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PROCEEDINGS
OF THE
ROYAL IRISH ACADEMY

VOLUME XXX



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1912-1913

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PROCEEDINGS

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ROYAL IRISH ACADEMY

VOLUME XXX

SECTION A.—MATHEMATICAL, ASTRONOMICAL, AND
PHYSICAL SCIENCE.



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1912

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ERRATA.

SECTION A.

p. 96, l. 11. *Add]* at end of line.

p. 100, l. 5. *For* $\Sigma m_1 a_1''$ *read* $\Sigma m_1'' a_1$.

„ 1. 10. *For* $\frac{\Sigma \chi a_1}{8a_1 a_2 a_3}$ *read* $\frac{\Sigma \chi_1 a_1}{8a_1 a_2 a_3}$.

PROCEEDINGS
OF
THE ROYAL IRISH ACADEMY
PAPERS READ BEFORE THE ACADEMY

I.

THE RIEMANN INTEGRAL AND MEASURABLE SETS.

BY M. J. CONRAN.

Read JUNE 24. Published AUGUST 16, 1912.

Introduction.

THE general theory of integration in any measurable set has been discussed by W. H. Young.¹ He discards the Darboux-Riemann definition, and ultimately defines a generalized integral not essentially different from that of Lebesgue.²

In this paper the Darboux-Riemann definition is taken as the starting-point and the extension to any measurable set made as follows:—

Commencing with the integral for a single interval, the integral is defined in succession for (a) a set of open intervals, (b) a closed set regarded as the set complementary to a set of open intervals, (c) a measurable set by considering the integrals in the closed components of the set.

In applying these ideas to multiple integrals I found it convenient to make a slight modification in the form of the Darboux-Riemann definitions. The region of integration is divided in the usual manner into a finite number of elementary parts, and the upper and lower limits of the function for the internal points of each elementary part are selected, and the usual summations formed; or, to express it in another form, the functional values at the boundary-points of the elementary parts are not considered in estimating the upper and lower limits. The values of the upper and lower integrals remain the same as before.

¹ Phil. Trans. of the Royal Soc., Ser. A, vol. cciv.

² "Integral, Longueur, Aire"—Annali di Matematica, Ser. III, vol. vii, 1902.

I have extended the theorem concerning the evaluation of a multiple integral by repeated simple integrations to the case when the region of integration has a frontier of positive content.

The Borel-Lebesgue theory of content is adopted throughout.

The function and the region of integration are in all cases taken to be finitely bounded.

The Integral in a Continuous Interval.

1. Suppose the upper integral of $f(x)$ in the open interval $a < x < b$ to be defined in the following manner:—

Divide the interval into n parts at the points $a = x_0, x_1, \dots, x_n = b$. Let M_r be the upper limit of $f(x)$ in the open interval $x_r < x < x_{r+1}$, and form the sum

$$\sum_{r=0}^{r=n-1} M_r(x_{r+1} - x_r).$$

If each elementary interval be divided in like manner, and the corresponding summations formed, and if this process be continued indefinitely, the successive summations form a monotone sequence. Let J be the limit of this sequence; then clearly $J < I$, where I denotes the ordinary upper integral

$$\int_a^b f(x) dx.$$

It is not difficult to prove that $J = I$.

Let the points x_1, x_2, \dots &c., be so chosen that

$$\sum M_r(x_{r+1} - x_r) - J < \epsilon,$$

where ϵ is any assigned positive quantity.

Now choose a positive quantity δ so that 2δ is less than the least length of the intervals (x_r, x_{r+1}) , and let M'_r denote the upper limit of $f(x)$ in the closed interval $x_r + \delta \leq x \leq x_{r+1} - \delta$. Then $M_r > M'_r$, therefore

$$\sum M_r(x_{r+1} - x_r) > \sum M'_r(x_{r+1} - x_r - 2\delta),$$

and

$$\sum M'_r(x_{r+1} - x_r - 2\delta) + 2n.M.\delta > I,$$

where M is the maximum value of $|f(x)|$.

$$\therefore J + \epsilon > I - 2nM.\delta;$$

$$\therefore J > I, \text{ and we have also } I > J;$$

$$\therefore J = I.$$

The definition of the lower integral may be similarly modified without altering its value.

The Integrals in a Set of Open Intervals.

2. If D denote the set of points of a finite or enumerably infinite number of non-overlapping open intervals (a_r, b_r) , contained in a finite segment L , we may define the integrals in D thus

$$\int_D = \int_{a_1}^{b_1} + \int_{a_2}^{b_2} + \dots \&c.$$

and

$$\int_D = \int_{a_1}^{b_1} + \int_{a_2}^{b_2} + \dots \&c.$$

These series are absolutely convergent.

The Integrals in a Closed Set.

3. Let S be a closed set, and D the complementary set with respect to the fundamental segment (which may be regarded as open at both ends); D consists of a set of non-overlapