid of Science and Art in Dublin.

"The other Institutions at Dublin which receive grants in aid of Science and Art, are—

"The Royal Irish Academy, which combines the objects of the London Royal and Antiquarian Societies, and has acquired a high reputation for the learning and activity of its researches. The last annual vote was £500.

"The Royal Hibernian Academy, which was formed on the model of the Royal Academy of London, and receives an annual grant of £300. It was inquired into by Mr. Macleod, in 1858, on behalf of the Department of Science and Art, and the annual grant was then appropriated entirely to the educational purposes of the institution.

"The National Gallery for Paintings and Sculpture. This has been recently erected under the authority of two Acts of Parliament, passed in the years 1854 and 1855, and the arrangements for completing its fitments and acquiring its contents are in active progress. An elaborate constitution, partly official and partly popular, has been given to it by the same Acts of Parliament.

"The Zoological Society, which receives an annual grant of £500, and raises a larger sum from private subscriptions, and from the receipts at the door. This well-managed Society contributes in a high degree to the instruction and amusement of the public.

"The annual grant to the Zoological Society is voted in the estimate of the Royal Dublin Society; but, besides acting as the channel for its payment, that Society does not exercise any interference with respect to it. Some advantage would be gained if all the Parliamentary grants in aid of Science and Art at Dublin were, in like manner, included in the estimate of the Royal Dublin Society, and were paid through its medium, inasmuch as they would then be annually brought under consideration in one point of view, and the Council of the Royal Dublin Society would have an opportunity of making any representation which the circumstances of the time might render proper in reference to them.

"Beyond this, we cannot advise that the Royal Dublin Society should be vested with any control over the proceedings of the other Societies. Freedom of action is indispensable for the success of institutions which depend upon voluntary unpaid agency; and, even when

there is some general connexion between the objects of such institutions, greater aggregate results, and even a greater disposition to co-operate, may be expected from a suitable division of labour and responsibility than from any consolidation that could be effected.

"The long established and comprehensive character of the Royal Dublin Society has already made it, to some extent, a point of union for the other local institutions for the cultivation of science and art; and when its constitution shall have been strengthened, and its means of instruction enlarged in the manner we have recommended, this tendency to approximate is likely to be increased. Real public benefit would ensue from voluntary affiliation of this kind, even if it did not go beyond a general recognition of the precedence due to the Royal Dublin Society, and an occasional comparison of what is in progress in each institution, in order to secure harmonious action, and as much reciprocal aid as the nature of the case admits."

The following Resolutions were unanimously adopted:—

I. That the Royal Irish Academy regards with surprise and alarm the suggestion contained in the Report of the Commissioners of Inquiry respecting Scientific Instruction in Ireland, that the Academy should be placed under the superintendence, and to some extent under the control, of the Council of the Royal Dublin Society.

II. That the Commissioners appointed by the Treasury to inquire into a number of Scientific Institutions, including this Academy, have made the above recommendation without examining any of its Officers, or even notifying their intention of taking evidence affecting its interests.

III. That such an arrangement would be incompatible with the dignity of an Academy incorporated as this is by Royal Charter, and would tend to lower it in the estimation of the public;—would be destructive of the independence and freedom of action of the gentlemen by whose unpaid agency the work of the Academy is, in a great measure, performed;—and would inevitably lead to misunderstanding and collision between bodies which have always occupied, and ought still to occupy, distinct, though equally important, spheres of action. In fact, the objections to such an arrangement felt by the Members of the Royal Irish Academy are such as would be felt by the Members of the Royal Society of London to a proposal to submit them, in any degree, to the control of the Society of Arts.

IV. That the Academy entirely dissents from the opinion expressed in the Report of the Commissioners, to the effect that real public benefit would ensue from affiliation of this Academy to any other Society.

V. That the only other reason assigned by the Commissioners for an innovation which would thus compromise the honour and interests of an important National Institution is an alleged official convenience of the most inconsiderable kind.

VI. That the Academy, for the foregoing reasons, protests against the proposed change.

VII. That copies of the foregoing Resolutions be forwarded to his Excellency the Lord Lieutenant; to the Lords of the Treasury; to the Committee of Council for Education; to the Secretary of the Department of Science and Art; and to all the Irish Members of both Houses of Parliament.

It was also Resolved,—That full authority be delegated to the Council to take such steps as they may consider expedient to protect the interests and independence of the Academy.

The Academy then adjourned.

MONDAY, NOVEMBER 9, 1863.

The Very Rev. Charles Graves, D. D., President, in the Chair.

The President handed in the following letters, and explained,—that on the very same day on which the Academy met, and passed the resolutions just read by the Secretary (see "Proceedings," p. 396), the letter addressed to him from the Chief Secretary's office was forwarded to him; but he did not receive it until he went home after the meeting. In it was enclosed the letter from the Lords of the Treasury, explaining that the idea of affiliating the Academy to the Royal Dublin Society had been given up. Having received that assurance, the President at once suspended all further proceedings. "It was," he said, "a result extremely gratifying to the Academy, as we all felt that without the independence which we asked in the resolutions, it would be impossible for us to maintain that dignity which we have always maintained in the face of the country and of the scientific world":—

"*Dublin Castle, 6th July*, 1863.

"Sir,—Referring to your letter of the 27th ultimo, relative to the proposed amalgamation of the Royal Irish Academy with the Royal Dublin Society, I am directed by the Lord Lieutenant to state, that it affords His Excellency much pleasure to transmit to you, for the information of the Members of the Academy, a copy of a letter received from the Assistant Secretary of the Treasury, from which it will be seen that it is not now intended to carry into effect that portion of the Report of the Commissioners which adverts to the connexion of the Royal Irish Academy with the Royal Dublin Society.

"I am sir, your obedient servant,
"Thomas Larcom.

"*To the President of the Royal Irish Academy.*"

"*Treasury Chambers, 4th of July*, 1863.

"Sir,—With reference to your letters of 29th and 30th ult., on the subject of the future position of the Irish Industrial Museum and the Royal Irish Academy in regard to the Royal Dublin Society, I am commanded by the Lords Commissioners of Her Majesty's Treasury to request that you will state to His Excellency the Lord Lieutenant, that they confined themselves in their communications to His Excellency, and to the Lords of the Committee on Education, to that part of the Report of the Commissioners of Inquiry into the Scientific Institutions in Dublin which has reference to the Royal Dublin Society and the Museum of Irish Industry.

"My Lords took the same view of the last clause in the Report under the head of 'other grants, &c.' (page 33), which His Excellency expresses, namely, that it contains matter rather adverted to than deliberately advised, and accordingly my Lords did not deal with that clause as containing the recommendations of the Commission.

"Their Lordships desire me to add that they fully concur with His Excellency in the expediency of continuing to the Royal Irish Academy that independent position and action as a scientific Society, which it has enjoyed for eighty years under Royal Charter, with advantage to the public, and credit to itself; and my Lords have no intention of taking any measures which would interfere with that position.

"Their Lordships request that His Excellency will cause a communication to this effect to be made to the President of the Academy.

"I am, &c., &c. &c.,

(Signed) "Geo. A. Hamilton.

"*To Sir Thomas Larcom, K. C. B.*"

Mr. Samuel Ferguson, Q. C., communicated the following—

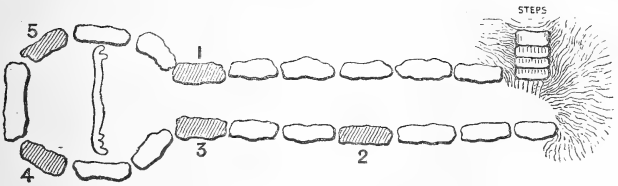
Account of Inscribed Stones in the Sepulchral Monument, called Mane Nelud, at Locmariaker, in the Department of Morbihan, Brittany.

On the peninsula of Locmariaker are several sepulchral tumuli containing stone chambers, and a large number of stone chambers from which the tumuli have been removed, all of great dimensions, and, with their associated pillar stones, well known as ranking among the most remarkable megalithic monuments in existence. The most northern of these is the tumulus called, in Breton, *Mane Nelud*, or, as usually (though it would appear erroneously) rendered in French, *montagne-cendre*. *Ludu*, in Breton, signifies cinder; but *nelud* is not the form which *ludu* would assume in composition. The mound is composed of earth and field stones, and is in form a long oval, whose major axis lies nearly east and west. It has been stripped, at its western end, down to the covering stones of a chamber approached by a passage opening towards the south. This chamber has lain open for a long period of time. A flight of steps has been formed to facilitate the descent into the interior,

where a poor's box invites the contributions of visitors. Light is admitted through the open end of the passage, and by an aperture under the covering stone of the chamber, at the west side, sufficient to give a tolerably distinct view of the interior. The interference of the lights, however, renders it very difficult to detect the shallow depressions in the undressed granite surfaces; which may account for the fact that, in a monument so much frequented, the existence of inscriptions should not have been previously observed.

On visiting the *Mane Nelud*, on the 29th of August, 1863, the writer observed inscribed characters on some of the stones which form the parietal inclosure of the chamber and passage. Further examination, on several subsequent days, with the advantage of the light of the early morning and late afternoon, resulted in the discovery of five inscribed stones, of which the most remarkable is (1) the terminal supporting stone of the passage, on the right hand, at the entrance to the chamber. On the opposite side of the passage, the fourth stone from the end (2) and terminal stone at that side of the entrance to the chamber (3), are also inscribed, but not so largely; and the writer did not copy the lines on the latter, regarding them as ornamentation merely. Within the chamber, the stones adjoining the headstone, on the west (4) and east (5), respectively, bear groups of characters. The subjoined ground plan of the monument exhibits the position of the stones in question in the order above enumerated.

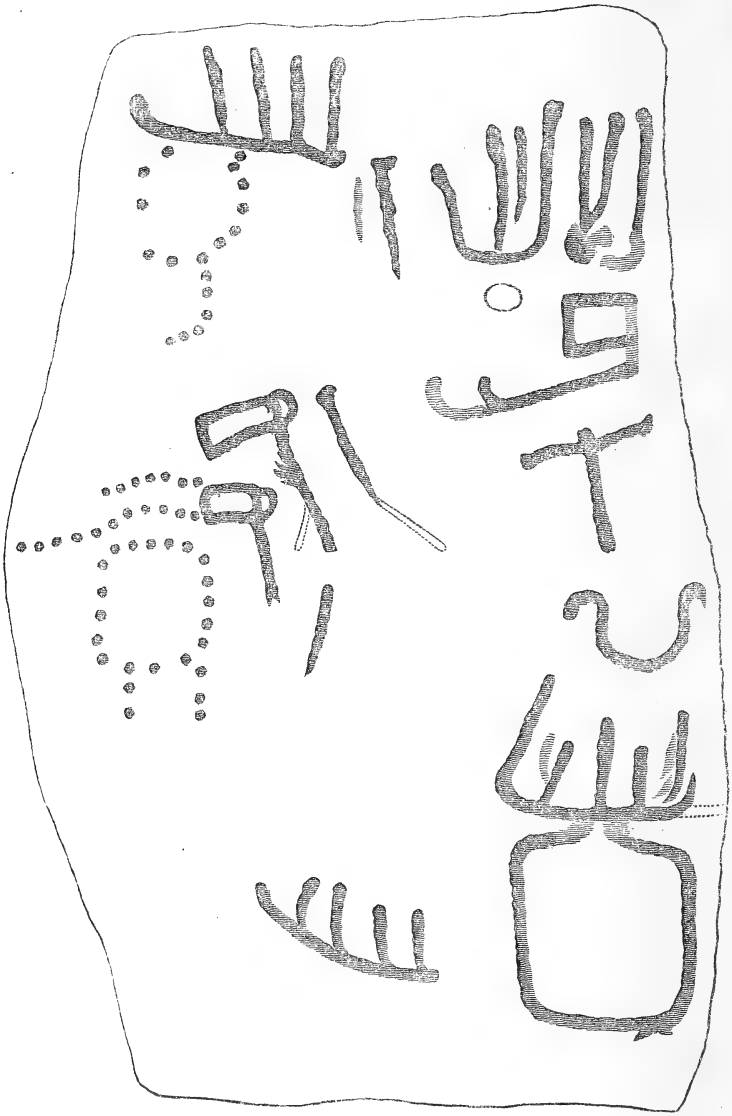
Fig. 1.



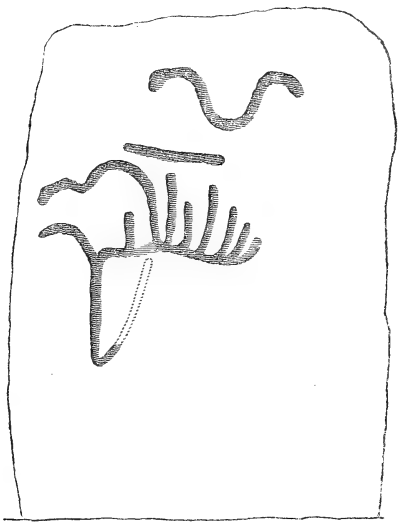
The writer exhibited drawings, traced from the stones, and verified by rubbings; but, owing to the roughness of the natural surface of the granite in which the lines are incised, an uncertainty exists as regards some portions of the characters which are indicated in the drawings by a lighter shading. Nothing, however, has been transcribed, except such depressions of the surface as appeared to the eye and touch to be incised or picked out by an instrument.

See reduced cuts of drawings on following pages. They are reduced on a scale of about one inch to the foot.

Stone No. 1.



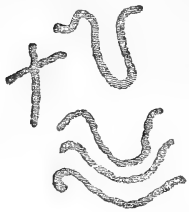
Stone No. 2.



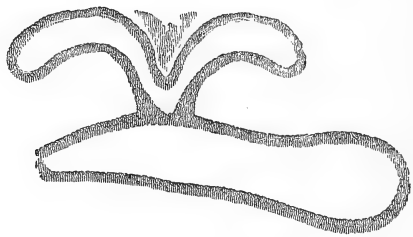
Stone No. 4.

The lines inscribed on stone No. 3 appeared to be repetitions, and lateral combinations of the U-like character appearing in each of the above groups.

Stone No. 5.

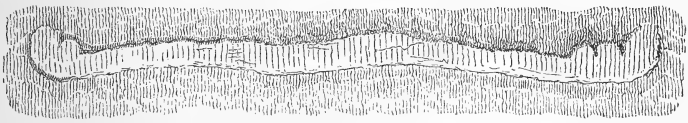


Besides these, there are on the headstone and floor of the chamber certain sculptures which have been previously known to exist. That on the headstone is a rude incised representation of some object which appeared to the writer to bear more resemblance to a plumed hatchet-head than to any other definite object. The plumed hatchet has been observed by the writer elsewhere on a monument of similar character; but for which circumstance he would be at a loss to assign any definite intention to this combination of rude, but boldly incised lines.



On the large flagstone, which forms the floor of the chamber, there appears, in strong relief, an elongated flat object, $7\frac{1}{2}$ feet long by about 5 inches broad, extending across the breadth of the chamber, of a somewhat serpentine outline, having at either end mamelon-like protuberances. It appeared to the writer to bear some resemblance to an unstrung bow, or possibly to a yoke for draught. Its outline, however, is much abraded, and the imperfectness of its resemblance to whatever object it may have been intended to represent is perhaps due to

the artist's having taken advantage of a natural prominence of the stone as a step towards his design.



The natural fracture of the headstone has also, to some extent, been worked into the plume-like design; and in this respect these particular sculptures, which are certainly parcel of the original work, differ from the incised characters on the stones, 1, 2, 3, 4, and 5. In these latter the rough portions of the surface have been avoided, and all the characters appear to have been designed irrespectively of any accidental configuration.

The absence of that barbaric species of ornamentation found on the stones of the often described neighbouring monument of Gavrinis, and the adoption of representations of definite objects, would lead to the inference that the *Mane Nelud* is of later date; while the comparative rudeness of the work would place it prior, in point of antiquity, to some of the adjoining monuments of the Locmariaker group. The best sculptured and most elegant of these is that popularly called the *Merchants' Table*, on the under surface of which, forming the ceiling of the chamber, is the well-known sculptured representation of a stone hatchet. It has not, however, been hitherto known that in connexion with the hatchet there appears a plume-like ornament, and that on the same stone there exists the sculptured representation of what appeared to the writer to be a plough.

This would leave the *Mane Nelud*, at all events, anterior to a time when, although the art of agriculture may have been introduced, the stone hatchet continued to be the principal weapon of a person of distinction; so that, if the characters inscribed on the stones of the *Mane Nelud* be coeval with the monument, they will necessarily carry us back to a very remote epoch in the history of man.

The writer examined the inscribed stones carefully to see whether the characters were anywhere overlapped by other parts of the work, or whether there existed any other indications of the sculptures having been executed before the stones were built in, such as may be observed in the analogous structures of New Grange, in this country, and of Gavrinis; but found nothing conclusive on this point. The occurrence, however, on one of the inscribed groups (No. 5) of the triangular object, conventionally called a celt, which figures prominently in the cotemporaneous decorations of Gavrinis, strongly aids the presumption that the inscriptions are coeval with the rest of the work.

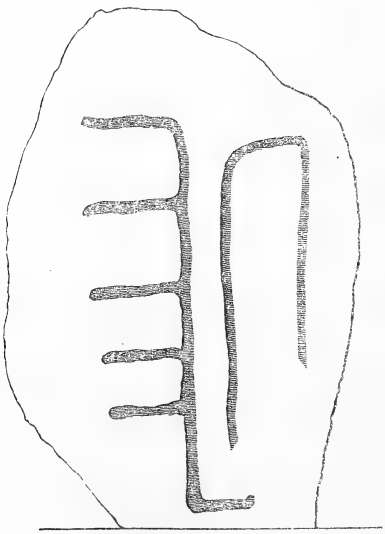
The writer does not enter on any consideration of the meaning or phonetic significance of the characters, desiring to submit the facts and objects, as they appeared, to the judgment of the Academy, and of those scholars to whose notice they will be brought by publication in the "Proceedings."

It appears to the writer that a sepulchral chamber probably exists under the eastern end of the tumulus, which remains undisturbed. Excavations are now being made at the great mount at Carnac, in the same neighbourhood, with distinguished success, and with a judicious regard to the preservation of the monument, under the direction of M. Galles, the Military Sub-Intendant of the department. A rich collection of hatchets and ornamental objects, in jade, jasper, and other rare kinds of stone, has been disinterred; but as yet nothing resembling an inscription, save some disk-shaped markings on the roof of the chamber containing the deposit, has been discovered. The writer expressed an earnest desire that the attention of the Commission of Ancient Monuments of France should be turned to the exploration of the eastern end of the *Mane Nelud*, where whatever exists may be relied on as hitherto undisturbed, and where there is so strong a probability of the existence of inscribed characters.

The writer desired it to be understood that the word "character" in this communication is used in its most general sense, and not as necessarily importing either ideagraphic or alphabetic signs.

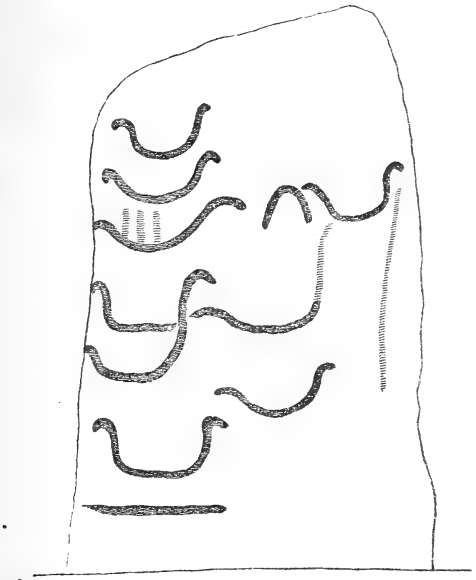
Since preparing this statement, the writer has had a communication from M. Galles, announcing that the excavation at the eastern end of *Mane Nelud* had been commenced. M. Galles, on a careful scrutiny of the chamber and passage by lamp light, has verified the writer's drawings, with the addition of the portions shown in dotted lines; and has also discovered another inscribed stone in the passage, being the third on the right hand, entering.

Additional Stone, discovered by M. Galles.



He has also favoured the writer with a drawing of the stone No. 3, to which particular attention had been requested, with a view to ascertain whether any transverse markings could be detected on the wavy lines constituting what the writer supposed to be ornamentation, but which appears, from M. Galles' drawing, to be substantially of the same character with the other inscribed objects.

Stone No. 3.



F. J. Foot, Esq., read the following paper:—

Notes on a Storm which occurred on Thursday, October 29, 1863, at Ballinasloe, about 150 feet above the Sea.

Tuesday, 27th, was dry, bright, and calm. Wednesday forenoon, bright, rather cold, with a fresh breeze from W. Aneroid barometer read at 9, A. M., 28·88. Fresh breeze all day; cumulous clouds, and partial showers. Towards evening the breeze died away; western horizon obscured by cumuli at sunset. The moon, which rose about half-past 5, P.M., appeared of great size, and very red, tinging the clouds which hung over it. Indeed, any one not knowing the bearings, and brought suddenly to the spot, might have imagined it to be the setting sun. At 8, P. M., the sky was pretty free from clouds, and there was a faint halo about the moon, but at 11 it was quite clear; sky cloudy towards the west; calm. Barometer 28·64.

Thursday, 29.—About 1, A. M., the wind, from W. or W. by N.,

freshened, and rapidly increased in force to a full gale, accompanied by heavy showers. At 10, A. M., the barometer read 27·76 (thus showing a fall of about $\frac{9}{100}$ of an inch during the night). From 10 to 11 it remained steady at 27·76. The storm appeared now to be at its height, the wind blowing furiously from W., accompanied by heavy showers. Windows were broken, roofs of houses stripped of their slates, and trees blown down. From 11 the barometer began to rise, and the storm showed symptoms of abating, coming on in heavy squalls with showers, instead of a constant steady gale, and the sky brightening after each shower. At 12 (noon) the barometer read 27·92; wind W. by N. Heavy cumuli, with patches of blue in the sky. At 1, P. M., barometer read 27·98; wind W., or W. by N.; heavy squalls. 2, P. M., barometer read 28·04; wind W., or W. by N.; heavy squalls. 3, P. M., barometer read 28·10; wind rather more of a gale, with heavy squalls; showers less frequent; sky clear, with cumuli to W. and N. Wind due W. At 4, P. M., barometer 28·14. The weather cleared up, the wind still blowing freshly from the west. At 6, P. M., barometer 28·22; dry; fresh breeze, with squalls. 7, P. M., barometer 28·26; wind considerably abated, but with occasional heavy squalls, W. to N.; the sky bright and clear. 8, P. M., barometer, 28·28; night dry, sky clear, with a few cumuli. From this time the wind decreased rapidly, dying away in squalls; and at 9, P. M., it was almost quite calm, the barometer standing at 28·32. At 11·30, P. M., barometer 28·34.

During this storm it was very cold, the temperature ranging from 44° to 46° Fahr.

Friday, 30th.—Cold, occasional light squalls, and heavy showers of rain and hail. 9, A. M., barometer 28·20; 11, A. M., 28·20. Thermometer, in a room of tolerably even temperature (no fire, &c.), 45° Fahr. The directions of the wind are *meridional*, not *magnetic*.

W. R. Wilde, V. P., exhibited a large collection of ancient Irish gold ornaments, which had been procured for the Museum under the Treasure Trove regulations during the past year. One of the most remarkable specimens was the hollow globular gold bead, $3\frac{1}{2}$ inches in diameter, composed of two hemispheres soldered together, and weighing 2 oz. 7 dwts. 10 grs., which formed a portion of the great gold necklace found near Carrick-on-Shannon in 1829, and which has been described in the "Dublin Penny Journal," and also in the Museum "Catalogue," Part III., page 35. See No. 36 A. It forms the seventh in the Academy's Collection of the eleven balls originally found in that locality, and was for many years in the possession of the late Sir Francis Hopkins, Bart., in the county of Westmeath.

Two large golden fibulæ, with cup-shaped extremities; the one weighing 6 ozs. 15 dwts., and measuring $5\frac{1}{2}$ inches long; the other 5 ozs. 18 grs., and $6\frac{1}{8}$ inches in length. The former massive specimen is in remarkably fine preservation, and was for many years in the possession of the late Mr. Law, of Sackville-street, from whose successors, the Messrs. Johnson, it was procured. The latter was obtained through Messrs.

Neill, jewellers, of Belfast, who say they purchased it from a dealer. The history of both is unknown. They make the ninth and tenth specimens of this description of ornament now in the Academy's Collection, and which have been described in the "Catalogue" at p. 57, as a Mamillary Fibula.

A small but very perfect fibula, with flat, circular discs, and a highly decorated bow, similar to that from which Figure 598, No. 130, at p. 65 of the "Catalogue" was drawn; it weighs 1 oz. 7 dwts., and was procured from Mr. Donegan. A similar article without discs.

Four specimens of so-called "Ring money," and two counterfeits of same. Several gold fillets, averaging $\frac{3}{8}$ths of an inch wide. Four golden armillæ, three of which have cupped extremities, and were, with the curious gold ornament described at page 96 of the recently published "Catalogue of Gold Articles," found in the plain beneath the Rock of Cashel.

A string of nine tubular gold beads. A gold lunula, similar to those in Case A in the Academy's Collection, specified in the "Catalogue," from page 10 to 19 of Part III., and purchased from Mr. Donegan; their history is unknown. The two articles of most interest, however, are the Gorey and county of Down torcs, which have been procured for the Academy within the few last weeks, of which the following cuts are good illustrations:—

No. 1.

No. 2.

The history of the Gorey Torc, No. 1, is as follows:—In sinking a quarry for railway purposes in that parish, an old clay ditch was cut through; a short time subsequently some children, playing about the mouth of the quarry, observed something bright in the face of the ditch, and drew out, in a very perfect state, a fine torc of remarkably yellow gold, and which must then have measured 28 inches in circumference, and probably weighed 14 ozs. It consisted of a solid quadrangular bar of gold, twisted funicularly, somewhat like No. 190, in the Academy's Collection; but was of its kind unique. The hooked extremities were rounded, and the diameter of the article, when perfect, was $7\frac{1}{2}$ inches; so that it was

evidently a *muin*, or neck torc, of very elegant proportions. The poor man to whom the children brought home this valuable relic of antiquity brought it to a person in Gorey, who pronounced upon the nature of the metal, and, it is said, advised the owner to cut it up, in order to conceal it from his landlord or the Crown, and also for the greater facility of disposing of it. It was accordingly chopped into nine fragments, eight of which averaged about three inches long, and the ninth was a small fragment cut off the end of one of the circular hooks, weighing not more than a few pennyweights, and which there is reason to believe is still in existence. The fragments of the torc were then brought up to Dublin, and sold to Mr. Donegan, who committed one of them to the smelting-pot. When he was waited upon by a member of the Committee of Antiquities, he at once, and on the most liberal terms, resigned it to the Academy. Since then I have had it repaired, with great success, by Mr. E. Johnson. Its present weight is 12 ozs. 10 dwts. Had the peasant who found this article been acquainted with the Treasure Trove regulations, and brought it in an unmutilated state to the police or to the Academy, he would have received its full value, both intrinsically and according to its state of preservation as an article of antiquarian interest.

It is to be hoped that this notice of the Gorey torc may be widely circulated, in order to prevent the further destruction of valuable articles when found, and in the expectation of inducing the finders of such to bring them under the notice of the Government, or directly to the Academy, where they may rest assured that they will be fairly and liberally dealt with, and moreover be secured from any proceedings which might be instituted against them.

The second article of this class, No. 2, now before the Academy, is the Belfast Torc—said to have been "found in digging an old ditch in the Co. Down"—which was purchased from Messrs. Neill, of Belfast. It is by far the most curious article of its class which has yet been discovered in this country, and substantiates in a most remarkable manner the fact that gold was manufactured in Ireland; for it is still in an unfinished state, and was probably in process of working when lost. It is a three-leaved gold torc, believed to have been found perfect, but which when brought to the Belfast jeweller consisted of two fragments, and was still further broken up in his establishment; so that when it came under my care it was in a very shattered condition. Under the skilful management of Mr. Johnson, it now forms a perfect whole, 32 inches in circumference, and about $\frac{3}{4}$ths of an inch wide, and weighs 5 ozs. 12 dwt. 6 grs. The terminal hooks are circular, as there is reason to believe the whole bar was originally. It was then cut longitudinally, and hammered out into three flat bands or ribbons, each about $\frac{3}{8}$ths of an inch wide, but retaining their integrity in the centre, as was demonstrated by a careful examination of the sections of the fragments into which it was broken, and which did not exhibit at the junction of these bands the slightest trace of solder or other mode of artificial joining. It was then slightly twisted, and might, in the opinion of our jewellers, be given the same

twist as that of the Tara torcs by filling the triangular spaces between the fillets with lead or some other ductile metal.

When the Tara torcs were first described to the Academy, it was believed, both by antiquaries and jewellers, that the leaves or ribbons of which they were composed were soldered together at the inner edges, and then twisted; but, after the most careful examination of this Torc, it is quite apparent that the process of torc-making was as I have described it.

Although no question has ever been raised with respect to the propriety of restoring with their fragments, fossils, and also ancient statuary, fictile ware, or other objects of antique art; and although some might object to the restoration of articles in metal work when found in fragments, bent, or otherwise altered from their original condition—common sense, taste, the interests of antiquarian and ethnological science, as well as the example of all public collections, and the necessity for preservation of the articles themselves, point out the advisability of restoring, when possible, articles recently cut up with a cold chisel on a smith's anvil, or crushed into pieces in a jeweller's workshop.

The Secretary read a letter from Dr. R. Keller, of Zurich, returning thanks for his election as an Honorary Member of the Academy.

The following donations were presented to the Academy:—

A portrait of Carolan, the harper; presented, through the Rev. Dr. Todd, by the Rev. Charles Tisdall, D. D.

Duplicate photographs of the Sheshkill, and of three Irish croziers; presented by the Commissioners of the Science and Art Department of the Committee of Council on Education.

A copy of the "Rhind Papyri," edited by Samuel Birch, LL. D.; presented by David Brewer, Esq., through Dr. Birch, of the British Museum.

The thanks of the Academy were returned to the donors.

STATED GENERAL MEETING, Monday, November 30, 1863.

The Very Rev. Charles Graves, D. D., President, in the Chair.

The Secretary read the following communication from the Rev. Professor Haughton, accompanied by letters from the Rev. Dr. Robinson, of Armagh, and Mr. Mettam, of Trinity College Magnetic Observatory:—

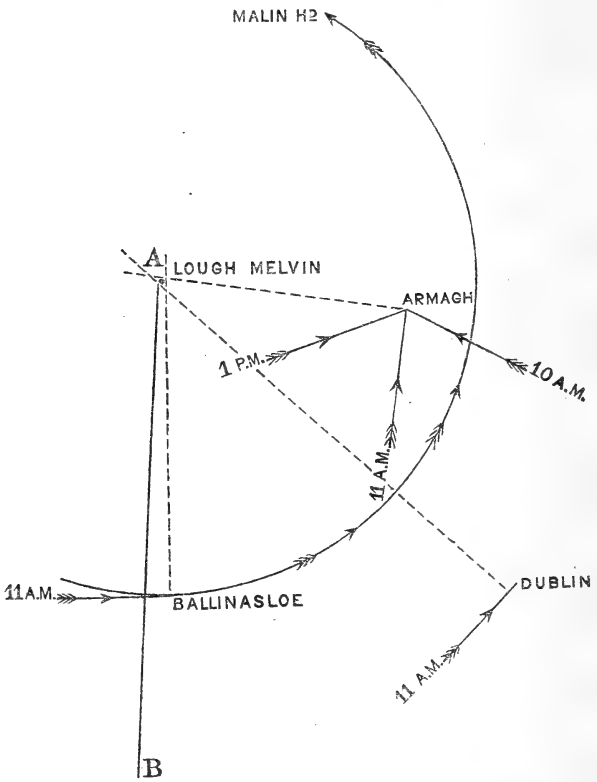
On the Non-Cyclonic Character of the Storm of October 29, 1863.

Trinity College, Dublin, Nov. 30, 1863.

Dear Dr. Reeves,—As Mr. Foot's paper on the storm of the 29th October, during which the ironclad "Prince Consort" nearly foundered at sea, appears to have attracted the notice of some meteorologists, I think it may prove of some interest to lay before the Academy two letters, one from the Rev. Dr. Robinson, and the other from Mr. Mettam, who keeps the records of the Magnetical Observatory of Trinity College.

These letters give an account of the observations on the wind made at Armagh and Dublin during the gale, and it appears to me that they completely establish the non-cyclonic character of the storm of the 29th October.

The wind in Dublin blew steadily from the S. W. during and long after the gale; while in Armagh (as appears from Dr. Robinson's letter, or from the accompanying drawing, which I have made to represent the observations) it seems to have shifted through 132° from 10 A. M., to 1 P. M.



The gale in Dublin was at its height at 11 A. M., when the wind travelled at the rate of 16 miles per hour.

Perpendiculars drawn to the directions of the wind at this hour, from Dublin, Armagh, and Ballinasloe, nearly intersect in Lough Melvin (A), in the county of Fermanagh,—a circumstance which, at first sight, would seem to prove that the storm was a Cyclone. But if a line BA be drawn, parallel to the bisector of the angle between the wind directions of Armagh at 10 A. M. and 1 P. M., it is well known that the gale, if a Cyclone, must have travelled along the line BA.

If this had been the case, the centre of the storm should have passed near Ballinasloe, where the wind should have changed through 180°. As this supposition is completely at variance with the facts observed at Ballinasloe, we are entitled to conclude that the gale was not a Cyclone.

I am yours sincerely,

SAMUEL HAUGHTON.

To the Rev. Wm. Reeves, D. D., Sec. R. I. A.

"*Armagh Observatory, Nov.* 19, 1863.

"MY DEAR HAUGHTON,—I see in the 'Irish Times' that you communicated to the Academy an account of the gale of the 29th last at Ballinasloe, where the direction of the wind seems to have been invariable. That was not the case here, as you will see by the annexed record of my anemometer.

"From noon, on the 28th, the direction changed *against the sun* till 10 A.M. on the 29th; then came back till 10 P.M. It was very strong here.

October 28.	Direction.	October 29.	Direction.	October 30.	Direction.
11 A.M.,	122°	. . .	0°	. . .	49°
Noon,	122	. . .	16	. . .	62
1	122	. . .	69	. . .	63
2	114.5	. . .	76	. . .	67
3	108	. . .	78	. . .	62
4	99	. . .	82	. . .	63
5	75	. . .	77	. . .	60
6	70	. . .	78	. . .	53
7	51	. . .	73	. . .	51
8	40	. . .	73	. . .	47
9	39	. . .	74	. . .	53
10	35	. . .	65	. . .	56
11	29	. . .	66	. . .	48
29° 12	19	. . .	52	. . .	47
A.M.					
1	14	. . .	51	. . .	48
2	0	. . .	41	. . .	53
3	329	. . .	40	. . .	59
4	336	. . .	37	. . .	60
5	329	. . .	38	. . .	61
6	344	. . .	38	. . .	63
7	335	. . .	37	. . .	65
8	324	. . .	34	. . .	69
9	298	. . .	38	. . .	72
10	297	. . .	44	. . .	71

"The graduation reads from 0 = south through 90 = west, 180 = north 270 = east. The time is the mid epoch between each number of the first column and the preceding, i. e. the direction opposite 11^h is that at 10^h 30^m.

"Yours ever,

"T. R. ROBINSON.

"*To the Rev. S. Haughton.*"

"22, *Trinity College, Nov.* 21, 1863.

"Dear Sir,—I send you the direction of wind every second hour from the commencement of the gale on 28th October, until it passed away, on the 30th, 1863, and find on reference that the gale was in Dublin October 29.

"Wind, October 28, 1863, commenced to blow from S. E. at 6 A.M.; 8 A.M., S. S. E.; 10 A.M., S. S. W.; 12, noon, S.W.; 2 and 4 P.M., S.W.; 6 P.M., S.S.W.; 8 P.M., S.W.; 10 P.M. and 12 midnight, S.W.

"October 29th, 2 and 4 A.M., S. S. W.; 6, 8, and 10 A.M., 12, noon, 2,* 4, 6, 8, and 10 P.M., 12, midnight, wind S.W.

"October 30th, 2, 4, 6, 8, 10 A.M., and 12 noon, 2 and 4 P.M., wind S.W.; 6 and 8 P.M., W. S. W.; 10 P.M. and 12 midnight, wind S.W.

"Yours faithfully,

"John Mettam.

"*To the Rev. Professor Haughton.*"

J. B. Jukes, Esq., read a paper—

On Crannoges in Lough Rea.† By G. Henry Kinahan, Geological Survey of Ireland.

The crannoges to be described in this paper occur in Lough Rea, which is situated in the parishes of Loughrea and Killeenadeema, barony of Loughrea, county of Galway, Sheet 105 of the Townland Ordnance Survey, and at the east margin of Sheet 115 of the one-inch Map of Ireland.

At the south-east of the lake is a group of rocks, called "Stone Islands, South;" at the east, an island, called "Stone Island, North;" at the north-east are five islands, called "Barrack, Long, Middle, Bush, and Switch Islands;" at the north-west, "Blake's Island;" near the west shore, "Reed's and Shore Islands;" at the south-west, "Ash Island;" and about 200 yards from the south shore is "Island M'Coo." The last four have been found to be *crannoges*, or artificial islands.

On looking at the Ordnance Map (Galway, Sheet 105), it will be seen that within a mile of the lake there are twenty-one *raths* or *raheens*, all of which, except two, are in the vicinity of the crannoges, two of the largest being in the immediate neighbourhood of Shore Island,‡

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* From $11\frac{1}{2}$ A.M. wind = 16 miles per hour.

† In Hardiman's "History of Galway" we find the ancient name of the town of Loughrea was *Baille Riogh;* from which it would appear that Rea is a corruption for Riogh, and that the name of the lake ought to be Lough Riogh, that is, the *Royal Lake*, or *The Lake of the Kings.* This name may have been so called from one of the crannoges having been the residence of the kings or chiefs of the sept that inhabited the district thereabouts; or perhaps it is much more modern, the town having been called Baillie Riogh, after *Mac William Eighter* (Sir William or Ulick De Burgo), one of its founders, who declared himself King of Connaght, and the lake Lough Riogh from the same. For neither of these conjectures is there documentary evidence; but the former seems to be the most probable, as in the latter case the lake would naturally have been called Baillieriogh Lough, or, to modernize it, Ballyrea Lough.

‡ One lies between Lord Dunlo's new house and Shore Island; the other, called Knocknasop, a little west of Lord Dunlo's house.

the largest and most important crannoge of the lake. There is a tradition in the country about Lough Rea, "that a city lies buried under the lake," which must have been handed down from generation to generation, as it undoubtedly points to the time when the crannoges were submerged, some of which may still be undiscovered, as on a calm day, in the shallow parts of the lake, heaps of regularly placed stones can be observed, all of which may be ancient habitations, and part of the submerged city.

While stationed in Loughrea last winter (1862), I was informed that Shore Island contained numerous bones, and that piles had been observed in places round and across it. I inferred, therefore, that it must be a crannoge; and during last summer I examined all the islands in the lake, and found that Reed's Island, Shore Island, Ash Island, and Island M'Coo, are crannoges, while Blake's Island may be one. The accompanying sketches, taken from the fair-green of Loughrea, will show the relative positions of these. Reed Island lies a little on the right of sketch, Fig. No. 1. It was not included, as it lies so low as to be unobserv-

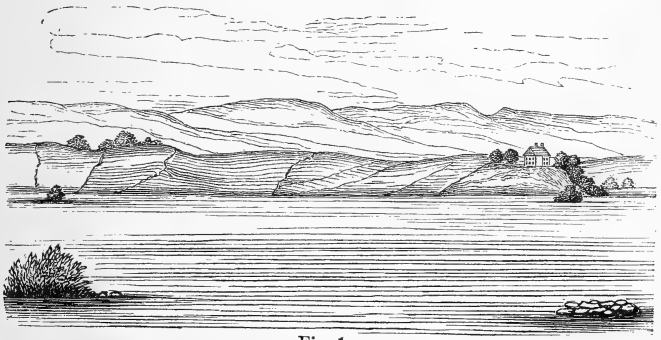

Fig. 1.

able in any picture. Shore Island lies immediately below Lord Dunlo's house, in Fig. No. 1; Ash Island is toward the left of the same sketch, near the shore; and Island M'Coo is the wooded island, toward the left of sketch, Fig. No. 2.

Fig. 2.

By the kind permission of Lord Clancarty and Mr. Blake (Lord Clanrickard's agent), I was enabled to explore Reed's, Shore, and Ash Islands; but to the proprietor of Island M'Coo (Lord Huntington) I did not make application, as by the time the others were examined, the waters of the lake had risen, and stopped all satisfactory work. In fact, but for this reason I would have made additional excavations in Shore Island.

Crannoge No. I., or *Reed's Island*, is situated at the N. W. corner of the lake, about fifty yards from the present shore. Fig. No. 3 is a plan

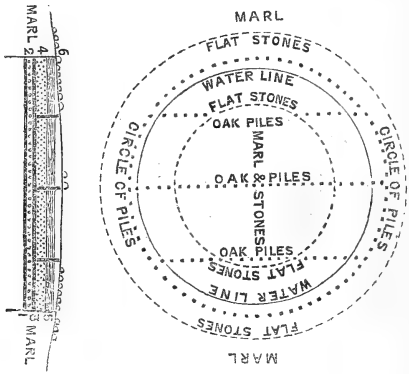

Fig. 3.—Scale, 20 feet to 1 inch.

and section of it. It lies very low, being covered with water during the winter months; but, owing to the late remarkably dry summer, the island, at the latter end of June, stood 12 inches above the water.

The following is the section which the crannoge afforded, commencing at the surface:—

Section No. 1.	Feet.	Inches.
7. Loose stones, laid in regular order,	0	6
6. Marl, with a few stones,	1	3
5. Peat, with a few stones,	0	9
4. Large stones, with peat between them,	1	0
3. A layer of branches and trunks of birch trees (some 6 inches in diameter),	0	6
2. Squared oak beams, 4 × 7 inches, lying N. and S. (mag.)	0	4
1. Squared oak beams, 4 × 7 inches, lying E. and W. (mag.)	0	4
	4	8

Round the island there is a circle, formed of piles, the piles being 2 feet apart, and each being about 4 × 8 inches; but their length was not ascertainable. For about 2 yards on the inside of the piles, and about 3 yards on the outside, on the surface of the island, there were regularly placed flat stones, marked No. 7 in section. Running

nearly N. and S. across the crannoge, are three sets of piles, 4 feet long, and 3 × 3 inches thick, marked on section and plan B, C, D. One of them is in the accompanying collection, No. 61.

In making the excavations, the moment bed No. 6 was cleared out, the water burst up, and impeded all satisfactory work. In all the workings subsequently opened, bed No. 3 was reached; but only in one instance were we able to get down to the lower beams, No. 1 in section, and then the influx of water prevented us finding what was below. In bed No. 6 a few bones were found that were much broken and gnawed. They seemed to belong to oxen, sheep, and pigs. Also a rough oak plank, No. 69 in collection, about a foot square; and at the surface of the bed a whetstone (No. 3 in collection). In an excavation on bed No. 5 there was found a quantity of wood ashes; and adjacent to them a circular wooden *noggin*, or *meather*, 4 inches in diameter, and 3 inches high, with a small round handle near its upper margin, which was bevelled to an edge. This *meather* was whole when taken out, but subsequently fell to pieces, as it was perforated by rootlets of bog plants. Near it was what seemed to be the handle of another wooden vessel; but, although it was freshly broken, the other pieces of it could not be found. In another excavation were found a piece of sharpening stone (No. 4), a slab of sandstone (Nos. 1 and 2), nearly 9 inches square, which seemed to have been used as a hearthstone; a piece of iron (No. 6), 4 inches long, apparently a portion of some sort of cutting instrument; and some bright red colouring matter, rolled up in a piece of birch bark.

The centre of this island, as marked on the Ordnance Map, is 271 feet above the level of the sea, while the height of the lake is 270·5 feet, which would leave a difference of 6 inches in favour of the crannoge; and by section No. 1, we find that the lowest beams of it are 4 feet 2 inches lower than the level of the lake. From this it would appear that the then surface of the water of the lake must have been at least 5 feet lower than at present; which would only leave the floor of the crannoge 1·5 feet above the water. It seems to have originally consisted of a circular wooden platform, round which was a circular wall, the framework of which were the piles, the interstices being filled with sods. As the lake rose, it was found necessary to raise the floor, first by a mass of birch timber, and branches, and afterwards by a layer of stones. About this time it may have been divided into compartments, by the north and south lines of piles, as they do not seem to go down lower than the oak beams. I should here mention, that whenever we find rows of piles, they appear to have been the framework of either a sod or wicker wall; in this crannoge they seem to have been the former. The last occupiers of which we have any trace coated the surface of the island with flat stones.

No. 5 in the collection was found near the surface of the crannoge. The bones in this and the other crannoges were more abundant near the outside piles than elsewhere. They are all very much broken, and many have also the appearance as if they were gnawed by dogs.

Crannoge No. II., or *Shore Island*, lies about a quarter of a mile S.W. of No. I. Figs. Nos. 4, 5, and 6 are a plan and section of it. For-

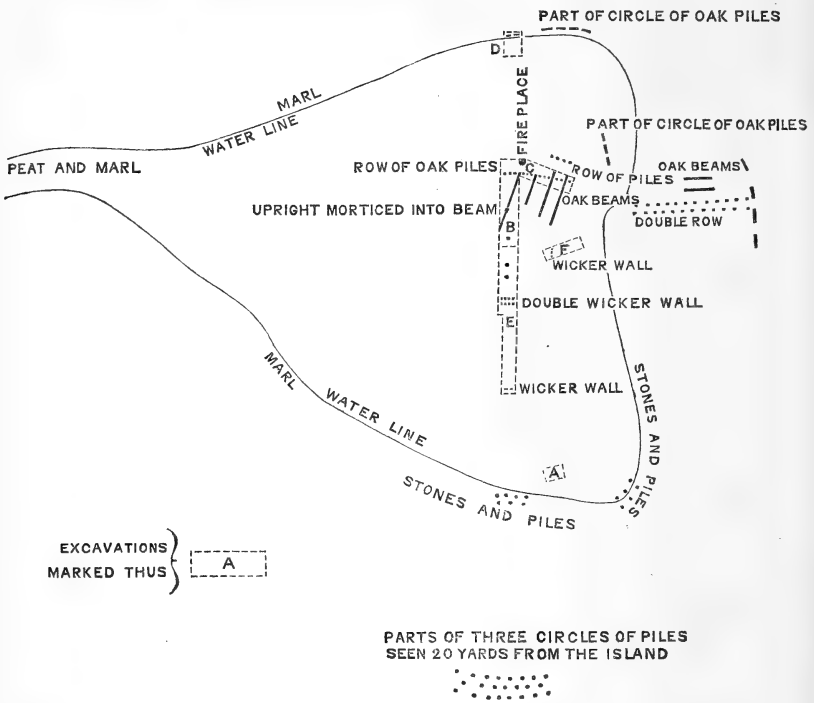

Fig. 4.—Scale, 80 feet to 1 inch.

merly from it to the mainland was a rampart, or moat, formed of marl and peat, about 4 yards wide; but within the last forty years the water of the lake has cut away about 15 yards of this, and made an island of the crannoge. Fifteen years ago numerous excavations were made in this island by the country people, in search of bones, in order to make sale of them for manure. Along with the bones various articles were found, a list of some of which will be hereafter given. The bones were first remarked immediately outside the island, when the waters of the lake were very low. Afterwards the country people found that they occurred in great plenty in the island, especially near the margin and in the northern part, which is now burrowed by these old excavations. In these burrows, and also outside the island, piles can be observed.

On examining the island, the south, south-east, and east shores are found to be a mass of stone between and outside two semicircles of oak piles, while the west and north are banked up with the shell marl, which is now being deposited on the bottom of the lake. About 20 yards south

of the island three circles of piles can be seen below the water on a calm day. They are about a yard apart. 35 feet from the east shore, part of a circle of piles is visible under the water; they may be part of the circle that was found in the most northern excavation, hereafter mentioned, as the heads of a circle of piles were observed among the reeds on the north of the island. From the east shore a double row of piles runs out to the circle, and on the north of the double row are horizontal beams parallel to it. A little N.W. of the double row, in an old working, there is part of a circle of piles; and in another, a row of piles running nearly E. and W. Mr. Hemsworth, of Danesfort, who spent many of his younger days boating on the lake, and knows every part of it, informs me, that on the upper end of some of the upright piles there were the marks of where horizontal beams were morticed on them. These seem now to have disappeared, as I did not remark them.

I caused to be made six excavations in this crannoge. The first ran S. from the trigonometrical point for 48 feet. It is marked E on plan. The north end was not carried down very deep, and gave the following section:—

Section No. 2.

	Feet.	Inches.
5. Stones, peat, and clay, } bones scattered sparingly }	1	4
4. Marl and peat, } through them, }	1	0
3. Marl (8 inches), peat (12 inches), ...	1	8
2. Scraws or peat sods, ...	1	0
1. Marl, not sunk into.		
	5	0

At about 35 feet from the north end, there was the following section:—

Section No. 3.

	Feet.	Inches.
6. Clay, stones, and peat, with bones, ...	1	6
5. Yellow sandy marl, ...	2	6
4. Turf sods, with heather and moss, ...	1	0
3. Horizontal basket flooring, ...	0	1
2. Sandy clay, ...	3	0
1. Turf sods, with heather and moss, ...	0	6
	8	7

By the Ordnance Map, the centre of this island is 3·5 higher than the water of the lake; and as the place where this section was taken was 1½ foot lower than the centre, we find that the basket flooring (No. 3) is about 3 feet lower than the lake, and the lower turf sods

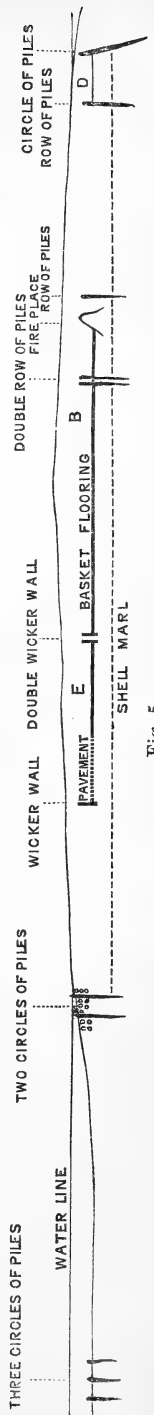

Fig. 5.

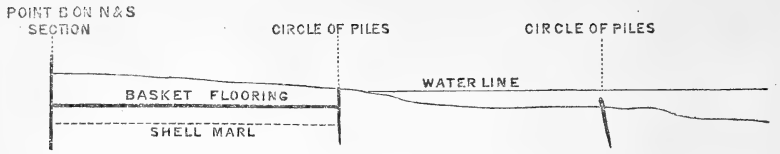

Fig 6.

6 feet. From this it would appear that the lower sods were placed before crannoge No. 1 was built; at least that the water of the lake was at least 7 feet lower than at present.

When bed No. 1 was cut, the water rushed up with a loud noise, like a pistol shot, and drove us out of the workings; that the layer was artificial was proved by the heather and moss on the sods. They were quite fresh, and had all the appearance of being recently cut, so much so, that when the men at work first saw them, they were fully persuaded they were opening an old hole that had only a short time previously been filled up.

In bed No. 2 no bones were remarked. This had the appearance of a bed deposited by water.

In bed No. 4 no bones were remarked; but the heather and mosses were similar to those found in bed No. 1.

Bed No. 5 had all the appearance of an alluvial deposit. A few bones were scattered through it, and the lump of metal dross (Nos. 51 and 52) was found near the bottom of it.

In bed No. 6 were found a few bones, and the following articles:—

No. 48, a quartz pebble. This may be either a sea stone, or a pebble from the old red conglomerate.

No. 49, a hone.

No. 50, a hone.

No. 53, an iron implement; seems to be part of a shears.

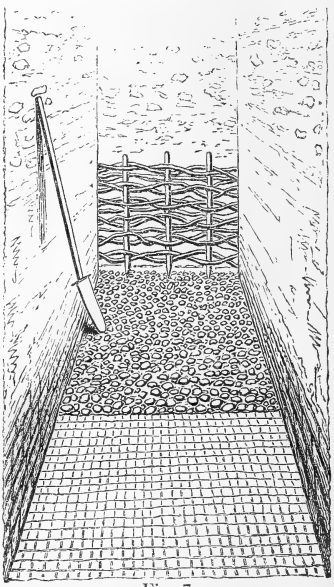

Fig. 7.

At the south end of this excavation was a perpendicular, single, wicker work wall or partition that went down to the level of the basket flooring; but from it, for 11 feet towards the north there was a rough pavement, on which was a thin layer of gravel. The surface of the pavement was on a level with the basket flooring. The accompanying sketch, taken by my colleague, Mr. F. J. Foot, shows the wicker wall, pavement, and basket flooring. About 20 feet north of this single wall, there occurred a double one, that was 20 inches wide, the centre of it being filled up with peat sods. The upright stakes in both

were about 1 foot apart. Nos. 64, 65, 66, and 67 are some of the upright stakes from these wicker walls. To the north of the last-mentioned wall, there were two piles, or rather butts of piles, about 1 foot long, the lower ends of which were quite flat, the flattened surface being apparently cut by some chopping implement. They rested on the surface of the bed No. 1, in Section 2. These and the double wicker wall did not go far up into bed No. 2 (same section), and the tops of them and the wickerwork wall were all charred, as if the structure had been burnt down. The same remark applies to the southern wicker walls, and to a wicker wall hereafter to be mentioned; but in these two latter cases, if they were destroyed by fire, they were not burnt down so low as the double wall or the two piles, as they were over 2·5 feet high. On the north of the double wicker wall, in beds, Nos. 3 and 4, Section 2, were numerous small heaps of ashes, and near some of them were flat stones, that evidently had been used as hearths, as they had all the appearance of being burnt by fire. The basket flooring was made of hazel rods, from 1 inch to $\frac{1}{2}$ inch in diameter. Some were squeezed quite flat by the pressure of the overlying mass, and were so rotten that a specimen of the basket work could not be procured.

The second excavation ran north for 30·5 feet from the north end of the last described. It is marked on plan as B. The following section was measured at its north end:—

Section No. 4.

	Feet.	Inches.
5. Soil, peat, and stones, with a few bones,	1	6
4 Marl and peat, with a quantity of bones,	2	7
3. Heather sods,	0	9
2. Chips of wood and peat, with basket flooring near the base,	0	4
1. Heather sods,	1	7
	6	9

When bed No. 1 was cut through, the water spouted up, and prevented my observing what was underneath. The heather sods had not knitted together, but were quite fresh looking, like those described in Section No. 3. Here we were able to measure their original size, which was about 1 foot square by 5 inches thick.

In bed No. 2 the chips were nearly all deal, and in it, slightly oblique to the length of the hole, ran a horizontal oak beam, that was 10 inches wide by 2·5 deep; on this lay the basket flooring.*

At about 6 feet from the north end of the beam, there was an upright morticed into it; the upright was 2 feet 2 inches high. The south end of the beam ran into the bank of the excavation, and was not followed. Upright stakes ran south from the upright; they seem to have been part of some sort of partition. One of them, No. 63, is in the collection.

* On comparing Sections Nos. 3 and 4, it will be seen that the beds above the basket flooring are very similar, and of nearly equal thickness.

The sods in bed No. 3 were similar to those in No. 1.

Immediately at the bottom of bed No. 4 there was a thin layer of sand, full of bones; and in it, or immediately above it, the following were found:—

No. 16. A fine hone, with a mark on it as if it had been used to sharpen fish hooks or some pointed implement.
No. 17. A hone—Silurian grit.
No. 18. Ditto—Old red sandstone.
No. 19. Ditto. ditto.
No. 20. Similar to No. 16.
No. 21. A small slab of sandstone, used for sharpening.
No. 22. A hone—Old red sandstone.
No. 23. Ditto. ditto.
No. 24. A fine hone. It seems to be one of the Silurian grits got in the hills north of Roxborough.
No. 25. A small celt—Silurian?
No. 26. A small sling-stone—Quartzite pebble from the old red conglomerate.
No. 27. A large sling stone—Made from old red sandstone.
No. 28. Small sea stone—Trappean porphyry, like some of those north-west of Galway.
No. 29. Small arrow-head—Chert from the limestone.
No. 30. A small stone.
No. 31. A piece of a clay crucible.
No. 34. A piece of bone, like a rude spoon.
No. 60. A knife, set in a rude bone handle.

Most of these were close together, near the north end of the excavation; and adjoining them was a large heap of ashes. I may here mention that immediately east of this, as will be hereafter mentioned, a hearth was discovered. The bones found in this bed were all smashed to pieces.

In bed No. 5 there were a few bones; and near the surface was a piece of iron (Nos. 32 and 33), which looks like part of a modern knife.

At the north end of this working were round ash piles that ran nearly east and west (E 5 S. Mag.); they were 2·5 feet apart, and between them was a peat wall.

For 32·5 feet on the north of excavation B there was a space full of old holes that we did not work; but at the end of it was opened a working, marked D on plan. This was 7·5 feet long (north and south), and about 5 feet wide. It gave the following section:—

Section No. 5.

	Feet.	Inches.
3. Marl, full of shells, part of what is now being deposited on the bottom of Lough Rea, ...	2	0
2. Peat, with bones, ...	4	0
1. Marl, full of shells, similar to No. 3, ... over	6	0
	12	0

This excavation was opened at a place which is 3·5 feet lower than the centre of the island. It was carried down for 6 feet; and a six foot pole was forced down into the marl without finding any change. From this it would appear that the sods bed No. 1, in Section 3, was at the bottom of the artificial work.

In bed No. 2 the wicker flooring occurred, but its exact position was not noticed.

At the north end of the excavation a segment of a circle of oak piles occurred, which came up to within 8 inches of the surface of bed No. 3. The tops of these inclined inwards, at about an angle of 75°; they were about 6 inches apart, 15 inches wide, 5 inches thick, and over 8 feet long. At the south end of the excavation were two circular ash piles, that seemed to be part of a partition. They were 7 inches in diameter, 6 feet long, ran 8 inches up into bed No. 3, and 1 foot 4 inches down into bed No. 1. A bone article, like the handle of a large gimlet, was found near the bottom of this bed; it is numbered 47 in the collection.

The next excavation to be described is marked C on plan, and runs E. 15 S. mag. from the north end of excavation B. It was 18 feet long by 6 wide, and was sunk down to the beams under the wicker flooring (Bed 2, in Section No. 4). At the north-west corner of it was a mass of yellow clay, crowned by a limestone flag and ashes, which had evidently been a fireplace, as the flag was all burnt, and quite brittle. At the east end, near the bottom, the celt No. 41 was found. In the vicinity of the hearth were the following:—

No. 35. A hazel nut.
No. 36. Part of a deer's horn.
No. 37. A piece of a fowl's bone.
No. 38. A piece of bone.
No. 39. A bone piercer.
No. 40. A piece of Silurian grit.
No. 42. Ditto.
No. 43. A large Silurian nodule.
No. 44. A hone, Silurian.
No. 45. Ditto.
No. 46. Ditto.

Under the wicker floor were a system of horizontal oak beams, parallel to the beams found in excavation B. They were 4·25 feet apart, 14 inches wide, by 3 deep. A set of oak piles ran nearly east and west, in places being a double row. They were 18 inches apart, and 3 inches in diameter, and were evidently the framework of a wall, as between them were regularly built-up sods.

Among the stones at the surface of this working were parts of the upper and lower stones of a quern. I have put the upper one among the collection (No. 72), as, though imperfect, it is unlike those that will be found in nearly every cabin in the parish of Tynagh, 7 miles west of

Loughrea. In it there are holes as if for two handles, to turn it backwards and forwards, and not describe an entire circle; while the modern querns have only one handle, and are turned round and round.

The next excavation was made a little south of the last described, and is marked F on plan. It was 15 feet long, and ran E. 10 N. (mag.), and gave the following section:—

SECTION No. 6.

	Feet.	Inches.
6. Peat, clay, stones, with a few bones,	2	0
5. Marl,	0	10
4. Peat, with bones,	1	0
3. Basket flooring,	0	1
2. Peat,	3	6
1. Stones, not sunk into,		
	7	5

When the stones No. 1 were reached, the water spouted up, and flooded the excavation.

The basket floor, pieces of the hazel rods being in the collection No. 70, was about the same distance below the waters of the lake as that before mentioned; and under it was a horizontal beam that ran E. S. E. (mag.). On the floor were numerous bones. This was different from what was found in all the other excavations, as in them there was a layer of sods between the basketwork and the bones.

In bed No. 5 a few bones were scattered about.

In bed No. 6 there were also a few bones, and the following articles near the bottom of it:—

No. 54. A hone.
No. 55. Ditto.
No. 56. A rubstone.
No. 57. Large sling stone—Quartzite, from the old red conglomerate.
No. 58. Egg-shaped sling stone—Old red sandstone.
No. 59. An angular piece of Silurian grit, evidently artificial.

Three feet from the west end of this working was a single wicker partition, 2·5 feet high. At the south side it seemed to curve round to meet the double wicker partition in excavation E. At the north side it ended against a large beam of oak, scooped out in the middle, and apparently part of a trough (No. 68 in collection). This was standing upright on the square end, making a right angle with the wicker partition. It here seemed to have been used as a door for a hut; from its east edge ran the before-mentioned horizontal beam. The wicker partition began at the top of bed No. 5, and went down into bed No. 2.

The last excavation to be described lies near the S. E. of the island, and is marked A on plan. It was carried down for 5 feet, the bottom foot consisting of turf sods, in which there were no remains. The other 4 feet were peat mixed with bones. Between 3 and 4 feet down the articles now enumerated were found:—

No. 10. A fine hone—Seems to be one of the Silurian grits found in the hills north of Roxborough.
No. 11. A small slab of sandstone, used for sharpening.
No. 12. A small sea stone. Coal measure?
No. 13. A hone—Old red sandstone.
No. 14. A cut piece of deer's horn.
No. 15. A large pig's tusk.

There was also found here what seemed to be the top of a table. This latter was composed of four planks of oak, 3·5 feet long by 9 inches wide and .2 thick, with underneath two slabs 5 inches wide by $1\frac{1}{2}$ inch thick. These slabs were fastened to the upper boards by dowels (No. 71), and each board was dowelled to its fellow (see dowel, No. 62). This table was so rotten, that it fell to pieces when taken out of its bed. The water came into this hole at a depth of 5 feet, and put a stop to the work.

The inferences I draw from my observations are, that a tribe, and not a family, inhabited this crannoge—each family occupying a hut, or apartment—they all having a common fire in the centre; that the island in the first instance extended much further to the south; that the inhabitants were driven out either by fire or the waters of the lake rising; but in either case it seems to have been deserted, and submerged for a period. Afterwards, by some cause or another, it again appeared above the water.* Then the natives of the country determined to repeople it; but they found that during S. E. and S. gales the whole force of the waves of the lake broke on it, and were gradually eating it away; they therefore, to preserve it, sank the before-mentioned piles and stones at its south and south-eastern shore. Mr. Foot, who assisted at the principal excavations, suggests, "That these inhabitants lived in stone huts; and that the uppermost bed in some of the foregoing sections, consisting of clay, stone, and peat, is the debris of the ruins of these." This does not appear at all unlikely; and it would account for the bones found in it, and not continuous up through the sections from their first appearance.

To arrive at full particulars, and thoroughly understand the history of the place, the whole of the ancient habitations ought to be cleared out, which could not be done properly unless the lake was lowered seven feet.

Mr. Silk, of Loughrea, bought most of the bones from the country people that burrowed this island, and he gave me the following information:—"The country people raised bones in this island and in the boggy bottom on the mainland opposite Reed's Island. The best bones were got in the latter place. In the crannoge the best and whitest bones

* Dr. Gerrard Boate, in his "Natural History of Ireland," mentions that the early English settlers carried on large drainage works in Ireland; and as their stronghold in Connaught was Athenry, nine miles distant, it is not unlikely that it was some of them that opened up the outlet from the lake.

were got deep down, near the margin." He bought altogether over 300 tons. "The excavations were carried on by women; and, as they teemed out none of them, they worked *en chemise*. Among the bones were perfect heads of oxen, sheep, goats, deer, pigs, and what seemed to be large dogs or wolves. There was also exhumed the head of a *Megaceros Hibernicus*, which measured over 13 feet from the tip to tip of its horns." This he had for some time in his possession, but unfortunately it was accidentally smashed to pieces. Mr. Jukes suggests that finding this here may not prove that the *Megaceros* was killed by the people of that age, as they may have found it, and put it up for an ornament or trophy, as is done at the present day. Besides the bones, Mr. Silk got the following articles, but unfortunately he is unable to say whether they were got high up or low down in the workings:—

Iron Shears.—These were made on the same principle as the sheep shears of the present day; but some of them were "so small and fine that they might have been used by any lady as scissors." Some of the best of these he gave to Lord Clancarty.

A brass pin, about 5 inches long, with a swivel head. "This looked like one of the *readiers* that soldiers used when they had match-locks."

A crozier, made of brass, inlaid with rectangular pieces of silver. This he sold for £5, and thinks that it is in the Museum of the Royal Irish Academy; as the gentleman who bought it from him told him "that he had put it in the Museum."

A battleaxe.—This was about 15 inches long. It had a hatchet on one side, and seemed to have had a spike on the other. The socket for the handle was very rudely forged. He gave this along with the crozier for the £5.

A cast for a coin.—This was an iron box, about $7 \times 5 \times 3$ inches, which opened in the centre. It was filled with a white substance, like plaster of Paris, in which the die was made. On the outside were two clips to keep the box close fastened, and a round hole for pouring in the metal. Unfortunately he did not know the value of it, and left it knocking about. Afterwards the idea came into his head of taking an impression from the cast; but when he opened the box, the white substance had fallen to pieces. The box he set no value on, and does not know what has become of it.

A hammered iron vessel.—This was about the size of a large cup, but went down more square to the bottom. It looked as if it had been used for smelting purposes; and he afterward gave it to a farmer for melting lead in. *

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* Since the above was read, Mr. Ryan, of Cuscarrick, Loughrea, has presented a semicircular knife, about 7 inches long by $\frac{3}{4}$th of an inch wide, which he says was found in this crannoge. It has been put along with the rest of the collection in the Royal Irish Academy.

Crannoge No. III., or *Ash Island*, of which Fig. No. 8 is a plan and section, is about 60 yards from the present shore, at the south-west

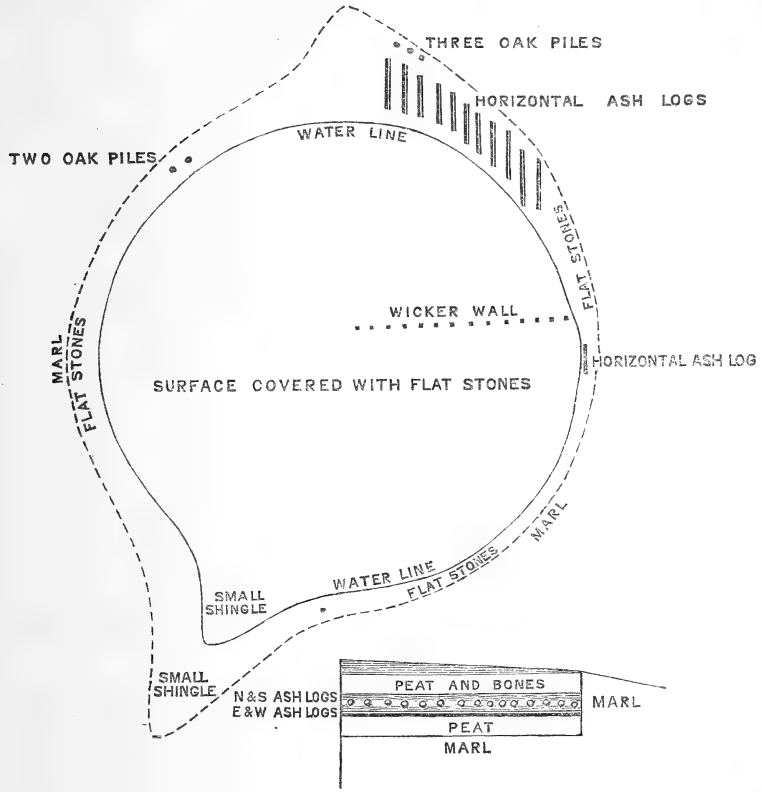

Fig. 8.—Scale, 20 feet to 1 inch.

corner of the lake. When examined in August last, the surface above the water was about 20 yards in diameter, with a spur out of it toward the south-west, 3 yards long. All the present surface of the island was covered with flat stones, as well as the west side below the level of the water, for about $1\frac{1}{2}$ yard on an average. To the north and south-west spurs ran out, both being about 4 yards long, measured from the edge of the water. On the north-east, from the water's edge for 2 yards the flat stones also were observed; while on the south-east they were less than half a yard wide. The spur on the south-west, both above and below the water line, was covered with small shingle. Below the water, on the north-east, a number of parallel logs of round ash timber, about 6 inches in diameter, and 2 feet apart, are visible; and one or two logs on the east side. Only a few oak piles were remarked, three being observed on the north-east, and two to the north-west. There are no indications

that this island was surrounded by a regular set of piles; for, unless they are much shorter than those observed, the tops of the piles would appear above the surface.

An excavation was made across the east side of this island, in which was the following section:—

Section No. 7.

	Feet.	Inches.
8. Stones, peat, and clay,	1	0
7. Peat and bones,	3	0
6. Stones and peat,	1	0
5. Round ash logs, 6 inches in diameter, 2 feet apart, ranging N. and S.,	0	6
4. Peat,	0	6
3. Round ash logs, 6 inches in diameter, 1 foot apart, ranging E. and W.,	0	6
2. Peat, not sunk into,	3	0
1. Marl, over	6	0
	15	6

On the surface of the island, immediately above and below the line of winter inundation, numerous bones and teeth lie scattered about. These may have been washed out of bed No. 7. In bed No. 8 no bones were met with. In bed No. 7 are numerous bones, more especially towards the outside of the crannoge; wood ashes; a round sea stone (No. 7); broken and whole hazel nuts; and two hones, one of which is in the collection (No. 9). Bed No. 2 could not be sunk into on account of the water; but it seemed to be 3 feet deep, and to lie on marl that was over 6 feet deep. An east and west wicker wall was found in this excavation, which went down to the east and west logs. The stakes in it were of round fir timber, 2 inches in diameter, and about a foot apart. According to the Ordnance Survey, this island is 0·5 feet higher than the surface of the water; but their B. M., which is at the north-east corner of the island, is a foot lower than where the section was measured, which will leave the lower beams 5 feet lower than the present surface of the lake.

Crannoge No. IV., or *Island M'Coo*, is 180 yards from the nearest shore. All we know about it is, that it seems to be surrounded by a circle of piles, 33 feet in diameter; and that in the summer months *gun-barrels* and bronze *spearheads*, or, as they are called hereabouts, Danes' hatchets, are said to have been brought up in the prongs of eelspears.

Mr. Hemsworth informs me that there are four canoes sunk at the east side of this island, with their prows in towards the shore. He tried to raise one of them; but it was so rotten, that it broke across in the middle. It was a log of oak, hollowed out to form the canoe. He accounts for the gunbarrels found in the following way:—About the year 1798, all the guns, &c., seized about the country were brought into Loughrea; and his grandfather, who was the magistrate in charge, being ordered to destroy them, had them all brought out and sunk in the lake.

From the above facts we may draw the following conclusions:—First, that iron was in use in the early ages of the crannoges. This is

proved by the old knife, No. 60. The sharp points on the stakes would lead to the same conclusion; also the number of hones which must have been used for the sharpening of metal implements. The cuts on the pieces of deer's horn, Nos. 16 and 36, must have been made by a very fine saw, as there are no marks of graining on the surfaces. Secondly—That when the crannoges were first built, the surface of the lake must have been at least seven feet lower than at present, as is proved by Sections 3 and 5, and by the old turf banks at the south-east of the lake, over which there are five or six feet of water. And that at a subsequent period the west part of the lake must have been twelve feet deeper than at present; this is proved by Sections Nos. 5 and 6, as in them we find six feet of shell marl under the artificial works. The change in the level of the lake must have been caused by the silting up of its outlet. The ancient stream from the lake seems to have been at the west end of the town, as in that place there is an alluvial deposit, while at its present outlet there is strong *corn* gravel; and a little below its present bed there seems to be rock. If the embouchure of the lake was at the west end, it must have run by the old Abbey to the alluvial flat on the north.

If we examine a lake that is silting up its outlet, we shall find what a tedious process it is. First, the weeds grow during the summer, and catch the heavy particles that are coming out with the water; but in the winter floods all the weeds are broken down, and most of the accumulated matter is carried away: so that in a century it would scarcely raise the bottom of the stream more than six inches; which would make the crannoges to have been built about 1400 years before the lake reached its present level. But we must consider that since Loughrea was built the lake could scarcely have changed its level; for the eastern outlet ran at the foot of the town wall, and the inhabitants would have kept it open, being part of the defences of their town. Loughrea is more than 400 years old;* but if we allow 400 years, it would make the age of the crannoges over 1800 years, or before the Christian era.

Loughrea is about a mile wide from the N. E. to the S. W., and a mile and three quarters long from the N. W. to the S. E. It contains about 900 acres, and of these at least 400 have not more than 15 feet in depth of water on them. These 400 acres could be easily drained, as it would be only necessary to open a cut from White's Bridge, that lies a mile on the north, which, according to the Ordnance Survey, is 17 feet lower than the lake.

The Rev. William Reeves read a paper "On the Bell of Armagh."

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* The castle of Loughrea, or *Baille Riogh*, was built in A.D. 1236, by Richard De Burgo (Hardiman's "History of Galway," from his authority, the "Annals of Inisfallen), and the town with its walls in the succeeding century. Of these, there now (1863) only remain the foundations of the castle, the east foss, and the keep at the S. E. gate, the N. E. gate having been demolished, by public presentment, about fifteen years ago, as it was considered an obstruction in the principal street of the town. The town seems to have been built on the margin of the lake, and the present principal outlet from the lake appears to have been made when the town was first built as a foss or dyke at the base of its eastern wall.

W. R. Wilde, V. P., presented to the Library and Museum of the Academy the following articles, which had been committed to his care:—

From Lady Otho Fitzgerald, "Miscellanea Graphica," an illustrated catalogue of the antiquities in the possession of the late Lord Londesborough, which possessed a special interest to the Academy, from its containing an account of the gold ornaments found at Newgrange, and also of the bell of St. Mura of Innishowen, and other Irish antiquities, which had passed into the collection of his lordship. From his brother Census Commissioners and himself, the "Census Reports for 1861," consisting of the volumes of the Townland Census, two volumes of the Report and Tables on Ages and Education, and the Report on Vital Statistics, Part I., "Status of Disease." Mr. Wilde stated that he hoped shortly to present the volume upon the "Religious Professions in Ireland," together with the remaining portions of the Census for 1861. He also presented, from Lord Farnham, a long, narrow celt of greywacke slate, found in the county of Fermanagh; a small earthen crucible; a copper celt, found at Ballyjamesduff, county of Cavan; a bronze, broad-bladed, axe-shaped celt, a socketed celt, and a paalstave, all from the county of Fermanagh. From Dr. Malcomson, of Cavan, a very perfect bronze spear-head, found ten feet beneath the surface in Kilmore bog, barony of Castlerahan, county of Cavan. From the same locality, the fragments of a bronze sword, much contorted, apparently by fire; and an ancient bronze spur, found in the foundations of an old wall in the townland of Killafinlagh, barony of Castlerahan, county of Cavan. From Charles Cheyne, Esq., C. E., the oaken model or representation of a curved sword, 16 inches long in the blade, and probably used for casting weapons of the same form, found in the townland of Leabeg, in the King's County, between Clara and Ferbane, imbedded in blue clay, seven feet below the surface, about half a mile to the north of the River Brusna, and along with the bones of ruminant animals; also a narrow spear-head, of bronze, found in the townland of Leamone, parish of Gallen, King's County, in blue clay, five feet beneath the surface, near the old castle of Cool, on the banks of the River Brusna. From William Kirwan, Esq., a small antique iron horseshoe, without grooves or cocks, and having six large square nail-holes in it—probably the shoe of one of the hobbles which John Dymmock notices in his description of Ireland in the time of Elizabeth. It was found at Blindwell, county of Galway. From Thomas Byrne, a road ganger, employed upon the Drogheda line, a brass shilling of James II., in very good preservation.

The thanks of the Academy were voted to the donors.

The Academy then adjourned.

MONDAY, DECEMBER 14, 1863.

The Very Rev. Charles Graves, D. D., President, in the Chair.

George V. Du Noyer, M. R. I. A., G. S. I., presented to the Library of the Royal Irish Academy 95 Drawings of Architectural Antiquities, from original sketches, to form Vol. V. of similar donations; of these the following is the Catalogue :—

No. 1.—View of St. Brendan's Cloghaun, or stone hut, on Innishtooskert (*Anglice* Northern Island), one of the Blasket Islands, off the coast of Kerry. This singular structure, which no doubt was erected by, or for, the Saint whose name it bears, and which is therefore of the sixth century, is partly constructed in the ground, and is of the beehive form, each stone overlapping the one below it till the dome was completed. Internally it measures about 16 feet in diameter, and the walls are of great thickness. The doorway, which is flat-headed, is placed over the lower portion of a flight of stone steps, which leads from the surface of the ground to the chamber beneath. The general similarity between this cloghaun and many of those which, in the summer of 1856, I had the good fortune to discover along the northern coast of Dingle Bay, at Fahan, west of Ventry, the detailed account of which is published in the "Journal of the Archæological Institute," for March, 1858, is very apparent; at present the terminal stone of St. Brendan's Cloghaun is wanting, thus leaving a convenient hole at the apex of the roof for the escape of the smoke when a fire is lighted in the apartment.

The island of Innishtooskert occupies an area of 186 acres, and lies in the Atlantic Ocean, at the distance of 5 miles due west of the village of Dunquin, and, excepting during the finest weather, is quite inaccessible, as its entire coast is precipitous, attaining on the northern side of the island a height of 573 feet. The so-called "landing place" is on the south side, up a cliff of about 50 feet in height, so steep, that occasionally our dogs and hampers had to be "passed up" from "hand to hand." There is no spring well on the island, but we encamped by the side of a deep hole in the grassy soil, which receives and retains the drainage of a large extent of surface.

On the northern side of the island some nearly vertical beds of Old Red conglomerate rise up boldly from the sea, and form a sharp peak of about 460 feet in height, which forms a striking feature when viewed even from the mainland.*

In addition to St. Brendan's house there are some rude, and no doubt equally ancient, ecclesiastical remains; they consist of two beehive huts, with rectangular buildings attached, having small walled enclosures

* See my description of this island and that of Innisvickillane in the "Memoirs of the Geological Survey, explanatory of the Geological Maps," Nos. 160, 161, 171, 172.

near them; one of the latter buildings was evidently a church, and its stone altar is yet standing. Here for thirteen centuries was left undisturbed the stone chalice of St. Brendan; but some years back this was abstracted by a tourist.

In the month of July every hole and cranny in the rocky shingle and peaty covering of the island is inhabited by the Stormy Petrel (Mother Cary's Chicken), which there performs its incubation; and the clear chirping noise of these little birds, which conceal themselves from view, was a source of much wonder and surmise to the boatmen and the rest of our party, till one adventurous coastguard man thrust his arm into a hollow in the turfy covering of a pile of rocks, and brought forth the little Petrel and its single egg.

About twelve or fourteen years ago this island was used as a sheep farm, and a married couple were left there in charge, and who lived in St. Brendan's Cloghaun. An unusual spell of stormy weather having occurred, the constant visits of the Dunquin boatmen were interrupted, and no communication with the people on the island could be attempted for about six weeks. When the place was at length visited, a fearful spectacle presented itself: the woman was alone, nearly dead from hunger, and a maniac; around her in the dark cloghaun lay clots of blood and lumps of putrid flesh, the remains of her husband. After a time, when she partially recovered her senses, the sad story was elicited, that during the bad weather her husband sickened and died, and being a very large and robust man, she had not strength to remove the body from the hut, up the steep flight of steps; for many weary days and nights she sat by the corpse, till its presence became intolerable; there was no other shelter but this hut on the island, and in despair she dismembered the decaying mass, and buried the pieces singly without. Since then the place has been deserted, and even sheep are rarely left to pasture there.

On the neighbouring Island of Innishvickillane, which lies to the south of Innishtooskert, and is 171 acres in extent, there are also some ancient ecclesiastial remains, but so ruinous as not to afford a subject for a sketch. The island is systematically farmed, and always stocked with sheep; a family of six or eight people inhabited it at the time of my visit, in the summer of 1856. These people assert that during one stormy season their fire went out, and not having the means of relighting it, they were reduced to almost starvation; they, however, supported life for a period of two months by the use of sheep's milk alone.

Strange to say, there are not any ancient remains on the Great Blasket Island.

No. 2.—The House of St. Finan Cam, on Church Island, in Lough Curraun, near Waterville, county of Kerry. This building is noticed by the learned Dr. Petrie, at p. 130 of his work on "The Round Towers," and he attributes it to the 6th century. There is a small rectangular window on the east side of this building, facing the doorway: without doubt this building was the *church*, as well as the residence of the Saint whose name it bears.

No. 3.—View, looking N. E., of a very singular stone building erected at a short distance to the westward of the old church of Kilmalkedar, county of Kerry. This is one of those primitive boat-shaped churches of which we have so perfect an example in the stone oratory at Gallarus, near Kilmalkedar. I believe that the term *nave*, as applied to the body of a church, is derived from the Latin *navis*, a boat or galley; and, if so, we have in the ancient structure I am about to describe the original idea of a church suggested by the form presented by a rude boat turned upside down, and copied in rough masonry. Dr. Petrie alludes to this stone oratory near Kilmalkedar, when describing that at Gallarus; but he has not given any illustrations of it, a want which it is my present object to supply.

The gable walls of this church are inclined externally at nearly as great a curve from the ground as those forming the sides and roof, but internally they are nearly perpendicular. The doorway is in the west gable, and is flat-headed with converging sides. The east gable is pierced by a narrow rectangular loop, splayed both within and without. The east gable springs from a plinth, but the remaining sides rest on the ground. In the stone oratory at Gallarus the internal curve is somewhat that of a stilted equilateral pointed arch; but in the Kilmalkedar oratory it resembles an exceedingly pointed ogee arch with a narrow flat top, formed by the row of covering stones laid along the ridge of the roof. The original Termon or boundary wall encloses this primitive church, which is certainly of greater antiquity than the stone oratory at Gallarus.

No. 4.—View of the east gable of the stone oratory at Kilmalkedar.

No. 5.—View of the interior of the west gable of the same building, showing the character of the doorway, and the massive projecting lintel perforated to enable a wooden door to be suspended from it.

No. 6.—View of the interior of the west gable of the same oratory, showing the peculiar form of the window.

No. 7.—Ground plan of the same building, showing the unequal thickness of the east and west gable walls, and the external inclination of the gables.

No. 8.—View of the interior of the doorway of the stone oratory at Gallarus, showing the projecting and perforated stones over the lintel, from which to suspend a wooden door.

No. 9.—View of the interior of the east window of the stone oratory at Gallarus, showing the fact that the semicircular head of the ope was cut out of the massive stones forming it without any attempt at the construction of an arch.

No. 10.—View of the exterior of the same window.

No. 11.—Plan of the stone oratory at Gallarus, showing its general similarity to that at Kilmalkedar.

No. 12.—View, looking S. E., of the old church of Ballineanig, near Ferriter's Cove, county of Kerry. This structure is of undoubted antiquity, possibly between the 12th and 13th centuries; it partakes of some peculiarities apparent in the stone oratories, though its form, and

the arrangement of the windows and door, are characteristic of medieval churches.

In plan this church is quadrangular, measuring about 49 feet by 20. The doorway, which is flat-headed with converging sides, has two lintels, one above the other, with an intervening row of small stones, and is placed near the centre of the north wall; its sides midway are deeply revealed, showing that the door was fastened from within; the east gable is pierced by a long, narrow, flat-headed window loop, widely splayed within, but very slightly so without. A similarly formed window loop occurs in the north and south wall, near the east gable. The peculiar form of these windows, which are quite unlike those of any other old church I have ever seen, has evidently been suggested by the east window of the stone oratory at Kilmalkedar. The west gable is pierced by a small angular loop at the height of six or eight feet from the ground, which I have every reason to think lighted that portion of the west end of the church set apart as the residence of the officiating ecclesiastic. A mortar of shelly sand and mud has been sparingly used in the construction of this church.

No. 13.—Enlarged view of the exterior of the doorway of the old church of Ballineanig.

No. 14.—Two views, internal and external, of the east window of the same church.

No. 15.—The Font at Ballineanig old church, with its original stone dish—view and section.

No. 16.—Plan of the old church of Ballineanig.

No. 17.—View, looking N. E., of the old church of Kilmalkedar, county of Kerry, showing the present position of the ancient cross, and the peculiar form of most of the smaller headstones in the grave-yard. On this form I shall not at present make any remarks, as it will furnish the subject of a paper for a future occasion.

From the general plan and style of ornamentation of the old church of Kilmalkedar, there is little doubt but that it is of the 12th century, as it exhibits sundry features closely resembling those of the architecture of Cormac's Chapel at Cashel. The west gable has square pilasters at either angle, produced by the prolongation of the side walls. The roof was originally of stone, and at its springing the pilasters are capped by several flat bands or fillets, after the fashion of some of the Saxon churches in England; the side walls of the church and the faces of the pilasters are inclined, but the west gable is perpendicular.

The doorway, which is flat-headed, but surrounded externally by two semicircular arches, is in the west gable, and is decorated with the ordinary zig-zag ornament, and surmounted by a heavy and beaded drip moulding, springing from heads which very much resemble those of sheep; the keystone of the drip is carved to represent a human head without hair, beard, or moustache, very possibly the portrait of "Kedar the Bald," as the name of the church would imply.

The tympanum is plain externally, and formed of a single massive flag.

No. 18.—Enlarged view of the exterior of the doorway of the old church of Kilmalkedar.

No. 19.—View of the choir arch of the same church, showing its style of decoration, and portion of the row of small, stunted, raised pilasters which ornament the side walls of the nave: to the right of the view are the remains of the old font.

No. 20.—View of the same arch, looking westward (or from the chancel), showing also the interior of the doorway, and the singularly rude ornament, like an animal's head, left standing on the inner surface of the tympanum when the slab forming it was being cut away, to fit the head of the door. To the right and left of the chancel arch are the remains of the original windows which lighted the north and south side of this part of the building, which were blocked up when the present larger chancel was erected in the 13th century, as the form of the east window would indicate.

One of the most beautifully formed skulls I ever saw was placed in the rude recess to the west of the chancel arch, as I have shown in the sketch; and from where I sat when making my drawing I could see several coffins which had never been buried, and in one instance the ghastly contents were fully exposed to view. It was in the summer of 1856 when I first visited this remote district of Kerry, and I have no doubt that the coffins I saw were the relics of the famine year of 1847, when in many instances the dying buried the dead.

In the view, and to the left of the doorway, is a rude piece of sculpture, resembling the lower half of a quadrangular-shaped cross placed on the top of a truncated cone; they fit together by a tenon and mortice, and are said to have fallen from the apex of the west gable; this is quite probable, but the cross is evidently incomplete, and we have only its lower half preserved: if this be true, we have here a form of cross which is quite unique.

No. 21.—Enlarged view of the ornamentation on the soffit of the choir arch of Kilmalkedar old church.

No. 22.—Enlarged view of one of the stunted pilasters ornamenting the side walls of the nave of Kilmalkedar old church, and close to the window on the north wall. The bases of these pilasters are enriched at the angles by that leaf-shaped ornament so descanted on by Ruskin, and is one of the very many quaint and beautiful features in early Irish church architecture so little known to our native architects, and which so well deserves to be rescued from the destructive hand of time and neglect.

No. 23.—External view of the south side wall window of the same church, from the general form of which we may assign the building to the twelfth century.

No. 24.—External view of the east window of the old church of Kilmalkedar. From its elongated form, though it is semicircular headed, we may assign its date to the thirteenth century.

No. 25.—Font from the same old church. This, like the font from Ballineanig, is a simple circular bowl with a thick rim beneath.

No. 26.—Enlarged views of the grotesque heads carved on projecting stones at the summit of the east and west angles of the north and south side walls of the same old church.

No. 27.—Ground plan of the old church of Kilmalkedar, showing the probable size of the original chancel.

No. 28.—View, looking north-east, of "the Chancellor's House" at Kilmalkedar. This singular building lies to the north of and close to the old church, and is well worthy of study. It is not by many centuries as old as the church adjoining, as is clearly demonstrated by the form of the window in the west gable, and the upper doorway in the south side wall, which are headed by the equilateral pointed arch, and are clearly in the style of the fourteenth century.

In plan this building is rectangular, and the walls are of massive proportions; it is divided into two floors, the basement being arched. Access to this room is by a large flat-headed doorway in the south wall, in front of which is a massive flight of steps parallel to the wall. This room is lighted by two narrow loops, one at either side of the doorway; without doubt this apartment was intended as a granary or storeroom, in which the worthy ecclesiastic laid by his tithes. The only present apparent access to the upper floor is by the small pointed doorway in the upper part of the south wall, just below the string course of the roof; access to this was by a ladder, which when pulled up rendered the place a safe retreat from any sudden attack. A well of excellent water gushes out of the gravelly soil close to the south-west angle of the house.

This concludes the present collection of the architectural antiquities from the county of Kerry; and I shall now call your attention to a very interesting group of ecclesiastical antiquities at Labba Mollogga, in the county of Tipperary, close to the bounds of the county of Cork, and within a walk of Mitchelstown, in the latter county.

No. 29.—Doorway and west gable of the older of the two churches at Labba Mollogga. This doorway is quite Cyclopean in its character, being formed of a very massive flat lintel, resting on a single massive block on one side, and on two such stones at the other. A broad flat moulding surrounds the doorway, and is its sole ornament. At either side of the gable there project massive buttresses, formed by the prolongation of the side walls. Without doubt this building is contemporaneous with the Saint whose name it bears, and who died about the close of the seventh century.

Dr. Reeves has kindly informed me that St. Mollogg was the first who introduced the hive bee into Ireland from Wales, with which latter country he was intimately acquainted. This Saint travelled into Munster in the year 664, and cured numbers of people afflicted with the plague called the *Buidhe conaill*, or yellow distemper. His life is given by Colgan in the "Acta Sanctorum," page 145, and his day is the 20th of January.

No. 30.—Two views of the upright flag said to mark the grave of St. Mollogga. On the west face there is a slightly raised flat cross en-

closed in a circle, the stem of the cross extending the entire length of the stone; and on the other there is a simple cross, also slightly raised, with very broad arms.

No. 31.—Plan of the ruins at Labba Mollogga, showing the position of the two churches, and the other antiquarian objects lying about, with the original termon or boundary wall, with its ancient stile on the west side, and its flight of steps on the east. The church which lies to the north of the one I have illustrated is of much larger proportions; and from the remains of its doorway, which was in the west gable, it is very probably a work of the eleventh or twelfth century.

No. 32.—View of the doorway of Templepatrick old church, on Innishgoil Island, in Lough Corrib. Dr. Petrie gives an illustration of this doorway in his work on "The Round Towers," and thinks it highly probable that it was erected during the lifetime of St. Patrick, in the fifth century.

No. 33.—Plan of Templepatrick old church.

No. 34.—Restoration of the highly ornamented doorway of the more recent of the two ancient churches on Innishgoil Island, in Lough Corrib. A portion of these decorations is unlike anything which I have seen in doorways of similar age and style; I allude to the decoration on the large beads along the angle of the outer arch of the door, and their being grouped in threes with blank spaces between; and again to the scalloping of the outer edges of the stones forming the outer arch. These features I discovered by carefully examining and measuring the broken fragments of the arch which lay scattered around the door, and they are worthy of being recorded. The capitals of the pilasters at either side of the doorway are ornamented by well-carved human masks at each angle, the hair, beard, and moustache of which are carefully curled, and sometimes platted.

In looking at the ancient Babylonian, Assyrian, and Ninevehtish sculptures, we are struck with the elaborate way in which the hair, beard, and moustache of the human figures were curled and arranged, and I think we are justified in believing that what we see was as nearly as possible a true representation of the facts. The same idea has often occurred to me when examining such decorated crosses as those at Clonmacnoise, and some of our illuminated Irish MSS.; and I believe it highly probable that the ancient Irish chieftains curled and platted their beards, moustaches, and hair, very much after the manner pourtrayed by the sculptor. On the great cross at Clonmacnoise this is very clearly apparent in the long beards of some warriors, and that of the king who is swearing on the cross to an ecclesiastic.

As well as I can recollect, I believe that it is in our MSS. of the 10th and 11th centuries that scroll work based on the human figure or groupings of figures is most prevalent; and, if so, we may suppose that such is about the age of this doorway.

No. 35.—Plan of the ancient church of which the previous sketch is the doorway.

No. 36.—View, looking N.W., of the ancient church of Donaghmore,

in the old district of Moy Femen, situated about midway between Clonmel and Fethard, in the county of Tipperary. This building, the late Dr. O'Donovan informed me, was characteristic of 12th century architecture. I have selected this view of the church as that which shows best the relative position and size of the nave and chancel, the latter being roofed with stone.

All the windows of this building are small, with converging sides, and semicircular headed, having their outer angle deeply recessed, in which respects they accurately resemble the windows in the side walls of Kilmalkedar old church.

The window at the summit of the chancel gable lighted a small apartment over the chancel, which was evidently the abode of the resident ecclesiastic, and access to which was by a ladder from the nave through a doorway over the chancel arch.

No. 37.—View of the chancel arch and east window of Donaghmore old church, showing the doorway in the wall above the chancel arch, and the small window in the summit of the chancel gable lighting the apartment just alluded to.

No. 38.—Enlarged view of the capitals of the pilasters of the choir arch of Donaghmore old church.

No. 39.—Enlarged view of the ornamentation on the soffit of the outer arch of the doorway of the same church.

40.—Ornamentation on the inner jam of the doorway of Donaghmore old church.

No. 41.—Interior and exterior view of the east window of the same church.

No. 42.—Plan of the choir arch and doorway of Donaghmore church.

No. 43.—Plan of the old church of Donaghmore.

No. 44.—View of an ancient doorway and adjoining blank arcades incorporated in the west gable of the abbey of Ardfert, county of Kerry. This relic of a highly decorated twelfth century church is called on the Ordnance Map "Templenagritty."

No. 45.—Enlarged view of the decorations on the jam of this doorway, north side.

No. 46.—Rough sketch of the exterior of the highly decorated window in the south wall of the old church, marked on the Ordnance Map as "Temple-na-hue," at Ardfert, county of Kerry. This window is in many respects unique. Its semicircular head is cut out of massive horizontal stones, after the manner of the oldest churches; and its outer margin is deeply recessed;—the entire window is surrounded by a broad flat band of the most intricate interlaced ornament, engraved on the stone, and bounded by a narrow fillet moulding. This is the most imperfect sketch in the present collection, as when I visited the spot I had but a few moments to spare. I present it, however, as a memento of the window, and to direct attention to a work of singular skill and beauty.

No. 47.—Details of the ornamentation at the angles of the gables of the old church of Temple-na-hue. As I have not a ground plan of the building, I may remark that its form is simply rectangular, having the

doorway in the west gable. Each angle of the church is decorated by an "engaged" circular pillar, springing from the ground, and terminating in a massive capital, decorated at each of the three angles by small human masks, from which in one instance depends some drapery after the Romanesque manner. Just below the string course of the roof a small raised tablet of masonry extends from each of the pillars on to the surface of the gable wall, giving the building a most quaint appearance. The string course is broadly chamfered, and ornamented by a row of large beads, which on the south side and the adjoining part of the east gable are carved in the form of octagonal pyramids; the beads on the other side of the building are semi-globular.

No. 48.—Doorway of Temple-na-hue old church. This is of small proportions, and semicircular-headed, formed of an outer and inner arch, with a heavy drip moulding, ornamented with massive beads, and springing from grotesque heads of nondescript animals, one of which is wanting. If the drip moulding was absent, this doorway would have a decided Romanesque look.

No. 49.—Enlarged view of the grotesque head supporting the drip moulding of the doorway just described.

No. 50.—View of a remarkably quaint window from the old church of Killeshin, in the county of Carlow. The absolute ope is rather narrow for its height; it is semicircular-headed, and very deeply recessed around its outer margin; this recessing is, however, triangular at top, and the whole is surmounted by a massive and raised syphon-shaped drip moulding. I believe that the supposed age of Killeshin church is the 10th or 11th century.

No. 51.—View of the cluster columns supporting the north side aisle arches at Jerpoint Abbey, in the county of Kilkenny.

No. 52.—View of the 12th century sedilia and piscina from Jerpoint Abbey. This and the former sketch should have been included in the illustrations of Jerpoint Abbey comprised in the 4th volume of my sketches.

No. 53.—Interior view of the window in the south side wall of the old church of Clonee, in the county of Waterford. The proportions of this window, and the broad cavetto moulding surrounding it, indicate the date of the church to be the 13th century.

No. 54.—Plan of the old church of Clonee, in the county of Waterford. In churches of this age the doorways are most usually placed either in the north or south side wall, and not in the west gable, and the walls are battered at their bases. This church had a chancel, which is now nearly obliterated.

No. 55.—External view of the east window of Faughanachold church, county of Derry. This window is apparently of the early part of the thirteenth century, and is somewhat singular in being flush with the external masonry; it is surmounted with a raised, flat, drip moulding.

No. 56.—External view of the window in the south side wall of Dunkitt old church, county of Kilkenny, near the city of Waterford. It

is semicircular-headed, but of that elongated form characteristic of the thirteenth century. The external angles, in addition to being recessed, have their edges plainly but broadly chamfered.

No. 57.—Ground plan of the old church of Dunkitt, showing the comparatively modern massive buttresses supporting the south side wall. The doorway was in the north wall, somewhere near the spot indicated, but its casing is gone. The chancel arch is at present built up, and the chancel obliterated, excepting a faint trace of its foundations. Each angle of the building is formed of well-dressed stones, with the angle chamfered. The west gable is pierced for a square-headed window, at the height of about twelve feet from the ground, which no doubt lighted an apartment at that end of the church, and which was the residence of the officiating ecclesiastic.

No. 58.—External view of one of the windows from the keep of the Castle of Carrickfergus, in the county of Antrim. The erection of this structure is attributed to John De Courcy, who received from Henry II. a grant of all the lands he could conquer in Ireland. From the architectural features of this castle, it is clear that it must have been erected either during the latter part of the reign of King John (1216), or more probably during the commencement of the reign of Henry III., as the pointed arch, with the nail-head ornament, is characteristic of thirteenth century art.

No. 59.—Window loop, from Carrickfergus Castle. This is also headed by a pointed arch, and the external angles are broadly and simply chamfered.

No. 60.—External view of a third window loop, from the same castle. Though this ope is semicircular-headed, its elongated form and chamfered edges prove it to be of the thirteenth century. This chamfering of the windows, doors, and walls of churches and castles is always characteristic of the thirteenth and subsequent centuries in Ireland, and forms a safe guide to the antiquary when speculating on the age of a building.

No. 61.—External view of the small doorway in the south wall of the chancel of the old church of Owning, county of Kilkenny, near Pilltown. Except in some of our finest cathedrals and abbey churches, I know of no doorway in a simple parish church to be compared to this for beauty of design and boldness of execution. It is tricusp-headed, with a massive drip moulding, springing from a ball flower on one side and a wimpled female head on the other. Apart from the form and mouldings of the arch, the style of the female head just alluded to would at once determine the age of the building to be either the latter part of the thirteenth or the beginning of the fourteenth century.

No. 62.—Exterior view of the window in the south wall of the chancel of Owning old church. This is also tricusp-headed, but the arch is remarkably flat; as is usual in buildings of this age, the external angles of the window are broadly chamfered.

No. 63.—Plan of the old church of Owning, showing the singular fact that the chancel is a subsequent addition to the original church,

which was simply rectangular, and of early thirteenth century age. It appears that the original east gable, which was pierced by a wide splayed window, was broken through to construct a narrow chancel arch, leaving the top of the window undisturbed. At the re-edification of the church and building of the chancel, the massive buttresses supporting the north and south walls of the nave were added, leaving the original doorway in the south wall undisturbed. The west gable is pierced for a small window loop, at the height of twelve or fourteen feet from the ground; and this, as I have had frequent occasion to remark, appears to have lighted the dwelling room of the officiating ecclesiastic, which possibly resembled the gallery of some of our modern churches.

No. 64.—View of the interior of the east and west gables of the old church of Kilmacomb, near Dunmore, county of Waterford. That of the east gable shows the occurrence of several square holes piercing the wall, the two lowest having probably answered the purpose of peep holes, which are commonly found in churches of the thirteenth and fourteenth centuries. The west gable shows an offset at the springing of the roof, on which the beams of an upper room may have rested; and this idea is borne out by the fact, that at the apex of the gable there is a square-headed window, which would have lighted such an apartment.

No. 65.—Ground plan of the old church of Kilmacomb, showing the position of the doorway in the north wall.

No. 66.—Plan of the old church of Stradbally, county of Waterford. This building indicates two different periods of construction, viz. the original church, consisting of nave and chancel, of the fourteenth century, and the massive square tower attached to it, on the north side, at the junction of the nave and chancel, which is probably of the fifteenth century. There are two doorways in the nave—one in the north, and the other in the south wall—that in the north being headed with an equilateral pointed arch, and its door fastened from within by a massive wooden bar, sliding in a groove constructed in the thickness of the wall. The massive tower on the north side of the church was of three stories (each lighted by a small loop in the north wall); and to give it its required proportions, the north wall of the chancel was removed, and made to encroach on the church. The exact position of the original entrance to this tower is now not apparent; but it may have been by a doorway raised above the floor of the chancel, to which access could be had only by a ladder. On the west side of the basement floor of the tower, a narrow flight of steps in the west wall lead to the room above.

No. 67.—Plan of the old church of Killea, near Dunmore, county of Waterford. This building is singular in its plan, the chancel having been prolonged on the north side, so as to form the base of a slender square tower. Three sides of the tower yet remain, and its basement room is arched. There are two peep holes in the north wall of this room, and a broad recess on the same side; each room was lighted by a window loop in the north wall: of the walls of the church the foundations only remain, and there is an indication of a chancel arch.

No. 68.—East window of the Black Abbey at Kilkenny, the date of which is about the end of the fourteenth century.

No. 69.—Window in the south wall of the same abbey.

No. 70.—Another window, from the same wall of the same abbey.

No. 71.—West window of Liscarton old church, county of Meath, built by Janico D'Artois, about the year 1403.

No. 72.—West window, from the same old church.

No. 73.—East window of Killeen Abbey, county of Meath.

No. 74.—Window from the south wall of Killeen Abbey.

No. 75.—Another window from the same abbey. The similarity between this and the east window of the old church of Liscarton is very singular, leading to the supposition that it was copied from the latter.

No. 76.—East window of the collegiate Abbey of Dunsaney, in the county of Meath.

No. 77.—Window from the side wall of Dunsaney Abbey.

No. 78.—Another window from the same abbey, the style of which is remarkably "perpendicular."

No. 79.—Ground plan of the collegiate Abbey of Dunsaney.

No. 80.—East window of Clonmel church.

No. 81.—Interior of the east window of St. Catherine's Chapel, Nook Bay, near Ballyhack, county of Wexford. The style of this window is about the middle of the fourteenth century.

No. 82.—Plan of St. Catherine's Chapel at Nook Bay. The west end of this church has been designed for the purpose of a dwelling-house. There is a recess, apparently for a bed, at the base of the west wall; and in the thickness of the same wall there is a narrow flight of steps, leading from the body of the building to a doorway midway up the gable, which afforded access to an upper room; the steps are then continued to the south parapet. The upper apartment just alluded to was heated by a fireplace, in the west gable, close to the summit of the north wall.

No. 83.—Interior view of the east window of Rathmore Abbey, county of Meath, a building of the latter part of the fourteenth century, or possibly the beginning of the fifteenth.

No. 84.—Plan of Rathmore Abbey.

No. 85.—Exterior view of the east window of the collegiate church of Youghal, erected A. D. 1464.

No. 86.—East window of the old church of Macloneigh, near Macroom, county of Cork—a very good example of the flamboyant style of the fifteenth century, of which we have so few good illustrations in Ireland, with the exception of the Abbey of Holycross.

No. 87.—Window from the cathedral of Old Leighlin, county of Carlow.

No. 88.—Another window from the same old church, both being good examples of the flamboyant style just alluded to.

No. 89.—East window from the Lady's Abbey, near Ardfinnan, county of Tipperary; flamboyant in style, and of the same age as the former.

No. 90.—East window of the old church of Malahide, county of Dublin—a most excellent example of the perpendicular style of the fifteenth century.

No. 91.—Window from the south side wall of Louth Abbey, which was probably erected in the fifteenth century.

No. 92.—View, looking N. W., of a small stone-roofed building, close to the Abbey of Louth, county of Louth. I am disposed to regard this as the granary of the abbey, and therefore a feature quite unusual in the monastic remains in this country.

No. 93.—Plan of the basement and upper floor of the granary of the Abbey of Louth, county of Louth. The lower room is arched, having the doorway in the west gable, and a wide splayed window in the east. In the N. E. angle there is a flight of winding steps, leading to the room under the roof. A small loop in the east gable lighted the upper portion of these stairs.

No. 94.—East window of Kilronan old church, near Clonmel, county of Tipperary. Its date may be the fifteenth century.

No. 95.—East window of Derrylorm old church, county of Derry, of the most debased style of the latter part of the fifteenth or the beginning of the sixteenth century.

The Rev. William Reeves, D. D., read a paper—

On some Ecclesiastical Bells in the Collection of the Lord Primate.

About thirty years ago, the Rev. Marcus Gervais Beresford, then Vicar of Drung and Larah, in the county of Cavan, purchased from a man called Keleher two articles of great antiquarian interest, which conjointly bore the name of the *Clog Mogue*, or Bell of St. Mogue. One of them was the principal surviving fragment of an extremely ancient Irish bell which had been disintegrated by the dint of corrosion; and the other, the mutilated and partly dismantled cover or shrine which at an early period had been made for the same bell.

The man Keleher had to wife the daughter of a Magoveran,* the last in the male line of a long succession of hereditary keepers of this bell, whose abode was among the Slieve-an-Eirin mountains, to the north-east, between Templeport and Fenagh.

While this line of the Magoverans were to the fore, they kept the bell carefully rolled up in rags, and only exposed it when it was required in the parish of Templeport or the neighbourhood for the purpose of administering oaths upon, or of giving additional sanction to social compacts; but when the Magoverans died out, and it passed into new hands, it acquired a marketable character, of which the collector availed himself, and obtained it at a price.

The local tradition regarding the bell and its origin was to the following effect, as narrated by an intelligent schoolmaster, who lived

* The name Magoveran, or Magauran, as it is sometimes written, is in Irish Mac Shamhradhain, "Son of Samhradhan." It was a patronymic derived from Samhradhan, twelfth in descent from Eochaidh, whose posterity, Tealach Eachdach, "Family of Eochaidh," occupied and gave name to the district now known as the barony of Tullyhaw, in the county of Cavan. From the year 1220 out, the Mac Samhradhains, or Magaurans, often appear in the "Annals of the Four Masters" as chieftains of Tullyhaw.

about the time of its transfer in the neighbourhood of Templeport church:—

St. Kilian (as Caillin is sometimes locally called) had at Fenagh a herd of oxen, which on a certain night strayed from their pastures, and in the morning were no where to be seen by the owner. Guided by inspiration, or led by an unseen hand, the saint in his search after them arrived at the shore of Templeport Lake, where they were found, gazing earnestly towards the middle of the lake, and motionless, like dogs when setting game. The saint inquired if anything strange or unusual had happened the night before; and he was told that a travelling woman, a perfect stranger, had sought shelter at an early part of the night, and had been conveyed across to the island in the lake, where she had been safely delivered of a son; and that while in labour she had caught hold of the bed-post, which presently threw down roots into the floor, and shot out branches upwards, that protruded through the roof of the house. St. Kilian ordered the boat to be put over to him, that he might cross to the island, and baptize the child. The woman of the house made answer, that the boat was not at hand, as her goodman had gone a fishing to a distant part of the lake. Whereupon the saint, *as well became him*, devoutly prayed that the man might never more set his foot on land. He next inquired if there was anything in the house upon which the child might be floated across to him; to which the woman replied that the only flat article in the house upon which the infant could be laid was a flag in the kitchen, that was used as a hearthstone. The saint ordered her to fetch it to the water-edge. The woman said she could not lift it, and that, if she did, it would serve to drown the babe. "Try it," said the saint. She did so, and, to her utter surprise, carried it as if it was a bit of board to the desired place; she laid it on the water; lo! it floated; she brought out the child, and laid him upon the dry surface; the wind arose, and, with steady but gentle impulse, bore the buoyant flagstone to the opposite bank; while the same wind, which here was but a zephyr, raged as a storm elsewhere over the face of the lake, overtook the fisherman in an unguarded moment, capsized his boat, and committed him to a watery grave, as the saint had prayed. This swimming flagstone was for ages preserved at Templeport, and was employed as a boat to ferry over dead bodies to the island for interment; till one day a young man and woman, who happened to cross over on it, were guilty of some indiscretion in the transit, when the flag snapped in two, and one half of it sank, helping to drown the inconsiderate couple; while the other half, of its own accord, floated away to the shore near Templeport church. This half remained there for ages after; and people who had suffered injury at their neighbours' hands used to go to it, and, having diligently swept it, place a piece of silver on it; then pray bad prayers against their enemies; and so sure as they did, death or some other grievous calamity overtook the offender before twelve months were out.

But to return to the child. The saint awaited his arrival, took him up in his arms, and baptized with every mark of respect and veneration, giving him the name of Aedh, then replaced him upon the flag, and gave

it a gentle push, and the child was sent back to his mother as he had come, with this difference, that at his right side was found resting on the slab a consecrated bell, which bell, after its employment in his maturer years, he left in the parish; and it was transmitted from erenach to erenach till the times grew bad, and their lands were lost, and the poor Magoverans their representatives died out, and the Vicar of Drung got possession of it; and that Vicar, as Lord Primate, allowed the Secretary of the Academy to exhibit it *in memoriam*, and also supplied him with this contribution towards a history of the vicissitudes of noble bells.

This tradition closely resembles the legend in the "Martyrology of Donegal," only that it places the birth of St. Mogue at Templeport Lake, instead of Brackley or Prospect Lake, which lies to the north-west in the same parish:—

"Jan. 31.—Maedhog, B. of Fearna. Aedh was his first name. He was of the race of Colla Uais, monarch of Erin. Eithne was the name of his mother, of the race of Amhalgaidh, son of Fiachra, son of Eochaidh Muighmedhoin. Among his first miracles was the flagstone upon which he was brought to be baptized, upon which people used to be ferried out and in, just as in every other boat, to the island in the lake on which he was born. Of his miracles, also, was that the spinster's distaff, which was in the hand of Maedhog's mother, Eithne, when she was bringing him forth, which was a withered hard stick of hazel, grew up with leaves and blossoms, and afterwards with goodly fruit; and this hazel is still in existence* as a green tree, without decay or withering, producing nuts every year in Inis-Breachmaighe, &c. A. D. 624 was the date when he resigned his spirit to heaven."†

The bell was of iron. Three fragments remain, two of which are attached to the inside of the case, and the third is a flat piece, of irregular form, which originally was part of the front or back. The case is of copper, and was ornamented with silver plated bands, which were attached along the margins. On the front were two small figures, also plated with silver. One of these is wanting, but that which remains represents a habited ecclesiastic, holding a book at his breast. The case, which was probably a handsome object in its day, is very much injured, and now chiefly interesting as a curiosity. Its dimensions are:—Height, 6 inches; breadth at top, $5\frac{1}{2}$ inches; breadth at bottom, 7 inches; depth at bottom, $5\frac{1}{2}$ inches.

No. 2.—*The Clog-na-fullah.*

This bell, whose name signifies the "bell of blood," in allusion to some tradition or supposed powers of retribution, was believed to have been one of the fifty consecrated bells which St. Patrick bestowed upon the Connaught churches. It had been kept for some time in Fenagh, and afterwards at Mohill, and the custodees were a family of the O'Rorkes.

It was employed for the administering of oaths, as also for the reco-

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* 19 April, 1630.

† "Martyrology of Donegal," p. 33.

very of lost property. For this purpose it used to be hired out by the keepers under the following terms:—The borrower, before it was committed to him, paid down a certain fee in silver; he then took an oath on the bell that he would safely return it within a certain time, and that while in his possession it should never touch the ground, or pass out of human hands. In consequence, it was customary for the person who borrowed it, when he required to be disengaged, to place it in the hands of a second person, and so on; and when night came, the family used to sit up, or the neighbours to be collected as at a wake, so that when one was tired holding it, another might relieve him, and thus fulfil, till the period of the loan had expired, the terms of the oath, that it was never to pass out of the hand of man.

The Primate purchased it, some twenty-three years ago, from one of the O'Rorkes, whose wants, coupled with the declining veneration for the article, led him to dispose of it.

Dimensions:—Height, 10 inches; breadth at shoulders, 5 inches; breadth at mouth, $7\frac{1}{2}$ inches; depth at top, $2\frac{1}{4}$ inches; depth at mouth, $4\frac{3}{4}$ inches. Material:—Iron, much corroded.

No. 3.—*The Barry Gariagh.*

This bell was bought by the Primate, from a pedlar, at his own gate, when rector of Drum. It had been obtained somewhere in Connaught, by this itinerant dealer, during the famine year, when hunger severed many strong ties. It bore the name of the Barry Gariagh; and, if I be allowed a conjecture, I would conclude from the name that it was a bell belonging to St. Berach, of Termonbarry, in the county of Roscommon, and that it is the one which is said, in his Life, to have been given to him by Dagæus, the artificer: "Igitur discedenti (S. Beracho) baculum seu pedum dedit, quod Hibernice Baculih-gearr, id est, baculus brevis; et cymbalum, quod Clog-beraigh; id est, tintinnabulum Berachi vocatur, quod Cluan-dalachiæ usque in hodiernum diem asservatur."*

Dimensions.—Height, 7 in.; width of mouth, 7 in.; depth ditto, $4\frac{3}{4}$ in.; breadth of shoulders, $3\frac{3}{4}$ in.; height of handle, $1\frac{1}{2}$ in.; span of handle, $2\frac{1}{2}$ in. Material:—Bronze, cast.

No. 4.

This bell is of bronze, and belonged to one of the old churches in the county of Monaghan, the name of which I have not been able to ascertain. But it was sold lately at Monaghan, among the effects of a medical man, who was an extensive collector, and a large portion of whose Irish antiquities have passed into the possession of the Lord Primate.

Dimensions:—Height, $7\frac{1}{2}$ in.; breadth of shoulders, $3\frac{1}{2}$ in.; breadth at mouth, $6\frac{1}{4}$ in.; depth at mouth, 5 in.

No. 5.—*Clog-na-righ.*

I take this opportunity of exhibiting also a drawing† of the famous

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* Colgan, Supplem. Vit. S. Berachi, 15 Feb., "Act. SS.," p. 345*a*.

† Copied from an exact drawing of the original by the late Myles J. O'Reilly, made in November, 1830.

Clog-na-righ, or "Bell of the kings," of which such honourable mention is made in the Book of Fenagh, and which derived its title from the belief that it had been used in early times as a cup for the baptism of kings. Its form is circular, and resembles an inverted goblet. In shape and pattern it is unlike other ecclesiastical bells, and would lead one to suppose that it was of a comparatively modern date, were it not for the early mention of it in the Book of Fenagh, and the Irish Annals, at the year 1244.

It is stated in the Book of Fenagh,* that St. Patrick gave this bell to St. Caillin, and that it was possessed of many wonderful powers, and was called Clog-na-righ, because it was the vessel which contained the water with which several Irish kings were baptized.

A layman was not allowed to carry this bell; and the kings who were baptized out of it were obliged to pay it certain dues when carried to them by twelve clergymen. If they refused to pay those dues, its clergy fasted, and the bell was rung, when plague, war, and other calamities were the consequence in their territories.

The bell still exists, and is preserved in the chapel at Foxfield, near Fenagh, county of Leitrim. It is regarded there as a sacred relic, and held in much veneration. It is formed of thin brass, about an eighth of an inch thick, which appears to have been cast, and probably afterwards hammered, the substance being rather soft and malleable. The upper part is ornamented with a thin cap of similar brass, and the thickness of a worn shilling, perforated in four compartments of net and figure work, each differing somewhat from the others. This cap is riveted to the bell with small brass rivets. A stronger piece of similar brass, attached by stronger rivets, stands up from the head of the bell, and is embraced by a flat plate on each side of the substance of the iron axle, which is transversely riveted through the strong piece of brass.

The axle abovementioned is $8\frac{5}{8}$ inches long, the two ends for about $1\frac{1}{2}$ inch are rounded into gudgeons, which worked in some frame or rest in which the bell was placed. At right angles horizontally extends an arm or lever, $6\frac{1}{2}$ inches long, bending a little upwards, and turned round at the end so as to form an eye, in which is an iron ring for the cord by which the bell could be sounded in its fixed position.

This iron axle and arm, though manifestly very ancient, appear more modern than the bell, which would seem, from its small size, to have been intended for the hand. The clapper or tongue is of iron; and that part of the knob at the end of it which comes in contact with the edge of the bell in striking is so very much worn by use and rust that it proves great antiquity. The bell thus consists, in its present state, of three distinct pieces of brass and three of iron, of which the ring is one. The liquid contents of the bell are $1\frac{1}{2}$ pint; the gross weight of iron and brass, 1 lb. avoirdupoise.†

In connexion with the first bell in the above list, Dr. Reeves read the following memoir of

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* Fol. 28 *aa*.

† Letter of M. J. O'Reilly, in "Ordnance Survey Correspondence, Cavan and Leitrim," p. 190.

St. Moedoc, *vulgarly called* St. Mogue.

The simple form of this name is Aedh[1] or Aodh, which signifies "fire,"[2] and, when borrowed into other languages, becomes *Aeda,*[3] *Aidus,*[4] *Aiduus,*[5] *Ædeus,*[6] *Edus,*[7] *Hugh.*[8] With the diminutive termination an, it becomes Aedhan,[9] modified into *Aedan,*[10] *Aedanus,*[11] *Aidanus,*[12] *Edanus,*[13] *Aidan.*[14] The same root, when mo, "my," is prefixed, and the syllable oc or og, denoting "little" or "dear," is suffixed,[15] assumes the form Mo-aedh-og, which is contracted into Moedoc,[16] and, according to the ordinary changes, becomes Maedoc,[17] Maedocc,[18] Maodhog;[19] in Latin *Modocus,*[20] *Maidocus*;[21] and in English

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[1] Felire of Aengus, Jan. 31. Martyrology of Tamhlact, Jan. 31.

[2] "*Aodh* vel *Oedh*, quod ignem denotat," Colgan, Trias Thaum., p. 176 *a* n. 72.

[3] "In Hibernia natale Sancti Aedae." Calendar of Drummond Missal, Jan. 31.

[4] Title of Life by John of Tinmuth, in Capgrave's Legenda Aurea, which says, "Sanctus iste in vita S. David Aidanus vocatur, in vita vero sua Aidus dicitur, et apud Meneviam in ecclesia S. David appellatur Moedok quod est Hibernicum," fol. 4 *ba*. So also the Cotton MS. Tiber. E. i. (Brit. Mus.), Tanner MS. 15 (Bodleian Libr.).

[5] Cotton MS. Vesp. A. 14, printed in Rees's Lives of the Cambro-British Saints, pp. 233–250. See T. Duffus Hardy's Descriptive Catalogue of Manuscripts, &c., vol. i., p. 188.

[6] Fleming, Collectanea, p. 431 *a*.

[7] Vita S. Edi, MS. Trin. Coll. Dubl., E. 3, 11, fol. 110, *bb*.

[8] So the name Aedh is generally rendered by Duald Mac Firbis and Connell Mageoghan in their respective translations of the Annals of Ulster and of Clonmacnois.

[9] Borumha Laighen.

[10] Aedan Foeddog is the Welsh name for this saint. Rees, Essay on the Welsh Saints, p. 227. The founder of Lindisfarne is called Aedan by Bede, Hist. Ec. iii., 5.

[11] "Ædanus qui vulgo appellatur Moedoc," Vit. in Cod. Kilkenn. apud Colgan, Actt. SS., p. 208 *a*. "Aedanus alias Moedocus," Cod. Salmant., fol. 133. "Aedanus scilicet Moedoc," Vit. S. Molassii ap. Colgan, Actt. SS. p. 222 *a*. "Maidoc qui et Aedanus," Vit. S. Moluæ, cap. 40, ap. Fleming, Collectan., p. 376 *a*. "Ædanus episcopus," MS. ap. Ussher, Works, vol. vi., p. 479.

[12] Vita S. Findani, cap. 10, ap. Goldast. Rer. Alemann., p. 222. "Maidoc qui et Aidanus ab infantia." "S. Aidanus monasterio quod Hibernensi lingua Guernin [Ferna] vocatur." Ricemarch Vit. S. David, ap. Rees, Lives of Cambro-Brit. SS., pp. 130, 133. Bede sometimes writes the name of Ædan of Lindisfarne *Aidanus.* Hist. Ec. iii., 14, 25, 26.

[13] Vita S. Edani, Cod. Marsh, fol. 51 *b*. Obits of Christ Church, p. xlvii. Harris' Ware's Works, i. p. 436.

[14] The form used by Protestants in Leinster. See O'Donovan, Irish Topogr. Poems, Introd. p. 57; Four Masters, vol. i., p. 247, note p.

[15] A very satisfactory explanation of the changes in Irish proper names by these additions is given by Colgan in his Acta Sanctor., pp. 71 *a* n. 2, 216 *a* n. 5, and Trias Thaum., pp. 175 *b* n. 54, 188 *a* n. 122.

[16] Passim in Vit. ap. Colgan, Actt. SS., p. 208–215. Moedoc .i. Aed .i. Moaedoc, "Moedoc i. e. Aed i. e. Moaedoc," Schol. in Felire, Jan. 31. Annal. Buell. 600.

[17] Ængus de Matrib. SS. Hib.; Naeimhsenchas; Tighernach, an. 625.

[18] Maedocc, Ferna epscop eride. Aodh a céd ainm, 'Maedocc, he was bishop of Ferna. Aedh was his first name.' Marianus Gorman, Jan. 31.

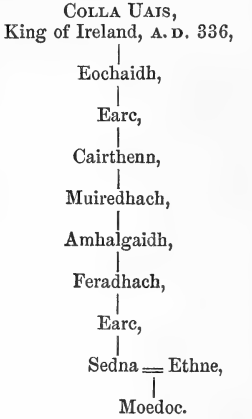
[19] Annals of the Four Mast. an. 624. Martyrology of Donegal, Jan. 31, p. 32.

[20] Breviarium Aberdonense, Calendar. Prid. Kl. Feb.; Propr. Sanctor., Pars Hyemal., fol. 45 *ba*. Registrum Episcopat. Aberdonen., vol. ii., p. 3. Martyrology of Aberdeen ap. Proceedings of the Soc. Antiq. of Scotland, vol. ii., p. 261.

[21] Giraldus Cambrensis, Topogr. Hib. ii., 47 (Ed. Camden, p. 732). Vita S. Senani ap. Colgan, Actt. SS., p. 532 *b*.

Maidoc[22] *Modoche*,[23] *Modock*,[24] *Madoes*,[25] *Mogue*.[26] By this process, two names so dissimilar in sound as *Eh* and *Mogue* are proved to be identical.

S. Moedoc was born, about the year 555, at Inis-Breaghmuigh,[27] a small island in a lake, in the territory of East Breffny,[28] which then belonged to Connacht, but is now reckoned in the province of Ulster, as part of the county of Cavan. His father's name was Sedna, and he was descended from Colla Uais,[29] the ancestor of several clans of the Airghialla, and among them of the Fer Luirg, to which St. Moedoc is said by Ængus to have more immediately belonged.[30] His mother, Ethne, was of the race of Amhalgaidh, whose descendants gave name to Tirawley, in the county of Mayo. While yet a little boy, he was delivered as a hostage by the Hy Briuin, of whose territory he was a native, to Aimmire, king of Ireland, who ascended the throne in 568,[31] and reigned three years. Having returned after a short detention, he became a diligent student, in company with Laserian or Molaisse, the subsequent founder of Devenish. Desiring to fly the honour which awaited him at home, he was preparing to depart, but Aedh Finn, the king of the Hy-Briuin, opposed the project, and was only induced to acquiesce by the promise of spiritual blessings. Thence Moedoc removed to Leinster, and from that passed over to St. David's monastery of Kill-muine, in Wales. Here he lived for some years in great sanctity, and rose so highly in the esteem of his master, that his history became interwoven with that of Menevia; and his abode in Bri-



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[22] Alban Butler, Lives of the Saints, Jan. 31.

[23] King, Calendar of Scotland, Jan. 31.

[24] T. Innes, Civil and Eccles. Hist. of Scotland, p. 161.

[25] His parish in Perthshire is called *St. Madoes*, formerly *St. Madois*. New. Stat. Account, vol. x., p. 607.

[26] The vulgar pronunciation of the name in the counties of Wexford and Cavan.

[27] Now Brackley island, in a lake of the same name. See his Irish Churches, No. 3, *infra*.

[28] In Hy Briuin Breiffne, the eastern portion of which, now the county of Cavan, was the territory of O'Reilly; the western, now the county of Leitrim, that of O'Rourke. The race derived its name from Brian, son of Eochaidh Muighmedhoin, through Duach Galach.

[29] His pedigree, with some variations, is given in the Naemsenchus, in the Book of Lecan, fol. 39 *ac*; MacFirbis's Geneal. MS., pp. 361*c*, 714 *a*; O'Flaherty's Ogyg., p. 362. Colgan gives two lines, which also vary, namely, one from Cormac and Maguir, and another from his Menelogium Genealogicum, Actt. SS., p. 222 *b*.

[30] "Aedh of Ferns, i. e. Moedoc, of the men of Lurg, on Loch Erne." Now the barony of Lurg, in the north of the county of Fermanagh. See Reeves's Eccles. Ant., p. 293.

[31] Reeves's Adamnan's Life of St. Columba, p. 32, note [e].

tain is not only related in his own acts, but in those of St. David and St. Cadoc. Returning with a company of Irish students to his native country, he landed in Hy-Ceinnselach, now the county of Wexford, where he founded a church. Being desirous to choose, according to the custom of the day, an *anmchara*, or spiritual director, he crossed over, and consulted St. David; at whose instance he fixed upon St. Molua, of Clonfertmulloe.

We next find him at a port in Hy-Ceinnselach, called Ard-ladhrann, where he founded a church; thence he proceeded to the Deise, now Decies, in the county of Waterford, where he founded a church, called Desert Nairbre; here, among other monastic appendages, he erected a mill. After some time, returning to Hy-Ceinnselach, he founded the church of Cluain Dicholla, or Cluain-mor. While here, the territory was invaded by Aedh, son of Ainmire, the monarch of Ireland; but through the intervention of Moedoc, he was induced to withdraw his troops. Subsequently, when he renewed hostilities, he was met by Brandubh, the king of Leinster, and slain at the battle of Dunbolg, in 598. This Brandubh is said to have been half brother of Moedoc, and his success is attributed to the saint's interference.[32] After this, king Brandubh fell sick, and, having been restored to health, bestowed on St. Moedoc a tract, called Fearna, or "Alder-ground," wherein the saint should erect his principal church, and whose cemetery should be the resting-place of himself and his people. On its completion, a synod of the Leinstermen was called together by the king, both of laity and clerics; and Moedoc having been consecrated their bishop, it was ordained that henceforth the primacy of the Lagenians should be fixed in the see of Moedoc at Ferns. St. David[33] having expressed a wish that Moedoc should come and receive his blessing before he died, the saint once more paid a visit to Britain. Some time after his return, he travelled southwards to the territory of Hy-Conaill-Gabhra,[34] in Munster; and here he founded a monastery, called Cluain-claidheach.[35] In 605, king Brandubh was slain by Saran, the erenach of Templeshanbo, and was buried at Ferns. St. Moedoc grieved bitterly for him, and cursed the hand that slew him. Among St. Moedoc's contemporaries and friends, his life mentions St. Columba, St. Munna of Taghmon, and St. Mochua of Lothra. Having founded many churches,[36] and acquired a high reputation for sanctity, he died on the 31st of January, in the year 625.[37]

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[32] See the tale Boramha Laighean, cited in O'Donovan's "Annals of the Four Masters," at the year 594, vol. i., p. 218.

[33] He died after the middle of the sixth century.

[34] Now the baronies of Connello, in the county of Limerick.

[35] See his "Irish Churches," No. 7 *infra*.

[36] He is the patron saint of the diocese of Ferns, as also of the barony of Lurg, in Fermanagh, and the territory of Breiffne, in the west. In the latter he was especially claimed by the great families of O'Reilly and O'Rourke.

[37] This is according to Tighernach, who has *Moedoc Ferna quies*. The Annals of Ulster, at 624, have *Moedoicc Ferna quievit*. The Annals of Boyle, at 600, have *Moedoc Ferna quievit*. The "Four Masters" place his death at 624.

We have no record of his visiting Scotland, although his memory was vividly preserved in that country. The Breviary of Aberdeen notices him, in the Proprium Sanctorum,[38] at Jan. 31, as "Sanctus Modocus epyscopus et confessor eximius apud Kilmodok," but despatches his commemoration with a short collect. Adam King antedates his existence by no less than 200 years, observing, at his day, "S. Modoche bishop in Scotland under Crathlintus, king, 328." Dempster follows in the same track, calling him *Medothus*, and adding some particulars, which never had any existence except in his mendacious brain. Camerarius and the Martyrology of Aberdeen merely notice him, at January 31, as of Kilmadok.

The Welsh have a lively recollection of him as Aeddan Foeddog, son of Caw; and it is probably owing to his connexion with St. David that the clergy of Menevia claimed Ferns as a suffragan bishopric of St. David's.[39] Traces of his memory are also retained in Pembrokeshire, as he is the reputed founder of Llanhuadain, or Llawhaden, in that county; and the churches of Nolton and West-Haroldstown are ascribed to him, under the name of Madog. His festival in Wales also is Jan. 31.[40]

Hanmer confounds this bishop, under his name of Aidan, with the founder of Lindisfarn; while Chatelain and Alban Butler erroneously refer to him the Acts of S. Mo-maedhog, of May 18, who is commemorated at that day in Lower Britany, under the name of St. De.

ST. MOEDOC'S IRISH CHURCHES.

1. Ferns. Feapna.—A bishop's see in the county of Wexford. He has been always regarded as the patron saint, under the name *Mogue*, which is a common Christian name among the Roman Catholics, often corrupted to *Moses*. The Protestants employ his other name *Aidan*.

2. Drumlane. Dpuim-leaċain.—A parish in the north of the county of Cavan, formerly the head of a rural deanery, and now remarkable on account of its ancient church and round tower.[41] S. Moedoc is the patron of it, but his Life speaks of a monastery as existing there before his birth.[42]

3. Templeport. Teampull an phuipt.—A parish in the north-west of the county of Cavan. In Brackley Lough, in the north of the parish, is the island of Brackley or Breaghwy, formerly Inip bpeċmaiġ, "Wolf-field Island," where the saint was born.[43] South of this is Templeport Lake, where is *St. Mogue's Island*, with the ruins of his ancient church.[44] His memory is vividly preserved in this parish.

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[38] Breviarium Aberdonense, Pars Hyemalis, fol. 45 *ba*.

[39] Ussher's Works, vol. v., p. 113.

[40] Rees, "Welsh Saints," p. 228.

[41] See the drawing in the Ulster Journal of Archæol., vol. v., pp. 110-116.

[42] Life c. 1. Colgan, Act. SS., p. 208 *a*.

[43] Colgan, Acta SS. p. 216 *a*, n. 6, 221 *a*; Martyrology of Donegal, p. 33; O'Donovan on the Four Masters, A. D. 1406, vol. iv., p. 1228.

[44] Ordnance Survey of Cavan, Sheet 13.

4. Rossinver. Ros inbir.—A parish in the extreme north of the county of Leitrim, where the saint's memory is kept as the patron.

5. Killybeg. Caille bega.—A townland of the parish of Inishmacsaint, in the county of Fermanagh. Here, according to Colgan, was a miraculous stone called *Lac-Maodhoc*, or Maedoc's stone.[45]

6. Dysert. Oirert Nairbre.—A townland in the parish of Ardmore, in the south-east of the county of Waterford.[46]

7. Cloncagh. Cluain claideach.—A parish in the territory of Hy-Conaill Gabhra, now the barony of Connello Upper, in the county of Limerick.[47]

8. Ardamine. Ard Laoghann.—A parish in the barony of Ballaghkeen, on the sea coast, in the county of Wexford.

9. Clonmore. Cluain mor.—A parish in the barony of Bantry, in the centre of the county of Wexford. It was formerly called *Cluain-mor-Dicholla Gairbh*. This is not to be confounded with *Cluain-mor Maedhoc*, which is mentioned in the Annals, and which was so called from another St. Moedhoc, whose day is April 11: his church is Clonmore, in the county of Carlow. Archdall falls into the error of confounding these two saints and their respective churches.[48]

ST. MOEDOC'S SCOTCH CHURCHES.

1. Kilmadock.—A large parish in Menteith, in the south of Perthshire, north-west of Stirling. "The name is believed to signify the Chapel of St. Madock, Madocus, or Modocus, one of the Culdees."[49]

2. St. Madoes.—A very small parish, in the Carse of Gowrie, south-east of Perth. The name is written in early records *St. Madois*, and is commonly called *Semmiedores* in the district, where are "The stannin stanes o' Semmiedores."[50] There is an ancient monument here called the *St. Madoes Stone*, of which a drawing is given in "The Sculptured Stones of Scotland."[51] The writer in the New Statistical Account rightly conjectures that the parish is called from the patron saint of Kilmadock, but errs greatly in styling him a "Gallic missionary."[52]

3. Balmadies.—An estate in the south-east end of the parish of Rescobie, in Forfarshire. The cemetery is at Chapeltown.[53]

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45 Acta Sanctorum, p. 293 *a*.

46 Ibid.

47 Colgan, Acta SS. p. 219 *b*, n. 37; Archdall, Monasticon, p. 420.

48 Monasticon Hibernicum, p. 734.

49 New Statistical Account of Scotland, vol. x., p. 1224. See also the Old Statistical Account, vol. xx., pp. 40-92; Innes, Civil and Ecclesiastical History of Scotland, p. 161.

50 New Statistical Account, vol. x., pp. 607, 624, 626.

51 Published by the Spalding Club. See Plates LV., LVI., and Notices of the Plates, p. 16.

52 Vol. x., p. 608. See Old Statistical Account, vol. iii., p. 568.

53 Old Statistical Account, vol. xiv., p. 602; New Statistical Account, vol. xi., part 1, p. 607.

Samuel Ferguson, Q. C., read—

An Account of further Explorations at Locmariaquer, in Brittany.

Since the discovery of the inscribed stones at the sepulchral monument called *Mane Nelud*, of which the writer gave an account at the meeting of the Academy on the 9th November, explorations attended with valuable results have been made at the *Mane Nelud*, and at another tumulus of the Locmariaquer group called the *Butte de Cæsar*. These operations have been instituted by M. Lefebvre, Prefect, and carried out by M. René Galles, Military Sub-Intendant of the Department of Morbihan. To M. Galles the writer is indebted for the facts of which he submitted a summary, with some illustrations and comments grounded on his own observation.

The expectation of finding a sepulchral chamber in the eastern end of the *Mane Nelud* was not realized. The only substruction discovered there consisted of a range of stones, set on end, crossing the breadth of the mound. Parallel to this, and nearer to the centre, was a trench cut in the under soil, filled with large stones, which appear to have undergone the action of fire. In the earth of which the body of the mound is composed, near the upright stones, were found the bones of several heads of horses.

The exploration of the *Butte de Cæsar* was more fruitful in results. This tumulus lies about half a mile south from the *Mane Nelud*, on the opposite side of the little town of Locmariaquer, overlooking the strait which connects the estuary or inland sea of Morbihan with the outer waters of the Bay of Quiberon. It is called, in Breton, *Mané-er-Hrouich*, that is, the Mount of the Fairy or Goblin, a name which argues ignorance of its real origin amongst those who have so designated it. It is of grander dimensions than the *Mane Nelud;* composed of dry stone with a thin coating of vegetable soil; in form, an oval of 110 yards in its major, by 66 yards in its minor diameter; and 33 feet high. Two rude stone obelisks, or *menhirs*, 27 and 25 feet high, respectively, formerly stood outside the base at the northern side. They are now fallen and broken, as are all the other *menhirs* at Locmariaquer, including the great one, the fragments of which collectively measure 67 feet, adjoining the *Merchants' Table* tomb.

The process of excavation was begun from above. In the external stratum of earth, eleven medals of Roman Emperors, from Tiberius to Trajan, were found, together with fragments of bronze, glass, and pottery. Lower down amongst the dry stones forming the bulk of the tumulus, were found beads in coloured terra cotta; and at a depth of about 15 feet a blue-veined glass bead, which, however, may have dropped from above in the course of excavation. At 22 feet, after precautions taken to prevent the descent of objects from

above, the workmen came on pieces of carbon and unglazed pottery; and from thence to the level of the soil, on scattered beads of jasper and agate. At 30 feet from the summit the great stones of the central chamber were encountered. An opening having been effected by the falling in of one of the covering stones, an interior of 13 feet by 9, and about 5 feet high, was disclosed. There is no external gallery, the chamber resembling, in this respect, that of the *Butte de Tumiac* in the same neighbourhood. Within were found the following objects :—

93 stone hatchets in hard *tremolith;* 11 ditto in jade, each broken in two or more fragments—one of the extraordinary length of 18 inches; 9 beads in jasper, some as large as hen eggs; 2 perfect jade hatchets, one white, the other green, of beautiful finish, and 13 inches long; an annular disk, or flat oval ring of jade, 5·3 inches in major, by 4·9 inches in minor diameter, slightly cambered or dished in the direction of the minor axis. It occupied the centre of the chamber, lying with its major axis in the line of north and south, being the line of the diagonal of the chamber. The small end of the green jade hatchet rested on the ring, and with the white jade hatchet and some of the jasper beads appeared to have been carefully placed in the same line. The other objects were imbedded in earthy matter covering the floor to a depth of about 18 inches, but no trace of bones or animal remains could be discovered.

Neither does any sculpture appear on the stones of the chamber; but outside, in the position of a bar laid flat among the stones closing the entrance at the northern end, was discovered the very remarkable inscribed stone figured in Plate XXIV. This stone has been broken in four pieces, probably by the weight of the superincumbent mass; and one small fragment is unfortunately missing. It is a rude parallelopiped of granite, measuring 3 feet 9 inches in length, by 17 inches in breadth, and 7 inches in thickness. It lay with the inscribed face under. The sides had been wrought parallel by the hand, but the inscribed surface is in the natural state. The writer has been furnished with a rubbing and photograph, from which the plate has been carefully designed.

The first consideration arising on the view of this remarkable anaglyph is the employment of the *cartouche*-like panel occupying the centre of the group. In respect to this object, the writer submits,—

First.—That it is not itself a character, but is designed to represent a shield. This conclusion arises from an examination of other objects sculptured on similar stone monuments of the neighbourhood, hitherto inedited or imperfectly represented. The first of these (Plate XXV.), hitherto unnoticed, is from one of the parietal supports of the corridor leading to the sepulchral chamber of the tumulus, on the *Isle Longue*, in the Morbihan Sea. This seems evidently meant as the outline of a shield, the rings at either side representing the arm-holds in imperfect perspective. The ogee form of the upper part, and the symmetrical contraction or gathering-in of the panel at the springing of the curve, are features to be specially noticed. The external ornamentation, giving the effect

of a fringe of threads or tassels* blown up by the wind, is quite in the taste of the Gavrinis sculptures. It appears to the writer most probable that it was some object similar to this which led the local antiquaries of the last century to believe that among the sculptures of the *dolmen* near Locmariaquer, called *Les Pierres Plattes*, they could discern the outline of the sacred scarabæus. The *Pierres Plattes* are still standing; but the chamber has been filled with field stones, and the writer was not able to uncover more than one of the five sculptured supports alleged to exist there; it also is in the same barbaric taste; but the design on it, if intended for a shield, as possibly it may be, does not present the peculiar outline now under consideration. This characteristic feature, however, is plainly traceable on the sculpture which decorates the headstone of the chamber of the noble megalithic tomb called the *Merchants' Table*, adjoining the *Mane Nelud* (Plate XXVI.). In the accurate work of Delandre it is alleged that the upper member of this design is a perfect ogee. This portion of the stone is much weather-worn; and the writer was unable, with the closest examination, to trace the termination of the outline at top. But just below the commencement of those lines, the characteristic lateral contraction, or gathering-in, which gives the insect appearance to the outline, is clearly apparent. A remarkable series of crescent-like projections form a fringe down one side of the panel, and may have existed symmetrically on the side opposite; but the stone is too much worn to render this certain. The field is charged with pattern work of considerable elegance, executed in bas-relief, as are the other parts of the design, which certainly seems intended to represent the shield of the personage whose war hatchet forms so conspicuous an object on the ceiling of the chamber. Comparing this and the object from *Isle Longue* with the ogee-headed *cartouche* under consideration, there seems no doubt that the latter is also designed as a shield.

Secondly.—Separating the outline of the panel from the characters with which it is charged, it would appear that these latter are not designed for mere ornamentation, but constitute a significant group, requiring a certain number of particular members to complete the expression of some meaning. This appears from the fact, that one member of the group extends beyond the margin of the panel, and is partly confused

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* *Confer* Hom. Iliad. B. 446:—

μετὰ δὲ γλαυκῶπις Ἀθήνη
Αἰγίδ' ἔχους' ἐρίτιμον, ἀγήρων ἀθανάτην τε
Τῆς ἑκατον θύσανοι παγχρυσεοι ἠερέθονται,
Πάντες εὐπλεκέες, ἑκατόμβοιος δὲ ἕκαστος.

"With whom Minerva azure-eyed advanced,
Th' inestimable Ægis on her arm,
Immortal, unobnoxious to decay.
An hundred braids, close-twisted, all of gold,
Each valued at a hundred beeves, around,
Dependent, fringed it."—*Cowper.*

with its outline. It would appear as if the artist had begun from the left-hand side, and was obliged, from want of room, to extend the last member of his composition beyond the limits intended to contain the monogram.

Thirdly.—The constituent parts of the monogram seem to be characters having separate and distinct functions. This would appear to result from a comparison of the central portion of the contained group with the central figure in stone (No. 4) from the *Mane Nelud* (see page 401, *ante*), and from the similarity of the lowest member of the group to the objects inscribed on the headstone of the chamber of the *Butte de Tumiac*, explored by the Antiquarian Society of Vannes, in A. D. 1853.

With respect to the objects external to the panel, they appear to present the hatchet in various modes of mounting and in various combinations. The loop at the head of some of the varieties seems to be an imperfect representation of the recurved handle, as it appears in the larger design on the ceiling of the *Merchants' Table* tomb, and on one of the parietal supports of the passage to the chamber of Gavrinis.

The drawing of the objects on the under surface of the covering stone of the *Merchants' Table* tomb (Plate XXVII.) exhibits, besides the peculiarly mounted hatchet and the designs referred to by the writer in his former Paper, two characters hitherto unnoticed, apparently the remains of some memorial designation formerly existing along the western edge of the *plafond*. This portion of the stone slopes upward and outward, forming a species of natural cornice, which is much exposed and weather-worn. Some traces apparently of a third character exist; but, owing to the disintegration of the surface, the writer was unable to fix on any definite outline. Resemblances may be traced between those which remain and two of the characters from the *Mane Nelud*. It would thus seem as if each of the great tumuli at Locmariaquer had originally contained a memorial designation inscribed in characters having separate functions, and some kind of significance in combination.

Returning to the varied array of hatchets which surrounds the panel on the stone from the *Butte de Cæsar*, and viewing these objects by the light reflected from the larger examples, it would appear as if some of them were designed to be represented as decorated with an ornament in the nature of a plume issuing from the curved top of a recipient handle; others are seen mounted on handles received into the socket of the head. The position of the hand-guard in all the instances where it appears, is reversed—a circumstance which can hardly be considered accidental. In one group a smaller hatchet seems to issue from the blade of a larger. The appendages attached to or connected with others appear not arbitrary, but the result of design. These singularities may induce a question whether we have here a representation merely of the arms of an individual, or whether those objects also may not have some significant force as characters or representative symbols.

In reference to the imperfect figure in the lower compartment, which seems to be the rude outline of a horned quadruped, the eye is at once arrested by the prominence rising from behind the shoulder. Whe-

ther this be designed to represent some detail of harness, or part of the natural outline, the writer does not venture to speculate; but refers to the fact, that amongst the objects shown to Pallas, as having been found in the tombs surrounded by stone circles, on the Obi, were flat cast figures of elks, reindeer, and stags. The object supposed by the writer to be a plough on the *Table des Marchands* has been thought by careful observers to represent portion of an animal figure.

As regards the probable age of the megalithic monuments of Brittany, the writer noticed the fact, that Cisalpine Gaul was peopled by tribes from the region of Transalpine Gaul, corresponding with modern Brittany, so early as the first and second centuries after the foundation of Rome; and that, with one exception near Trent, no monuments of this character appear to have been observed anywhere in the valley of the Po. On this subject the writer invited information, and submitted that, if in fact the Gaulish family did not leave such memorials of their presence in Lombardy, the conclusion would seem to follow that we must seek for the people who practised those modes of sepulture in an earlier epoch than that of the Celtic migrations. The singular taste and barbaric aspect of the objects appear to the writer to refer them to a race having more of the characteristics of the Indian and Polynesian offshoots from the parent seats, than of any of the existing nationalities of Europe.

Denis H. Kelly, Esq., read the following—

Account of Inscribed Stones at Fuerty, County of Roscommon.

Previous to entering on the subject matter of the paper to be submitted to the Academy's notice this evening, I think it well to read St. Evin's words, as quoted by Colgan in the tripartite Life of St. Patrick, in order that a correct idea may be formed of the remarkable locality in which these inscribed stones have been discovered, and which my lamented friend, Dr. O'Donovan, has fully identified in the Ordnance Survey letters, county of Roscommon, in 1838, with the Fiodart of Colgan:—

"The holy man came afterwards to the country of Ua Maine; and, preaching the divine word there, converted and baptized all the people of that country, and laid the foundation of the church of Fiodart, over which he appointed one of his disciples *re et nomine Justus*, and who was in dignity *a deacon*. He left him the 'Ritual Book of the Sacraments and of the Sacred Ministry.'

"The *sanctity* of Justus was not more wonderful than his *age;* for it is said 'that it was from *this Ritual Book*, left him by St. Patrick, he read, in the CXLTH year of his age! the form and the rite, when he regenerated St. Kiernan of Cluain in the salutary water of baptism.'"

Colgan also says, in a note, that "Fidhart was in his own time a parish church, in the diocese of Elphin, and in the country of Mainech."

Dr. O'Donovan, at considerable length, in the Ordnance Survey Letters, Roscommon, proves the Fiodart of Colgan to be derived from fiod, a wood, and ard, *arduus*, an height; and from the analogy of

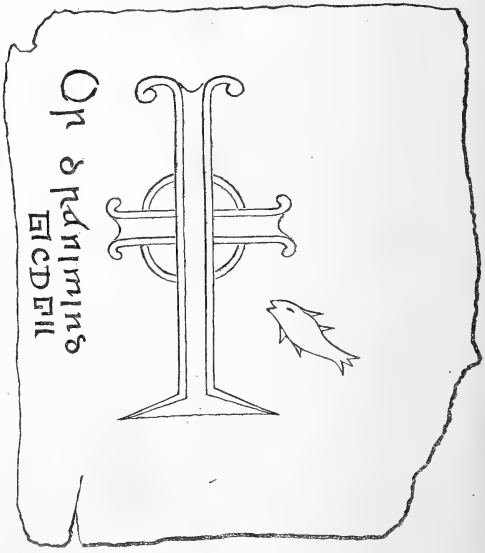
ꝑıoꝺ being elsewhere Anglicised Few, as in the case of the Fews in Armagh, les Fayes O Neachtan's Country, in Roscommon, &c., that the present name Fuerty may well be Fiodh (*Few*), aꝛꝺ (*art*), ꝺıǯ (*tigh* or *ty*), Few-art-ty.

St. Patrick when he baptized the people of Hymany, came from Uaꝑaꝺ, now *Oran*, in the north of the county of Roscommon, where he had just been baptizing the Sıol Muıꝑeaꝺaıǯ, or O'Conors; and Fuerty would be precisely in the position the Saint would naturally have taken, and it also fulfils another of the points of Colgan's description by being in a *loop of the Suck*, which there is very remarkably sinuous.

Mr. Petrie wrote to my friend Dr. O'Donovan, to Tuam, county of Galway, on 8th September, 1838, as follows:—

"I have got from Mr. Smith some copies of Irish inscriptions, collected in Ireland by a man named Matt O'Conor,—*one* in the churchyard of *Fuerty*, county of Roscommon; another at Fair Hill, county of Galway."

O'Donovan, being at that time unable to return to the county of Roscommon, communicated Mr. Petrie's communication to me, and requested that I would make inquiry for anything of the kind. I did so; but all my exertions were in vain, till July, 1862, when I received a polite note from the Rev. J. S. Gumley, Perpetual Curate of Fuerty, to say that two curiously sculptured stones, of evidently ancient date, had recently been discovered, hid under rank grass, at the interment of a parishioner; and that, knowing I took an interest in such matters, he would gladly point them out to me. It was traditionally said that a man named O'Conor, a great scholar, had discovered them several years ago, and that he had stated the inscription upon them to mean—"Eight men, who took their title as fishers of men, lie here until the end of time." On going there, I found two inscribed flagstones, bearing every mark of extreme antiquity. One was of grey and the other of red sandstone. They were placed in proximity, as the covering of a recent grave, and were of about similar dimensions, 3 ft. × 2 ft. 6 in. No. 1 was nearly square. The inscription is in incised letters, and very legible, except the two last strokes of what I



No. 1.

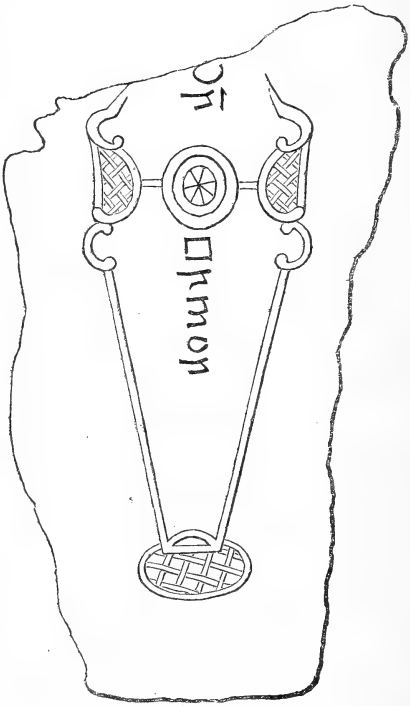
take to be a date; and I read it

Oꞃ ꝺ̇ ꞃanımınꝺ,
"Pray for many Saints."*
MCDVII.
M.CD.VII. 1407.

The other stone, figured as No. 2, has been partially broken.† It is of red sandstone, and its inscription is also incised. The external band appears to have been intended to represent a coffin, to which form the stone itself also approximates. The central boss, as well as the two lateral enclosures, are of the Irish interlaced work, as well as the one at the foot (there may have been another at the top when the stone was unbroken), and make the form of a cross, similar to those found in our most ancient churches. There is one nearly the same in the primitive Irish church of the Luċꞇ Cꞃaıḃ-ꞇeaċ at Inch Ᵹoıll, in Lough Corrib, county of Galway. This inscription is quite legible, and I read it

Oꞃ uꞃmoꞃ,
Pray for very many,

being singularly in accordance with the inscription on No. 1.



No. 2

That these stones are of a very remote antiquity can hardly be disputed; and the fish in No. 1, the primitive emblem of Christianity, so prominent in the early martyrs' monuments in the Catacombs at Rome, well bears out the fact.

* Mr. Petrie, who has since been at the place, and examined these stones, makes Oꞃ aꞃanmaınoıꝺ acaın, oꞃ̄ aꞃ anmaın oıꝺ acaın, meaning, Pray for the soul of Oidachain, or Ogan (M'Egan).

† Dr. Petrie makes this Oꞃ Aꞃmoıl, oꞃ aꞃ̄ Maoıl (quere Seaċluın), which may have been on the broken part of the stone, and means, Pray for Maelseachluin.

The tripartite Life of St. Patrick tells us that "St. Patrick himself here founded a monastery, and placed over it his honoured disciple Justus." Tradition has it that here were both a monastery and a nunnery, celebrated for the sanctity of their inhabitants; and that they so continued up to 1641, when Robin Ormsby, of Tobarvaddy (Tobar a madaig ("the Wolf's Well"), one of Coote's most active lieutenants, and who was usually called Robert na Gligeirta, or Jingling Robert, from the clattering of his coat of mail and his horse trappings, expelled the monks and nuns, and levelled the ancient structures to the ground, and verily left not one stone upon another! so that these two stones alone remain to testify that they once were there.

Whether I may be right in my guess as to the date, or not, it is certain that these stones are not the production of modern times; and they combine to prove the same fact, that many celebrated for their sanctity once dwelt here, and were interred in Fuerty church-yard.

Dr. Petrie made some remarks in explanation, and gave a different reading and analysis of the inscriptions. Reference being made to Dr. Stokes regarding the representation of a fish on one of these stones, he observed that, in a recent visit to Prague, he found this symbol very prevalent on the tombstones of the Jewish cemetery in that city.

The Academy then adjourned.

MONDAY, JANUARY 11, 1864.

The Very Rev. Charles Graves, D. D., President, in the Chair.

The Right Hon. the Earl of Charlemont; Right Hon. the Earl of Donoughmore; Charles H. Foot, B. A.; G. Charles Garnett, B. A.; J. J. Digges La Touche, B. A.; and Major Robert Poore; were elected members of the Academy.

Edward Blythe, Esq. (with the permission of the Academy), read a paper "On the existing Species of Stag (*Elaphus*)."

The Rev. Samuel Haughton, M. D., Fellow of Trinity College, Dublin, read the following paper:—

Notes on Animal Mechanics.

No. I.—*On the Muscular Mechanism of the Hip Joint in Man.*

Introduction.—In the course of the following notes on the muscular mechanism of the joints in man and other animals, I shall have occasion to use certain principles, or postulates as I prefer to call them, which are not as yet employed generally by anatomical writers; and for this reason I shall here give a few words of explanation respecting them.

These postulates are two in number, and are as follows:—

Postulate 1.—That the amount of Work done by a muscle in a given time is proportional to its weight; *i. e.*, to the number of muscular fibres in contraction.

Postulate 2.—That the mean lengths of the different muscles employed at each joint are proportional to the perpendiculars let fall from the centre of motion of the joint upon the directions in which the muscles act.

In the statement of the first postulate there is, of course, a slight error, arising from the different amounts of cellular tissue and fascia entering into the composition of each muscle; this, however, only introduces an error proportional to the differences of the cellular tissue and fascia in the different muscles, which may be regarded as small. So far as my experiments have led me, I incline to the opinion, that such muscles as the heart and psoas, composed nearly altogether of muscular fibre of fine texture, are capable of giving out their work for a longer time than muscles of an opposite character, such as the glutæus maximus and deltoid; but that for an interval of time less than that requisite to produce fatigue, the work given out is the same for both classes of muscles, within small limits.

The reasonableness of the second postulate may be shown from the following considerations:—

1. The distance through which the point of application of a muscle is moved by its contraction is proportional to the mean length of the muscle.

2. It is geometrically evident that the perpendiculars let fall on the directions of the muscles are proportional to the spaces moved through by their points of application.

3. The Divine Contriver of the joint has made a perfect mechanism, and therefore employs a minimum expenditure of force.

If the third of these considerations be admitted, *Postulate* 2 follows from the first two considerations; for otherwise there would occur a waste of force, some of the muscles having ceased to act before the others had expanded their store of force.

Professor Donders, of Utrecht, has indeed proved, by direct measurement, that the lengths of the muscles acting on the human elbow are nearly proportional to the distances of their points of application from the joint; and I believe that he would have found a still more exact agreement, if he had used the perpendiculars instead of the distances. The following corollary follows from the two postulates employed:—

Corollary 1.—The moment of each muscle, with respect to the centre of the joint, is proportional to its weight.

Let F be the force of the muscle, p the perpendicular let fall upon its direction from the centre of the joint, x the space through which the muscle contracts, and l its mean length.

The work done by the muscle is Fx, which is proportional to Fl, and therefore to Fp, by the second postulate; but Fx is also proportional to the weight of the muscle, by the first postulate; and therefore Fp, which is the moment of the muscle with respect to the centre of the

joint, is also proportional to its weight.—Q. E. D. Hence it follows that—

Corollary 2.—The weights of the muscles surrounding the joint may be regarded as moments of the forces, and may therefore be compounded by the law of composition of moments or couples.

The action of the muscles that move the thigh upon the hip is usually referred by anatomists to three classes of motion :—

a. Rotation outwards or inwards.

b. Flexion or extension.

c. Abduction or adduction.

If we imagine three rectangular co-ordinates drawn at the centre of the acetabulum in the following manner :—

a. Vertical axis,

b. Horizontal lateral axis,

c. Horizontal antero-posteral axis;

it is easy to see that rotation round these axes corresponds with the three recognised classes of motions; and as every motion, however complex, of the thigh upon the hip, must be a rotation round some diameter of the sphere of which the acetabulum forms a portion, it is evident that every such motion may be interpreted correctly in the usual way, by the aid of the composition of rotations.

Such a method of interpretation, although exact, is not simple, as the axes of co-ordinates are not chosen with reference to the forces and directions of the muscles themselves, but with reference to directions, vertical and horizontal, arbitrarily assumed beforehand.

In the following note I shall endeavour to establish the existence of three axes of co-ordinates, to which the motions of the hip joint may be referred, and which possess not only greater simplicity than other systems of axes, but also other properties of great interest and importance.

The centre of the acetabulum is the centre of motion of the thigh upon the hip; and the centre of motion of the body upon the pelvis is situated in the junction of the fifth lumbar vertebra with the sacrum. If these two centres of motion be joined, we have a geometrical line to which the motions of the hip joint ought to be referred. In the erect posture in man, this line is the axis of the neck of the femur, and is essentially an oblique line, making acute angles with all the three axes of anatomical writers.

The anatomical and mechanical problem which I propose to solve is the following :—

"To find the simplest planes passing through the centres of motion of the body on the pelvis, and of the hip on the thigh, to which the forces of the muscles of the hip joint can be referred."

I shall commence by recording the observations made upon a human subject, which was a female, aged 40, weight 82 lbs., and height $65\frac{1}{4}$ inches. I selected a female subject, in consequence of my first comparative dissections having been made on a female Cercopithecus.

The weights of the body, viscera, and muscles of this subject were found to be as follow :—

Table I.—*Physical Data (Woman).*

(*a*) *Body and Viscera.*

1. Body,	82 lbs.	1312 oz. av.
2. Brain,		53¾ ,,
3. Heart,		7¼ ,,
4. Right Kidney,*	7¼ oz.	16½ ,,
5. Left Kidney,*	9 ,,	
6. Liver,*		119¼ ,,
7. Spleen,		7¼ ,,

(*b*) *Posterior Muscles of Hip Joint.*

1. Glutæus maximus,	11½ oz.	21¾ oz.
2. Glutæus medius,	7½ ,,	
3. Glutæus minimus,	2¾ ,,	

(*c*) *Anterior Muscles of Hip Joint.*

1. Iliacus,	2¾ oz.	21 oz.
2. Psoas magnus,	1½ ,,	
3. Psoas parvus,†	0¼ ,,	
4. Pectinæus,	0¾ ,,	
5. Adductor longus,	1¾ ,,	
6. Adductor brevis,	1¼ ,,	
7. Adductor magnus,	11¾ ,,	
8. Gracilis,	1 ,,	
9. Sartorius,	2¼ ,,	
10. Tensor vaginæ femoris,	1½ ,,	

(*d*) *Flexors of the Knee Joint.*

1. Biceps femoris,	3¼ oz.
2. Semi-tendinosus,	1¼ ,,
3. Semi-membranosus,	2¾ ,,

(*e*) *Extensors of the Knee Joint.*

1. Rectus femoris,	2¾ oz.
2. Triceps extensor, (viz., vastus externus, internus, and cruræus.)	17 ,,

(*f*) *Rotators of Hip Joint.*

1. Pyriformis,	1 oz.
2. Obturator externus,	0¾ ,,

(*g*)

Quadratus lumborum,	0⅔ oz.

---

* Both kidneys were fatty, and the liver was fatty and enlarged.

† I have placed this muscle among the muscles of the hip joint, because the connexion of its tendon with the *fascia iliaca* enables it to modify the action of the *m. iliacus.*

(h) Muscles of the Leg and Foot.

1.	Gastrocnemius,	$3\frac{1}{4}$ oz.
2.	Plantaris,	$0\frac{1}{6}$,,
3.	Solæus,	$5\frac{1}{2}$,,
4.	Poplitæus,	$0\frac{1}{5}$,,
5.	Peronæus longus et brevis,	$1\frac{1}{4}$,,
6.	Flexor proprius hallicis,	$0\frac{3}{4}$,,
7.	Tibialis posticus,	$1\frac{2}{3}$,,
8.	Flexor communis digitorum,	$0\frac{1}{4}$,,
9.	Tibialis anticus,	$1\frac{1}{3}$,,
10.	Extensor communis digitorum, et perinæus tertius,	$0\frac{4}{5}$,,
11.	Extensor proprius hallicis,	$0\frac{1}{4}$,,

Posterior Muscles of Hip Joint.

The posterior muscles, or *glutæi*, act on the hip joint in the manner represented in the annexed diagram (Fig. 1), which shows the innominate bone of the left side.

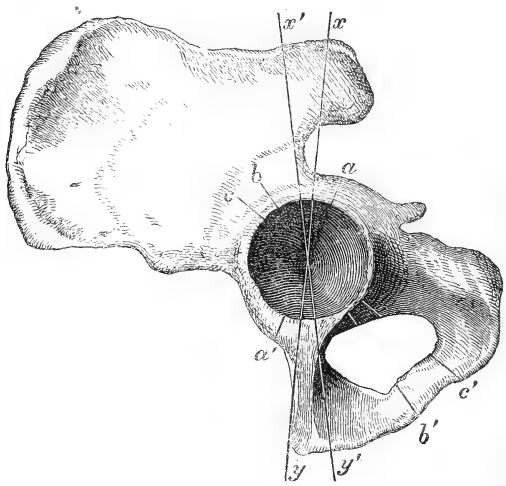


Fig. 1.

The *glutæus maximus* produces a rotation round the centre of the acetabulum in a plane passing through the line *a*; the *glutæus medius* in a plane passing through *b*; and the *glutæus minimus* in a plane through *c*.

The angle between *a* and *b*, measured at the centre of the sphere, is 49°; and the angle between *a* and *c* is 64°.

Taking the moments of the three muscles, with respect to the centre of the sphere, we find, by corollary 2, the resultant of all supposed to be in action together, as follows:—Measuring X along *a*, and Y at right angles to it, we obtain—

$$X = 11{\cdot}5 + 7{\cdot}5 \cos 49° + 2{\cdot}75 \cos 64°,$$
$$Y = \quad 7{\cdot}5 \sin 49° + 2{\cdot}75 \sin 64°;$$

from which follows,

$$X = 17{\cdot}62 \text{ oz.}$$
$$Y = 8{\cdot}15 \text{ oz.}$$

and

$$\sqrt{X^2 + Y^2} = 19{\cdot}41 \text{ oz.}$$

$$\frac{Y}{X} = 0{\cdot}4625 = \tan (24^\circ\ 49').$$

The resultant direction of the moment of the glutæal muscles is represented by the line *yx*, which nearly coincides with the ilio-pectinæal ridge, and lies somewhat inside a tangent plane from the centre of the acetabulum to the greater ischiadic notch.*

The resultant plane *xy* passes through the body of the 5th lumbar vertebra, and between the spinous processes of that vertebra and the first sacral vertebra.

Anterior Muscles of Hip Joint.

The first eight of the ten anterior muscles have the following action:—

1. Iliacus, ... } $4\frac{1}{2}$ oz.
2. Psoas magnus, ... }
3. Psoas parvus, ... }

move the head of the femur in the plane *a'*, which is found to be the prolongation of the diameter *a*; and their action therefore is directly the opposite of that of the *glutæus maximus*.

4. Pectinæus, ... } $2\frac{1}{2}$ oz.
5. Adductor longus, ... }

move the head of the femur in the plane containing the ilio-pectinæal ridge, or very nearly in the plane of the resultant moment of the *glutæi* muscles.

6. Adductor magnus, ... } 13 oz.
7. Adductor brevis, ... }

produce motion alone the line *b'*, which is opposite to *b*, the direction of the *glutæus medius*. And, lastly, the

8. Gracilis, ... 1 oz.

moves the head of the femur in the plane *c'*, opposite to *c*, the direction of the *glutæus minimus*.

---

* It was through this notch that Meriones was in the habit of piercing the bladders of his flying enemies; Il. E. 65-68, and Il. N. 650–655; and the bone mentioned is the *ilium*, and not the *pubes*, as the commentators suppose. It is very possible that Homer may have seen such a wound inflicted through the buttock, for his description of the wounded man, wriggling on the ground like a worm, after the division of the sciatic nerve, could only have occurred to an eye-witness.

Compounding the moments of these muscles as before, and using the line aa' as our origin of X, we obtain

$$X = 4\tfrac{1}{2} + 2\tfrac{1}{2} \cos 25° + 13 \cos 49° + \cos 64°$$
$$Y = \quad 2\tfrac{1}{2} \sin 25° + 13 \sin 49° + \sin 64°$$
$$\sqrt{X^2+Y^2} = 19{\cdot}89 \text{ ozs.}$$
$$\frac{Y}{X} = \tan (36° 47').$$

The close agreement in magnitude between the resultant moment of these muscles (19·89) and that of the *glutæi* (19·41) is very remarkable; and the difference of angle between them (11° 58′) is not more than might have been anticipated from unavoidable errors of observation.

The resultant plane of the anterior muscles is shown in the figure by the line $x'y'$. The bisector of the angle between the lines xy and $x'y'$ is a tangent to the ischiadic notch, and coincides with the ilio-pectinæal ridge.

The diametral plane of the acetabulum just found, containing the ilio-pectinæal ridge, and touching the ischiadic notch, possesses many remarkable properties.

1st. It passes through the centre of the anterior line of junction of the fifth lumbar and first sacral vertebræ; i. e. through the centre of motion of the body on the pelvis.

2nd. It gives, both as respects distribution of matter and geometrical form, the section of the pelvis, which offers the *maximum* resistance to forces acting from the outside.

3rd. It is the plane of the resultant moment of the muscular forces acting on the hip joint, both with respect to the posterior and anterior muscles.

This plane may be called the ilio-pectinæal plane, and is the plane of maximum moments acting on the hip joint.

Remaining Muscles of the Hip Joint.

In addition to the eleven muscles whose action has been already considered, there are six others which act upon the hip joint. They all act upon the joint so as to cause it to rotate upon the head of the femur in a plane at right angles to that already found to be that of the resultant moment of the posterior and anterior muscles. This plane passes through the tuberosity of the ischium, and falls just inside the anterior rim of the ilium. Three of the muscles in question act on one side, and three on the other side of the centre of motion, and in the erect posture their moments on the head of the femur are balanced. They may be called the ischiac and iliac muscles, with reference to their action on the hip.

Ischiac Muscles (flexors of knee).

1. Biceps femoris (part), ...
2. Semi-tendinosus, ... } $7\frac{1}{4}$ ozs.
3. Semi-membranosus, ...

Iliac Muscles (extensors of knee in part).

1. Tensor vaginæ femoris, . . .
2. Sartorius, ... } $6\frac{1}{2}$ ozs.
3 Rectus femoris, ...

The resultant plane of the portion of the *biceps* attached to the ischium, and of the two internal hamstring muscles, is at right angles to the ilio-pectinæal plane; and the resultant of the action of the *tensor vaginæ* and of the *sartorius* coincides with the plane of the *rectus*, and also is at right angles to the ilio-pectinæal plane. Considering that only a portion of the *biceps* acts on the hip, and that in the erect posture the leverage of these muscles on the head of the femur is equal and opposite, it is manifest that these two groups of muscles, as well as the posterior and anterior groups, balance each other's action. This plane of resultant moments may be called the ilio-ischial plane. It is at right angles to the ilio-pectinæal plane, and intersects it along the line joining the centre of the sacro-lumbar articulation with the centre of the acetabulum—that is to say, the line joining the centre of motion of the body on the pelvis with the centre of motion of the hip upon the thigh.

In the erect posture, neither of these planes is vertical, and the diameters of the acetabulum corresponding to them make angles of about 45° at each side of the vertical diameter.

The ilio-ischial plane makes a section of the os innominatum, not so strong as that made by the ilio-pectinæal plane; and its curvature is in the opposite direction, being slightly concave outwards, while the curvature of the ilio-pectinæal section is strongly convex outwards. From this and other considerations, it follows that the ilio-ischial plane has relation rather to the support of the weight of the body than to resistance to forces acting from without.

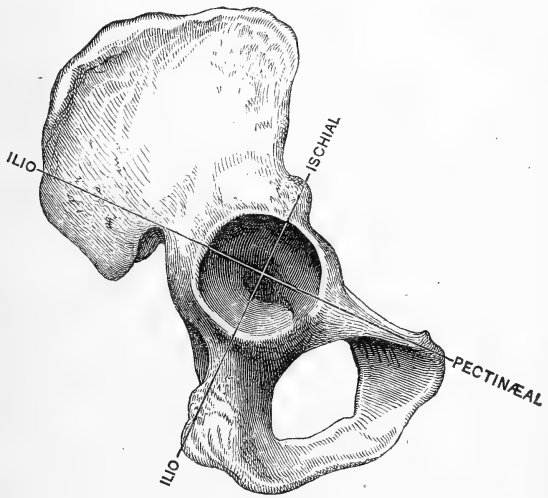


Fig. 2.

The above figure represents the os innominatum of the right side, drawn from a point of view situated on the line joining the sacro-

lumbar articulation with the centre of the acetabulum, and therefore shows the traces of the ilio-pectinæal and ilio-ischial planes as two right lines intersecting at an angle of 90°.

The Fig. 3 shows the section of the os innominatum made by the ilio-pectinæal plane, in which, as I have shown, the resultant couples of the principal muscles acting on the hip joint are situated. The cancellated portion of the bone is shaded, and the dense part is left white.

It would require a separate paper to show how admirably adapted this form of section is either to resist a shock acting in the direction of the arrow, which the bone receives in jumping down from a height on one foot, or to counteract the strain produced by the muscles acting from the periphery of the bone upon the femur.

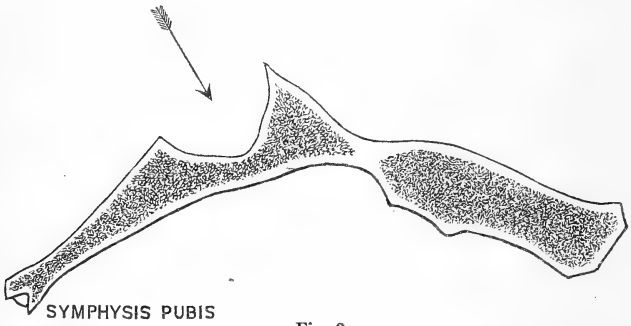


Fig. 3.

In Fig. 4 I have shown the section of the os innominatum made by the ilio-ischial plane, at right angles to the ilio-pectinæal plane.

This section of the bone is rarely called upon to resist any strain in a transverse direction; and when the cavity of the acetabulum is completely filled by the head of the femur, its strength to resist vertical pressure, as in sitting, is very great.

Some interesting deductions may be made from the weights of the muscles, classified into groups suggested by the preceding analysis.

The total weight of the muscles of the hip and knee joints, named *b, c, d, e,* is found to be 73·50 oz.; of this amount 21·75 oz. are included in the three *glutæi*; 21 oz. in the group of eight muscles antagonistic to the *glutæi;* 23·5 oz. in the extensors of the knee (including the *tensor vaginæ,* which aids the *quadriceps extensor*); and 7·25 oz. are included in the flexors of the knee joint.

Expressed in percentages of the hip and knee joint muscles, these groups have the following values:—

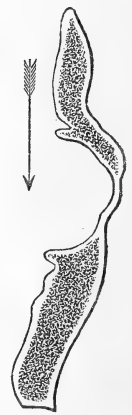


Fig. 4.

	Percentage.
1. Posterior muscles of hip joint,	29·6
2. Anterior muscles of hip joint,	28·6
3. Extensors of knee joint,	31·9
4. Flexors of knee joint,	9·9
	100·0

The first three groups of muscles are here of nearly equal force, while the fourth is about a third of each of the first three.

No. II.—*On the Muscles of some of the smaller Monkeys of the Genera Cercopithecus and Macacus.*

The first monkey whose muscular anatomy I shall describe was a female, of the genus *Cercopithecus*, which died in the Zoological Gardens of Dublin, in 1860.

The dissection of this animal gave me the following results:—

TABLE II.—*Physical data. Cercopithecus* (female).

(*a*) *Body and Viscera.*

	Grains.		Grains.
1. Body,	34,390	4. Spleen,	85
2. Brain,	921	5. Kidneys,	299
3. Liver,	1422	6. Heart,	210

(*b*) *Muscular System.*

	Grains.
1. Psoas magnus,	145
2. Psoas parvus,	45
3. Iliacus,	70
4. Quadratus lumborum, and Sacrolumbalis, (not separable,)	419
5. Lumbo caudalis, (arises from (1 – 5) lumbar vertebræ, and is inserted into upper third of tail.)	165
6. Longissimus dorsi (spliced into last),	—
7. Glutæi and pyriformis,	638
8. Quadriceps extensor femoris,	628
9. Biceps, semimembranosus, semitendinosus, and gracilis,	697
10. Adductores femoris,	478
11. Trapezius,	90
*12. Accessory slip from the semicircular ridge of the occiput to the superior posterior angle of the scapula,	15
13. Rhomboidei,	35
14. Latissimus dorsi, (attached to triceps).	219
*15. Levator anguli scapulæ, (part of the serratus magnus, attached to the transverse process of 2 – 7 cervical vertebræ.)	30
*16. Levator acromio-trachelius of Cuvier? (from transverse spine of first vertebra to anterior third of the spine of the scapula),	23
17. Sterno-cleido-mastoid,	50
18. Pectorales,	224

	Grains.
19. Serratus magnus,	90
20. Deltoid,	100
21. Coraco-brachialis,	7
22. Biceps humeri,	135
23. Brachialis anticus,	50
24. Triceps,	349

It is not my intention at present to enter upon a detailed examination of the action of the hip and knee joint muscles in this monkey. It is sufficient to notice that, although the positions and relations of the parts are so different from those of man, yet that the muscles admit of being divided into the same four antagonistic groups.

	Grains.
1. Posterior muscles of hip joint, (glutæi and pyriformis.)	638
2. Anterior muscles of hip joint, (adductores, iliacus, and psoas magnus.)	693
3. Extensors of knee joint,	628
4. Flexors of knee joint,	697
	2656

Converting these as before into percentages, we find—

1. Posterior muscles of hip joint,	24·02
2. Anterior muscles of hip joint,	26·10
3. Extensors of knee joint,	23·64
4. Flexors of knee joint,	26·24
	100·00

In this monkey, therefore, the four groups of muscles are of nearly equal force; whereas in man the last group is greatly below the first three in amount of force.

If we compare the os innominatum of this monkey with that of man, we find very striking differences, which may be seen from an examination of Fig. 5, which represents the outer aspect of this bone, on the right side of the body. This figure should be compared with Fig. 2, which represents the same bone in man.

The ilio-pectinæal and ilio-ischial lines are not formed by planes, but consist each of a broken line; they are at right angles to each other, as in man, in the lower portion of their course, but form an acute angle of 30° with each other in their course along the edges of the ilium.

The next monkey whose muscular anatomy I shall describe is the *Macacus*.

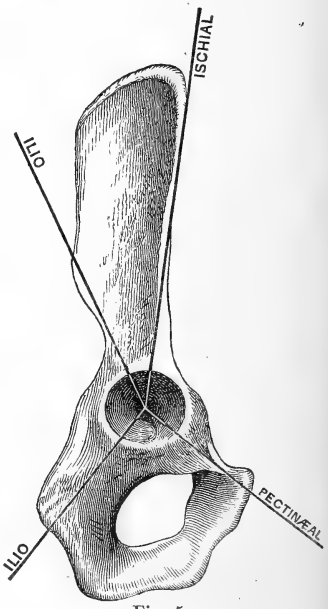


Fig. 5.

TABLE III.—*Physical data. Macacus* (female).

(*a*) *Body and Viscera.*

	Grains.		Grains.
1. Body,	41,700	4. Heart,	418
2. Kidneys,	385	5. Brain,	1210
3. Liver,	1650	6. Intestines, stomach, and spleen,	1584

(*b*) *Muscular System.*

	Grains.
1. Adductores femoris, (triceps, adductor, and pectinæus.)	462
2. Gracilis and sartorius, (These two muscles are united at their point of attachment to the tubercle of the tibia, and the *gracilis* arises from the whole length of the symphysis pubis.)	110
3. Psoas and iliacus,	231
4. Glutæi, and small rotators,	451
5. Flexors of knee:—	
Biceps femoris,	396
Semimembranosus and semitendinosus,	231
6. Extensors of knee:—	
Quadriceps and tensor vaginæ,	605

N. B.—The trachelo-acromius (No. 16 of last) is attached to the anterior third of the spine of the scapula, on its inner edge below the trapezius, and to the anterior fourth of the clavicle.

The accessory slip (No. 12 of last) passes from the semicircular ridge to a fibrous band running along the anterior half of the vertebral edge of the scapula. There is no distinct *levator anguli scapulæ;* it forms part of the *serratus magnus.*

Combining these muscles into the same four groups as before, we find—

	Grains.	Per Cent.
1. Posterior muscles of hip joint,	451	18·98
2. Anterior muscles of hip joint,	693	29·16
3. Extensors of knee joint,	605	25·46
4. Flexors of knee joint,	627	26·40
	2376	100·00

The distribution of the muscles is here very similar to that found in the Cercopithecus, and very different from that of man. In both cases the prominent point of difference is the feebleness of the flexor muscles of the knee joint in man.

The insertion of the trachelo-acromius (*16) into both clavicle and scapula, and not into the scapula only, would seem to be characteristic of the Macacus, as distinguished from the Cercopithecus.

I shall add, for the purpose of comparison with the foregoing, the weights of the muscles of a male Cercopithecus and Macacus.

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* These muscles are numbered as in Table II.

TABLE IV.—*Physical data. Cercopithecus* (male).

(*a*) *Body and Viscera.*

	Grains.		Grains.
1. Body,	55,160	5. Kidneys,	440
2. Brain,	1265	6. Heart,	358
3. Liver,	2090	7. Lungs,	798
4. Spleen,	220	8. Stomach and intestines,	3520

This fine monkey was formerly the property of Lord Massereene, and was presented to the Royal Zoological Gardens by Lady Massereene.

The brain showed an injury on left cerebral lobe, with meningitis and slight softening, and there was a scalp bruise over the seat of the internal injury; the lungs contained a few pneumonic spots in their upper portions. It was dissected in October, 1863.

(*b*) *Posterior Muscles of Hip Joint and smaller Rotators.*

	Grains.
Glutæi, pyriformis, &c.,	660

(*c*) *Anterior Muscles of Hip Joint.*

1. Iliacus and two psoades,	412
2. Adductores (viz. longus, magnus, and brevis), sartorius, and pectinæus,	852
3. Gracilis,	82

(*d*) *Extensors of Knee Joint.*

1. Quadriceps extensor femoris,	990
2. Tensor vaginæ femoris,	28

(*e*) *Flexors of Knee Joint.*

Biceps, semimembranosus, and semitendinosus,	495

(*f*) *Other Muscles.*

(*12) Accessory slip from the semicircular ridge to the lower point of trisection of inner side of vertebral edge of scapula (well developed).	
(*15) Levator anguli scapulæ, part of the serratus magnus, attached to the transverse processes of the seven cervical vertebræ,	22
(*16) Trachelo-acromion-levator, attached to the anterior third of the spine of the scapula, and not to the clavicle; proceeds from transverse process of the atlas (well developed).	

TABLE V.—*Physical data. Macacus* (male).

(*a*) *Body and Viscera.*

	Grains.		Grains.
1. Body,	22,014	5. Kidneys,	150
2. Brain,	1093	6. Heart,	180
3. Liver,	910	7. Lungs,	220
4. Spleen,	110	8. Stomach and intestines,	1590

Dissected in March, 1862.

(*b*) *Posterior Muscles of Hip Joint.*

	Grains.
1. Glutæi, pyriformis, obturatores, and gemelli, ...	280

(*c*) *Anterior Muscles of Hip Joint.*

1. Iliacus and two psoades, ...	120
2. Adductores, ...	220

(*d*) *Extensors of Knee Joint.*

1. Quadriceps femoris, ...	160

(*e*) *Flexors of Knee Joint.*

1. Biceps, semimembranosus, semitendinosus, (and gracilis), .	270

(*f*) *Other Muscles.*

1. Quadratus lumborum and sacrolumbalis, ...	140
2. Triceps humeri, ...	125
3. Latissimus dorsi, ...	77
(*12) Accessory slip (wanting).	
(*16) Trachelo-acromius, from transverse processes of atlas and axis, to the posterior edge of the outer third of the clavicle and spine of scapula, ...	15

Sir W. R. Hamilton, LL. D., read a paper—

On the Eight Imaginary Umbilicar Generatrices of a Central Surface of the Second Order.

He stated that he had been lately led, by quaternions, to perceive that the twelve known umbilics of such a surface are ranged on *eight imaginary right lines*, of which he has assigned the vector equations, and deduced a variety of properties.

J. Ribton Garstin, Esq., on behalf of Captain St. Vincent Hawkins Whitshed, presented a flat ornamented bronze celt, found near Tallaght, county of Dublin; also a piece of iron, which was believed to be part of an ancient celt.

The thanks of the Academy were voted to the donors.

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* These muscles are numbered as in Table II.

MONDAY, JANUARY 25, 1864.

The Very Rev. Charles Graves, D. D., President, in the Chair.

The Rev. J. H. Jellett read a paper "On the Refraction of Polarized Light."

The Secretary of the Academy read the following communication from F. J. Foot, Esq., on a Quern Stone found in the neighbourhood of Ballinasloe, and presented by him to the Academy:—

This Quern Stone now presented was found, about one hundred years ago, in a fort in the townland of Gorteencahill (parish of Clonmacnowen, Ordnance Sheet, Galway, $\frac{8}{47}$), about three miles south of Ballinasloe, and near the road leading from that town to Eyrecourt.

As well as I can ascertain, it was found lying on the surface, and was discovered in clearing away the low brushwood which encumbered the surface of a fort. This I think is probable, as it is well known the peasantry seldom dig the soil in a fort. It was not perfect when found, and since then it has undergone a good deal of ill usage. Two small crosses may be seen on the outer rim. Probably there was another on the part of the stone which has been broken off.

I recollect a few years ago seeing a quern stone near Liscannor, in the county of Clare, with three plain crosses on it, the surface of the stone having been cut away, so as to leave them in *alto relievo*. The place of the fourth cross was occupied by the hole for the turning handle. It was flat, and not convex, like the present one; indeed, I think, the great convexity of its upper side and corresponding concavity of the under side are perhaps the most striking features of this stone. It has evidently been much used, as may be seen by the worn and smooth appearance of the concave or grinding side, when compared with the rough surface of the convex.

The stone now before you is a piece of a highly micaceous schistose rock; and Mr. J. Beete Jukes, to whom I showed it, considers it identical with the metamorphic rock of Galway. In all probability, it was made from an erratic block of that rock. Boulders of the well-known porphyritic granite of Galway are abundant in the drift, S. and S.W. of Ballinasloe. The Quern, from its having been found in a fort, is supposed, as usual, by the peasantry, to be of Danish origin.

Edward Blyth, F. Z. S., read the following paper:—

On the Animal Inhabitants of Ancient Ireland.

After some preliminary and introductory observations, he proceeded to state that he had had the opportunity, only a few hours previous to this congress of learned and scientific gentlemen, of examining a number of skulls and other animal remains, of various degrees of antiquity, that had been recovered from the superficial deposits of Ireland. When time

permitted of it, he would treat of these matters in elaborate detail; but now he merely wished to announce a few facts which, he believed, would be of considerable interest to naturalists, whether in Ireland or elsewhere.

In the first place, he would call attention to the *Bos frontosus* of Nilsson, which, so far as he had yet seen, was the hitherto supposed *Bos primigenius* of Ireland. He exhibited specimens, together with a fine series of heads or skulls of the *Bos longifrons*, many of both species presenting the very conspicuously evident effect and result of the fatal blow which had been undeniably administered by man. He would not now enter deeply into the question of the degree of antiquity of these skulls; but he had recently been exploring at Uriconium, the city of the Wrekin (Wroxeter or Uroxeter), so long the home and head-quarters of the Roman Twentieth Legion, and there he had seen abundance of the remains of the *Bos longifrons*, specimens of which he had collected and brought with him to Dublin, which were altogether undistinguishable from the animal of which the more or less ancient remains are so common in Ireland. Those specimens he had presented to the University Museum of this city, together with some examples of Roman pottery from the same site, inclusive of the famous Samian ware. Fragmentary remains of *Bos frontosus* are also among the Uriconian specimens in the Shrewsbury Museum. Dr. Blyth even knew of and recognised the identity of *Bos longifrons* before it had been described by his friend Professor Owen; and he had long felt sure that there must have been a race or species intermediate to the large *Bos primigenius* and the comparatively tiny and diminutive *Bos longifrons*, which race or species had been described by Professor Nilsson, of Stockholm, as *Bos frontosus*. The speaker would rather designate it as *Bos taurus*. There were those three races of yore in pre-historic Europe, which, by interbreeding and commixture in every shape and way, have resulted in and produced the multitudinous breeds of the present day. There was another in the east of Europe, the *Bos trochocerus;* and another in the Nerbudda deposits of the peninsula of India, the *Bos namadicus* of his friends, Sir T. Proby Cautley and Dr. Falconer, which latter approximated very closely indeed to the European *Bos primigenius*. He had also seen, some quarter of a century ago, the frontal bones and horn-cores of a Bos noticed in an early volume of the "Proceedings of the London Geological Society," which had been gathered from the high banks of some stream that flows into the Orange or Gareip river in South Africa. Those horns were of the same particular division of the taurine type which was exemplified by *B. primigenius*, *B. frontosus*, *B. longifrons*, *B. trochocerus*, and by the Indian *B. namadicus*.

Dr. Blyth had a deal to say upon this subject, much more than he would now venture to indulge in, to weary, perchance, and to try the patience of the Academy. But he did not believe that all of the remains to which he had adverted were of equal or corresponding antiquity; but rather that those of *Bos frontosus* and *Bos longifrons* reached down to quite a modern period, as compared to the latest remains in Western

Europe of the *Bos primigenius*, and still more so as compared to the latest date of the *Megaceros hibernicus*. All of those races of humpless taurine cattle would interbreed and combine with the races of humped cattle (which latter he believed to be of African rather than of Asiatic origin), as also with the sub-bisontine Yak; and, doubtless, likewise with the three or four species of flat-horned taurine cattle of South-Eastern Asia; but certainly not with the Buffaloes, nor with the genuine Bisons—one of which is the so-called Buffalo of North America, from which the name of the great city of "Buffalo," upon the shores of Lake Erie, is derived. Before he concluded about Bos, he would offer yet a few remarks.

Far away in India, his attention had been attracted by a paper from a gentleman that he was now proud to call his friend—Dr. Wilde—and he had long wished to examine certain skulls which Dr. Wilde had treated of, and which he had now determined, to his complete satisfaction, to be those of *Bos frontosus*. There was a small particular, or character, which generally distinguished a wild herbivorous animal from a tame one, and this was a certain incrustation of brown tartar upon the teeth, which he did not find in the porcine relics at Uriconium, but which he thought at first he did find upon Irish specimens of *Bos frontosus*, even though the mark or blow of the wedge was through the forehead. That character was observable even in the more completely vegetarian Quadrumana, as Semnopithecus and Colobus, and even in the Orang-utan. But after examining the Irish bovine remains more attentively, he had noticed a ferruginous deposit from the peat, which might easily be mistaken for the incrustration of brown tartar that he had spoken of. In the one case there would be traces of parasitic life under the microscope—not so in the other case; and the absence of that particular kind of tartar upon the teeth indicated a tame animal rather than a wild one. The incrustation from the peat covered the whole tooth, at least as much of it as was out of the bony alveolus; whereas the tartar incrustation was only upon that portion of the tooth that had not been imbedded in the gum. The latter was conspicuously present in sundry teeth of *Megaceros hibernicus* and of *Cervus elaphus*. By the way, he would remark that the state or condition of preservation of the osseous remains of animals at Uriconium was something wonderful for bones that had been in the ground for two thousand years. But, whereas the mould of an ordinary grave-yard was somewhat acidulous, that of Uriconium was alkaline; and so the phosphates and carbonates of lime had not been dissolved away, and even much of gelatine remained in them. The bones usually resembled those found about a recent *abattoir* or slaughter house. Dr. Blyth had just examined a very considerable number of skulls of the *Bos longifrons;* and he was struck with the vast preponderance of females among them, even as, *mutatis mutandis*, the female skull of Megaceros was supposed to be comparatively rare. Nothing was more easy of explanation in either case. In the instance of the Megaceros the skulls of hinds had been found over and over again, and had been tossed aside as horses' skulls; perhaps, not having the grand horns to attract

attention. So likewise with the *Bos frontosus*. Its remains had been found in various parts of Europe, *ex necessitate rei*, and had been supposed to be those of a modern ox, and therefore neglected altogether, even as fossil human bones had doubtless, often and often, been similarly neglected. But in *Bos longifrons*, and probably in *Bos frontosus*, we find a preponderance of females. Why is this? Because the remains in bogs represented the herd as it existed—one bull at the head of a train of cows, as in wild or semi-wild bovine animals which exist at the present day; and because the bulls fight amongst each other and slay each other, and the animals which thus perish on the surface of the ground resolve and dissipate into their constituent proximate elements, instead of being imbedded and preserved in the peat of a morass.

Dr. Blyth next called the attention of the meeting to a series of skulls and fragments of skulls, which he considered to illustrate two races of domestic sheep, not very ancient, in his opinion, as compared with the remains of *Bos primigenius* (*verus*), or of *Megaceros Hibernicus*, in Western Europe. One series was of the polycerate race, still existent in Iceland, into which northern island it had probably been introduced from Ireland many centuries ago, although now utterly extinct (so far as he could learn) in Ireland. The other race would seem to be not very different, if at all so, from the old Scottish Highland race of sheep with which we are sufficiently familiar. He believed that either of those races might claim about the same antiquity with specimens of the *Bos frontosus* and of the *Bos longifrons*, but not of the *Bos primigenius*; that of Sus and of Equus, also, in Ireland; being much older than the oldest Capra that he had yet seen the remains of in this island. He drew the attention of the assembly to the most ancient-looking Irish Capra skull that had been brought to his notice; but this, he could perceive at a glance, was comparatively quite modern, and was that of the tame Welsh goat of the present day.* Its horn-cores had the ibicine arched curvature backwards, analogous to that of the wild *Capra ægagrus* and of other species, not the twist or spire of the *C. megaceros* of Kashmir, a link to which, from the other ibicine goats, was supplied by the *Capra pyrenaica* of Schinz, a fine stuffed specimen of which is in the Museum of the Royal Dublin Society, and another in the British Museum; and the species is most interesting as explaining the immediate affinities of the *C. megaceros*. The different animal remains from the Irish bogs had been found at various depths beneath the surface, and had been indiscriminately collected and promiscuously tumbled into the same heap by the finders of them; but they had not been contemporaneously deposited.

Dr. Blyth lastly exhibited to the meeting a very extraordinary frontlet and pair of horns, which, as he more than suspected, were not ancient Irish at all, but were obviously quite recent, and probably Ti-

* The specimen is figured in vol. vii., p. 206, f. 8; the Polycerate sheep in fs. 9 and 11; and the other race of sheep in fs. 7 and 10.

betan; but which were considerably interesting in a physiological point of view, whatever their age or local origin. They were, in fact, closely approximative to those of the unicorn breed of sheep of Tibet, which had been described by his friend, Mr. Robert Schlagintweit, only that after they had become tolerably united for a while the horns gyrated outward, and were far divergent at the tips. Those of the so-called unicorn breed of Tibet were developed as usual, each from the centre of ossification of the frontal bone, and, of course, not from the median frontal suture. They were, therefore, separate in the lamb, but grew towards each other until each bony horn-core became enveloped in and surrounded with the same corneous or cuticular integument, like two fingers of the hand inserted into one finger of a glove, the transverse section being that of a dicotyledonous seed—in other words, like that of the two lobes of a bean.

W. Lane Joynt, Esq. (with the permission of the Academy), exhibited an ancient Bell, called "The Bell of Burren."

The Secretary, on the part of W. Eassie, Esq., of High Orchard House, Gloucester, presented a large collection of Chinese drawings.

The thanks of the Academy were voted to the donor.

MONDAY, FEBRUARY 8, 1864.

The Very Rev. Charles Graves, D. D., President, in the Chair.

James W. Warren, Esq., was elected a member of the Academy.

The Rev. Professor Jellett read a paper (in continuation) "On the Refraction of Polarized Light."

J. R. Garstin, LL. B., exhibited, and described, an ancient steel-yard, found on the property of the Rev. G. N. Tredennick, Co. Donegal. The steel-yard, which is evidently of considerable antiquity, was lately found on the property of the Rev. G. N. Tredennick, near Ballyshannon, by a tenant, when clearing away a mound of earth and stones, at a few feet from the surface. The mound appeared to have been a part of what was considered a Danish fort, or rath, of which there are several in the immediate vicinity. When found, the yard or stem was attached to the round bulb or weight; but was broken off by the person who found it, who imagined it was gold from the weight of it, and colour, resembling gilding. The covering of the lead was cut away by him, to ascertain whether the interior was gold. The stem is graduated on either side, evidently for ascertaining the weight of the article, and, from the appearance and manner in which it was ornamented, must have been a standard weight. A number of bronze celts, or ancient Irish implements, and bronze hatchets, also a sword of bronze, have been found in the immediate vicinity where the steel-yard was got.

Mr. Hardinge made the following observations:—I hand in, Mr. President, as the property of the Academy, the original MS. from which my "Memoir on Townland and other Surveys in Ireland of a public character, from the year 1641 to the year 1688," was published in the Academy's "Transactions;" and beg to observe that the value of the MS. is, that it exhibits the superior form in which the statistical analyses of the forfeited, profitable, and unprofitable baronial areas of the lands exhibited in Appendix E. would have appeared, had not a pressing necessity to economize the Academy's funds obliged its modification to the form in which it has been printed. The MS. is also valuable in enabling any person to distinguish the author's from the printer's errors; and, as I lay claim to no infallibility this way, I consider the present an opportune time and place to state, that I will feel much obliged, upon the discovery of errors, if the discoverers will communicate to me their nature, and the exact references to them in the "Transactions'" volume, I beg also to present to the Academy one of my own copies of the publication; it will be found to embrace an Introduction not contained in the copies distributed amongst the members of the Academy, and this Introduction divulges some circumstances that Academicians especially should be made acquainted with; it also contains two photographed Down Survey Maps, which in the operation were reduced to a size suitable for introduction into the "Transactions'" volume. These maps were presented to me, in duplicate, by Sir Henry James, Chief of the Ordnance Survey Department. They are elegantly and accurately executed; and my reason for thus presenting them is, to promulgate the circumstances leading to their existence, and at the same time to perpetuate these circumstances and the illustrations themselves in the Library of the Academy.

The Academy then adjourned.

MONDAY, FEBRUARY 22, 1864.

The Very Rev. Charles Graves, D. D., President, in the Chair.

J. Huband, Smith, Esq., exhibited an autograph letter of Oliver Cromwell to his son Henry, when Governor-General of Ireland, and read a paper explaining the circumstances referred to in the letter.

W. H. Hardinge, Esq., read the following paper, containing some remarks on the Countess of Desmond, in the reign of Charles I.:—

The Old Countess of Desmond.

It must appear presumptuous in me, thus occupying the position of a yet living, though unhappily absent author, in the observations I am about offering to the Academy on a few points hitherto unnoticed, and which I think throw additional light upon the history of the Old Countess of Desmond; but in explanation I may be permitted to state, that having placed at the disposal of the author alluded to the materials giv-

ing rise to these observations, he frankly informed me that he had retired from the printing office, and requested that I would communicate the nature of them to the Royal Irish Academy for publication.

I esteem the permission thus given so nearly allied to a command, if not a challenge, that I feel I have no other resource than to comply with the request of Mr. Richard Sainthill.

The publication of that gentleman in 1863, dedicated to Miss Saunders Forster, and the publication in the "Quarterly Review"* for March, 1853, both on the subject of the Old Countess, appear to me conclusively to prove, "that Catherine FitzGerald, a daughter of the Lord of Decies, was born in the reign of Edward IV.; was married to Sir Thomas FitzGerald about the close of that, or the commencement of the reign of Henry VII.; became Countess of Desmond in the year 1529, when her husband succeeded to the earldom; became Countess Dowager in the year 1534, when he died; and from that period to the time of her death in the year 1604, at the patriarchal age of 140 years, she resided in the Castle of Inchiquin, which, together with the manor of that name situated in the county of Cork, had been at an early period settled upon her in dowry."

In the memoir publications referred to, there are two suggestions of a very remote and pertinent character discussed. The one originates in the note-book of the Earl of Leicester, when ambassador at Paris, in the year 1640, which contains a statement, "that the Old Countess and her aged and decrepit daughter went over to Bristol, and from thence, the Countess on foot and the daughter in some rude and humble conveyance, travelled up to London, where the Countess was introduced at the court of Queen Elizabeth (about the year 1586), represented her necessitous condition, and was graciously received by the Queen, who redressed her wrongs." The suggestion leaves the reader to imagine what the nature and extent of these wrongs were, what was the nature of the redress granted, and how the noble supplicants returned to their native land—points of information which appear to me more worthy of note and comment than those dwelt upon by the Earl of Leicester.

The other suggestion is that of Sir William Temple, who postpones the visit to the reign of King James I., but supplies no particulars whatsoever of its cause or consequence.

The paper of of Mr. Sainthill, read before this Academy on 8th April, 1861, and published in its "Proceedings" under that date, with great force and perspicuity combats and disposes of the visit of the Old Countess to Queen Elizabeth, suggested by Lord Leicester. He, however, does not touch upon that which, upon the authority of Sir William Temple, she is said to have made to King James I.—concluding, I presume, that if the Countess Dowager Catherine of Desmond was proved, by his (Mr. Sainthill's) arguments, to have been raised by her jointure provision to such an independent position in the year 1586, as not to need any aid or

* Vol. xcii., p. 329.

bounty from Queen Elizabeth, it would be needless to repeat the same arguments to disprove an assumed subsequent visit of the same Countess to the court of King James, and at this point Mr. Sainthill abruptly concludes his inquiry.

It must, however, strike the mind of an accurate investigator, that although the imputation of Lord Leicester and Sir William Temple may have been wrong as respects the *Old* Countess of Desmond, it might be applicable to a younger Countess of Desmond, namely, Elinor, wife of the ill-fated and unfortunate Garrett—*alias* Gerald—sixteenth and last Earl of Desmond of the Fitz Gerald line—who was cotemporaneous with the older Countess during the limited period of this inquiry; and that, therefore, Mr. Sainthill would have done well to have proceeded one step further than he did, cleared up this remaining point, and with it have exhausted the subject.

In 1579 Garrett, Earl of Desmond, was proclaimed a traitor by military law. In 1583 he was barbarously murdered for the money reward set upon his head, and in 1586 be was attainted, when his immense territorial possessions were vested in the Crown by Act of Parliament.

This transfer of the Desmond estates to the Crown did not affect the ancient jointure charge to which the Inchiquin manor fragment of them was liable, in favour of the Countess Catherine, *alias* the Old Countess; but it annihilated, swept away every other charge and interest to which they might have been subject, so far as Elinor, the young Countess Dowager, and all the sisters of her then late husband, Garrett, were concerned.

I need scarcely remind my auditory of the intensity of feeling that subsisted in the minds of the British rulers then in power in Ireland against the Desmond race; and helpless and destitute as the widow of Garrett and his sisters were at that time, there was not, I believe, to be found one amongst these rulers who would publicly support a claim for a pension to relieve and comfort their helplessness and destitution.

The individuals placed in the year 1586 in the position I have described were, Ellen, Countess Dowager of Desmond; Lady Jane FitzGerald; Lady Ellen FitzGerald; and Lady Elizabeth FitzGerald, sisters of the Earl Garrett.

There can be no doubt, as evidenced by a license granted to the Countess of Desmond to return* to Ireland from England, where she had been for some time staying, dated 23rd June, 39th Elizabeth, that she went over to the Court of St. James's, where she was presented to the Queen, and successfully urged her melancholy suit.

The result of that suit was a grant by letters patent,† under the great seal of Ireland, dated 25th November, 29th Elizabeth, Anno

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* Morrin's "Calendar to Patent and Close Rolls, Court of Chancery, Ireland," vol. ii., p. 479.

† Landed Estates' Record Office, liber 15, f. 128, Patents, Elizabeth.

Domini 1587, settling upon the Countess for her life a pension of £100, Irish, per annum.

And by warrant* of same Queen, issued in same year, a pension of £35, Irish, per annum, each, was granted, during pleasure, to the Ladies Jane, Ellen, and Elizabeth FitzGerald.

It is manifest from these facts, that the Earl of Leicester was in error in attributing to the Old Countess and her decrepit daughter a visit to Queen Elizabeth, which was really made, and at the very period indicated, by the younger Countess and one of her sisters-in-law.

Having placed these respective parties in the enjoyment of pensions from Queen Elizabeth, I will at once pass on to the reign of King James I., and see what happened then.

This monarch ascended the throne of England in March, 1602, and the pension granted to the three Ladies FitzGerald ceased to be paid. This I can understand, as the warrant of grant from Queen Elizabeth constituted a tenure during pleasure only, and it was merely an act of official duty in the Vice-Treasurer of Ireland to refuse further compliance with it until the will of the king was known. The pension granted to the Countess ceased to be paid then also; this I cannot understand, as the tenure of her grant was for the term of her natural life, and such instruments are and have been always considered binding upon the Crown, without regard to succession.

The circumstance of estoppel must have occasioned much inconvenience, if it did not produce absolute want, to these ladies; and once more the Countess proceeded to London, and in all likehihood was again accompanied by one of her participating sufferers, to seek redress at the foot of the throne.

The result of the appeal to the King was crowned with the same success as a similar appeal was to Queen Elizabeth; but the case of the three Ladies Fitzgerald was more tardily dealt with than was that of the Countess. Their situation, however, when redress did come, was improved in the permanency of the tenure, as well as the amount of the pensions granted to them, as I find letters patents,† under the great seal of Ireland, bearing date the 1st day of June, in the fourth year of the reign of King James I. of England, Anno Domini, 1606," which recite "that information had been given to the King of the distressed estates of the Ladies Jane, Elinor, and Elizabeth Fitz-Gerald, sisters to the late Earl of Desmond, who complained of their want of maintenance, because their several pensions of £33 6*s.* 8*d.*, sterling, granted them by Queen Elizabeth, determined by her death, being held and enjoyed by warrant, and not by letters patent," and which granted a pension of £50 *sterling* per annum to each of said ladies, to hold same from the cessation of payment of the former pensions, until by a gift of lands, or other good means, they and each of

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* Landed Estates' Record Office, warrants of payment pensions, Elizabeth.

† Ibid., Patents, James I., lib. 11 B, p. 245.

them should obtain as great or greater benefit and advancement, when said pensions were respectively to determine. I shall only observe in reference to these ladies and their pensions, that they continued to receive them down to the year 1641, when the great rebellion happened in Ireland and extinguished law, order, and the royal and public revenues together.

The pension of the Countess was more immediately restored, as the ensuing copy of a letter from the Lords of the Privy Council of England to the Lord Lieutenant and Privy Council of Ireland demonstrates, viz. :—

"After* our hearty commendations to your lordships and the rest, &c., upon humble suit made by the Countess of Desmond unto the King's Majesty, his Highness is graciously pleased that she shall enjoy a pension she had in Ireland of £100, Irish, per annum. These shall be to require you to take order the said pension of £100, Irish, shall be paid from henceforth unto the said Countess, with the arrears not exceeding one year, wherein this signification of his Majesty's pleasure shall be your sufficient warrant in that behalf. And so we bid your lordship and the rest a hearty farewell. From the Court at Theobald's, the last of July, 1604.

"Your lordships', &c., very loving friends,

"T. Ellesmere, *Canc.*,	E. Worcester,
T. Dorset,	R. Cecyll,
Nottingham,	W. Knollys,
Suffolk,	J. Stanhope."
Northumberland,	

This letter, reviving the grant of Queen Elizabeth, shows that the pension had been stopped, and that the Countess made personal suit for its revival to the King; and it further shows, as well by the immediate orders it issues as the number and rank of the names attached to it, the deep interest and commiseration entertained by King James and his Court for the Countess and her misfortunes; and I think it is manifest from the circumstances disclosed by this letter, as well as by the letters patents granting the pensions of £50 each to the Ladies FitzGerald, that Sir William Temple was in error in attributing the visit so made by the Countess Elinor of Desmond at the Court of King James to the "Old Countess," who, if she was living in July, 1604, certainly died before the close of the following December.

The pension of £100 per annum was paid to Countess Elinor, by the Vice-Treasurer of Ireland, to Michaelmas, 1638, when it ceased; and I therefore conclude that she must have died before the Easter of 1639, when another half-year of the pension would have been due and payable; and at this point I should have closed my observations, if it

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* Landed Estates' Record Office, Patents, James I., lib. 2 B, p 111.

was not stated in the "Anthologia Hibernica,"* and if that statement was not supported in "Lodge's Peerage,"† edited by Archdall, "that Elinor, daughter of Edmund, Lord Dunboyne, the second wife of the 16th Earl of Desmond, remarried O'Connor of Sligo, *and died in* 1656; that she erected a chapel near the church of St. Dominick, in Sligo, had a monument placed therein, and is herself buried there.

I will not attempt to reconcile the discrepancy apparent between the date (1638) at which I assume her death to have taken place, and the date (1656) at which Lodge places it. I will only observe, that, as she is known to have had one son and five daughters living at the time of the murder of her husband, Earl Garrett, in 1583, it is not unreasonable to conclude her then age to have been 30 years; and if this be so, she would have attained the age of 85 in 1638, and of 103 in 1656. I leave the Academy, keeping in view the fact of the cessation of the payment of the pension from Michaelmas, 1638, to form its own judgment.

The monument which was erected to the memory of her last husband is still subsisting, and I am enabled, through the kindness of a lady friend, to present a sketch of it, done in oils.‡ From this illustration, the monument appears to be a chaste and elaborate piece of sculpture, and is a valuable relic of the past, whether considered in a genealogical, antiquarian, or artistic point of view, and certainly the families most interested should pay great attention to its preservation.

This Countess of Desmond held estates in her own right in the county of Sligo. I find her in charge upon the Crown Rentals from 1620 to 1641, as tenant, which officially signifies patentee to the Crown, at a Crown rent of 20*s.*, equivalent to 15*s.* of the late Irish currency, for the castle of Bealadrohid, the quarter of land of Rathsene, the quarter of land of Leighcarrow, the cartron of land of Carrcumone, with other lands which were forfeited to the Crown by the attainder of Brian O'Connor, one of the Sligo family.

Her second husband, the O'Connor Sligo, surrendered his estates for the purpose of obtaining a regrant of them from Queen Elizabeth. Such a regrant§ was made to him; it bears date 12th July, 27th Eliz., A. D. 1585, and comprehends a large portion of the county of Sligo; but these estates of the Countess Elinor, as well as a large portion of her second husband's, the O'Connor Sligo, by some arrangement, made about the year 1636, passed into the hands of the Earl of Strafford and Thomas Ratcliffe. A clause in the Act of Explanation of 1665, and a grant from King Charles II., confirms the arrangement so made, and at the present day represent the title from the Crown to these Sligo estates.

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* Vol. i., p. 245. † Vol. ii., p. 75.

‡ This lady would not permit me to reveal her name, for the reason that she is offended at the illiberality of the Academy in excluding ladies from hearing polite literature and antiquarian papers read, in many of which they would take a deep interest.

§ Landed Estates' Record Office, Patents, Eliz., lib. 26, f. 53.

In the publications of Mr. Sainthill, the "Quarterly Review," and this paper, there is now before the Academy a complete genealogical and life account of the two Old Countesses of Desmond; and from it a satisfactory conclusion may be arrived at as to whether both, or which of them, appeared at the courts of Queen Elizabeth and King James.

It appears to me that, without a violation of the just application of the laws of evidence, the decision must be against any such visit of the older Countess, who had no apparent necessity for the journeys, and at the first suggested visit was 120, and at the latter 140 years of age; while the other Countess had the inducement of hard necessity, and was then in the vigour of her age, being 30 years old in 1576, and 48 in 1604.

Lord Talbot, on the part of the Earl of Enniskillen, presented some drawings, maps, and photographs of antiquarian remains.

The thanks of the Academy were returned to the donor.

The Academy then adjourned.

STATED MEETING.—Monday, March 16, 1864.

The Very Rev. Charles Graves, D.D., President, in the Chair.

The Secretary of the Council read the following—

Report of the Council.

Since our last Report was presented to the Academy, the following papers have been printed in the "Transactions:"—

In the Department of Science.—Mr. Bindon B. Stoney, "On the Relative Deflection of Lattice and Plate Girders."

And in Antiquities.—Mr. W. H. Hardinge, "On MS. Mapped and other Townland Surveys in Ireland of a Public Character, from 1640 to 1688."

The printing of Captain Meadows Taylor's paper, "On the Cromlechs and other Antiquarian Remains in the Dekhan," has been completed, but its issue is retarded by a delay in the execution of the illustrations.

It has recently been decided, on the recommendation of the Committee of Publication, that every paper printed in our "Transactions" shall be made up separately, and issued in that form to members applying for it. This arrangement will greatly diminish the interval which has hitherto usually elapsed between the reading of a communication and the delivery to our Members of the part of the "Transactions" in which it appears. For the future, when a paper is ready for issue, notice will be sent to each Member of the Academy; and after the lapse of twelve months from the date of the notice, the Academy will not consider itself bound to supply copies of the paper.

The preceding regulation has enabled us to prepare for immediate issue several papers which have been long printed, and had remained in

our hands for the purpose of being included along with others in a Part of the usual size.

These are, in the Department of Science:—

1. Mr. F. J. Foot, "On the Distribution of Plants in Burren, County of Clare."

2. Dr. Robert Macdonnell, "On the System of the Lateral Line in Fishes."

And, in Polite Literature:—

Mr. Denis Crofton's "Collation of a MS. of the Bhagavad Gita."

Many interesting communications have been read before the Academy within the past year. We have had papers on Scientific subjects from Sir W. R. Hamilton, Mr. F. J. Foot, Rev. Professor Haughton, Rev. Professor Jellett, Mr. John Purser, Jun., Mr. Edward Blyth, and Mr. Clibborn. In Polite Literature, from R. R. Madden, M. D.; and from Dr. Carl Lottner, who gave us the substance of some unpublished researches in Celtic philology by the late Professor T. R. Siegfried. In Antiquities, from the Very Rev. the President, Rev. Dr. Reeves, Mr. Samuel Ferguson, Q. C., Sir William R. Wilde, Mr. G. V. Du Noyer, Mr. W. H. Hardinge, Mr. W. Lane Joynt, Mr. D. H. Kelly, Mr. Hodder M. Westropp, Mr. G. H. Kinahan, and Mr. J. Huband Smith.

During the past year a few valuable additions have been made to the library by purchase and donation, and a further portion of the arrears of binding has been executed.

To the Academy's collection of Antiquities there have been added 196 articles, of which 24 were obtained by purchase, 156 by presentation, and 16 under the treasure-trove regulations. Several of the latter are gold articles of great interest and value. A number of copies of the Catalogue of the Museum have been sold within the year. The two first parts have been bound up as Volume I.; and may now be had in this form by application at the Academy's house, or through the publishers. The price has been settled at 14*s.* to the public, and 12*s.* to members. Some additional woodcuts have been executed for the illustrations of the Fourth Part, which will comprise the articles of silver and iron, and also such articles as have been obtained in what are called "finds."

With regard to the finances of the Academy, the Treasurer anticipates that on the 31st of March, after defraying all existing liabilities, a small balance will remain, to be carried over to the credit of next year's account.

It may be worth while to state here that the total number of the Members of the Academy on the 1st of March, 1864, was 358; of whom, 198 were Life, and 160 Annual Members. Of the Life Members, 130 had paid life compositions of £21, amounting in all to £2730; 22 had paid compositions of £15 15*s.*, amounting to £346 10*s.*; 43, compositions of £6 6*s.*, amounting to £270 18*s.*; and 3 had been admitted by vote of the Academy, without payment.

To represent the total amount of these compositions, viz., £3347 8*s*., the Academy have to their credit in 3 per cent. consols. only £1201 18*s*. 10*d*., leaving a balance due to the Life Composition Fund of more than £2000.

The Academy has lost by death during the past year two Honorary Members, William Vrolik, and Sir W. E. Parry, and fourteen Ordinary Members, viz.:—

1. Rev. James Kennedy Bailie, D. D.; elected January 26, 1818.
2. Sir Robert Bateson, Bart.; elected April 24, 1809.
3. Beriah Botfield, Esq., F. R. S.; elected April 12, 1841.
4. Rt. Hon. Francis W., Earl of Charlemont; elected December 28th, 1793.
5. Edward J. Cooper, Esq., F. R. S.; elected February 27, 1832.
6. Most Rev. Richard Whately, Lord Archbishop of Dublin; elected January 27, 1834.
7. Daniel Griffin, M. D.; elected January 13, 1851.
8. Rt. Hon. John S. F., Viscount Massareene and Ferrard; elected August 24, 1857.
9. Christopher Moore, Esq.; elected January 14, 1850.
10. Jonathan Osborne, M. D.; elected June 10, 1839.
11. Hon. and Very Rev. Henry Pakenham, Dean of St. Patrick's, Dublin; elected April 10, 1843.
12. Major-General J. E. Portlock, F. R. S.; elected May 24, 1830.
13. Robert Reid, M. D.; elected February 24, 1834.
14. George Roe, Esq., D. L.; elected January 12, 1852.

Several of these are distinguished names; five of their number meet us in the records of the scientific, literary, or antiquarian labours of the Academy:—

1. The Rev. James Kennedy Bailie, D. D., was rector of the parish of Ardtrea, to which he was presented in 1830, by Trinity College, having previously been a Junior Fellow of that college. He was distinguished as a Greek scholar, and published two different editions of the Iliad of Homer, one with Latin notes and Excursus in 1821-3; the other with English notes, for school and college use, in 1833. He was also the author of "Lectures on the Philosophy of the Mosaic Record of the Creation," published in 1826; and of "Prelections on the Language and Literature of Ancient Greece," published in 1834. He contributed to the nineteenth and twenty-first volumes of our "Transactions" a "Memoir of Researches amongst the Inscribed Monuments of the Greco-Roman Era, in certain Ancient Sites of Asia Minor;" and to the twenty-second volume, a Memoir on two Medallion Busts preserved in the manuscript room of the library of Trinity College, Dublin.

2. Edward Joshua Cooper, Esq., was well known as an able practical astronomer, and as the proprietor and director of the Markree Observatory. He contributed to our "Proceedings" a considerable number of papers; "On the Zodiacal Light," in vol. iii.; "On Comets," in vols. iii. and v.; "On Observations with his Transit Circle," and "On Leverrier's Planet,"

in Vol. iii.; "On a New Mode of Determining the Longitude," and "On the Discovery of the Planet Metis," in Vol. iv.; "On a Thunder Storm," in Vol. v.; "On Ecliptic Catalogues," in Vol. vi. A Cunningham Medal was awarded to him by this Academy in the year 1856, for his "Catalogue of Ecliptic Stars." An account of his labours in the preparation of this catalogue will be found in Vol. vii. of our "Proceedings," p. 52, in the address delivered by the Rev. J. H. Todd, D. D., on the occasion of the presentation of the medal. Mr. Cooper was M. P. for County of Sligo from 1830 till 1841, and again from 1857 to 1859. He was also a Member of the Royal Society of London.

3. The late eminent Archbishop of Dublin was for many years a member of the Council of this Academy, and was several times nominated as one of its Vice-Presidents. In vol. i. of our "Proceedings" will be found some remarks by His Grace, "On Barometric Prognostication of the Weather;" and in Vol. ii., "Observations on the Leafing of Plants."

4. Dr. Daniel Griffin contributed to the "Proceedings" of the Academy, "A Description of certain Phenomena observed during the Limerick Whirlwind of October 5, 1851."

5. Jonathan Osborne, M. D., was King's Professor of Materia Medica and Pharmacy, in the King and Queen's College of Physicians in Ireland. He read before the Academy, in 1840, a paper "On Aristotle's History of Animals," an abstract of which will be found in our "Proceedings," vol. i., p. 427. In 1842 he gave an account of a singular case of deprivation of the power of speech, while the intellect remained unimpaired; and in 1850, a letter, "On a New Application of Thermometrical Observations for the Determination of Local Climates in reference to the Health of Invalids."

6. Major General J. E. Portlock, R. E., is best known as the author of a Report on the Geology of the Co. Londonderry, and of parts of Tyrone and Fermanagh (London, 1843). He was for some time a member of the Council of the Academy. Abstracts of two communications made by him to the Academy will be found in Vol. i. of the "Proceedings," "On Anatifa Vitrea" and "On Otis Brachyotos."

The Academy has elected during the year one Honorary Member—
His Royal Highness the Prince of Wales.
And fourteen Ordinary Members :—

1. The Rt. Hon. the Earl of Belmore.
2. Christopher N. Bagot, Esq.
3. Rev. Josiah Crampton, M. A.
4. The Rt. Hon. the Earl of Charlemont.
5. The Rt. Hon. the Earl of Donoughmore.
6. Charles H. Foot, Esq.
7. The Rt. Hon. the Earl of Granard.
8. G. Charles Garnett, Esq.
9. Thomas W. Kinahan, Esq.
10. J. J. Digges La Touche, Esq.
11. David R. Pigot, Esq.
12. Major Robert Poore.
13. Edmund Waterton, Esq.
14. Jas. W. Warren, Esq., M.A.

Whereupon it was—

Resolved,—That the Report now read be received and adopted by the Academy.

The ballots for the annual election of President, Council, and Officers, having been scrutinized in the face of the Academy, the President reported that the following gentlemen were duly elected:—

President.—The Very Rev. Charles Graves, D. D.

Council.—Rev. Samuel Haughton, M. D., F. R. S; Rev. J. H. Jellett, M. A.; Robert W. Smith, M. D.; Robert M'Donnell, M. D.; William K. Sullivan, LL. D.; Joseph B. Jukes, F. R. S.; and George B. Stoney, M. A., F. R. S.: on the Committee of Science.

Rev. Joseph Carson, D. D.; John F. Waller, LL. D.; John Kells Ingram, LL. D.; John Anster, LL. D.; R. R. Madden, M. D.; and Denis F. Mac Carthy, Esq.: on the Committee of Polite Literature.

John T. Gilbert, Esq.; Rev. William Reeves, D. D.; George Petrie, LL. D.; W. H. Hardinge, Esq.; Lord Talbot de Malahide; Rev. J. H. Todd, D. D.; and Sir W. R. Wilde: on the Committee of Antiquities.

Treasurer.—Rev. Joseph Carson, D. D.

Secretary of the Academy.—Rev. William Reeves, D. D.

Secretary of the Council.—John Kells Ingram, LL. D.

Secretary of Foreign Correspondence.—Sir W. R. Wilde, M. D.

Librarian.—John T. Gilbert, Esq.

Clerk, Assistant Librarian, and Curator of the Museum.—Edward Clibborn, Esq.

The names of Carl Joseph Hyrtl, of Vienna; F. Le Verrier, of Paris; and Herman Helmholtz, of Heidelberg—specially recommended by the Council as Honorary Members—were read. Whereupon it was

Resolved,—That the ballot be dispensed with; and these gentlemen were declared by the President to be unanimously elected Honorary Members in the department of Science.

Pursuant to the By-laws, chap. ii., sec. 15, Major-General Edward Sabine, as President of the Royal Society of London, was declared an Honorary Member of the Academy.

His Grace the Archbishop of Dublin, having been proposed and seconded as a member of the Academy (the preliminary notice being dispensed with on privilege), was declared to be duly elected a Member of the Academy.

Sir W. R. Wilde exhibited and read the following paper on an—

Ancient Wooden Shield found in Ireland.

Sir W. R. Wilde, Vice-President, brought under the notice of the meeting an ancient wooden shield, and said:—During the eighty years and upwards which the Academy has been established, it has done good service to the cause of science, polite literature and antiquities in Ireland, in the original communications which it has published, the library

which it has created, the historic manuscripts which it has preserved, and, above all, the great National Museum which, within the last thirty-five years it has created, and that, too, on very slender means. In that Museum—containing the largest and purest collection of Celtic antiquities in the world, the truest exposition of the manners and arts of the earliest races that spread over North-western Europe, unalloyed by Roman, and but slightly tinctured by either Saxon or Frankish art,—may be read the unerring page of history in more enduring and unalterable characters, and upon more authentic materials, than in all the bardic legends that refer to the primeval occupation of this island. Here we have the rude flint weapons and stone tools of the earliest Pagan colonists; and the evidences of the metallurgic skill of their successors displayed in copper and bronze celts, swords, spears, and battle axes of surpassing beauty, and in numbers far exceeding those in any other museum in Europe. Here also have been collected the personal ornaments formed out of the precious metals, which clearly attest the taste and skill of a refined and wealthy people; and we likewise possess objects of mediæval art of unsurpassed beauty, in our ecclesiastical and ecclesiological remains, which bear witness to the piety and artistic culture of our Christian ancestors of upwards of 800 years gone by. There is scarcely an object of any kind, connected with the chase or warfare, household economy or domestic usage, the dress or decoration, the religion or sepulture of the early or middle-age people of Ireland, that is not fully and abundantly illustrated,—with one solitary exception. That exception has been the more eagerly sought for, because it is scarcely possible that warfare (a pastime in which our Celtic ancestors specially delighted) could have been carried on with such weapons as the period produced without it, and because the written histories specially allude to its existence—I mean the shield. Some years ago a collector brought under the notice of our venerable and venerated colleague, Dr. Petrie, a small bronze shield, or covering of a shield, found among some old brass and iron in a scrap metal shop in Thomas-street, in this city, and which article was *said* to have come from the West of Ireland. Unfortunately it was not procured by the Academy; but fortunately it is in the possession of Lord Londesborough, a nobleman at all times willing to assist our institution; and at a future period I hope to be able to present the Academy with a model of it. His Lordship's absence in Egypt prevents my doing so on the present occasion.

During the past summer a most remarkably perfect wooden shield was discovered, ten feet deep in a turf bog, on the property of William Slacke, Esq., of Annadale, townland and parish of Kiltubride, county of Leitrim, to which gentleman the Academy is indebted for having preserved and forwarded to my care this very ancient relic of the past. It is of an oval shape; originally, when taken out of the bog, it measured 26½ inches long, by 21 broad, and about half an inch thick; plain on the reverse side, with an indentation traversed by a longitudinal crosspiece or handle, carved out of the solid, and occupying the hollow of the

umbo or central boss on the front or anterior face. The front is carved with ribs, or raised concentric ridges, triangular in section, seven in number, and arranged in pairs, except the outward one, which is single. The conical boss, also carved out of the solid, stands 3 inches high, and measures 8 inches in the long diameter. One end of the shield is narrower than the other, but this I think is more the result of contraction of the wood towards the upper portion of the tree from which it was cut than the original intention of the artist. The boss has, likewise, been canted over to one side; but this is also in part due either to the action of the air on the drying wood, or to pressure while in the bog. Both actions may have effected this result. A very remarkable and equable indentation exists along one side of the boss in the line of the lateral diameter of the shield, which can only be accounted for in three ways: by the tool of the artist, by pressure while in the bog, or by greater shrinking of the fibrous texture of the wood at this particular point from a knot or such other circumstance. It is, however, worthy of remark, that in one of the bronze shields preserved in the Copenhagen Museum, a similar indentation presents on one side of the boss.

Professor Haughton, whom I have consulted on the subject of this curvature, is of opinion that, as in certain fossils, it is the result of pressure while in the bog; but the objection to this is, that the grain of the wood runs through on the obverse side, but has been cut obliquely by the tool of the graver in forming the ribs in front. The tilting over of the boss may, however, have been somewhat influenced by pressure.

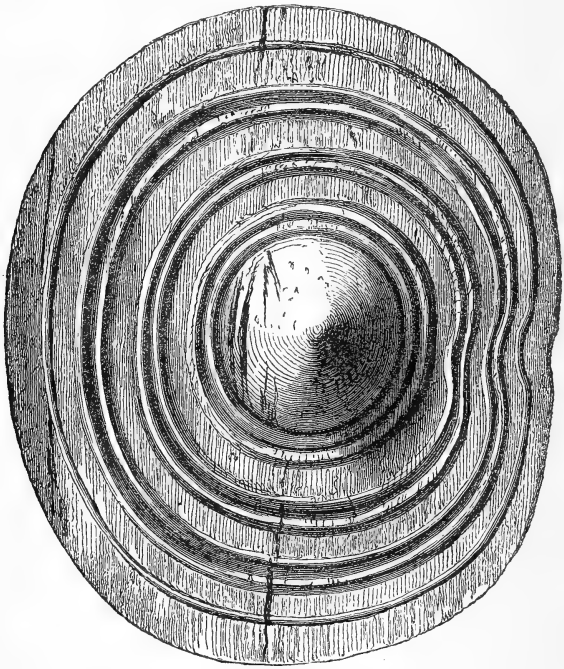
When the shield was first taken up, and even after it came into my possession about a fortnight afterwards, it was so soft, that any firm substance could be easily passed through it; and very great care was required for many weeks subsequently, and during the process of evaporation, drying, and shrinking, to preserve its shape, and prevent its splitting. A plentiful saturation with Crewe's chloride of zinc in the first instance, and then a continuous and abundant dosing for weeks with liquid glue and litharge (such as is used by cabinet-makers for stopping cracks), while at the same time the form was retained by lateral and equally adjusted pressure, and a copper band encircling the circumference, has enabled me to preserve this very remarkable and unique specimen of defensive warfare. During the drying process it shrunk about three inches in the lateral, but only a quarter of an inch in the long diameter.

As soon, however, as the shield came into my possession, I had a very perfect piece-mould made of it, from which casts may now be obtained at a moderate cost by those interested in such matters.

The wood of which this shield is formed could only have been oak, willow, or alder. The peculiar grain of the wood, even when saturated with moisture, as well as the fact that Roderick O'Flaherty had stated in the "Ogygia," that the Irish name of the alder, as well as the letter F, was *Fearn*, because "shields are made of it," led me to decide on the last; and, without mentioning my surmises to them, I am happy to mention that my opinion has been confirmed by two of the first ve-

getable physiologists—Professor Oliver, of the London University, and Professor Harvey, of Trinity College; and both agree that "it is highly probable that it is the wood of the alder."

The accompanying illustration is a very faithful representation of the shield when it first came into my possession.



Ancient Irish shields are frequently mentioned in our annals and histories, and several localities take their names from shields, such as Dun-an-Sciath, the Dun or Fortress of the Shields, in the county of Tipperary, and another near Lough Ennell, in the county of Westmeath; Sciath-Ghabra, now Lisnaskea, the Fort of the Shields, in Fermanagh; Sciath-an-Eegis, on the River Bandon, in Cork; Sciath-Nachtain, near Castledermot, in Kildare; and a number of other localities of like nomenclature. In Christian times, objects emblematical of the religion of the day were displayed upon the shield, and hence the name applied to one of the O'Donnells of Donegal, of "Conall Sciath Bhackall," or Conall of the Crozier Shield, from the legend that St. Patrick inscribed with the Bhachall Jesu a cross upon the shield of that chieftain, and told him "to adopt the motto long retained by that clan of 'In hoc signo Vinces.'"

The word sciath, or shield, buckler, or target, is likewise applied to

the shallow wicker basket of an oval shape, and sometimes called a *skib*, used in the South and West for straining potatoes, and which very closely resembles both in size and form this wooden shield; and there can be very little doubt that wickerwork formed the basis of many of the shields which in former days were covered with leather. Spenser, in his "View of the State of Ireland," in 1586, when describing the arms of the Irish, refers to "their long broad shields, made but with wicker rods, which are commonly used among the said Northerne Irish, but especially of the Scots;" and in another place, "likewise round leather targets," after the Spanish fashion, "which in Ireland they use also in many places coloured after their rude fashion."

Walker, in his "Memoirs on the Arms and Weapons of the Irish," says:—"On this subject I cannot promise much satisfaction. That the shields of the early Irish were not made of metal may be safely inferred from the circumstance of there being but a single instance of a metal shield having been found in our bogs, so replete with almost every other implement of war."

It is related in Holinshed's "Chronicles," that the army led by Hasculpus against Dublin, in the time of Henry II., had round shields, bucklers, and targets, coloured red, and bound with iron. But, to go back to much older times, we have, in the metrical description of the battle of Moyteura Conga,—the details of which are, taking it with all its imperfections, the most minute of any battle fought during the Pagan occupation of Ireland,—an account of the dress and weapons of the warriors, and especially of the uses of the shield. Thus, in one of the personal combats between chieftains of the Firbolgs and Tuath-de-Danaan, it is said—"They first fought with swords till their stout shields were all shattered, and their swords bent and broken, and afterwards with lances." But one of the most remarkable notices of the shield employed in that battle, which took place on the old plain of Magh Nia, extending from Knock-Maaha, near Tuam, to the foot of Ben Leve, on the confines of Joyce Country, is the alteration of the name of that memorable locality to Moy Tureadh. The Tuatha-de-Danaan occupied the plain in front of Ben Leve, and probably extending from Cong to Kilmaine; and after some days' fighting, the Firbolgs, who were to the east, "rose out early the next morning and made a beautiful *scell* [or *skell*, a word which O'Donovan, in his translation of the poem for the Ordnance Survey, has queried a "testudo"] of their shields over their heads, and they placed their battle spears, like trees of equal thickness, and then marched forward in Turtha (?) of battle. The Tuatha-de-Danaans, seeing the Firbolgs marching forward in this wise from the eastern head of the plain, exclaimed—'How pompously these Tuirthas of battle march towards us across the plain!' and hence it was that that plain was called Magh Tuireadh, or the Plain of the Tuireadh."

From a very careful examination of this shield, I am inclined to believe that it was not covered either with leather or any metallic sub-

stance; but that it may have been painted or decorated is not improbable. The toughness and density of the alder, of which it is composed, would in itself be a firm defence against the thrusts of the swords, if not the spears, to which it was opposed. Unlike some of the ancient classic shields, through which the forearm was passed, and which were chiefly used as a protection to the body, this Irish wooden shield, grasped by the stout crosspiece underneath the umbo, could be projected to full arm's length to meet the weapon of an antagonist.

In the *Leabhar-na-Garth*, or "Book of Rights," we read of shields, generally equal in number to the swords which formed the tribute of the chieftains, and some of these are said to have had "the brightness of the sun." Others are described as "fair shields from beyond the seas; shields against which spears are shivered, bright shields over fine hands, shields of red colour," and "shields of valour;" and again, "golden shields," probably plated with that metal, like that gold-adorned shield said to have been found near Lismore upwards of a century ago, the bullion of which was sold in Cork for upwards of £600.

No conjecture can be formed as to the precise age of this antique shield; but it certainly must be of great antiquity, and is, so far as I can learn, the only perfect article of this description found either in the British Isles or on the Continent—for the remains of the wooden shield found in a barrow in Yorkshire were decorated with bronze bosses, and were encircled with an iron rim.

In the excavations recently made at Nydam Moss, in Jutland, several shields were discovered; but, according to the account given of these diggings, "they were so thin and soft that not one was taken up whole." These shield boards are said to have been of oak, maple, or ash; but we have no botanical opinion upon the subject, and I doubt whether the ash grew in Jutland at the period to which these articles have been referred.

I am indebted to my friend, Mr. Franks, of the British Museum, for some notes respecting the shields found in England and Scotland; but this, as well as a communication from Dr. Petrie, will more appositely apply to the Irish bronze shield in Lord Londesborough's collection, and of which I expect to be able to present a model to the Academy very soon. In the meantime I must refer to Mr. Franks' illustrations and descriptions of British shields, in that beautiful work, the "Horæ Ferales," of my late friend, John Mitchell Kemble.

In the Academy's Museum may be seen a collection of seven embossed circular thin brass plates, one of which I have figured at p. 637 of the Catalogue, and stated my belief that it formed part of the decoration of a shield. Such, it appears, is also the opinion of Mr. Franks, who has figured a similar article in the "Horæ Ferales."

The Rev. Professor Haughton, in illustration of the effect produced upon the shape of the shield by its position in the bog under pressure, exhibited and described drawings of certain fossil remains found in

Ireland which owe their peculiar shape to the circumstance of pressure.

Sir W. R. Wilde exhibited and described the shrine of St. Manchan, or Monahan, of Leigh, together with a fac-simile model of it which had lately been made for the Museum; and also a restoration of the shrine which he had had constructed for the Kensington Museum.

The President under his hand and seal nominated the following Vice-Presidents.—Rev. J. H. Jellett, A.M.; John F. Waller, LL.D.; George Petrie, LL. D.; and Lord Talbot de Malahide.

The Academy then adjourned.

APPENDIX.

No. I.

ACCOUNT

OF

THE ROYAL IRISH ACADEMY,

FROM 1ST APRIL, 1861, TO 31ST MARCH, 1862.

THE CHARGE.

				£	s.	d	£	s.	d.
To balance in favour of the Public on the 1st April, 1861 (see Vol. VII., App. No. IV., p. xxxvii.)				. . . . .			150	12	0
PARLIAMENTARY GRANT, ...				. . . . .			500	0	0
CUNNINGHAM FUND, INTEREST, 3 PER CENTS.:									
Half-year's Interest on £1775 12*s.* 1*d.*, . . .	£26	12	8						
Deduct Income Tax, ...	1	2	2						
				25	10	6			
Half-year's Interest on £1803 17*s.* 6*d.*, . . .	£27	1	2						
Deduct Income Tax, ...	1	0	4						
				26	0	10			
Total Cunningham Fund, Interest, .							51	11	4
ACADEMY 3 PER CENT. CONSOLS:									
Half-year's Interest on £974 4*s.* 3*d.*, ...	14	12	3						
Deduct Income Tax, . . .	0	11	0						
				14	1	3			
Half-year's Interest on £974 4*s.* 3*d.*, , . . .	14	12	3						
Deduct Income Tax, . . .	0	11	0						
				14	1	3			
Total Academy Stock, Interest, .							28	2	6
Total Interest on Stocks, ...							. . . . .		79 13 10
CATALOGUES SOLD, PART I.: In April, 1861, 7 copies, £1 8*s.*; June, 3 copies, 12*s.*; July, 2 copies, 8*s.*; September, 1 copy, 4*s.*; November, 21 copies, £3 19*s.*; January, 1862, 1 copy, 4*s.*; February, 9 copies, £1 19*s.*							8	11	0
			Forward,				8	11	0	730	5	10

	£	s.	d.	£	s.	d.
Brought forward,	8	11	0	730	5	10
CATALOGUES SOLD, PART II. :						
In April, 1861, 26 copies, £6 12*s.* 6*d.*; May, 2 copies, 10*s.*; June, 1 copy, 5*s.*; July, 3 copies, 15*s.*; September, 2 copies, 10*s.*; November, 15 copies, £3 19*s.* 7*d.*; December, 1 copy, 5*s.*; January, 1862, 1 copy, 7*s.* 6*d.*; February, 11 copies, £2 15*s.*	15	19	7			
Total Catalogues sold, ...	.	.	.	24	10	7
SUBSCRIPTIONS TO THE CATALOGUE OF THE MUSEUM. PART II., &c.						
At £1 each :—						
Hamilton, Sir W. R.; M'Carthy, D. F., Esq.; Talbot de Malahide, Right Hon. Lord, ...	3	0	0			
W. R. Wilde, Esq., to pay overcharge of alterations on proof sheets of second part Catalogue over 14*s.* per sheet, allowed by Committee of Publication, ...	12	17	6			
Total Subscriptions to Catalogue, ...	.	.	.	15	17	6
ENTRANCE FEES (£5 5*s.* each):						
Abraham, G. W., LL. D.; Berwick, Hon. Judge; Burnside, Rev. W. S., M. A.; Cather, Rev. R. G., LL. D.; Sargent, W. J., Esq.; Sloane, J. S., Esq.; Fitzgerald P., Esq.; Hartley, R., Esq.; Hatchell, J., Esq.; Hudson, A., M. D.; Maunsell, D. T. T., M. D.; Nixon, G., M. D.; O'Mahony, Rev. T., M. A.; Tombe, Rev. H. J., M. A.; Wilkie, H. W., Esq.; Wilson, J., Esq.; Wyse, Sir T. A.,						
Total Entrance Fees, ...	.	.	.	89	5	0
LIFE COMPOSITIONS :						
Cather, Rev. R. G., LL. D, ...	21	0	0			
Jellett, Rev. J. H., M. A., ...	6	6	0			
O'Mahony, Rev. T., M. A., ...	21	0	0			
Patten, J., M. D., ...	6	6	0			
Total Life Compositions, ...	.	.	.	54	12	0
ANNUAL SUBSCRIPTIONS (£2 2*s.* each).						
For 1859 :—						
Corrigan, D. J., M. D.; Jones, P., Esq.; Lefroy, G., Esq., ...	6	6	0			
For 1860 :—						
Abeltshauser, Rev. J. G., LL. D.; Blakely, A. T. Esq.; Codd, F., Esq.; Colclough, J. T. R., Esq.; Corrigan, D. J., M. D.; Deasy, Right Hon. Baron; Domvile, Sir C., Bart.; Drennan., W., Esq.; Du Noyer, G. V., Esq.; Griott, D. G., Esq.; Hamilton, G. A., LL. D.; Jennings, F. M., Esq.; Jones, P., Esq.; Leared, A., Esq.; Lefroy, G., Esq.; O'Driscoll, W. J., Esq.; O'Hagan, T., Esq., Q. C.; Staples, Sir T. Bart.; Wynne, Right Hon. John, M. P., ...	39	18	0			
Forward,	46	4	0	914	10	11

	£	s.	d	£	s.	d.
Brought forward,	46	4	0	914	10	11
For 1861:—						
Andrews, W., Esq.; Atkinson, R., Esq.; Baker, A W., Esq.; Barnes, E., Esq.; Bevan, P., M. D.; Bewley, E., M. D.; Blackburne, Right Hon. F., LL. D., Lord Justice of Appeal; Blakely, A. T., Esq.; Brady, D. F., M. D.; Brooke, T., Esq.; Brownrigg, Sir H J., C. B.; Burke, Sir J. B. (Ulster); Cane, A. B., Esq.; Carte, A., M. D.; Cather, T., Esq.; Chapman, Sir B. J., Bart.; Codd. F., Esq.; Colclough, J. T. R., Esq.; Cooke, A., Esq.; Copland, C., Esq.; Corbet, R., Esq.; Corrigan, D. J., M. D.; Cotton, Ven. H., LL. D.; Curry, E., Esq.; Davidson, J., Esq.; Davy, E. W., Esq.; D'Arcy, M. P., Esq.; Deasy, Right Hon. Baron; De Vesci, Right Hon. Viscount; Domvile, Sir C., Bart.; Donovan, M., Esq.; Downing, S., LL. D.; Drennan, W., Esq.; Du Noyer, G. V., Esq.; Egan, Rev. J. C., M. D.; Farnham, Right Hon. Lord; Ferrier, A., Esq.; Fitzgerald, Lord W.; Fitzgibbon, G., Esq.; Foley, W., M. D.; Foot, L. E., Esq.; Freke, H., M. D.; Galbraith, Rev. J. A., M. A.; Gibson, Rev. C. B.; Gibson, James, Esq.; Graves, Rev. J., B. A.; Griffin, D., M. D.; Grimshaw, W., Esq.; Griott, D. G., Esq.; Hancock, W. N., LL. D.; Hanlon, C., Esq.; Hardy, S. L., M. D.; Haughton, J., Esq.; Haughton, Rev. S., M. A.; Hayden, T., Esq.; Ingram, J. K., LL. D.; James, Sir H.; James, Sir J. K., Bart.; Jellett, Rev. J. H., M. A.; Jennings, F. M., Esq.; Kennedy, H., M. D.; Kenny, J. C. F., Esq.; Killaloe, Right Rev. the Lord Bishop of; Kilmore, Right Rev. the Lord Bishop of; Kinahan, J. R., M. D.; King, C. C., M. D.; Law, R., M. D.; Leach, Lieut.-Col. G. A., R. E.; Lee, Rev. A. T., M. A.; Le Fanu, W. R., Esq.; Lefroy, G., Esq.; Longfield, Rev. G., M. A.; Lyons, R. D., M. D.; MacCarthy, D. F., Esq.; MacCarthy, J. J., Esq.; MacDonnell, J. S., Esq.; MacDougall, W., Esq.; Magee, J., Esq.; Massereene and Ferrard, Right Hon. Viscount; Meyler, G., Esq.; Mollan, J., M. D.; Moore, C., Esq.; Moore, D., Esq.; Moore, W., M. D.; Muspratt, J. S., Esq.; O'Driscoll, W. J., Esq.; O'Flanagan, J. R., Esq.; O'Hagan, T., Esq.; Oldham, T., Esq., M. A.; Osborne, J., M. D.; Pakenham, Hon. and Very Rev. H.; Patten, J., M. D.; Pigot, J. E., Esq.; Pratt, J. B., Esq.; Purser, J., Esq.; Ringland, J., M. B.; Roe, G., Esq.; Sanders, G., Esq.; Sawyer, J. H., M. D.; Segrave, O'N., Esq.; Sidney, F. J., Esq.; Smith, C., Esq.; Smith, R. W., M. D.; Smyth, H., Esq.; Stapleton, M. H., M. B.; Starkey, D. P., Esq.; Stewart, H. H., M. D.; Stoney, B. B., Esq.; Stoney, G. J., Esq.; Stuart de Decies, Right Hon. Lord; Sullivan, W. K., Esq.; Talbot De Malahide, Right Hon. Lord; Tufnell, T. J., Esq.; Waller, J. F., LL. D.; West, Ven. J., D. D.; Wright, E. P., M. D.; Wynne, Right Hon. J., M. P.; Yeates, G., Esq., ...	247	16	0			
For 1862:—						
Blackburne, Right Hon. F., Lord Justice of Appeal;						
Forward,	294	0	0	914	10	11

	£	s.	d.	£	s.	d.
Brought forward,	294	0	0	914	10	11
Butler, Very Rev. R., M. A.; Chapman, Sir B. J., Bart.; Cooke, A., Esq.; Cotton, Ven. H., LL. D.; Domvile, Sir C., Bart.; Donovan, M., Esq.; Drennan, W., Esq.; Dungannon, Right Hon. Viscount; Fleming, C., M. D.; L'Estrange, F., Esq.; MacDonnell, J. S., Esq.; Moore, J., M. D.; Nixon, G., M. D.; Patterson, R., M. D.; Waldron, L., Esq., M. P.; Wright, E. P., M. D., ...	35	14	0			
Total Annual Subscriptions, . . .	.	.	.	329	14	0
SUBSCRIPTIONS TO PURCHASE SHESHKILL MOLASH.						
At £5 each:—						
Kildare, Most Noble the Marquis of, ...	5	0	0			
At £3 each:—						
Dunraven, Right Hon. Lord; Haliday, C., Esq.; Talbot de Malahide, Right Hon. Lord, ...	9	0	0			
At £2 each:—						
Graves, Very Rev. Dean, D. D., President; Larcom, Major-General Sir T. A., R. E.; Todd, Rev. J. H., D. D., ...	6	0	0			
At £1 each:—						
Baker, A. W., Esq.; Cane, E., Esq.; Gilbert, J. T., Esq.; Guinness, B. L., Esq.; Hardinge, W. H., Esq.; Kilmore, Right Rev. the Lord Bishop of; Provost of Trinity College, Rev. the, D. D.; Pim, J., Esq.; Pim, W. H., Esq.; Reeves, Rev. W., D. D.; Strong, Ven. Charles; Wilde, W. R., Esq., ...	12	0	0			
At 10*s.* each:—						
Curry, E., Esq.; Hutton, T., Esq.; Lentaigne, J., M. D., ...	1	10	0			
At 5*s.* each:—						
Haughton, J., Esq., ...	0	5	0			
Total Subscriptions to purchase Sheshkill Molash,	.	.	.	33	15	0
Rev. Dr. Carson's donation in aid of the publication of the Tidal Observations, ...	.	.	.	50	0	0
CONTINGENCIES (DR. SIDE):—						
Royal Dublin Society, carriage of books, ...	0	3	6			
Rev. W. Roberts, M. A., F. T. C. D., ...	0	1	0			
Natural History Society, ...	0	2	6			
Edward P. Wright, M. D., ...	0	2	0			
H. K. Sullivan, Esq., ...	0	7	6			
F. J. Fowler, Esq., ...	0	5	6			
Geological Society, ...	0	5	6			
Total Contingencies (Dr. side), . . .	.	.	.	1	7	6
Forward,	.	.	.	1329	7	5

	£	s.	d.	£	s.	d.
Brought forward,				1329	7	5
PROCEEDINGS SOLD:						
Henry Hudson, binding Proceedings,	0	3	0			
Rev. John Alcorn, D. D., ditto,	0	1	0			
Total Proceedings sold,				0	4	0
TRANSACTIONS SOLD:						
Mr. Warren, Vol. XXIV., Part I,	0	5	0			
Williams and Norgate, Transactions sold,	32	10	8			
Total Transactions sold,				32	15	8
DISCOUNT ON CASH PAYMENTS:						
West and Son, discount on £88 0*s.* 0*d.*, for Cunningham Medals at 3 per cent.,	2	4	0			
M. H. Gill, discount on £94 11*s.* 10*d.*, for printing to December 9, 1861, at 5 per cent.,	4	14	2			
M. H. Gill, discount on £47 18*s.* 11*d.*, for printing to 16th March, 1862, at 5 per cent.,	2	8	0			
Total Discount on Cash Payments,				9	6	2
TOTAL AMOUNT OF CHARGE,				1371	13	3

THE DISCHARGE.

ANTIQUITIES BOUGHT, MUSEUM, &c.:—	£	s.	d.	£	s.	d.
Campbell, R., bronze plate,	0	6	0			
Haliday, C., Esq., cast of Sheshkill Molaise,	45	0	0			
Lewis, H., ten spear-heads, &c.,	3	0	0			
O'Connell, P., bronze dagger-blade,	0	8	0			
O'Donnell, J., cinerary urn, and large hollow vessel,	3	0	0			
Sproule, D., sundry articles,	8	0	0			
Forkington, J., silver mace,	8	0	0			
Yeates, A., silver coin,	0	0	6			
Total cost of Antiquities bought,				67	14	6
Cullen, J., plaster casts of Antiquities,	0	10	0			
Total cost of plaster casts,				0	10	0
Gill, M. H., printing circulars for subscription to purchase Sheshkill Molaise,	1	0	6			
Total cost of printing circulars, &c.,				1	0	6
Forward,				69	5	0

	£	s.	d.	£	s.	d.	£	s.	d.
Brought Forward, ...				69	5	0			
Maguire and Son, Treasure-Trove box, .	0	15	6						
Total cost of Fittings for Museum, ...				0	15	6			
Total Antiquities bought, Museum, &c., . . .							70	0	6
BOOKS, PRINTING, AND STATIONERY:—									
Barthes and Lowell, books, ...	4	16	0						
Cadby, H. W., "Calvert's Rocks," . .	0	3	0						
O'Neal, T., books, &c., ...	0	12	0						
Whelan, M., Thom's Directory, . . .	0	15	0						
Hodges, Smith, and Co., books and periodicals, ...	31	16	1						
Total Books, Periodicals, &c., bought, ...				38	2	1			
Long, J., MS. copy of part of Book of Lismore, ...	16	0	0						
Total Manuscripts bought, ...				16	0	0			
Camden Society, 1860, 1861, ...	2	0	0						
Camden Society, Catalogue, ...	0	5	0						
Total Subscriptions paid, ...				2	5	0			
Jones, J. F., first moiety of cost of new Catalogue of Library, ...	25	0	0						
Jones, J. F., paper for new Catalogue, .	2	5	0						
Library Catalogue, ...				27	5	0			
Barthes and Lowell, charges on books, .	2	4	0						
British and General Navigation Comp., parcels, ...	0	4	0						
City of Dublin Steam Packet Co., do., .	0	3	6						
Dublin and Liverpool Screw S. Co., do.,	1	1	6						
Dublin and London Steam S. Co., do.,	0	14	2						
Graham, J., do., ...	0	0	6						
Hodges, Smith, and Co., charges on books,	0	7	0						
London N. W. Railway Co., parcels, .	0	4	0						
Maguire, J., and Son, tin box for books sent to Rome, ...	0	18	0						
Mason, G., parcels, ...	0	7	0						
Pickford and Co., do., ...	0	4	6						
Twamley, S., do., ...	0	2	0						
Williams and Norgate, charges on books,	16	10	9						
Total Freight, Duty, and Charges on Books, .				23	0	11			
Total Expenditure on Library for Books, Carriage, &c., ...				106	13	0			
MISCELLANEOUS PRINTING:—									
Gill, M. H., miscellaneous printing, from Dec., 14, 1860, to March 16, 1862, .	23	2	8						
Total Miscellaneous Printing, ...				23	2	8			
Forward,				129	15	8	70	0	6

	£	s.	d.	£	s.	d.	£	s.	d.
Brought forward, ...				129	15	8	70	0	6
PROCEEDINGS, PRINTING, BINDING, &c.:—									
Gill, M. H., printing, to March 16, 1862,	162	3	3						
Oldham, W., woodcuts, &c., ...	6	15	0						
Total Printing, Proceedings, . .	.	.	.	168	18	3			
TRANSACTIONS, PRINTING, AND BINDING, &c.:—									
Bellew, G., engraving copperplates, .	7	14	0						
Du Noyer, G. V., drawing for vol. xxiv., Parts i. and ii., ...	5	0	0						
Gill, M. H., printing vol. xxiv., Part i.,	32	6	4						
,, ,, Part ii.,	24	11	5						
Oldham, woodcuts, vol xxiv. Part ii., .	19	12	0						
Total cost of Transactions, . . .	.	.	.	89	3	9			
STATIONERY, &c.:—									
Jones, J. F., Legers, ink-bottles, &c., .	1	3	9						
Tallon, J., paper, envelopes, &c., from March 22, to December 31, 1861, .	5	5	3						
Total Stationery, &c., ...	.	.	.	6	9	0			
MISCELLANEOUS BINDING:—									
Caldwell, M., binding, &c., ...	25	16	1						
Total Miscellaneous Binding, . .	.	.	.	25	16	1			
Total Books, Printing, Stationery, &c., . . .				.	.	.	420	2	9
CATALOGUE OF MUSEUM (PART II.):—									
Gill, M. H., circulars, &c., ...	1	14	6						
Ditto, overcharge on proofs of second part Catalogue, ...	12	17	6						
Expended on Part II. of Catalogue,	.	.	.	14	12	0			
CATALOGUE OF MUSEUM (PART III.):—									
Du Noyer, G. V., drawing on wood, .	2	10	0						
Eager, C. E., registering antiquities, .	5	0	0						
Gill, M. H., printing Part III., . . .	51	7	7						
Hanlon, G. A., woodcuts, ...	5	11	0						
Kelly, A., numbering gold articles, . .	1	0	0						
Maguire, J., brass hooks, &c., . . .	0	15	6						
Oldham, W., woodcuts, ...	2	12	0						
Parr, H., transcribing catalogue, . .	1	10	0						
Wakeman, W. F., drawing on wood, .	2	10	0						
Williams and Norgate, advertising, . .	0	4	6						
Expended on Part III. of Catalogue,	.	.	.	73	0	7			
Forward,				87	12	7	490	3	3

	£ s. d.	£ s. d.	£ s. d.
Brought forward,		87 12 7	490 3 3
CATALOGUE OF MUSEUM (PART IV.):—			
Wakeman, W. F., drawing iron antiquities,	2 10 0		
Expended on Catalogue, Part IV.,		2 10 0	
Total Expended on Catalogue of Museum in 1861–2,			90 2 7
REPAIRS OF HOUSE:—			
Alliance Gas Company, gas fittings, &c.,		0 3 1	
Boylan, S., cleaning windows,		2 2 6	
Bray, J., cleaning ashpit,		0 18 0	
Mooney, W. F., gas fittings, &c.,		10 3 6	
Murphy, J., sweeping chimneys,		1 5 6	
O'Brien, M., fittings, &c., in Library,		11 5 8	
Total Repairs of House,			25 18 3
FURNITURE AND REPAIRS:—			
Dobbyn and Sons, repairs of clocks,		1 1 0	
Ferguson and Co., India-rubber springs,		0 1 6	
Franklin, J. D., oilcloth,		1 1 0	
Jones, J. F., cabinet for papers,		3 6 0	
Maguire, J., hardware, &c.,		0 5 2	
O'Brien, M., fittings, &c.,		4 3 0	
Sibthorpe and Son, glazing &c.,		0 8 10	
Walpole and Geoghegan, towels, &c.,		0 17 1	
Total Furniture and Repairs,			11 3 7
TAXES AND INSURANCE:—			
National Insurance Company,		10 6 0	
Patriotic ditto,		6 3 6	
Parish Cess,		0 12 6	
Pipe-water rent for 1860 and 1861,		5 15 4	
Total Taxes and Insurance,			22 17 4
COALS, GAS, &c.:—			
Alliance Gas Co., 12 months,		25 18 10	
Lambert and Co., candles, &c.,		0 14 9	
Tedcastle and Co., coals,		29 0 0	
Total cost of Coals, Gas, &c.,			55 13 7
CONTINGENCIES:—			
Bristol Steam Ship Co., carriage of parcel,		0 0 8	
Clibborn, E., one year's allowance for incidentals used in cleaning house,		10 0 0	
Donovan, M., medicine for servants,		2 11 5	
Dublin and Drogheda Railway, parcels,		0 5 5	
Edwards, H. G., parcel,		0 2 2	
Fannin and Co., parcel,		0 0 8	
Gerty and Rourke, carriages at Dr. O'Donovan's funeral,		3 5 0	
Great Southern and Western Railway, parcel,		0 2 0	
Forward,		16 7 4	695 18 7

	£	s.	d.	£	s.	d.
Brought forward,	16	7	4	695	18	7
Johnson, J., chloride of lime,	0	5	0			
Leigh, S., parcel,	0	6	0			
Lesage, A., frame for photograph of the Moore Library,	0	12	6			
Maguire, J., ironmongery,	2	12	0			
Maguire, R., cord for packing,	0	11	9			
Mares, F. H., photograph of the Moore Library,	2	10	0			
Midland Great Western Railway, parcel,	0	3	10			
Postages, &c.,	7	11	8			
Poul, E., sawdust,	0	1	6			
Smith, M., ditto,	0	1	8			
Tighe, J., transcribing Address of Condolence to the Queen,	0	10	0			
Walpole and Geoghegan, scarfs, &c.,	1	1	5			
Total Contingencies,				32	14	8
CUNNINGHAM FUND :—						
West and Sons, for gold medals granted to :—						
1. Rev. H. Lloyd, D. D., in Science ;						
2. Robert Mallet, Esq., ditto,						
3. Whitley Stokes, Esq., in Polite Literature ;						
4. John T. Gilbert, Esq., in Antiquities,	88	0	0			
Total Cunningham Fund,				88	0	0
SALARIES, WAGES, &c. :—						
Carson, Rev. J., D. D., Treasurer, 1861–62,	21	0	0			
Reeves, Rev. W., D. D., Sec. of Academy, do.,	21	0	0			
Ingram, J. K., LL. D., Sec. of Council, do.,	21	0	0			
Gilbert, J. T., Esq., Librarian, do.,	21	0	0			
Clibborn, Edward, Esq., Clerk, Assistant-Librarian, Curator of the Museum, &c., 1861–62,	150	0	0			
Doyle, E. W., Accountant &c., do.,	49	0	0			
Kelly, A., house-porter, 52 weeks,	39	0	0			
Leigh, S., messenger, &c., do.,	39	0	0			
Keefe, A., cleaning house, &c.,	5	0	6			
Maguire, C., ditto,	0	13	6			
Newton, A., ditto,	4	2	6			
Maher, M., liveries for porters,	13	0	0			
Walpole and Geoghegan, sundries for porters,	1	8	6			
Wright and Oxley, hats for porters,	1	5	0			
Doyle, J., boots for messenger,	1	0	0			
Total Salaries, Wages, &c.,				387	10	0

GOVERNMENT STOCKS BOUGHT ON ACCOUNT OF CUNNINGHAM TRUST FUND.

£28 5 5	New 3 per Cents, cost,	£25	8	10				
	11 days' Interest,	0	0	5				
	Brokerage,	0	1	3				
					25	10	6	
28 14 0	New 3 per Cents, cost,	25	19	5				
	4 days' Interest,	0	0	2				
	Brokerage,	0	1	3				
					26	0	10	
£56 19 5	*Total Cunningham Trust Fund Stock bought*,							
					51	11	4	
	Forward,				51	11	4	1204 3 3

						£	s.	d.	£	s.	d.
					Brought forward, . .	51	11	4	1204	3	3
CONSOLS BOUGHT ON ACADEMY'S LIFE COMPOSITIONS' ACCOUNT:											
£35	18	8	Consols, ...	£33	7	5					
			57 days' Interest,	0	3	4					
			Brokerage, . . .	0	1	3					
							33	12	0		
22	7	6	Consols, ...	20	16	2					
			71 days' Interest,	0	2	7					
			Brokerage, . . .	0	1	3					
							21	0	0		
£58	6	2	*Total Consols bought on Academy's Life Compositions' Account*, ...								
							54	12	0		
			Total Government Stocks bought, ...							106	3	4
			TOTAL DISCHARGE, ...							1310	6	7
			Balance in Bank of Ireland, ...				54	14	1		
			,, in Treasurer's hands, ...				6	12	7		
			Total Balance in favour of the public, per this account, ...							61	6	8
			TOTAL AMOUNT OF CHARGE, . . .							1371	13	3

GENERAL ABSTRACT OF THE MONTHLY ACCOUNTS OF THE ROYAL IRISH ACADEMY.

AS FURNISHED TO AUDIT OFFICE, FROM 1ST APRIL, 1861, TO 31ST MARCH, 1862.

Dr.	£	s.	d.	Cr.	£	s.	d.
To Balance on 1st April, 1861, . . .	150	12	0	By Academy Stock bought, ...	54	12	0
To Annual Subscriptions, ...	329	14	0	By Cunningham Fund Stock bought,	51	11	4
To Entrance Fees, ...	89	5	0	By Coals, Gas, &c., ...	55	13	7
To Life Compositions, ...	54	12	0	By Furniture and Repairs, ...	11	3	7
To Academy Interest on Stock, . .	28	2	6	By Repairs of House, ...	25	18	3
To Cunningham fund, Interest, . . .	51	11	4	By Taxes and Insurance, ...	22	17	4
To Government Grant, ...	500	0	0	By Salaries, &c., ...	387	10	0
To Rev. Dr. Carson's Donation towards the publication of the Tidal Observations, ...	50	0	0	By Printing Proceedings, ...	168	18	3
				By Printing Transactions, ...	89	3	9
				By Miscellaneous Printing, ...	23	2	8
To Subscription to purchase Sheshkill Molaise, ...	33	15	0	By Catalogue of Library, ...	25	0	0
To Transactions sold, ...	32	15	8	By Books bought, ...	42	12	1
To Proceedings sold, ...	0	4	0	By Miscellaneous Binding, ...	25	16	1
To Catalogue Subscriptions, . . .	15	17	6	By Manuscripts bought, ...	16	0	0
To Catalogues sold, Part I., ...	8	11	0	By Antiquities bought.	70	0	6
To Catalogues sold, Part II., . . .	15	19	7	By Catalogue of Museum, ...	90	2	7
To Contingencies, Dr. Side, ...	1	7	6	By charges against Cunningham Fund, ...	88	0	0
To Discount on cash payments, . . .	9	6	2	By Stationery, &c., ...	6	9	0
				By Contingencies, Cr. side, . . .	55	15	7
				By Balance to next Account. . . .	61	6	8
	£1371	13	3		£1371	13	3

BANK OF IRELAND,
April 11, 1862.

I certify that it appears by the Books of the Bank of Ireland there remained a Balance of £1832 11*s.* 6*d.* New Three per Cent. Government Stock, and £1032 10*s.* 5*d.* Three per Cent. Consols Government Stock, to the credit of the Account of the Royal Irish Academy, on the 31st day of March, 1862. For the Governor and Company of the Bank of Ireland.

J. R. BRISCOE.
Stock Leger Keeper.

ROBERT ROBERTS,
Transfer Office.

APPENDIX.

No II.

ACCOUNT

OF

THE ROYAL IRISH ACADEMY,

FROM 1st APRIL, 1862, TO 31st MARCH, 1863.

THE CHARGE.

	£ s. d.	£ s. d.	£ s. d.
To balance in favour of the Public on the 1st April, 1862 (see Vol. VIII., App. No. I., p. x.), ...	. . . . .		61 6 8
PARLIAMENTARY GRANT, ...	. . . . .		500 0 0
CUNNINGHAM FUND, INTEREST, 3 PER CENTS. :—			
Half-year's Interest on £1832 11*s.* 6*d.*, . . . £27 9 9			
Deduct Income Tax, ... 1 0 7			
	26 9 2		
Half-year's Interest on £1763 6*s.* 10*d.*, . . . £26 9 0			
Deduct Income Tax, ... 0 19 10			
	25 9 2		
Total Cunningham Fund, Interest, .		51 18 4	
ACADEMY 3 PER CENT. CONSOLS :—			
Half-year's Interest on £1032 10*s.* 5*d.*, . . . 15 9 9			
Deduct Income Tax, . . . 0 11 7			
	14 18 2		
Half-year's Interest on £1032 10*s.* 5*d.*, . . . 15 9 9			
Deduct Income Tax, . . . 0 11 7			
	14 18 2		
Total Academy Stock, Interest, .		29 16 4	
Total Interest on Stocks, ...		. . . . .	81 14 8
CATALOGUES SOLD, PART I. :—			
In May, 1862, 1 copy, 4*s.*; July, 2 copies, 8*s.*; October, 2 copies, 8*s.*; November, 1 copy, 4*s.*; February, 1863, 21 copies, £3 18*s.* 9*d.*; March, 2 copies, 8*s.* .		5 10 9	
Forward,		5 10 9	643 1 4

	£	s.	d.	£	s.	d.
Brought forward,	5	10	9	643	1	4
CATALOGUES SOLD, PART II.:—						
In April, 1862, 1 copy, 7*s.* 6*d.*; September, 1 copy, 5*s.*; October, 2 copies, 10*s.*; November, 1 copy, 5*s.*; February, 1863, 31 copies, £7 7*s.* 9d.; March, 2 copies, 10*s.*, ...	9	5	3			
CATALOGUES SOLD, PART III.:—						
In May, 1862, 3 copies, 8*s.* 2*d.*; September, 4 copies, 9*s.* 4*d.*; October, 1 copy, 2*s.* 4*d.*; November, 1 copy, 2*s.* 4*d.*; February, 1863, 94 copies, £10 19*s.* 4*d.*; March, 1 copy, 2*s.* 4*d.*, ...	12	3	10			
Total Catalogues sold, ...				26	19	10
ENTRANCE FEES (£5 5*s.* each):						
Armstrong, A., Esq.; Campbell, J., M. B.; Coppinger, C., Esq., Q. C.; Garstin, J. R., Esq., A. M.; Joyce, P. W., Esq., A. B.; Kirwan, J. S., Esq.; Porte, G., Esq.; Richardson, T., M. D.; Taylor, Captain M.; Tyrrell, J. H., M. D.,						
Total Entrance Fees, ...				52	10	0
LIFE COMPOSITIONS:—						
Armstrong, A., Esq., ...	21	0	0			
Cane, A. B., Esq., ...	6	6	0			
Chapman, Sir B. J., Bart., ...	6	6	0			
Churchill, F., M. D., ...	6	6	0			
Fitzgibbon, G., Esq., ...	6	6	0			
Garstin, J. R., Esq., A. M., ...	21	0	0			
Grimshaw, W., Esq., ...	6	6	0			
Jennings, F. M., Esq., ...	6	6	0			
Monsell, Right Hon. W., M. P., ...	6	6	0			
Montgomery, H. B., M. D., ...	13	13	0			
Total Life Compositions, ...				99	15	0
ANNUAL SUBSCRIPTIONS (£2 2*s.* each):—						
For 1859:—						
Gordon, S., M. D.; Monsell, Right Hon. W., M. P., .	4	4	0			
For 1860:—						
Gordon, S., M. D.; Monsell, Right Hon. W., M. P.; Pigot, Right Hon. D. R., Lord Chief Baron, ...	6	6	0			
For 1861:—						
Alcorn, Rev. J., D. D.; Claridge, J., Esq.; Eiffe, J. S., Esq.; Field, F., Esq.; Gages, A., Esq.; Goold, Ven. F., M. A.; Hamilton, G. A., Esq.; Leared, A., M. D.; Lentaigne, J., M. D.; Madden, R. R., M. D.; Monsell, Right Hon. W., M. P.; Neville, P., Esq.; Nugent, A. R., Esq.; Pigot, Right Hon. D. R., Lord Chief Baron; Preston, A., Esq.; Staples, Sir T., Bart., ...	33	12	0			
For 1862:—						
Abraham, G. W., LL. D.; Alcorn, Rev. J., D. D.; Andrews, W., Esq.; Armagh, Most Rev. M. G., Lord						
Forward,	44	2	0	822	6	2

	£	s.	d.	£	s.	d.
Brought forward,	44	2	0	822	6	2
Archbishop of, Primate of All Ireland; Atkinson, R., Esq.; Baker, A. W., Esq.; Barnes, E., Esq.; Berwick, Hon. Judge; Bevan, P., M. D.; Bewley, E., M. D.; Blakely, A. T., Esq.; Brady, D. F., M. D.; Brooke, T., Esq.; Brownrigg, Sir H. J., C. B.; Burke, Sir J. B. (Ulster); Cane, A. B., Esq.; Carte, A., M. D.; Cather, T., Esq.; Churchill, F., M. D.; Claridge, J., Esq.; Copland C., Esq.; Corbet, R., Esq.; Davy, E. W., Esq.; D'Arcy, M. P., Esq.; Deasy, Right Hon. Baron, LL. D.; De Vesci, Right Hon Viscount; Downing, S., LL. D.; Duncan, J. F., M. D.; Eiffe, J. S., Esq.; Enniskillen, Right Hon. the Earl of; Farnham, Right Hon. Lord; Ferrier, A., Esq.; Field, F., Esq.; Fitzgerald, Lord W.; Fitzgibbon, G., Esq.; Foley, W., M. D.; Freke, H., M. D.; Gages, A., Esq.; Galbraith, Rev. J. A.; Gibson, J., Esq.; Goold, Ven. F.; Graves, Rev. James, B. A.; Griffin, D., M. D.; Grimshaw, W., Esq.; Hancock, W. N., LL. D.; Hanlon, C., Esq.; Hardinge, W. H., Esq.; Hardy, S. L., M. D.; Hartley, R., Esq.; Hatchell, J., Esq.; Haughton, J., Esq.; Haughton, Rev. S., M. D.; Hayden, T., Esq.; Hudson, A., M. D.; Ingram, J. K., LL. D.; James, Colonel Sir H.; James, Sir J. K., Bart.; Jennings, F. M., Esq.; Kennedy, H., M. D.; Kenny, J. C. F., Esq.; Killaloe, Right Rev. The Lord Bishop of, D. D.; Kinahan, J. R., M. D.; King, C. C., M. D.; Law, R., M. D.; Le Fanu, W. R., Esq.; Longfield, Rev. G., M. A.; Lyons, R. D., M. D.; MacCarthy, D. F., Esq.; Mac Carthy, J. J., Esq.; MacDougall, W., Esq.; Madden, R. R., M. D.; Magee, J., Esq.; Maley, A. J., Esq.; Maunsell, D. T. T., M. B.; Meyler, G., Esq.; Mollan, J., M. D.; Monck, Right Hon. Viscount; Moore, C., Esq.; Moore, D., Esq.; Moore, W., M. D.; Neville, P., Esq.; Nugent, A. R., Esq.; O'Donnell, Lieut.-Gen. Sir C. R.; O'Flanagan, J. R., Esq.; Oldham, T., LL. D.; Osborne, J., M. D.; Pakenham, Hon. and Very Rev. H.; Pigot, Right Hon. D. R., Lord Chief Baron; Pigot, J. E., Esq.; Pratt, J. B., Esq.; Preston, A., Esq.; Purser, J., M. A.; Ringland, J., M. B.; Roe, G., Esq.; Sanders, G., Esq.; Sawyer, J. H., M. D.; Segrave, O'N., Esq.; Sidney, F. J., LL. D.; Sloane, J. S., Esq.; Smith, R. W., M. D.; Smyth, H., Esq.; Staples, Sir T., Bart.; Stapleton, M. H., M. B.; Starkey, D. P., Esq.; Stewart, H. H., M. D.; Stoney, B. B., Esq.; Stoney, G. J., Esq.; Stuart de Decies, Right Hon. Lord; Sullivan, W. K., Esq.; Talbot de Malahide, Right Hon. Lord; Waller, J. F., LL. D.; West, Ven. J., D. D.; Wilson, J., Esq.; Wynne, Right Hon. J., M. P., . .	239	8	0			
For 1863:—						
Armagh, Most Rev. M. G., Lord Archbishop of, Primate of All Ireland, D. D.; Atkinson, R., Esq.; Barnes, E., Esq.; Blackburne, Right Hon. F., LL. D.; Blakely, A. T., Esq.; Brady, D. F., M. D.; Brownrigg, Sir H. J., C. B.; Burke, Sir J. B. (Ulster); Cather, T., Esq.; Cooke, A., Esq.; Copland, C., Esq.; D'Arcy,						
Forward,	283	10	0	822	6	2

	£	s.	d.	£	s.	d.
Brought forward,	283	10	0	822	6	2
M. P., Esq.; De Vesci, Right Hon. Viscount; Donovan, M., Esq.; Downing, S., LL. D.; Duncan, J. F., M. D.; Farnham, Right Hon. Lord; Foley, W., M.D.; Freke, H., M. D.; Graves, Rev. J., B. A.; Hancock, W. N., LL. D.; Hanlon, C., Esq.; Hatchell, J., Esq.; Haughton, J., Esq.; Kennedy, H., M. D.; Kenny, J. C. F., Esq.; Killaloe, Right Rev. The Lord Bishop of, D. D.; King, C. C., M. D.; L'Estrange, F., Esq.; Le Fanu, W. R., Esq.; Macdonnell, J. S., Esq.; Maley, A. J., Esq.; Mollan, J., M. D.; Monck, Right Hon. Lord Viscount; Moore, D., Esq.; Nugent, A. R., Esq.; O'Donnell, Lieut.-Gen. Sir C. R.; Oldham, T., LL. D.; Osborne, J., M. D.; Pakenham, Hon. and Very Rev. H.; Patterson, R., Esq.; Pratt, J. B., Esq.; Purser, J., M. A.; Segrave, O'N., Esq.; Smith, R. W., M. D.; Starkey, D. P., Esq.; Stoney, G. J., Esq.; Talbot de Malahide, Right Hon. Lord; Waldron, L., Esq., M. P.; West, Ven. J., D. D.; Wilkie, H. W., Esq.; Wright, E. P., M. D.; Wynne, Right Hon. J., M. P., . . .	111	6	0			
For 1864:—						
Nugent, A. R., Esq., ...	2	2	0			
For 1865:—						
Nugent, A. R., Esq., ...	2	2	0			
Total Annual Subscriptions, ...				399	0	0
PROCEEDINGS SOLD:—						
Hart, Dr., binding Proceedings, Vol. VII., ...	0	1	0			
Haliday, Charles, Esq., ditto, ...	0	1	0			
Salmon, Rev. Dr., ditto, Vols. IV., V., VI., VII.,	0	4	0			
Farnham, Right Hon. Lord, ditto, Vols. V., VI., VII.,	0	3	0			
Total Proceedings sold, ...				0	9	0
TRANSACTIONS SOLD:—						
Harvey, W. H., M. D., ...	0	10	0			
Roberts, Rev. W., M. A., ...	0	1	0			
Turner, Mr., Vol. XXII., Part I., ...	0	5	6			
Williams and Norgate, sold to March 16, 1863, . .	4	16	8			
Total Transactions sold, ...				5	13	2
CUNNINGHAM FUND, STOCK SOLD:—						
£69 4 8 | At 90¾ per Cent.,	62	16	7			
84 days' Interest,	0	9	6			
Deduct power of Attorney, . . £1 0 0	63	6	1			
Deduct Brokerage, 0 1 9	1	1	9			
	62	4	4			
Total Cunningham Fund Stock sold, ...				62	4	4
TOTAL AMOUNT OF CHARGE, . . .				1289	12	8

THE DISCHARGE.

ANTIQUITIES BOUGHT, MUSEUM, &c.:—	£	s.	d.	£	s.	d.	£	s.	d.
Dalton, G., antique stand,	0	10	0						
Donegan, P., gold-plated ring, and Irish ornament,	1	12	6						
English, W., bronze cup from Holycross,	1	0	0						
Ferguson, J., silver seal,	0	10	0						
Lloyd, J., celt from Templemore,	0	7	6						
Mason, Thomas, two gold articles from Bagnalstown,	1	0	0						
Ryan, F., small lot of antiquities,	0	1	0						
Smith, C., small lot of coins found in Dublin,	0	2	0						
Smullan, Rev. A., two silver coins,	0	5	0						
Smyth, J., antique silver cross,	0	5	0						
Total cost of Antiquities bought,				5	13	0			
Thom, A., Printing Treasure Trove Papers,	5	12	0						
Total cost of printing forms, &c.,				5	12	0			
Leedom, R., trays for Museum,	0	6	0						
Total cost of Fittings for Museum,				0	6	0			
Total Antiquities bought, Museum, &c.,							11	11	0
BOOKS, PRINTING, AND STATIONERY:—									
Barthes and Lowell, books,	1	18	0						
Hodges, Smith, and Co., books and periodicals,	20	12	3						
Kerslake, T., books,	3	8	8						
Lewis, H., Cróker's Catalogue,	0	6	0						
Quaritch, B., books,	4	16	0						
Total Books, Periodicals, &c., bought,				31	0	11			
Jones, J. F., second moiety of cost of new Library Catalogue,	25	0	0						
Library Catalogue,				25	0	0			
Barthes and Lowell, charges on books,	2	1	9						
Burns and Mac Ivor, carriage of books,	2	17	10						
British and Irish Steam Packet Co., do.,	0	3	10						
City of Dublin Steam Ship Comp., do.,	0	0	8						
Cullen, T., do.,	0	1	2						
Dublin and Glasgow Steam Ship Co., do.,	0	4	0						
Dublin and Liverpool Screw S. Co., do.,	1	3	5						
Dublin and London Steam S. Co., do.,	0	9	2						
Fishbourne and Co., do.	0	2	6						
Graham, J., do.,	0	0	4						
Hodges, Smith, and Co., do.,	0	13	0						
Forward,	7	17	8	56	0	11	11	11	0

	£	s.	d.	£	s.	d.	£	s.	d.
Brought forward,	7	17	8	56	0	11	11	11	0
Kelly, W. B., carriage of books,	0	2	0						
London N. W. Railway Co., do.,	1	10	10						
Nowlan, J., do.,	0	7	11						
Sanders, G., do.,	0	0	4						
Stevens, H., do.,	0	5	6						
Williams & Norgate, charges on books, do.,	10	18	11						
Total Freight, Duty, and Charges on Books,				21	3	2			
Connellan, Owen, Irish MS.,	4	0	0						
Long, J., Irish MS.,	5	0	0						
O'Curry, A., executor of the late Eugene O'Curry, Subscription of the Royal Irish Academy to O'Conor MSS. Fund,	6	0	0						
Pilkington, F., binding O'Conor MS.,	1	4	0						
(See Appendix III., p. xxi.)									
Total cost of Manuscripts bought, &c.,				16	4	0			
Jones, J. F., 4 Vols. Transactions, R.I.A.,	1	0	0						
M'Grane, W., 2 Vols. do.,	0	8	0						
O'Daly, J., 3 Vols. do.,	1	0	0						
O'Neill, T., 21 Vols. do.,	3	19	6						
Total cost of Transactions, R. I. A., bought,				6	7	6			
Total Expenditure on Library for Books, Carriage, &c.,				99	15	7			
MISCELLANEOUS PRINTING:—									
Gill, M. H., miscellaneous printing, from March 16, 1862, to March 27, 1863,	22	12	9						
Total Miscellaneous Printing,				22	12	9			
PROCEEDINGS, PRINTING AND BINDING:									
Gill, M. H., printing, to March 16, 1863,	176	18	4						
Gyde, C., binding Proceedings for Royal Society,	5	12	6						
Hamon, George A., woodcuts, &c.,	4	17	6						
Mares, F. H., photograph,	0	12	6						
Mowat, J., binding Vol. VII.,	6	5	0						
Oldham, W., woodcuts,	10	15	0						
Wilde, W. R., paid for tracings,	0	12	6						
Total Printing Proceedings, &c.				205	13	4			
TRANSACTIONS, PRINTING AND BINDING:—									
Conolly, J., illustrations, Dr. M'Donnell's paper,	10	10	0						
Day and Son, plates, Dr. M'Donnell's paper,	17	15	0						
English, J., lithograph map, Mr. Foot's paper on "Burren,"	6	10	0						
Gill, M. H., printing, to March 16, 1863,	30	18	0						
Forward,	65	13	0	427	17	3	11	11	0

	£	s.	d.	£	s.	d.	£	s.	d.
Brought forward,	65	13	0	427	17	3	11	11	0
Mowat, J., binding Transactions, . .	8	0	0						
Oldham, woodcuts, Dr. M'Donnell's paper,	1	18	6						
Pilkington, F., binding vol. XXIV., Part II., ...	15	14	0						
Total cost of Transactions, ...	.	.	.	91	5	6			
STATIONERY :—									
Jones, J. F., blotting pads, ...	0	3	9						
Pilkington, F., sundries, ...	0	15	0						
Tallon, J., paper, envelopes, &c., . . .	9	13	7						
Waller, J., printing drafts, ...	0	6	11						
Whelan, M., Thom's Directory, . . .	0	15	0						
Total Stationery, &c., ...	.	.	.	11	14	3			
MISCELLANEOUS BINDING :—									
Caldwell, M., binding, &c., from April 1, 1862, to March 28, 1863, ...	58	9	7						
Total Miscellaneous Binding, . . .	.	.	.	58	9	7			
Total Books, Printing, Stationery, &c.,	.	.	.	.	.	.	489	11	0
CATALOGUE OF MUSEUM (PART III.) :—									
"Daily Express," advertising, ...	0	2	6						
"Evening Mail," do., ...	0	2	6						
"Evening Post," do., ...	0	2	6						
"Irish Times," do., ...	0	2	6						
"Medical Times," do., ...	0	4	6						
"Morning News," do., ...	0	2	6						
Gill, M. H., circulars, &c., ...	0	14	6						
Pilkington, F., binding Part III., . .	6	0	0						
Williams and Norgate, advertising, . .	0	12	6						
do., copies of Catalogue presented, ...	0	8	5						
Expended on Part III. of Catalogue, ...	.	.	.	8	12	5			
CATALOGUE OF MUSEUM, (PART IV.) :—									
Oldham, W., woodcuts, ...	11	8	6						
Wakeman, W. F., drawing on woodblocks,	0	7	6						
Expended on Part IV. of Catalogue, .	.	.	.	11	16	0			
Total expended on Catalogue of Museum, 1862–3, ...	.	.	.	.	.	.	20	8	5
REPAIRS OF HOUSE :—									
Alliance Gas Company, fittings, . . .	.	.	.	0	5	5			
Boylan, S., cleaning windows, ...	.	.	.	2	9	2			
Bray, J., cleaning ashpit, ...	.	.	.	1	4	0			
Forward, ...	.	.	.	3	18	7	521	10	5

	£	s.	d.	£	s.	d.
Brought forward,	3	18	7	521	10	5
Dobbyn and Son, repairs of clocks,	1	5	0			
Mooney, gas fittings, to February 20, 1863,	4	8	0			
Murphy, J., sweeping chimneys,	1	13	6			
Total Repairs of House,				11	5	1
FURNITURE AND REPAIRS:—						
Clarke, J., beating carpets,	1	10	0			
Kelly, A., cleaning portrait of Provost Lloyd,	1	10	0			
Maguire and Son, ironmongery, &c.,	4	10	6			
Total Furniture and Repairs,				7	10	6
TAXES AND INSURANCE:—						
Patriotic Insurance Company, £6 3 6						
National do., 10 6 0						
	16	9	6			
Parish Cess, Easter, 1862,	0	9	4			
Total Taxes and Insurance,				16	18	10
COALS, GAS, &c.:—						
Alliance Gas Company, gas, coke, &c.,	29	4	2			
Lambert, Brien, and Co., tapers, candles,	0	12	6			
Smyth, B., 30 tons coal,	22	10	0			
Total Cost of Coals, Gas, &c.,				52	6	8
CONTINGENCIES:—						
Angeli, L., cleaning W. E. Hudson's bust,	0	10	0			
Clibborn, E., one year's allowance for incidentals used in cleaning house,	10	0	0			
Gerty and Rourke, carriages at Dr. Siegfried's funeral,	2	12	0			
Johnson, J., chloride of lime,	0	10	0			
Midland Great Western Railway, carriage of antiquities,	0	1	8			
Postages, &c., April 1, 1862, to March 31, 1863,	10	4	1			
Smyth, B., carrriage of ancient canoe,	0	10	0			
Total Contingencies,				24	7	9
CONTINGENCIES (extra):—						
Hibernian Gas Company, gas used in illuminations,	11	0	0			
Maguire and Sons, gas fittings for illuminations,	21	0	0			
Ryan, H., transcribing addresses to Queen and Prince of Wales,	8	0	0			
Total Extra Contingencies,				40	0	0
SALARIES, WAGES, &c.:—						
Carson, Rev. J., D. D., Treasurer, 1862-63,	21	0	0			
Reeves, Rev. W., D. D., Sec. of Academy, do.,	21	0	0			
Forward,	42	0	0	673	19	3

	£ s. d.	£ s. d.
Brought forward,	42 0 0	673 19 3
Ingram, J. K., LL. D., Sec. of Council, 1862–63, . .	21 0 0	
Gilbert, J. T., Esq., Librarian, do., ...	21 0 0	
Clibborn, Edward, Esq., Clerk, Assistant-Librarian, Curator of the Museum, &c., 1862–63, ...	150 0 0	
Doyle, E. W., Accountant, &c., do., ...	46 0 0	
Kelly, A., house-porter, 52 weeks, ...	39 0 0	
Leigh, S., messenger, do., ...	39 0 0	
Keefe, A., cleaning house, ...	10 1 0	
Walpole and Geoghegan, servants' sundries, ...	0 15 0	
Maher, M., servants' liveries, ...	18 0 0	
Doyle, J., boots for messenger, ...	1 0 0	
Total Salaries, Wages, &c., ...	. . . .	387 16 0
TIDAL OBSERVATIONS, PUBLICATION OF:—		
Mettam, J., plotting tidal curves, ...	20 0 0	
Expended on Publication of Tidal Observations, .	. . . .	20 0 0

GOVERNMENT STOCKS BOUGHT ON ACCOUNT OF CUNNINGHAM TRUST FUND:—

£28 14 0	New 3 per Cents., cost, ...	£26	7	5		
	10 days' Interest,	0	0	6		
	Brokerage, . .	0	1	3		
					26 9 2	
£28 14 0	*Total Cunningham Trust Fund Stock bought, cost*, ...				26 9 2	

CONSOLS BOUGHT ON ACADEMY'S LIFE COMPOSITION ACCOUNT:—

£39 13 8	Consols, . . .	£36	11	2		
	39 days' Interest,	0	2	7		
	Brokerage, . .	0	1	3		
					36 15 0	
29 9 2	Consols, . . .	27	2	0		
	58 days' Interest,	0	2	9		
	Brokerage, . . .	0	1	3		
					27 6 0	
6 14 10	Consols, . . .	6	4	1		
	60 days' Interest,	0	0	8		
	Brokerage, . .	0	1	3		
					6 6 0	
20 9 4	Consols, . . .	18	14	6		
	70 days' Interest,	0	2	3		
	Brokerage, . .	0	1	3		
					18 18 0	
6 15 3	Consols, . . .	6	3	11		
	74 days' Interest,	0	0	10		
	Brokerage . . .	0	1	3		
					6 6 0	
£103 2 3	*Forward*, ...				£95 11 0	26 9 2	1081 15 3

				£ s. d.	£ s. d.
£103 2 3	*Brought forward,*		95 11 0	26 9 2	1081 15 3
6 15 5	Consols, ...	6 3 10			
	77 days' Interest,	0 0 11			
	Brokerage, . .	0 1 3			
			6 6 0		
£109 17 8	*Total Consols bought on Academy's Life Composition Account, cost,*			101 17 0	
	Total Government Stocks bought, ...			. . . . .	128 6 2
	Total Discharge, ...			. . . . .	1210 1 5
	Balance in Bank of Ireland, ...			71 10 2	
	,, in Treasurer's hands, ...			8 1 1	
	Total Balance in favour of the public, per this account (31*st March*, 1863), ...			. . . . .	*79 11 3
	Total Amount of Charge, . . .			. . . . .	1289 12 8

GENERAL ABSTRACT OF THE MONTHLY ACCOUNTS OF THE ROYAL IRISH ACADEMY,

AS FURNISHED TO AUDIT OFFICE, FROM 1st APRIL, 1862, TO 31st MARCH, 1863.

Dr.	£ s. d.	Cr.	£ s. d.
To Balance on 1st April, 1862, . . .	61 6 8	By Academy Stock bought, ...	101 17 0
To Parliamentary Grant, ...	500 0 0	By Cunningham Fund Stock bought,	26 9 2
To Annual Subscriptions, ...	399 0 0	By Coals, Gas, &c., ...	52 6 8
To Entrance Fees, ...	52 10 0	By Furniture and Repairs, ...	7 10 6
To Life Compositions, ...	99 15 0	By Repairs of House, ...	11 5 1
To Interest on Academy Stock, . . .	29 16 4	By Taxes and Insurance, ...	16 18 10
To Interest on Cunningham Fund, .	51 18 4	By Salaries, &c., ...	387 16 0
To Cunningham Fund, Stock sold, . .	62 4 4	By Printing Proceedings, ...	205 13 4
To Catalogues sold, Part I., ...	5 10 9	By Printing Transactions, ...	91 5 6
To Catalogues sold, Part II., ...	9 5 3	By Miscellaneous Printing, ...	22 12 9
To Catalogues sold, Part III., . . .	12 3 10	By Books bought, ...	56 0 11
To Transactions sold, ...	5 13 2	By Miscellaneous Binding, ...	58 9 7
To Proceedings sold, ...	0 9 0	By Manuscripts bought, ...	16 4 0
		By Antiquities bought, ...	11 11 0
		By Catalogue of Museum, ...	20 8 5
		By Stationery, ...	11 14 3
		By Transactions and Proceedings bought,	6 7 6
		By Tidal Observations, ...	20 0 0
		By Contingencies, ...	45 10 11
		By Contingencies, extra, ...	40 0 0
		By Balance to next Account, ...	79 11 3
	£1289 12 8		£1289 12 8

Bank of Ireland,
May 6, 1863.

I certify that it appears by the Books of the Bank of Ireland, there remained a Balance of £1792 1*s.* 8*d.* New Three per Cent. Government Stock, and £1142 8*s.* 1*d.* Three per Cent. Consols, to the credit of the Account of the Royal Irish Academy, on the 31st day of March, 1863.—For the Governor and Company of the Bank of Ireland.

J. R. BRISCOE,
Stock Leger Keeper.

ROBERT ROBERTS,
Transfer Office.

* This sum includes the balances to the credit of the Tidal Observation and Catalogue funds, and also the amount of several small accounts due, but not furnished. It also stands charged with the printing of several papers in the "Transactions" not yet finished. The above balance would have disappeared to meet these demands, had they been made in time; and some Academy Stock should have been sold to meet the deficiency of income over expenditure of the year ending 31st March, 1863.

APPENDIX III.

List of Subscriptions paid towards the purchase and presentation to the Library of the Royal Irish Academy (or to that of Trinity College, Dublin) of the two volumes of Transcripts of the O'Conor MS. Poems, made by the late Professor Eugene O'Curry, delivered to the Academy on 16th March, 1863, by Robert D. Lyons, M. D. See "*Proceedings*," *Vol. VIII. p.* 305.

SUBSCRIBERS' NAMES.

	£	s.	d.
**William E. Hudson, Esq., M. R. I. A.,*	10	0	0
Royal Irish Academy,**	6	0	0
**Rt. Hon. the Lord Chief Baron, M. R. I. A.,*	5	0	0
**J. E. Pigot, Esq., M.R.I.A.,*	5	0	0
**Robert D. Lyons, M. D., M. R. I. A.,*	5	0	0
Adolphus Cooke, Esq., M. R. I. A.,	5	0	0
The (late) Earl of Leitrim, M. R. I. A.,	5	0	0
The (late) Lord Cloncurry,	5	0	0
B. Lee Guinness, Esq., M. R. I. A.,	5	0	0
**M. F. O'Flaherty, Esq.,*	3	0	0
The Earl of Dunraven, M. R. I. A.,	3	0	0
**Wm. Stokes, M. D., M. R. I. A.*	2	0	0
**R. Callwell, Esq., M. R. I. A.,*	2	0	0
**William R. Wilde, Esq.,*	2	0	0
**Rev. Jas. H. Todd, D. D.,*	2	0	0
Very Rev. Charles Graves, D. D., Pres. R. I. A.,	2	0	0
V. Scully, Esq., M. P., M. R. I. A.,	2	0	0
R. Tighe, Esq., M. R. I. A.,	2	0	0
Rev. J. K. Baillie, D. D., M. R. I. A.,	2	0	0
Lord Talbot de Malahide, M. R. I. A.,	2	0	0
Rev. Wm. Reeves, D. D., M. R. I. A.,	2	0	0
Major-Gen. Sir T. A. Larcom, M. R. I. A.,	2	0	0
Brought forward,	£79	0	0
Amount forward,	£79	0	0
T. Hutton, Esq., M.R.I.A.,	1	1	0
**John O'Hagan, Esq.,*	1	0	0
**V. B. Dillon, Esq.,*	1	0	0
C. P. Croker, M.D., M.R.I.A.,	1	0	0
J. J. MacCarthy, Esq., M. R. I. A.,	1	0	0
J. Apjohn, M.D., M.R.I.A.,	1	0	0
D. H. Kelly, Esq., M.R.I.A.,	1	0	0
Ven. Archdeacon Strong, M. R. I. A.,	1	0	0
M. M. O'Grady, M. D., M. R. I. A.,	1	0	0
Very Rev. C. W. Russell, D.D.,	1	0	0
Rev. W. H. Drummond, D. D., M. R. I. A.,	1	0	0
John T. Gilbert, Esq., M. R. I. A.,	1	0	0
Rev. T. R. Robinson, D. D., M. R. I. A.,	1	0	0
Andrew Armstrong, Esq., M. R. I. A.,	1	0	0
J. Pim, Esq., M. R. I. A.,	1	0	0
L. Waldron, Esq., M. P., M. R. I. A.,	1	0	0
John A. Nicholson, Esq., M. R. I. A.,	1	0	0
Rev. S. Butcher, D. D., M. R. I. A.,	1	0	0
S. Ferguson, Esq., M.R.I.A.,	1	0	0
L. Dobbin, Esq., M. R. I. A.,	1	0	0
R. R. Madden, M. D., M. R. I. A.,	0	10	0
E. Clibborn (to close account),	0	18	8
Total amt. of Subscriptions,	£100	9	8

	£	s.	d.
Original Estimated value of the Transcripts, as per original circulars proposing Subscription,***	100	0	0
Postages of circulars issued,	0	9	8
	£100	9	8

The above is a correct account, according to the best of my knowledge and belief.

EDWARD CLIBBORN,
Accountant R. I. A.

MARCH 31, 1863.

* The Names of the original Subscribers are printed in italics.

** The Academy also paid £1 4*s.* for the binding of the Transcripts, which sum is not included in the above account.—See p. xvi.

*** Of this sum £77 was paid Mr E. O'Curry, and the balance, £23, was paid to Mr. A. O'Curry, the Executor of the former.

APPENDIX.

No. IV.

THE

ROYAL IRISH ACADEMY.

MARCH 16, 1864.

Patroness.

HER MOST SACRED MAJESTY THE QUEEN.

Visitor.

HIS EXCELLENCY THE LORD LIEUTENANT OF IRELAND.

President.

THE VERY REV. CHARLES GRAVES, D. D.

Elected 16th March, 1861.

Vice-Presidents.

(Nominated by the President).

Rev. John H. Jellett, A. M.
John F. Waller, LL. D.
George Petrie, LL. D.
Lord Talbot de Malahide, F. R. S.

COUNCIL.

Committee of Science.

Elected.	
March, 1857	Rev. Samuel Haughton, M. D., F. R. S.
April, 1857	Rev. John H. Jellett, A. M.
March, 1859	Robert W. Smith, M. D.
March, 1862	Robert Mac Donnell, M. D.
March, 1862	W. K. Sullivan, Ph. D.
March, 1863	Joseph Beete Jukes, A. M., F. R. S.
March, 1864	George J. Stoney, LL. D., F. R. S.

Committee of Polite Literature.

Elected.	
April, 1857	Rev. Joseph Carson, D. D.
March, 1858	John F. Waller, LL. D.
March, 1859	John Kells Ingram, LL. D.
March, 1861	John Anster, LL. D.
March, 1862	Richard R. Madden, Esq.
March, 1863	Denis F. Mac Carthy, Esq.
March, 1864	Rev. George Longfield, B. D.

Committee of Antiquities.

March, 1856	John T. Gilbert, Esq.
March, 1857	Rev. William Reeves, D. D.
March, 1860	George Petrie, LL. D.
June, 1860	William H. Hardinge, Esq.
March, 1862	Lord Talbot de Malahide, F. R. S.
Nov. 1862	Rev. James H. Todd, D. D.
March, 1864	Sir William R. Wilde.

Officers.

Treasurer.—Rev. Joseph Carson, D. D.
Secretary of the Academy.—Rev. William Reeves, D. D.
Secretary of Council.—John Kells Ingram, LL. D.
Secretary of Foreign Correspondence.—Sir William R. Wilde.
Librarian.—John T. Gilbert, Esq.
Clerk, Assistant Librarian, and Curator of Museum.—Edward Clibborn, Esq.

HONORARY MEMBERS.

Elected.

June 22, 1863 — His Royal Highness Albert Edward, Prince of Wales.

Aug. 2, 1849 — Wrottesley, John, Lord, Ex-President of the Royal Society. *Wrottesley Hall, Wolverhampton.*

Mar. 16, 1863 — Sabine, Major-General Edward, R. A., President of the Royal Society. 13, *Ashley-place, Westminster, London, S. W.*

Section of Science.

(*Thirty Members.*)

Mar. 16, 1863 — Agassiz, Louis. *Cambridge, Massachusetts, U. S.*

Nov. 30, 1832 — Airy, George Biddell, M. A., F. R. S., &c., Astronomer Royal. *Greenwich.*

Nov. 30, 1826 — Babbage, Charles, M. A., F. R. S. 1, *Dorset-street, Manchester-square, London.*

Nov. 30, 1850 — Bache, Alexander D. *Washington, D. C. United States.*

Nov. 30, 1852 — Beaumont, J. B. A., L. L., Elie de. *Paris.*

Oct. 28, 1822 — Brewster, Sir David, K. H., LL. D., F. R. S., &c. *Allerly, Roxburghshire.*

Jan. 25, 1836 — Daubeney, Charles Giles Bridle, M. D., LL. D., F. R. S., &c. *Oxford.*

Mar. 16, 1863 — Dove, Heinrich Wilhelm. *Berlin.*

Mar. 16, 1841 — Dumas, Jean Baptiste. *Paris.*

Mar. 16, 1820 — Dupin, Charles. *Paris.*

June 27, 1825 — Greville, R. K., LL. D. *Edinburgh.*

Mar. 16, 1863 — Hansteen, Christopher. *Stockholm.*

Mar. 16, 1864 — Helmholtz, Hermann. *Heidelberg.*

Jan. 23, 1826 — Herschel, Sir John Frederick William, Bart., D. C. L., F. R. S. *Collingwood, Hawkhurst.*

June 27, 1825 — Hooker, Sir William Jackson, K. H., LL. D., F. R. S. *Royal Gardens, Kew.*

Elected.	
Mar. 16, 1864	Hyrtl, Carl Joseph. *Vienna.*
Mar. 16, 1864	Le Verrier, F. *Paris.*
June 26, 1837	Liebig, Baron Justis Von. *Munich.*
June 26, 1836	Murchison, Sir Roderick Impey, Knt., D.C.L., F.R.S. 16, *Belgrave-square, London, S.W.*
Mar. 16, 1863	Plana, Baron Giovanni. *Turin.*
Mar. 16, 1841	Quetelet, Lambert Adolphe Jacques. *Brussels.*
Nov. 30, 1852	Regnault, Henri Victor. *Paris.*
Jan. 25, 1836	Rennie, George, Esq., F.R.S., &c. 37, *Wilton-crescent, London, S.W.*
Jan. 25, 1836	Sedgwick, Rev. Adam, M.A., F.R.S., &c. *Cambridge.*
May 26, 1834	Somerville, Mrs. Mary.
Mar. 16, 1827	South, Sir James, Knt., F.R.S., &c. *Observatory, Camden-hill, Kensington, W.*
Mar. 16, 1863	Struve, Frederick G. Wilhelm. *Pulkowa.*
Jan. 25, 1836	Sykes, Colonel Wm. Henry, F.R.S., &c. 47, *Albion-street, Hyde-park, London.*
Mar. 16, 1842	Wheatstone, Charles, Esq., F.R.S., &c. 7, *Chester-terrace, Regent's-park, London, W.*
Jan. 25, 1836	Whewell, Rev. William, D.D., F.R.S., &c., Master of Trinity College, Cambridge. *Cambridge.*

Section of Polite Literature.

(*Fifteen Members.*)

Nov. 30, 1850	Boeckh, Augustus. *Berlin.*
Nov. 30, 1849	Bopp, Franz. *Berlin.*
Nov. 30, 1850	Cousin, Victor. *Paris.*
Mar. 16, 1863	De Lamartine, Alphonse. *Paris.*
Mar. 16, 1863	Ebel, Hermann. *Leipsic.*
Nov. 30, 1849	Grimm, Jacob. *Berlin.*
Mar. 16, 1863	Grote, George, Esq.
Nov. 30, 1849	Guizot, Françoise Pierre Guillaume. *Paris.*
Jan. 25, 1836	Harcourt, Rev. Wm. Venables Vernon, A.M., F.R.S. *Bolton Percy, Tadcaster.*
Nov. 30, 1835	Hobhouse, Right Hon. Henry. *Hadspur House, Somersetshire.*
Nov. 30, 1849	Lepsius, Richard. *Berlin.*
July 25, 1830	Macloughlin, David, M.D. *Paris.*
Mar. 16, 1863	Müller, Professor Max.
Nov. 30, 1850	Thiers, A. *Paris.*
Nov. 30, 1849	Von Ranke, Leopold. *Berlin.*

Section of Antiquities.

(*Fifteen Members.*)

Elected.	
Nov. 30, 1848	Botta, P. E. *Paris.*
April 24, 1826	Brewer, James N., Esq.
Mar. 16, 1863	Cochet, L'Abbe. *Rouen.*
May 27, 1833	Cooper, Charles Purton, LL. D., F. R. S., F. S. A., &c. 12, *New-square, Lincoln's Inn, London, W. C.*
May 15, 1835	Donop, Baron. *Saxe Meiningen.*
Nov. 30, 1832	Ellis, Right Hon. Sir Henry, K. H., Sec. S. A., F. R. S. 24, *Bedford-square, London, W. C.*
Nov. 30, 1832	Forshall, Rev. Josiah, A. M., F. R. S., F. S. A., &c. 54, *Hunter-street, London, S. W.*
Mar. 16, 1841	Halliwell, James Orchard, Esq., F. R. S., F. S. A., &c. 6, *St. Mary's-place, W. Brompton, London, S. W.*
Mar. 16, 1863	Keller, Dr. Ferdinand, *Zurich.*
Nov. 30, 1832	Madden, Sir Frederick, K. H., F. R. S., F. S. A., &c. *British Museum, London, W. C.*
Mar. 16, 1854	Mauray, M. Alfred de. *Paris.*
Nov. 30, 1850	Petit-Radel, L. C. F. *Paris.*
Dec. 30, 1837	Rafn, C. C. *Copenhagen.*
Nov. 13, 1827	Smyth, William H., Rear-Admiral, D. C. L., F. R. S., F. S. A. *Athenæum Club, London, S. W.*
Nov. 30, 1848	Thomsen, C. J. *Copenhagen.*

MEMBERS.

The Names of Life Members are marked with an Asterisk.

Elected.

June 10, 1861 ABRAHAM, George Whitley, LL. D. 7, *Buckingham-street, Upper.*

April 9, 1838 *Adams, Robert, M.D. 22, *Stephen's-green, North.*

April 13, 1846 Alcorn, Rev. John, D.D. *Cashel.*

April 10, 1843 *Allman, George James, M.D., F.R.S.E. 21, *Manor-place, Edinburgh.*

Jan. 14, 1839 *Andrews, Thomas, M.D., F.R.S., Vice-President, and Professor of Chemistry, Queen's College, Belfast. *Queen's College, Belfast.*

Jan. 10, 1842 *Andrews, William, Esq. *The Hill, Monkstown.*

Feb. 12, 1838 *Anster, John, LL.D., Regius Professor of Civil Law, T.C.D. 5, *Gloucester-street, Lower.*

April 28, 1828 *Apjohn, James, M.D., F.R.S., Professor of Mineralogy and Chemistry, T.C.D. *South Hill, Blackrock.*

June 8, 1851 Armagh, Most Rev. Marcus G., Lord Archbishop of, D.D., Primate of all Ireland. *The Palace, Armagh.*

April 14, 1862 *Armstrong, Andrew, Esq. *Claddagh-terrace, Strand, Bray; and* 16½, *D'Olier-street, Dublin.*

Mar. 16, 1815 *Ashburner, John, M.D. 7, *Hyde-park-place, Cumberland-gate, London.*

Aug. 27, 1857 Atkinson, Richard, Alderman, J.P. *Highfield House, Rathgar.*

June 8, 1863 Bagot, Christopher Neville, Esq. *Aughrane Castle, Ballygare, Co. Galway.*

April 12, 1847 Baker, Abraham Whyte, Esq. *Ballaghtobin, Callan.*

April 13, 1840 *Ball, John, Esq. 85, *Stephen's-green, South; and* 18, *Park-street, Westminster, London.*

Jan. 10, 1842 *Banks, John T., M.D., King's Professor of the Practice of Medicine. 10, *Merrion-square, East.*

April 14, 1851 *Barker, John, M.D. 48, *Waterloo-road.*

Jan. 25, 1836 *Barker, William, M.D. 21, *Hatch-street.*

May 10, 1847 *Barnes, Edward, Esq. *Ovoca Lodge, Ovoca.*

June 24, 1833 *Beatty, Thomas E., M.D. 18, *Merrion-square, North.*

April 27, 1863 *Belmore, Right Hon. Somerset R. Lowry Corry, Earl of. *Castle Coole, Enniskillen.*

Elected.

Nov. 30, 1825 *Benson, Charles, A. M., M. D., Professor of the Practice of Medicine, Royal College of Surgeons. 42, *Fitzwilliam-square, West.*

April 8, 1861 Berwick, Hon. Walter, Judge in the Court of Bankruptcy. 5, *Merrion-street, Upper; and St. Edmondsbury, Lucan.*

April 13, 1846 Bevan, Philip, M. D., T. C. D., F. R. C. S. I. 21, *Baggot-street, Lower.*

Jan. 8, 1849 *Bewglass, Rev. James, LL. D. *Wakefield, Yorkshire.*

Dec. 11, 1843 *Bewley, Edward, Esq. *Edington, Clara.*

Jan. 8, 1855 Blackburne, Right Hon. Francis, LL. D., Lord Justice of Appeal. *The Castle, Rathfarnham; and* 34, *Merrion-square, South.*

Jan. 11, 1858 Blakely, Alexander T., Esq. 34, *Montpelier-square, London, S. W.*

Jan. 9, 1843 *Blacker, Stewart, Esq., A. M. *Carrick Blacker, Portadown, Co. Armagh.*

Nov. 30, 1836 *Bolton, William Edward, Esq. 7, *Drumcondra Hill.*

Feb. 12, 1838 *Boyle, Alexander, Esq. *Belvue Park, Dalkey.*

April 10, 1854 *Brady, Cheyne, Esq. *Willow Bank, Monkstown.*

April 9, 1849 Brady, Daniel Frederick, M. D. 5, *Gardiner's-row.*

Feb. 27, 1832 *Brady, Rt. Hon. Maziere, Lord Chancellor. 26, *Pembroke-street, Upper; and Hazelbrook, Roundtown.*

April 12, 1858 Brooke, Thomas, Esq. *Lough Eske, Strabane, Donegal.*

April 11, 1864 Brooke, Sir Victor, Bart. *Colebrook-park, Brookboro', Co. Fermanagh.*

Jan. 13, 1851 *Browne, Robert Clayton, Esq., M. A., D. L. *Browne's Hill, Carlow.*

June 14, 1858 Brownrigg, Sir Henry J., C. B. 22, *Longford-terrace, Monkstown; and Dublin Castle.*

April 10, 1854 Burke, Sir J. Bernard (Ulster), LL. D. *Record Tower, Dublin Castle; and* 28, *Pembroke-place.*

May 13, 1861 Burnside, Rev. William Smyth, B. D. *Enniskillen.*

Jan. 8, 1855 *Butcher, Richard G. H., M. D. 19, *Fitzwilliam-street, Lower.*

Jan. 10, 1842 *Butcher, Rev. Samuel, D. D., Regius Professor of Divinity, T. C. D. 40, *Fitzwilliam-square; and* 6, *Trinity College.*

Feb. 10, 1838 *Callwell, Robert, Esq. 25, *Herbert-place.*

April 14, 1862 Campbell, John, M. B. 51, *York-street.*

June 13, 1842 *Cane, Arthur B., Esq. *Collinstown House, Clondalkin.*

Feb. 22, 1836 *Cane, Edward, Esq. 60, *Dawson-street.*

Feb. 12, 1838 *Carson, Rev. Joseph, D. D., F. T. C. D., Treasurer. 18, *Fitzwilliam-place, South; and* 1, *Trinity College.*

Feb. 12, 1855 Carte, Alexander, M. B., Director of Museum, R. D. S. 54, *Waterloo-road.*

Elected.

Jan. 8, 1843 Cather, Thomas, Esq. *Newtownlimavady.*
Jan. 13, 1862 *Cather, Rev. R. C., LL. D. 3, *Queen's Elms, Belfast.*
June 13, 1842 *Chapman, Sir Benjamin J., Bart. *Killua Castle, Clonmellon.*
Jan. 11, 1864 Charlemont, Right Hon. James Molyneux, Earl of.
Mar. 16, 1824 *Chetwode, Edward Wilmot, Esq., A. M. *Woodbrook, Portarlington.*
Jan. 10, 1842 *Churchill, Fleetwood, M. D., F. K. & Q. C. P. I. 15, *Stephen's-green, North.*
June 9, 1845 Claridge, James, Esq. 10, *Wellington-road.*
Jan. 9, 1837 *Clarke, Edward S., M. D. 24, *Mountpleasant-square, West, Ranelagh.*
April 13, 1857 *Cleland, James, Esq. *Tobar Mhuire, Crossgar, Co. Down.*
Jan. 10, 1842 *Clendinning, Alexander, Esq.
Jan. 11, 1841 *Clermont, Right Hon. Thomas, Baron. *Ravensdale Park, Newry.*
May 12, 1851 Codd, Francis, Esq. *Strickland House, Blackrock.*
Jan. 9, 1854 Colclough, John T. Rossborough, Esq. *Tintern Abbey, Kinnagh, New Ross.*
Nov. 30, 1835 *Cole, Owen Blayney, Esq.
June 23, 1855 *Conolly, Daniel, LL. D. *Montebello, Killiney.*
May 13, 1839 *Conroy, Sir Edward, Bart. *Aborfield, near Reading, Berks.*
Jan. 9, 1860 *Conwell, Eugene Alfred, Esq. *Trim, Co. Meath.*
June 9, 1845 Cooke, Adolphus, Esq. *Cookesborough, Mullingar.*
April 14, 1856 Copland, Charles, Esq. 7, *Longford-terrace, Monkstown.*
Nov. 30, 1825 *Corballis, John R., LL. D., Q. C. 19, *Baggot-street, Lower; and Rosemount, Roebuck.*
Aug. 24, 1857 Corbet, Robert, Esq. *Sandymount Castle.*
Jan. 11, 1847 Corrigan, Dominick J., M. D. 4, *Merrion-square, West.*
May 9, 1864 Cotton, Charles P., Esq., C. E. 11, *Pembroke-street, Lower.*
Jan. 12, 1846 Cotton, Ven. Henry, LL. D., Archdeacon of Cashel. *Thurles.*
Nov. 30, 1835 *Courtney, Henry, Esq., A. M. 24, *Fitzwilliam-place.*
April 13, 1863 Crampton, Rev. Josiah, A. M. *Violet Hill, Florence Court, Enniskillen.*
Aug. 24, 1857 *Crofton, Denis, Esq., A. B. 8, *Mountjoy-square, North*
Oct. 27, 1834 *Croker, Charles P., M. D., F. K. & Q. C. P. I. 7, *Merrion-square, West.*
Jan. 14, 1861 *Cusack, Henry T., Esq. *Abbeville House, St. Doulough's.*
April 11, 1853 *Davies, Francis Robert, Esq., A. M. 10, *Montpelier Parade, Monkstown.*

Elected.		
Mar. 16,	1830	*Davis, Charles, M.D., F.R.C.S.I. 33, *York-street.*
May 14,	1855	Davy, Edmund W., B.A., M.B. *Garville Avenue, Rathgar.*
April 13,	1846	D'Arcy, Matthew P., Esq. 1, *Fitzwilliam-square; and Raheny Cottage.*
Jan. 12,	1846	Deasy, Right Hon. Rickard, LL.D., Fourth Baron of the Exchequer. 27, *Merrion-square, North.*
June 9,	1851	*De la Ponce, Mons. Amadie. *Paris.*
Sept. 9,	1849	De Vesci, Right Hon. Thomas, Viscount. 26, *Merrion-square, North; and* 4, *Carlton-terrace, London, S. W.*
Jan. 9,	1860	*Dickson, Rev. Benjamin, D.D., F.T.C.D. 3, *Kildare-place; and* 36, *Trinity College.*
Jan. 11,	1847	*Dobbin, Leonard, Esq. 27, *Gardiner's-place.*
Jan. 13,	1851	*Dobbin, Rev. Orlando T., LL.D. *Ballivor, Kells.*
Feb. 13,	1854	Domvile, Sir Charles C. W., Bart. *Santry House, Santry.*
Jan. 11,	1864	Donoughmore, Right Honourable Richard John, Earl of. *Knocklofty, Clonmel; and* 52, *South Audley-street, London, W.*
Jan. 11,	1847	Donovan, Michael, Esq., H. M. Philadelphia College of Pharmacy, 11, *Clare-street.*
Feb. 11,	1856	Downing, Samuel, C.E., LL.D., Professor of Civil Engineering, T.C.D. 5, *The Hill, Monkstown; and Trinity College.*
June 11,	1838	Drennan, William, Esq. 35, *Cumberland-street, North.*
Nov. 29,	1817	*Drummond, Rev. William H., D.D. 27, *Gardiner-street, Lower.*
Jan. 9,	1843	*Drury, William Vallancey, M.D. 86, *Harley-street, Cavendish-square, London, W.*
Mar. 16,	1864	Dublin, Most Rev. Richard Chenevix, Lord Archbishop of, D.D. *The Palace, Stephen's-green, North.*
Feb. 11,	1861	Duncan, James Foulis, M.D. 8, *Merrion-street, Upper.*
Aug. 24,	1857	*Du Noyer, George Victor, Esq. *Albert Ville, Sydney-avenue, Blackrock.*
Oct. 25,	1830	*Dunraven and Mount-Earl, Right Hon. Edwin R., Earl of, F.R.S. *Adare Manor, Adare.*
Dec. 11,	1843	Eiffe, James S., Esq., F.R.Ast.S., &c. *Plantation House, Amersham, Bucks.*
Jan. 12,	1846	Enniskillen, Right Hon. William Willoughby, Earl of, F.R.S., F.G.S.L., and Dublin Trustee of the Hunterian Museum, R.C.S., London. *Florence Court.*
April 12,	1847	*Esmonde, Right Hon. Sir Thomas, Bart., D.L. *Ballynastra, Gorey.*
Nov. 11,	1844	Farnham, Right Hon. Henry Maxwell, Baron, K.St.P. *Farnham, Co. Cavan.*

Elected.

Feb. 13, 1854 *Ferguson, Rev. Robert, LL. D., F. S. A., F. R. S. 15, *Carlton Hill, East, St. John's Wood, London.*

Mar. 15, 1854 *Ferguson, Samuel, Esq., Q. C. 20, *George's-street, North.*

Jan. 10, 1842 *Ferrier, Alexander, Esq., Jun. *Knockmaroon Lodge, Chapelizod.*

Feb. 9, 1857 Field, Frederick, Esq. 3, *Chapel-terrace, Denbigh-road, Bayswater, London.*

Nov. 12, 1849 Fitzgerald, Lord William. 7, *Harcourt-terrace.*

Jan. 13, 1862 Fitz Gerald, Percy, Esq., M. A. 32, *Merrion-street, Upper.*

April 12, 1841 *Fitzgibbon, Gerald, Esq., M. C. 10, *Merrion-square, North.*

June 9, 1851 Fleming, Christopher, M. D. 6, *Merrion-square, North.*

Jan. 9, 1860 Foley, William, M. D. *Kilrush.*

Jan. 11, 1864 Foot, Charles H., B. A. 14, *Fitzwilliam-street, Upper.*

April 28, 1828 *Foot, Simon, Esq. 4, *Avoca-terrace, Blackrock.*

Nov. 12, 1838 *Frazer, George A., Esq., Captain R. N. *Warrenpoint, Co. Down.*

May 10, 1847 Freke, Henry, M. D., T. C. D., F. K. & Q. C. P. I. 28, *Holles-street.*

Jan. 14, 1861 *Frith, Richard H., Esq., C. E. 51, *Leinster-road, Rathmines.*

Jan. 10, 1859 Gages, Alphonse, Esq., Curator of Museum of Irish Industry. 51, *Stephen's-green, East.*

April 14, 1845 Galbraith, Rev. J. A., M. A., F. T. C D. 48, *Leeson-street, Upper.*

Jan. 11, 1864 Garnett, George Charles, Esq., A. B. 5, *Mountjoy-square, North.*

Feb. 9, 1863 *Garstin, John Ribton, M. A., LL. B. 21, *Merrion-street, Upper.*

April 12, 1858 Gibson, Rev. Charles B. *Monkstown, Co. Cork.*

Jan. 13, 1851 Gibson, James, Esq. 35, *Mountjoy-square, South.*

April 9, 1855 *Gilbert, John T., Esq., Librarian. *Villa Nova, Blackrock.*

June 14, 1858 Goold, Ven. Frederick, Archdeacon of Raphoe. *Sharon Glebe, Newtowncunningham, Derry.*

May 25, 1836 *Gough, Hon. George S., A. M., D. L., F. L. S., F. G. S. *Lough Cutra Castle, Gort.*

June 12, 1848 *Graham, Andrew, Esq.

April 10, 1848 *Graham, Rev. William. *Dresden.*

April 13, 1863 Granard, Right Hon. George Arthur Hastings Forbes, Earl of, K. St. P. *Castle Forbes, Co. Longford.*

April 24, 1837 *Graves, Very Rev. Charles, D. D., Dean of the Chapel Royal, PRESIDENT. *Upper Castle Yard; and Trinity College, Dublin.*

Elected.

May 14, 1860 Graves, Rev. James, A. B., Treasurer of the Cathedral of St. Canice. *Rectory, Inisnag, Stoneyford.*

Mar. 16, 1824 *Grierson, George A., Esq.

April 26, 1819 *Griffith, Sir Richard, Bart., LL. D., F. R. S., F. G. S. 2, *Fitzwilliam-place.*

Jan. 10, 1842 *Grimshaw, Wrigley, Esq. 13, *Molesworth-street.*

June 8, 1857 Griott, Daniel G., Esq., M. A. *King's Inns.*

Jan. 14, 1839 *Grubb, Thomas, Esq. 141, *Leinster-road, Rathmines.*

April 9, 1849 *Guinness, Benjamin Lee, D. L., LL. D. 80, *Stephen's-green; and St. Anne's, Clontarf.*

Jan. 10, 1848 *Haliday, Alexander H., Esq., M. A. *Carnmoney, Co. Antrim.*

Jan. 11, 1847 *Haliday, Charles, Esq., J. P. *Monkstown Park.*

April 25, 1836 *Hamilton, Charles William, Esq. 40, *Dominick-street, Lower.*

Jan. 13, 1845 Hamilton, George Alexander, LL. D. *Hampton Hall, Balbriggan.*

Oct. 22, 1827 *Hamilton, Sir William Rowan, LL. D., F. R. A. S., Astronomer Royal of Ireland, and Andrews' Professor of Astronomy, T. C. D. *Observatory, Dunsink.*

Jan. 11, 1847 Hancock, William Neilson, LL. D. 64, *Gardiner-street, Upper.*

June 10, 1844 Hanlon, Charles, Esq. *Bedford House, Rathgar.*

April 13, 1840 *Hanna, Samuel, M. D., M. A., F. K. & Q. C. P. I. 42, *Leinster-road, Rathmines.*

April 8, 1850 Hardinge, William Henry, Esq. 16, *Buckingham-street, Upper.*

Nov. 30, 1829 *Hardy, Philip Dixon, Esq. 23, *Sackville-street, Upper.*

Feb. 8, 1858 Hardy, Samuel L., M. D. 9, *Merrion-square, North.*

Feb. 13, 1837 *Hart, Andrew Searle, LL. D., S. F. T. C. D. *Killester, Raheny; and Trinity College.*

April 28, 1828 *Hart, John, M. D. 3, *Bloomfield-avenue.*

May 13, 1861 Hartley, Richard, Esq. *Beech Park, Clonsilla.*

May 13, 1844 *Harvey, William Henry, M. D., F. R. S., F. L. S., Professor of Botany in the University of Dublin; Keeper of Botanical Museum, T. C. D.; Member of Royal Academies of Upsal and Munich, of the Imp. Acad. Leop. Cæs. Nat. Cur., and Hon. Member of Lyceum of Natural History, New York, &c., &c. 40, *Trinity College.*

May 13, 1861 Hatchell, John, Esq. 12, *Merrion-square, South.*

Feb. 13, 1860 Haughton, James, Esq. 35, *Eccles-street.*

Feb. 24, 1845 Haughton, Rev. Samuel, M. D., F. R. S., F. T. C. D., 17, *Heytesbury-terrace; and Trinity College.*

Aug. 24, 1857 Hayden, Thomas, Esq., F. R. C. S. I., L. K. and Q. C. P. I. 30, *Harcourt-street.*

Elected.

April 12, 1852 *Head, Henry H., M.D., F.R.C.S.I., L.K. and Q.C.P.I., F.R.G.S.I. 7, *Fitzwilliam-square.*

June 8, 1840 *Hemans, G. W., Esq., C.E. 13, *Queen-square, Westminster, London, S.W.; and* 46, *Sackville-st., Up.*

Jan. 13, 1851 *Hennessy, Henry, F.R.S., Professor of Natural Philosophy, R.C.U.D. *Wynnefield, Rathgar; and* 2, *Harcourt-buildings, Temple, London.*

Jan. 10, 1859 *Hildige, James Graham, Esq. 7, *Merrion-street, Upper.*

Mar. 16, 1831 *Hill, Lord George A. *Ballyare, Rathmelton.*

April 12, 1847 *Hone, Nathaniel, Esq. *St. Doulough's, Co. Dublin.*

June 9, 1851 *Hone, Thomas, Esq. 1, *Fitzwilliam-square, East; and Yapton, Monkstown.*

April 8, 1861 Hudson, Alfred, M.D. 2, *Merrion-square, North.*

Feb. 28, 1824 *Hudson, Henry, M.D., F.K. & Q.C.P.I. *Glenville, Fermoy.*

Feb. 10, 1835 *Hutton, Edward, M.D. 5, *Merrion-square, South.*

June 24, 1816 *Hutton, Robert, Esq., F.G.S. *Putney Park, Surrey.*

Feb. 10, 1840 *Hutton, Thomas, Esq., D.L., F.G.S. *Elm Park; and* 115, *Summer Hill.*

Jan. 11, 1847 Ingram, John Kells, LL.D., F.T.C.D., Secretary of Council. 43, *Wellington-road; and* 34, *Trinity College.*

June 13, 1845 James, Sir Henry, Colonel R.E., F.R.S. *Ordnance Survey Office, Southampton.*

Jan. 9, 1837 James, Sir J. Kingston, Bart., D.L. 9, *Cavendish-row.*

April 12, 1841 *Jellett, Rev. John H., M.A., F.T.C.D. 18, *Heytesbury-terrace.*

June 13, 1842 *Jennings, Francis M., Esq., F.G.S., *Cork.*

Nov. 30, 1835 *Jessop, Frederick T., Esq. *Doory Hall, Mullingar.*

Jan. 14, 1839 *Jones, Lieut.-General Sir Harry D., G.C.B., M.I.C.E., D.C.L. (Oxford). *Royal Military College, Farnboro' Station, Hants.*

Jan. 25, 1836 *Joy, Henry Holmes, Esq., Q.C., LL.D. 33, *Mountjoy-square, North.*

Jan. 12, 1863 Joyce, Patrick Weston, Esq., A.B. 6, *Victoria-terrace, Circular-road, North.*

Jan. 12, 1852 *Jukes, Joseph Beete, Esq., M.A., F.R.S. 72, *Leeson-street, Upper.*

Nov. 30, 1831 *Kane, Sir Robert, M.D., F.R.S., &c. *Queen's College, Cork; and Wickham, Dundrum, Co. Dublin.*

June 24, 1838 *Kelly, Denis Henry, Esq., D.L. 51, *Mount-st., Up.*

Jan. 25, 1836 *Kelly, Hon. Thomas F., LL.D., Judge of the High Court of Admiralty of Ireland. 10, *Leeson-street, Lower; and Wilford, Dundrum.*

Elected.

Nov. 30, 1835 *Kennedy, George A., M. D. 6, *Mountjoy-place.*

April 9, 1849 Kennedy, Henry, M. B., F. K. & Q. C. P. I. 17, *Frederick-street, North.*

April 13, 1846 *Kennedy, James Birch, Esq., J. P. 50, *Dame-street, and Marybrook, Dromore, Co. Down.*

April 10, 1848 Kenny, James Christopher F., Esq., J. P. *Kilclogher, Co. Galway; and 2, Merrion-square, South.*

May 14, 1838 *Kent, William Todderick, Esq. 51, *Rutland-square, West.*

April 8, 1844 *Kildare, Charles William, Marquis of, V. P. R. D. S. *Kilkea Castle, Mageney.*

Aug. 24, 1857 Killaloe, Right Rev. William, Lord Bishop of, D. D. *Clarisford House, Killaloe.*

April 13, 1863 Kinahan, Thomas W., Esq., A.B. *St. Kilda, Sandycove, Kingstown.*

June 8, 1845 King, Charles Croker, M. D. *Galway.*

April 14, 1862 Kirwan, John Stratford, Esq. *Moyne, Dangan, Co. Galway; and Balcarg, Aughencairn, near Castle Douglas, Scotland.*

Feb. 13, 1837 *Knox, George J., Esq. 2, *Finchley, New-road, London.*

Jan. 11, 1841 *Knox, Very Rev. H. Barry, M. A., Dean of Hadleigh. *Deanery House, Hadleigh, Suffolk.*

Feb. 13, 1837 *Knox, Rev. Thomas, M. A. *Lurgan.*

Nov. 30, 1835 *Kyle, William Cotter, LL. D. 8, *Clare-street.*

April 11, 1864 Lalor, J. J., Esq. *Monkstown, Co. Dublin.*

Nov. 30, 1833 *Larcom, Sir Thomas A., Major-General, K. C. B., F. R. S. *Under Secretary's Lodge, Phœnix Park; and Dublin Castle.*

Feb. 23, 1835 *La Touche, David Charles, Esq. *Castle-street.*

Jan. 11, 1864 La Touche, J. J. Digges, A. B. 1, *Ely-place, Upper.*

Jan. 25, 1836 *La Touche, William Digges, Esq., D. L. 118, *Stephen's-green, West.*

April 11, 1842 Law, Robert, M. D. 25, *Merrion-street, Upper.*

May 11, 1857 *Lawson, James A., LL. D., Q. C., Solicitor-General. 27, *Fitzwilliam-street, Upper.*

April 13, 1857 *Leach, Lieut.-Colonel George A., R. E. 3, *St. James's-square, London, S. W.*

May 13, 1839 *Leader, Nicholas P., M. P. *Dromagh Castle, Kanturk, Co. Cork.*

May 10, 1852 Leared, Arthur, B. A., M. D. T. C. D., M. R. C. P. L., Physician to the Great Northern Hospital. 12, *Old Burlington-street, London, W.*

Aug. 24, 1857 Lee, Rev. Alfred T., M. A. *The Rectory, Ahoghill, Ballymena.*

Jan. 13, 1845 L'Estrange, Francis, M. D., A. M., F. R. C. S. 39, *Dawson-street; and Landaur, Raglan Road.*

Elected.		
Feb. 10, 1845	Le Fanu, William R., Esq. 7, *Fitzwilliam-square, North.*
May 11, 1846	Lefroy, George, Esq. 18, *Leeson-street, Lower.*
April 10, 1843	*Leinster, His Grace Augustus Frederick, Duke of. 13, *Dominick-street, Lower; and Carton, Maynooth.*
April 28, 1828	*Lenigan, James, Esq., A. M., D. L. *Castle Fogarty, Thurles.*
April 11, 1853	Lentaigne, John, Esq., D.L. 1, *Great Denmark-street, and Tallaght House, Co. Dublin.*
Feb. 27, 1832	*Lloyd, Rev. Humphrey, D. D., D. C. L., F. R. SS., L. & E., Vice-Provost of Trinity College, Dublin. 35, *Trinity College; and Kilcrony, Bray.*
Jan. 12, 1846	*Lloyd, William, M. D.
Feb. 10, 1845	Longfield, Rev. George, B. D., F. T. C. D. 25, *College; and* 2, *Waterloo-road.*
Feb. 12, 1838	*Longfield, Hon. Mountifort, LL. D., Judge in the Landed Estates Court. 47, *Fitzwilliam-square, West.*
June 24, 1859	*Longfield, William, Esq. 19, *Harcourt-street.*
Feb. 25, 1833	*Luby, Rev. Thomas, D.D., S. F. T. C. D. 43, *Leeson-street; and Trinity College.*
Jan. 13, 1845	*Lucas, Right Hon. Edward. *Castle Shane, Co. Monaghan.*
Mar. 16, 1836	*Lyle, Acheson, Esq., M. A. *The Oaks, Londonderry.*
May 12, 1851	Lyons, Robert D., M.D. 8, *Merrion-square, West.*
Jan. 9, 1812	*Mac Carthy, Vicomte de. *Toulouse.*
April 13, 1857	Mac Carthy, Denis Florence, Esq. *Summerfield House, Dalkey.*
April 11, 1853	Mac Carthy, James Joseph, Esq. 3, *Longford-terrace, Kingstown; and* 183, *Great Brunswick-street.*
April 11, 1864	Mac Donnell, Alexander, Esq., C. E. *St. John's, Islandbridge.*
Feb. 24, 1825	Macdonnell, James S., Esq., C. E. *Her Majesty's Dockyard.*
Mar. 16, 1827	*Mac Donnell, John, M. D. 4, *Gardiner's-row.*
Oct. 23, 1820	*Mac Donnell, Rev. Richard, D. D., Provost of Trinity College. *Provost's House, College; and Sorrento-terrace, Dalkey.*
Feb. 9, 1857	*Mac Donnell, Robert, M. D. 14, *Pembroke-street, Lower.*
Dec. 11, 1843	Mac Dougall, William, Esq. *Drumleek House, Howth.*
April 11, 1864	M'Gee, Hon. Thos. D'Arcy, M. P. for Montreal. *Montreal, Canada.*
June 9, 1856	*Mac Ivor, Rev. James, D. D. *Moyle, Newtownstewart.*
Feb. 10, 1841	*M'Kay, Rev. Maurice, LL. D. *Drumgooland, Castlewellan.*
Jan. 14, 1861	Mac Namara, Rawdon, M. D. 80, *Harcourt-street.*

Elected.

Feb. 28, 1831 *Mac Neill, Sir John, LL. D., F. R. S., *Mountpleasant, Dundalk.*

Feb. 23, 1846 Madden, Richard Robert, Esq., F. R. C. S. Eng. 9, *Great Denmark-street ; and Dublin Castle.*

June 13, 1864 Madden, Thos. M., Ex. Lic. K. & Q. C. P., &c. 9, *Great Denmark-street.*

Feb. 13, 1843 *Magee, James, Esq. 39, *Leeson-street, Lower.*

Oct. 22, 1832 *Mallet, Robert, Esq., M. I. C. E., F. R. S., F. G. S. 11, *Bridge-street, Westminster ; Athenæum Club, and The Grove, Clapham-road, London, S.*

Jan. 10, 1859 *Manchester, His Grace William Drogo Montagu, Duke of. 1, *Great Stanhope-street, London ; Kimbolton Castle, England ; and Tanderagee Castle, Ireland.*

Oct. 24, 1836 *Marks, Rev. Edward, D. D. 2, *Heytesbury-street.*

Mar. 15, 1828 *Martin, Ven. John C., D. D., Archdeacon of Ardagh. *Killeshandra.*

May 13, 1861 Maunsell, Daniel Toler T., M. D. 53, *Harcourt-street.*

Mar. 15, 1817 *Mayne, Rev. Charles, M. A. *Killaloe.*

Mar. 16, 1813 *Meath, Most Rev. Joseph H., Lord Bishop of, D. D. *Ardbraccan House, Navan ; and* 66, *Harcourt-street.*

June 11, 1860 Meyler, George, Capt. *Bayswater, Dalkey.*

Jan. 13, 1840 Mollan, John, M. D. 60, *Fitzwilliam-square, North.*

Jan. 14, 1861 Monck, Right Hon. Charles Stanley, Viscount. *Quebec, Canada ; and Charleville, Enniskerry, Co. Wicklow.*

April 12, 1841 *Monsell, Right Hon. William, M. P., D. L. *Tervoe, Limerick.*

Jan. 11, 1858 *Montgomery, Howard B., M. D.

Jan. 9, 1860 Moore, A. Montgomery, Captain, 4th Hussars.

June 23, 1845 Moore, David, Esq., Ph. D., F. L. S. *Glasnevin.*

Jan. 14, 1861 Moore, James, M. D. 7, *Chichester-street, Belfast.*

April 13, 1857 Moore, William, M. D. Dub., F. K. & Q. C. P. I. 67, *Fitzwilliam-square, North.*

Dec. 12, 1859 *Moore, William D., M. D. Dub. 7, *South Anne-street.*

April 12, 1852 Muspratt, Sheridan, M. D. (Hon.), F. R. S. Ed. *College of Chemistry, Liverpool.*

Feb. 10, 1840 *Napier, Right Hon. Joseph, LL. D. 4, *Merrion-square, South.*

June 8, 1844 *Neville, John, Esq., C. E. *Jocelyn-street, Dundalk.*

May 8, 1854 Neville, Park, Esq., C. E. 1, *Mount-street Crescent.*

Nov. 30, 1835 *Nicholson, John A., Esq., A. M., M. B., Lic. Med. *Balrath House, Kells, Co. Meath.*

Jan. 12, 1846 Nugent, Arthur R., Esq. *Clonlost, Killucan.*

April 23, 1857 *O'Brien, Wm. Smith, Esq. *Cahermoyle, Newcastle W., Co. Limerick.*

May 27, 1833 *Odell, Edward, Esq. *Carriglea, Dungarvan.*

May 27, 1857 O'Donnell, Sir Charles R., Lieut.-General. *Limerick.*

Elected.	
Feb. 10, 1845	O'Driscoll, W. Justin, Esq. 65, *Mountjoy-square.*
Nov. 30, 1832	*O'Ferrall, Joseph M., M. D. 15, *Merrion-square, North.*
Feb. 13, 1834	O'Flanagan, James R., Esq. 3, *Ormond-quay.*
Feb. 12, 1849	*Ogilby, William, Esq., M.A., F.G.S., &c. *Altnachree Castle, Dunamanagh, Co. Tyrone.*
June 8, 1857	O'Hagan, Right Hon. Thomas, Q. C., M. P., Attorney-General. 34, *Rutland-square, West.*
June 10, 1844	Oldham, Thomas, LL. D., F. R. S., Superintendent of the Geological Survey of India, *Calcutta.*
June 10, 1861	*O'Mahony, Rev. Thaddeus, M. A. 87, *Waterloo-road; and* 24, *Trinity College.*
Dec. 10, 1838	*Orpen, John Herbert, LL. D. 58, *Stephen's-green, East.*
June 10, 1839	*Parker, Alexander, Esq., J. P. 46, *Upper Rathmines.*
June 14, 1841	*Patten, James, M. D. *Streamville, Lisburn.*
Feb. 25, 1828	*Petrie, George, LL. D. 7, *Charlemont-place.*
April 12, 1841	*Phibbs, William, Esq. *Seafield, Sligo.*
Dec. 11, 1843	*Pickford, James H., M. D., J. P., and D. L. for Sussex. *Brighton.*
Feb. 10, 1845	Pigot, Right Hon. David R., Lord Chief Baron. 52, *Stephen's-green, East.*
April 13, 1863	Pigot, David R., Esq. 40, *Gardiner-street, Lower.*
June 9, 1851	Pigot, John Edward, Esq. 23, *Fitzwilliam-street, Lower.*
Feb. 12, 1838	*Pim, George, Esq. *Brennanstown, Cabinteely.*
Jan. 8, 1849	*Pim, Jonathan, Esq. *Greenbank, Monkstown.*
Jan. 13, 1851	*Pim, William Harvey, Esq. *Monkstown House.*
Jan. 11, 1864	Poore, Major Robert, *Carysfort House, Blackrock.*
April 14, 1862	*Porte, George, Esq. *Lansdown Lodge, Beggar's-bush-road; and* 43, *Great Brunswick-street.*
April 12, 1852	*Porter, H. J. Kerr, Esq. *Brampton Park, Huntingdon.*
April 25, 1836	*Porter, Rev. Thomas H., D. D. *Tullahogue, Dungannon.*
June 13, 1864	Power, Alfred, Esq. 1, *Somerset-place, Raglan-road.*
June 9, 1854	Pratt, James Butler, Esq. *Drumsna, Co. Leitrim.*
Feb. 10, 1845	Preston, Algernon, Esq. *Albert Lodge, Donnybrook.*
Oct. 25, 1830	*Prior, Sir James, F. S. A., F. R. Ast. S. 20, *Norfolk-crescent, Hyde Park, London.*
Jan. 11, 1858	Purser, John, Esq., Jun., M. A. 5, *Brighton-terrace, Monkstown.*
Dec. 14, 1846	*Reeves, Rev. William, D. D., M. B., LL. D., Secretary of the Academy. *The Public Library, Armagh; and the Vicarage, Lusk.*
Feb. 13, 1843	*Renny, H. L., Lieut. R. E. (Retired List).

Elected.

April 8, 1839 *Rhodes, Thomas, Esq., C. E., F. R. A. S., Hon. M. I. C. E.

Jan. 12, 1863 Richardson, Thomas, M. A., Ph. D., L. R. S. E., Reader in Chemistry in the University of Durham. 17, *Framlington-place, Newcastle-on-Tyne.*

April 9, 1855 Ringland, John, M. B. 14, *Harcourt-street.*

Feb. 14, 1816 *Robinson, Rev. Thomas Romney, D. D., F. R. S., F. R. Ast. S., Hon. M. I. C. E. Lon., Hon. M. Cambridge Phil. Soc., Hon. M. I. C. E. I., Hon. M. Acad. Palermo, Hon. M. Acad. Philadelphia, Hon. F. R. G. S. I. *Observatory, Armagh.*

June 10, 1844 *Roe, Henry, Esq., M. A.

Oct. 22, 1832 *Rosse, Right Hon. William, Earl of, F. R. S., LL. D. *Birr Castle, Parsonstown.*

Jan. 9, 1843 *Salmon, Rev. George, D. D., F. T. C. D., F. R. S. 2, *Heytesbury-terrace, Wellington-road.*

Jan. 10, 1853 Sanders, Gilbert, Esq. *The Hill, Monkstown.*

April 13, 1857 Sawyer, James H., M. D. 122, *Stephen's-green, West.*

May 12, 1851 *Sayers, Rev. Johnston Bridges, LL. D.

Feb. 14, 1848 Segrave, O'Neale, Esq., D. L. *Kiltimon, Newtownmountkennedy.*

Jan. 8, 1855 *Senior, Edward, Esq. *Ashton, Phœnix Park.*

Feb. 9, 1846 *Sherrard, James Corry, Esq. *Kinnersley Manor, Reigate, Surrey.*

Jan. 11, 1847 Sidney, Frederick J., LL. D. 19, *Herbert-street.*

July 27, 1829 *Sirr, Rev. Joseph D'Arcy, D. D. *Morested Rectory, Winchester.*

April 8, 1861 Sloane, John Swan, Esq., C. E., Architect. 18, *Philipsburgh-avenue, Fairview.*

Feb. 23, 1835 *Smith, Aquilla, M. D. 121, *Baggot-street, Lower.*

June 23, 1834 *Smith, Rev. George S., D. D., Professor of Biblical Greek, T. C. D. *Trinity College.*

April 22, 1833 *Smith, J. Huband, M. A. 12, *Camden-street, Upper.*

April 10, 1837 Smith, Robert William, M. D. 63, *Eccles-street.*

Jan. 8, 1849 Smyth, Henry, Esq., C. E. *Downpatrick.*

June 13, 1842 Staples, Sir Thomas, Bart., LL. D., D. L. *Lissan, Co. Tyrone; and* 11, *Merrion-square, East.*

April 13, 1846 Stapleton, Michael H., M. B. 1, *Mountjoy-place.*

May 12, 1845 Starkey, Digby P., Esq., M. A. 17, *Mount-street, Lower.*

April 11, 1853 Stewart, Henry H., M. D. 71, *Eccles-street; and Spa House, Lucan.*

Nov. 29, 1834 *Stokes, William, M. D. 5, *Merrion-square, North.*

June 8, 1857 *Stoney, Bindon, B. Esq., C. E. 63, *Wellington-road.*

April 14, 1856 Stoney, G. Johnstone, LL. D., M. A., F. R. S., Secretary to the Queen's University in Ireland. 89, *Waterloo-road.*

Elected.	
Aug. 24, 1857	Stuart de Decies, Right Hon. Henry Villiers, Baron. *Dromana, Cappoquin, Co. Waterford.*
Aug. 24, 1857	Sullivan, William K., Esq., Ph. D. 53, *Leeson-street, Upper.*
Feb. 24, 1845	Sweetman, Walter, Esq. 4, *Mountjoy-square, North.*
June 23, 1845	Talbot de Malahide, Right Hon. James, Baron. *The Castle, Malahide.*
Feb. 14, 1848	*Tarrant, Charles, Esq., C. E. *Waterford.*
Jan. 12, 1863	Taylor, Captain Meadows. *Oldcourt, Harold's-cross.*
Jan. 12, 1846	*Tenison, Edward King, Esq., D. L. *Kilronan Castle, Keadue, Carrick-on-Shannon.*
Feb. 11, 1861	Thomson, Wyville, LL. D. *Queen's College, Belfast.*
Feb. 8, 1847	*Tibbs, Rev. Henry Wall, M. A., F. S. A. Scot., &c. *Bobbington, Bridgnorth.*
Oct. 28, 1833	*Todd, Rev. James Henthorn, D. D., S. F. T. C. D. *Silverton, Rathfarnham; and* 35, *Trinity College.*
May 13, 1861	Tombe, Rev. H. Joy, M. A. *Glanely, Ashford, Co. Wicklow.*
Feb. 9, 1846	Tufnell, T. Jolliffe, Esq., F. R. C. S. I. 58, *Mountstreet, Lower.*
Feb. 14, 1816	*Turner, William, Esq.
Feb. 8, 1863	Tyrrell, Henry J., M. D. 34, *York-street.*
May 26, 1834	*Vandeleur, Crofton M., Colonel, D. L. 4, *Rutland-square, East.*
Jan. 25, 1836	*Vignoles, Charles, Esq., C. E., F. R. S., F. R. A. S. 21, *Duke-street, Westminster, London, S. W.*
Jan. 9, 1860	Waldron, Laurence, Esq., M. P. 38, *Rutland-square; and Ballybrack.*
April 28, 1823	*Wall, Rev. Richard H., D. D. *Errislannon Lodge, Co. Galway.*
April 14, 1845	Waller, John Francis, LL. D. 4, *Herbert-street.*
Feb. 11, 1861	Walker, David, M. D. *British Columbia.*
April 9, 1855	*Walsh, John Edward, LL. D., Q. C. 14, *Merrion-square, South.*
Feb. 25, 1822	*Walshe, Francis Weldon, LL. D. *Limerick.*
Feb. 8, 1864	Warren, James W., M. A. 39, *Rutland-square, West.*
April 13, 1863	Waterton, Edmund, Esq. *Walton Hall, Wakefield.*
Feb. 11, 1856	*West, James, Esq., J. P. 42, *Upper Mount-street; and Shanganagh Grove, Killiney.*
Jan. 11, 1841	West, Very Rev. John, D. D., Dean of St. Patrick's, 6, *Wilton-place.*
June 8, 1857	*Whitehead, James, M. D. 87, *Mosley-street, Manchester.*
Jan. 13, 1851	*Whittle, Ewing, M. D. 1, *Parliament-terrace, Liverpool.*

Elected.	
June 10, 1839	*Wilde, Sir William R., F. R. C. S., Surgeon Oculist in Ordinary in Ireland to her Majesty; M. R. S. of Upsala, &c. 1, *Merrion-square, North.*
Jan. 13, 1862	Wilkie, Henry, Esq. 30, *Great Charles-street.*
Jan. 14, 1839	*Williams, Richard Palmer, Esq. 38, *Dame-street.*
Jan. 9, 1837	*Williams, Thomas, Esq. 71, *Stephen's-green.*
Jan. 14, 1839	*Wills, Rev. James, D. D. *Altanagh, Durrow.*
June 10, 1844	*Wilson, Robert, Esq.
April 8, 1861	Wilson, Joseph, Esq. 15, *Temple-street, Upper.*
Nov. 12, 1855	*Wright, Edward, LL. D. *Floraville, Eglinton-road.*
Aug. 24, 1857	Wright, E. Perceval, F. R. G. S. I., M. D. 10, *Clare-street; and Museum, Trinity College.*
April 10, 1843	Wynne, Right Hon. John. *Hazlewood, Co. Sligo.*

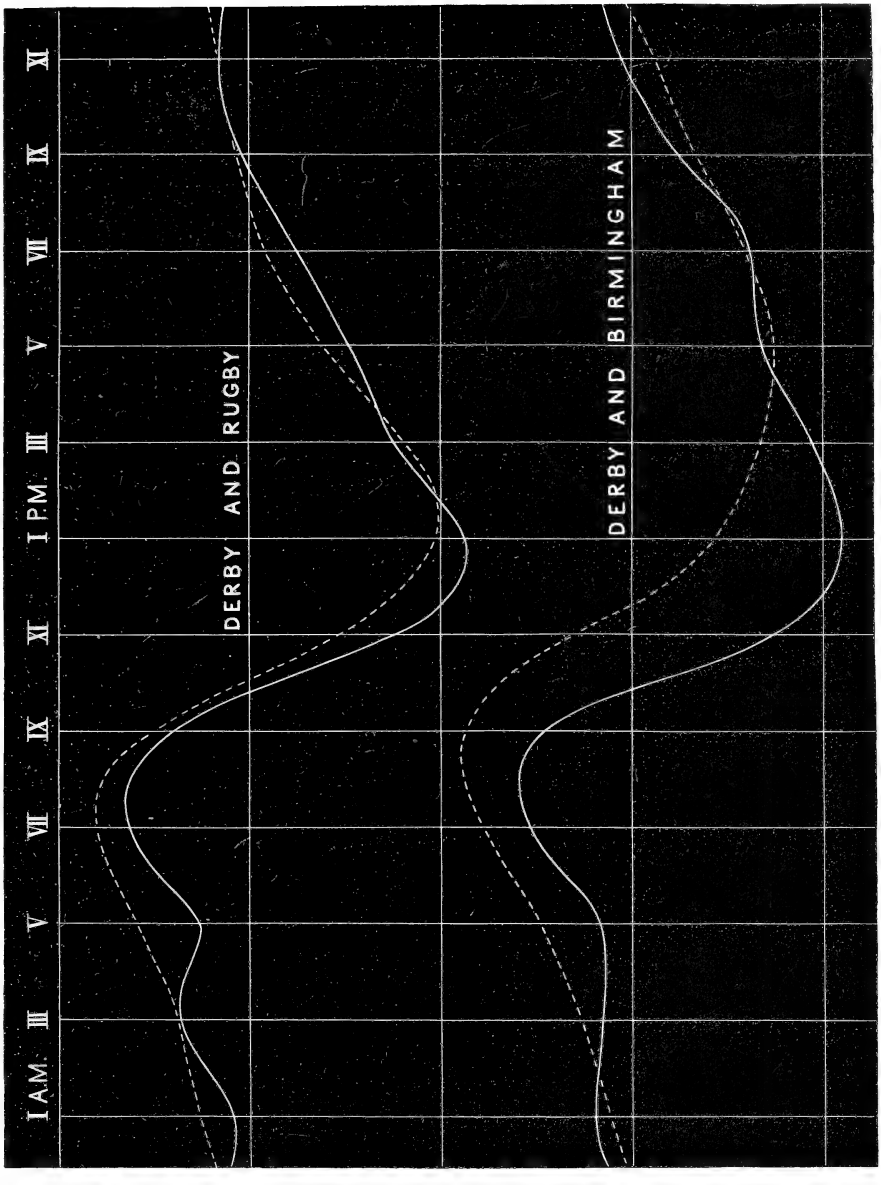
INDEX

TO VOLUME VIII. OF THE PROCEEDINGS.

CORRIGENDA.

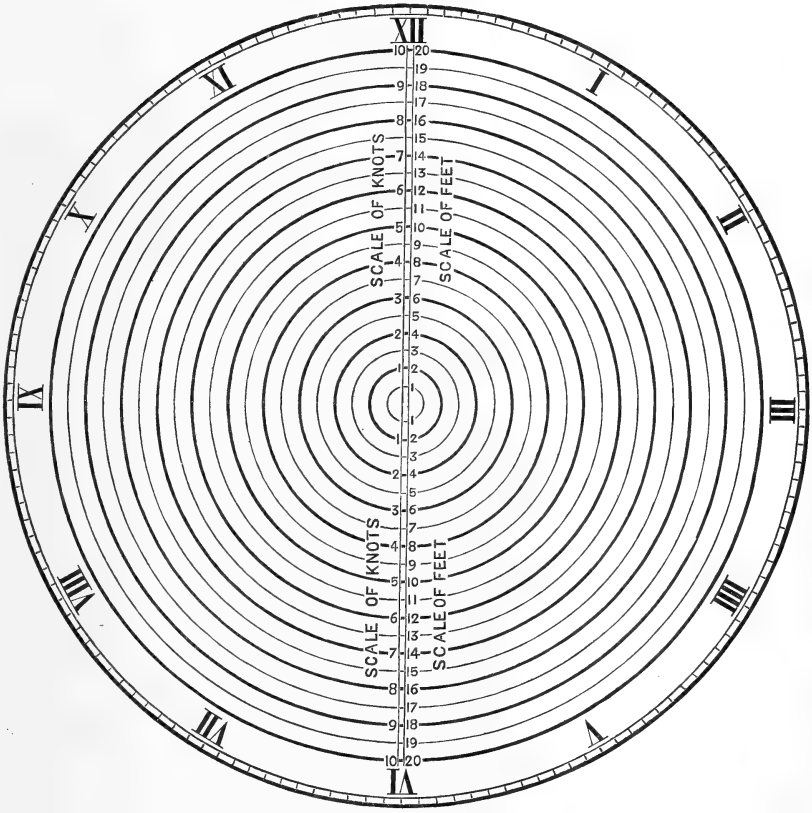
Page 409, *for* Dr. R. Keller, *read* Dr. F. Keller.
„ 457, line 23, *for* Ꝺoill, *read* Ꝺoill.
„ 458, „ 28, *for* Blythe, *read* Blyth.
„ 487, „ 10, *for* George B. Stoney, *read* George J. Stoney.
„ 487, Com. Pol. Lit., *insert* Rev. George Longfield, B. D.

END OF VOLUME VIII.



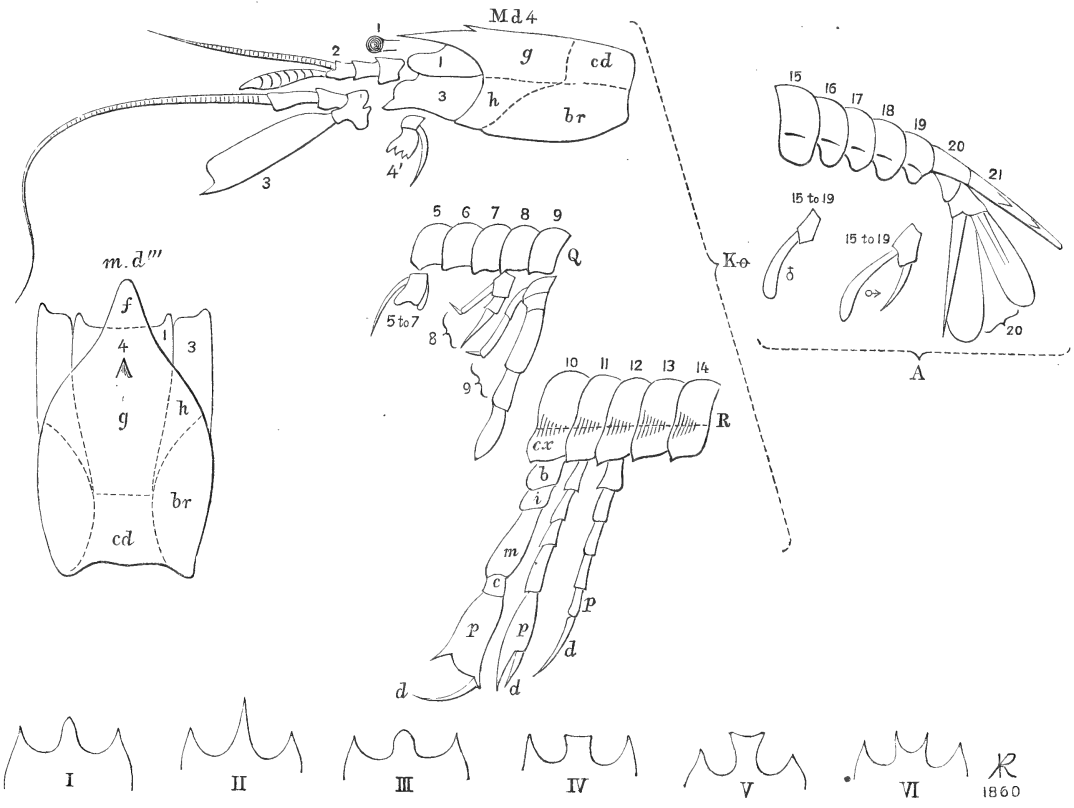
Graphical Comparison of the Numerical Results of Tables I. & II. of Dr. Lloyd's Paper on Earth Currents.

[The dotted line is the *calculated* Curve; the other the *observed* Curve.]



TIDAL CLOCK CARD.


NATURAL HISTORY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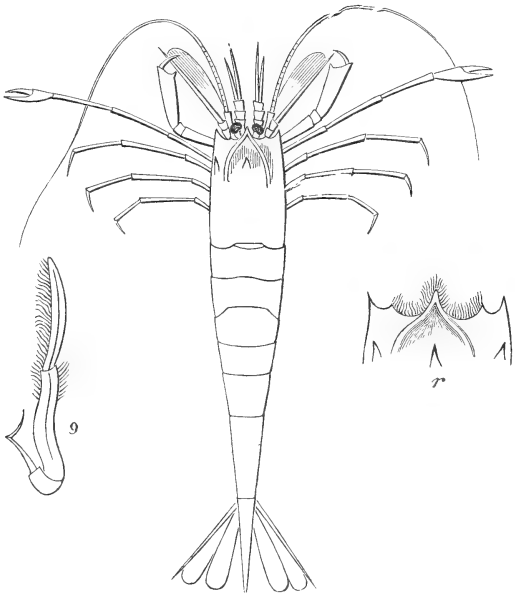
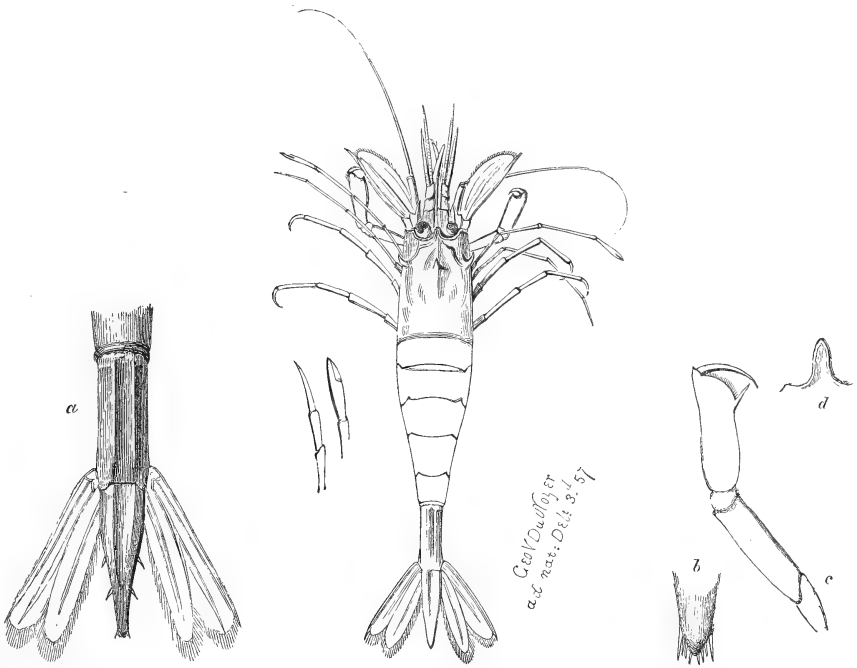
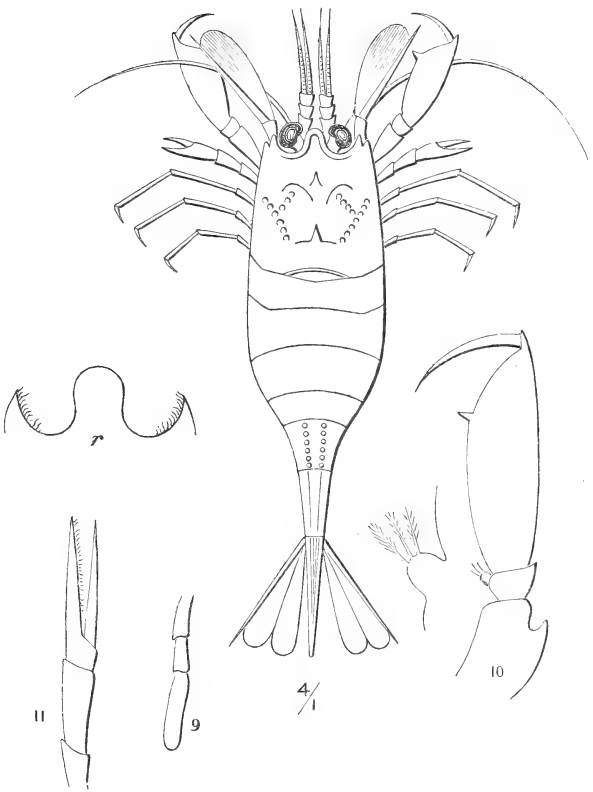


Grey Shrimp —Crangon vulgaris.

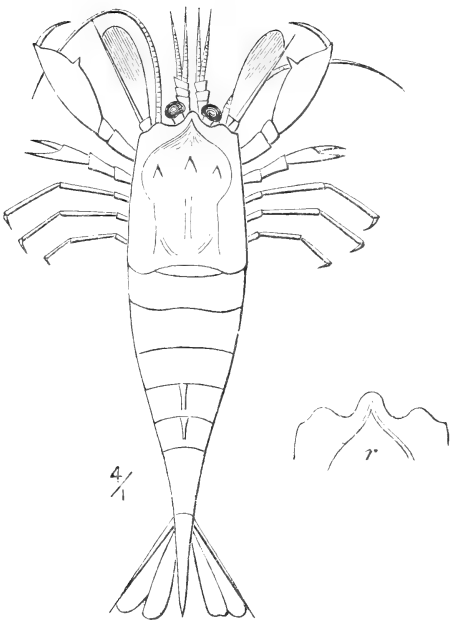


Channelled-Tailed Shrimp.– Steiracrangon Allmanni.



Two-Spined Shrimp.—Cheraphilus bispinosus.


BRITISH
NATURAL HISTORY



Three-Spined Shrimp.—Cheraphilus trispinosus.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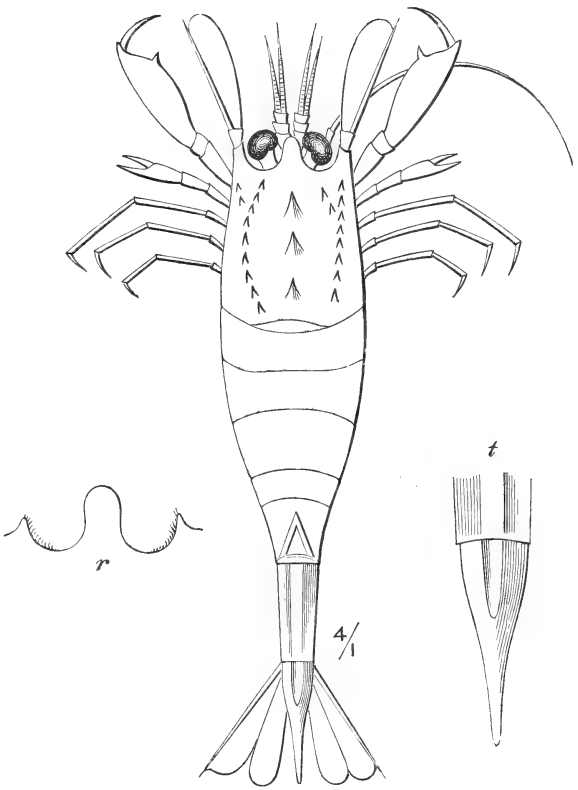
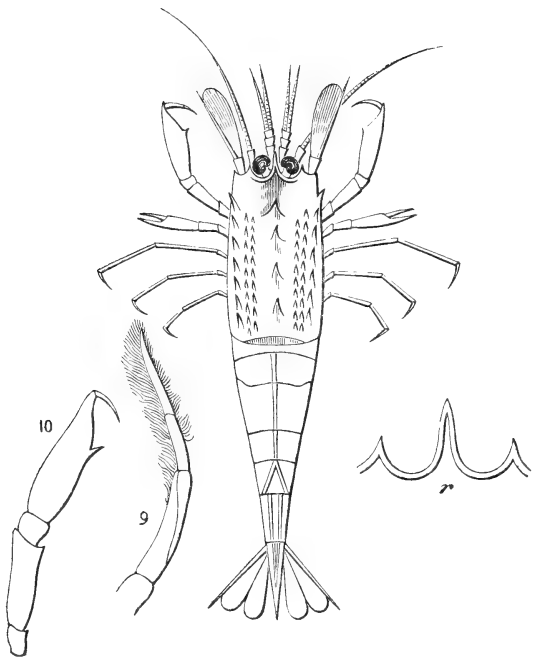
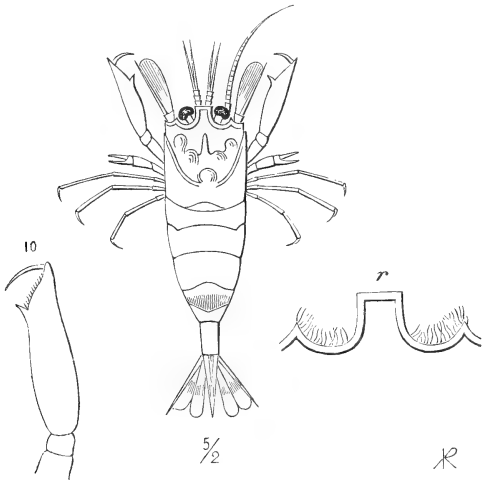


Smooth-tailed Spinous Shrimp.—Cheraphilus Pattersonii.

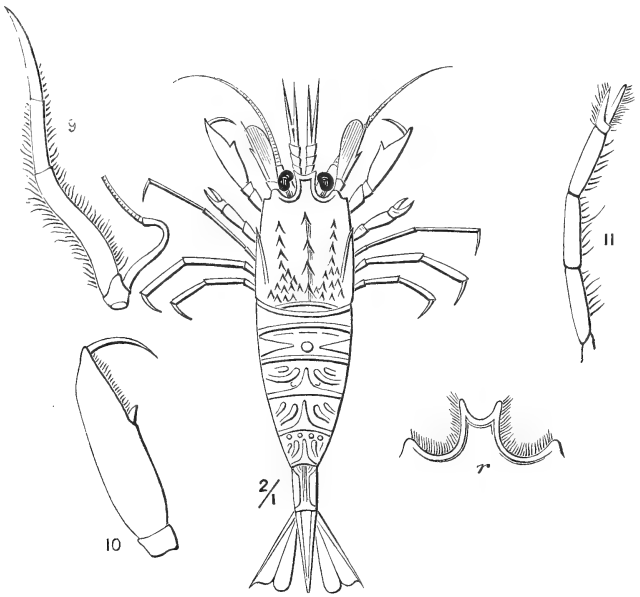

BRITISH
NATURAL HISTOR



Spined Shrimp.—Cheraphilus spinosus.

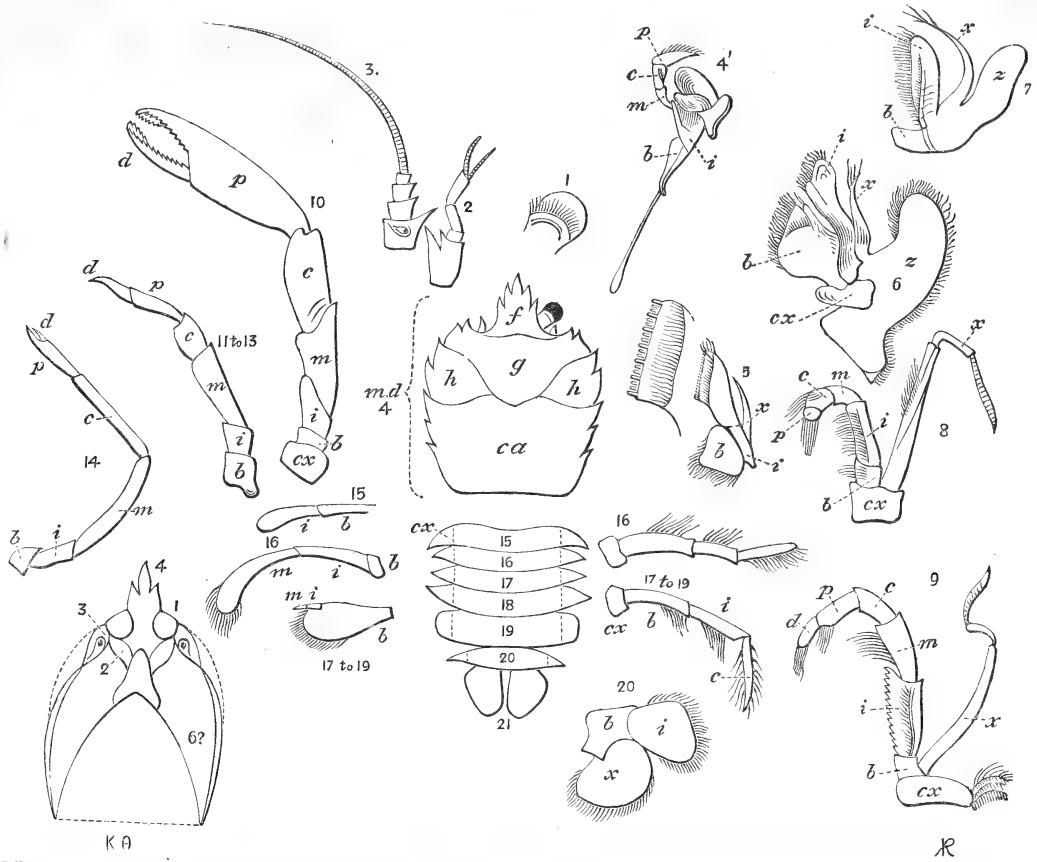


Banded Shrimp.—Ægeon fasciatus.



Sculptured Shrimp.—Ægeon sculptus.


NATURAL HISTORY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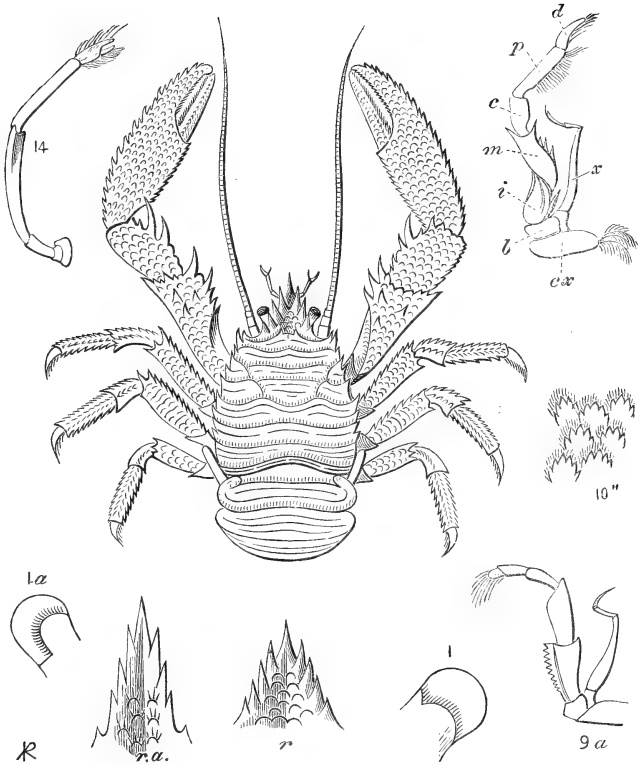
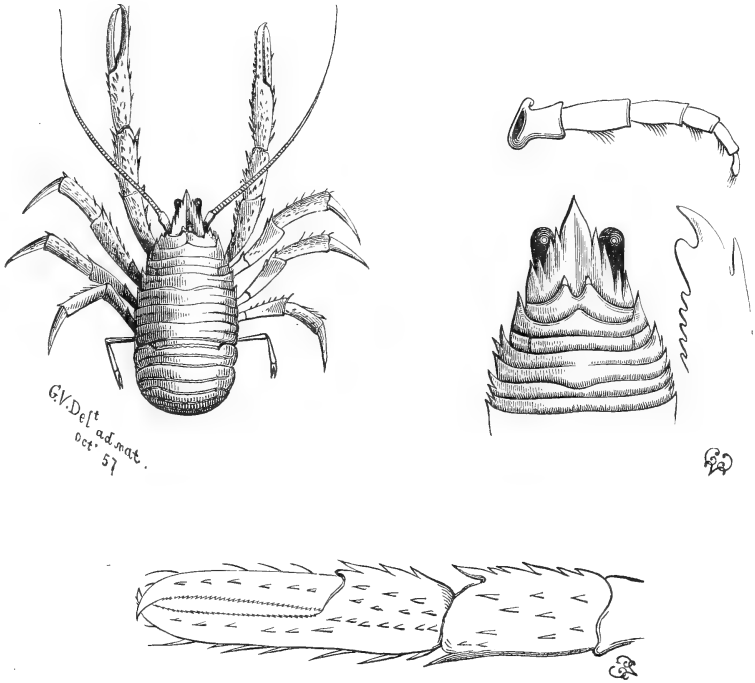
BRITISH MUSEUM
NATURAL HISTORY



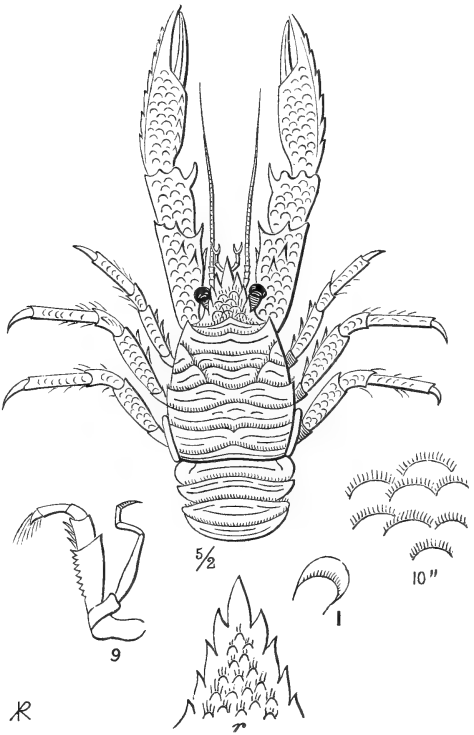
Scaly Spanish Lobster.—Galathea squamifera.


BRITISH MUSEUM
NATURAL HISTORY



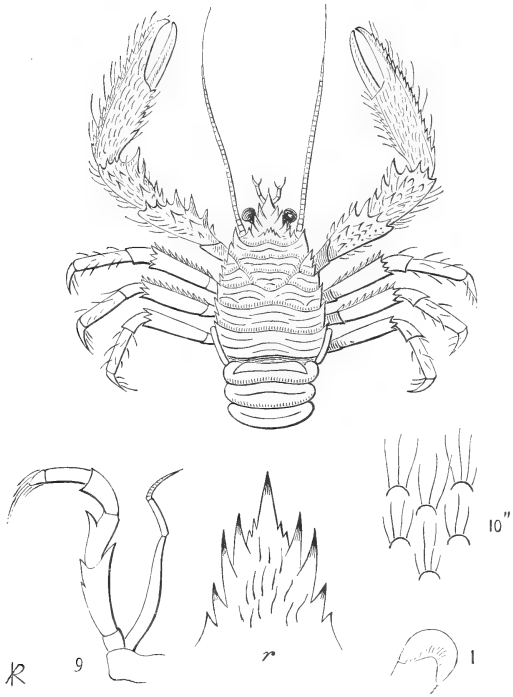
Slender-armed Spanish Lobster.—Galathea Andrewsii.


NATURAL HISTORY

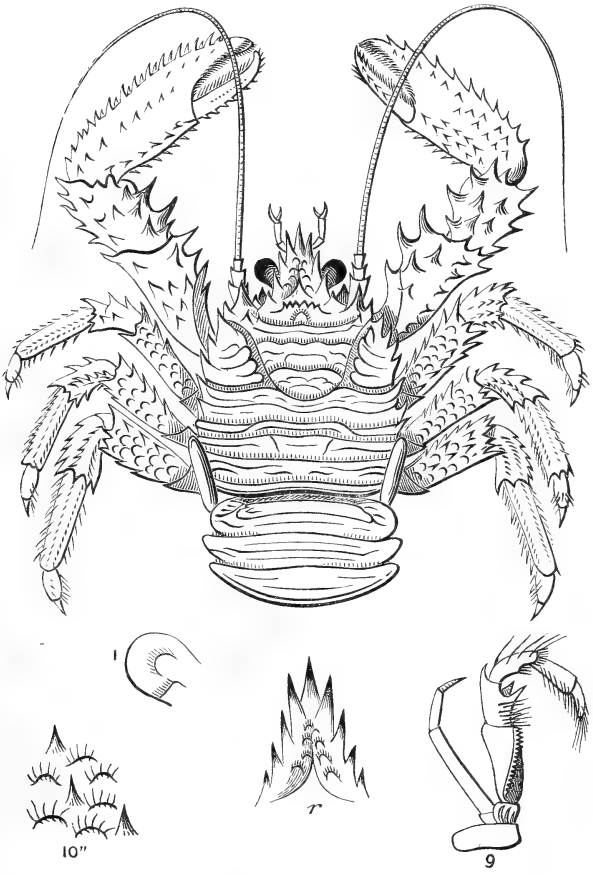


Scaly-armed Spanish Lobster.—Galathea dispersa.


NATURAL HISTORY



Smooth-beaked Spanish Lobster.—Galathea nexa.



Spiny Spanish Lobster.—Galathea strigosa.

Fig. 1.

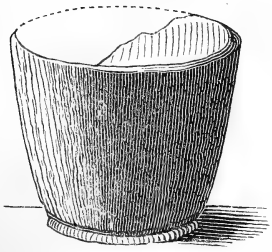


Fig. 2.

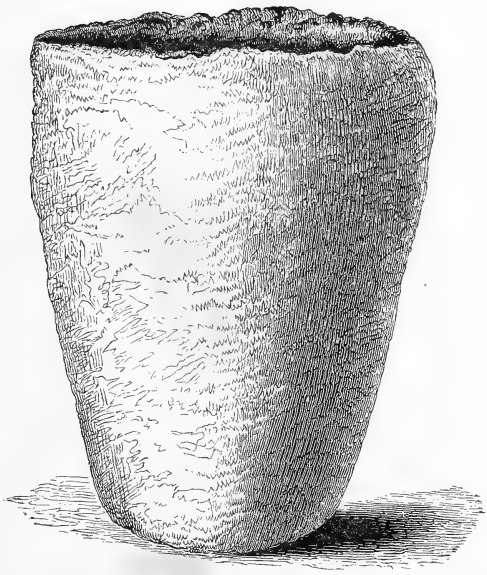


Fig. 3,


BRITISH
NATURAL HISTORY

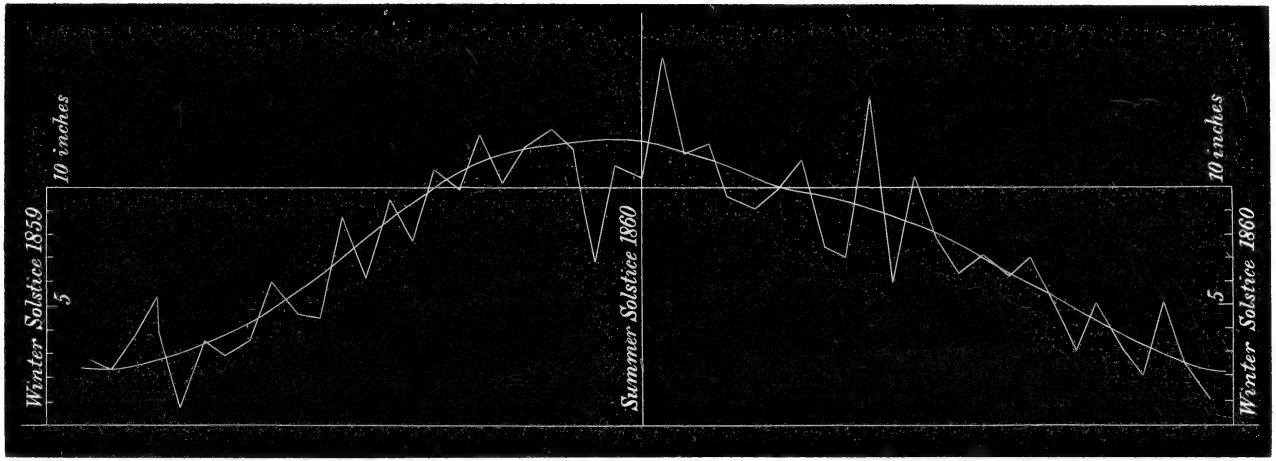
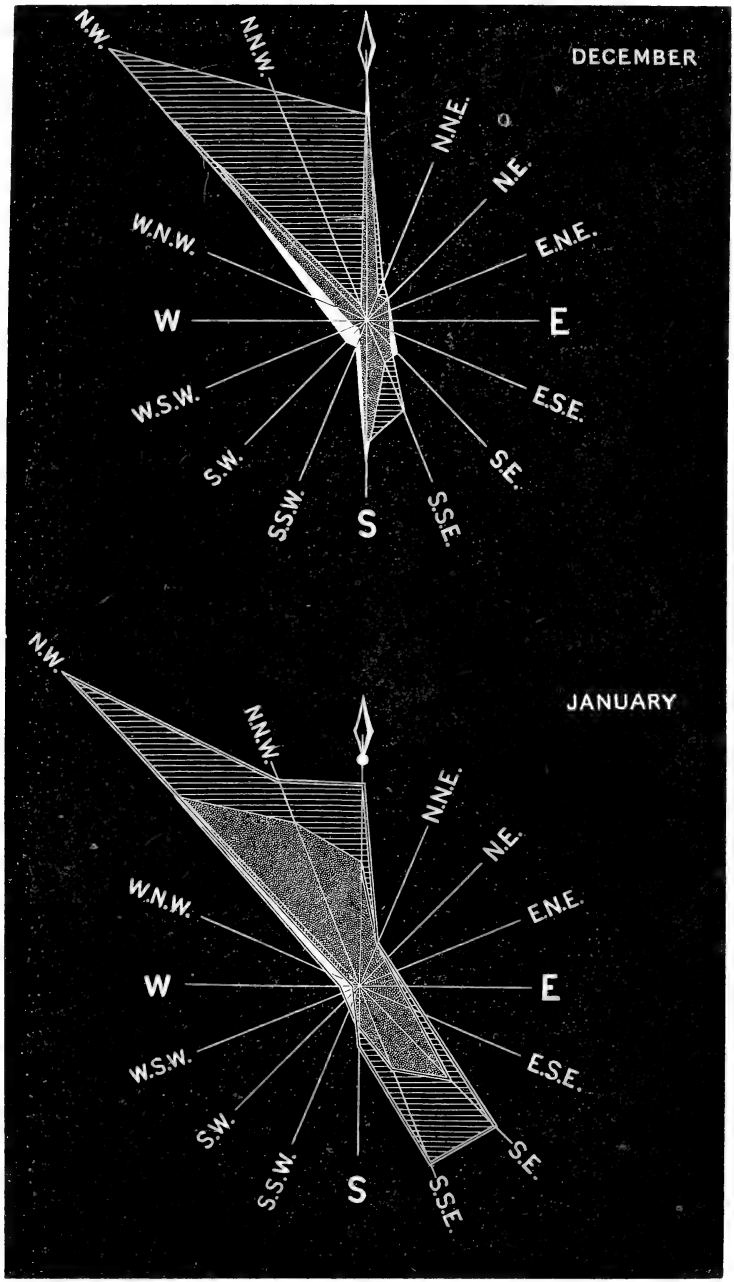


DIAGRAM OF THE EVAPORATION CURVE AT THE DUBLIN MAGNETICAL OBSERVATORY, FOR THE YEAR 1860.

[Abscissæ measured in weeks. Ordinates measured in tenths of inches.]

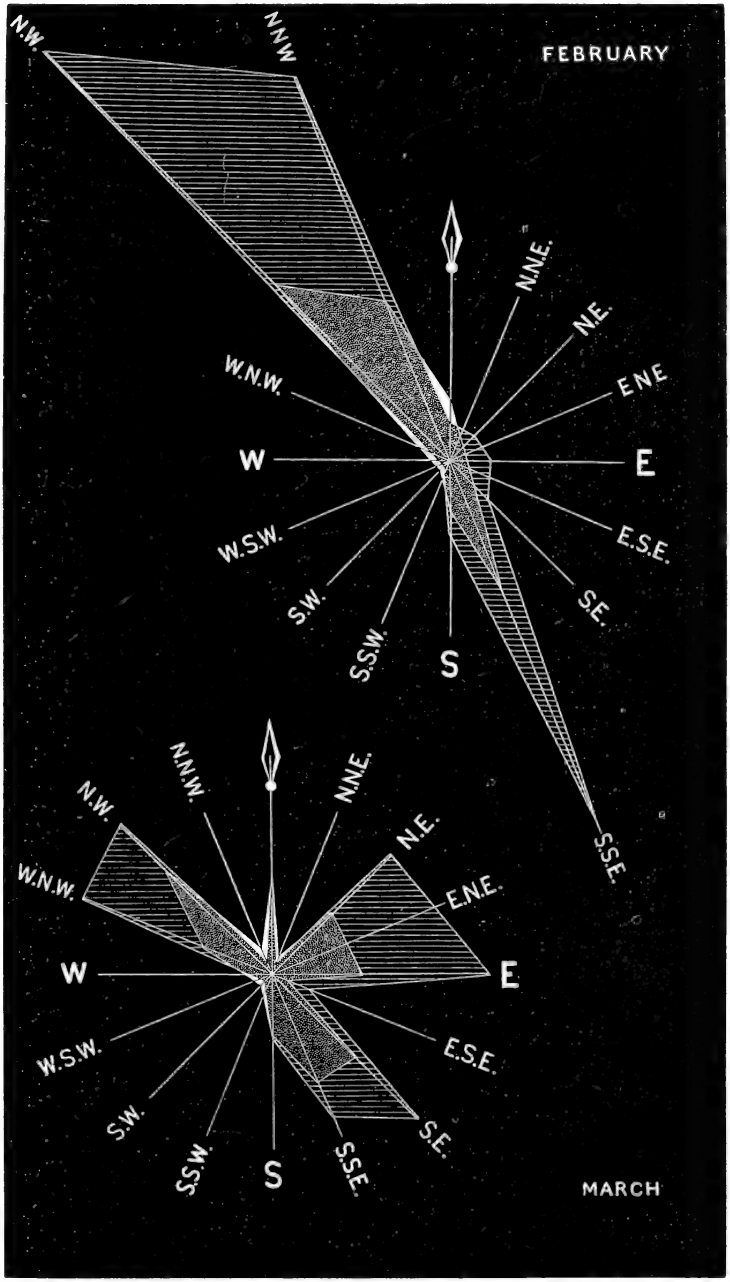

NATURAL HISTORY



FREQUENCY AND FORCE OF THE WIND AT LEOPOLD HARBOUR, IN DECEMBER, 1848, AND JANUARY, 1849.

The ruled space represents the Force of the Wind. The white space represents the Frequency of the Wind, and is dotted where it overlaps the ruled space.

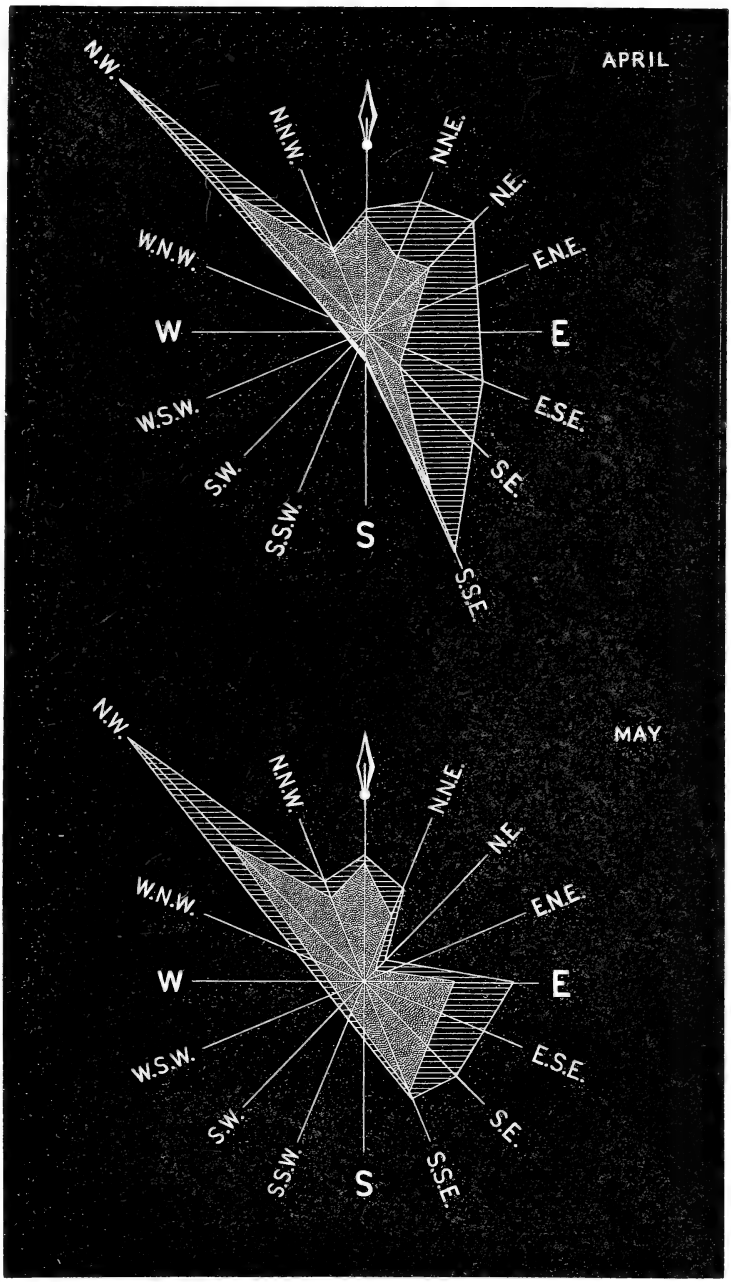

NATURAL HISTORY.



FREQUENCY AND FORCE OF THE WIND AT LEOPOLD HARBOUR, IN FEBRUARY AND MARCH, 1849.

The ruled space represents the Force of the Wind. The white space represents the Frequency of the Wind, and is dotted where it overlaps the ruled space.

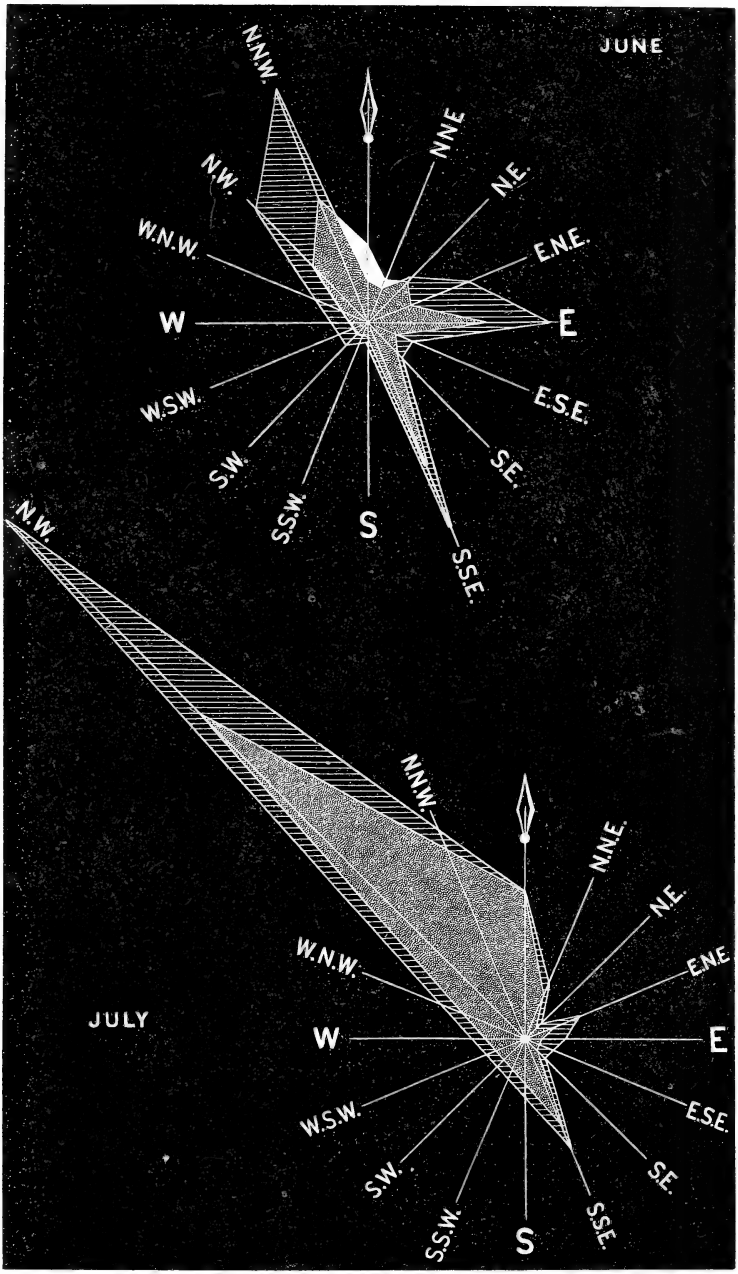

BRITISH
NATURAL HISTORY



FREQUENCY AND FORCE OF THE WIND AT LEOPOLD HARBOUR, IN APRIL AND MAY, 1849.

The ruled space represents the Force of the Wind. The white space represents the Frequency of the Wind, and is dotted where it overlaps the ruled space.


NATURAL HISTORY



FREQUENCY AND FORCE OF THE WIND AT LEOPOLD HARBOUR, IN JUNE AND JULY, 1849.

The ruled space represents the Force of the Wind. The white space represents the Frequency of the Wind, and is dotted where it overlaps the ruled space.


NATURAL HISTORY

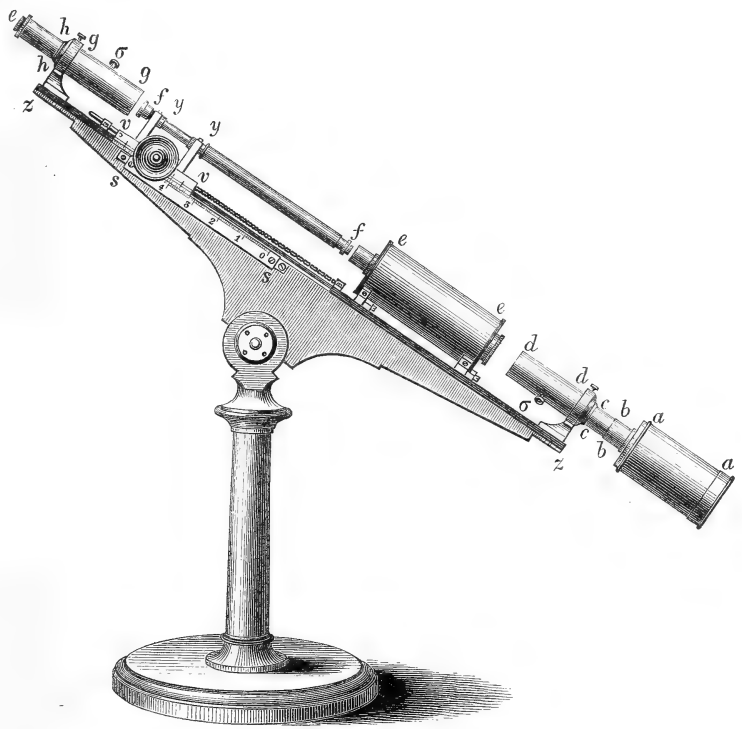


Fig. 1.

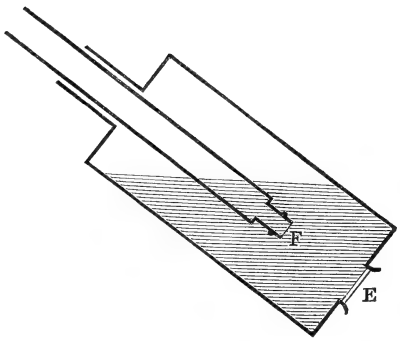


Fig. 2.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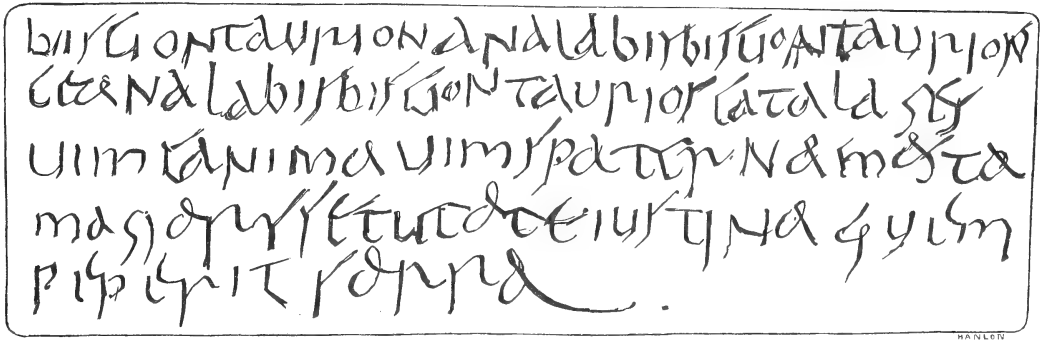
NATURAL HISTORY

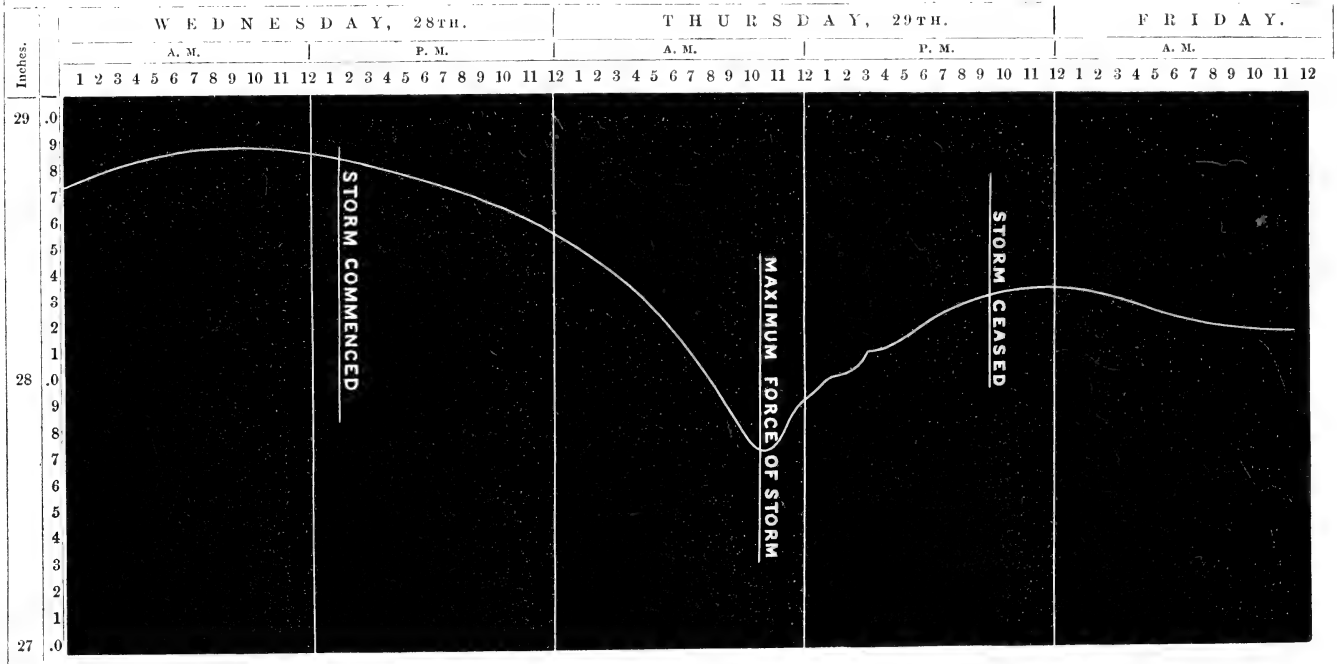


FAC-SIMILE OF THE INSCRIPTION OF POITIERS.

[Reproduced from the Bulletin de la Société des Antiquaires de l'Ouest, 1859.]

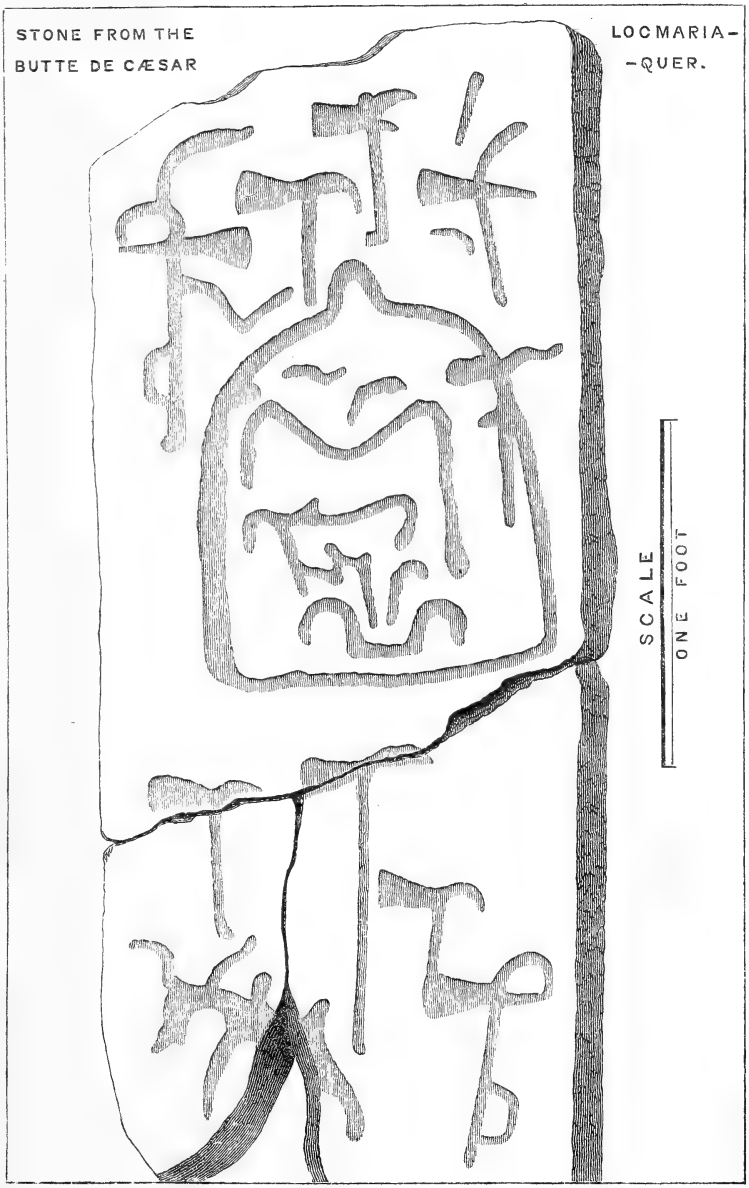

HISTOR

BAROMETRICAL CURVE.—OCTOBER, 1863.



"PRINCE CONSORT" STORM AT BALLINASLOE.

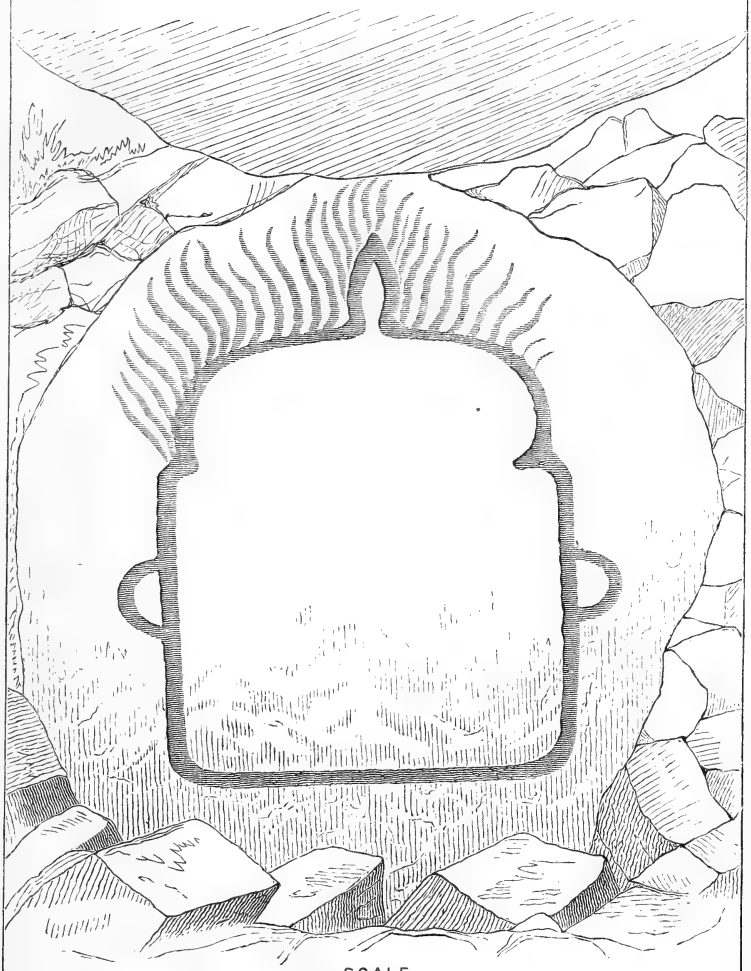

NATURAL HISTORY



TO ILLUSTRATE MR. FERGUSON'S PAPER.

INSCRIBED STONE IN TUMULUS ON L'ISLE LONGUE

SEA OF MORBIHAN.



TO ILLUSTRATE MR. FERGUSON'S PAPER.


NATURAL HISTORY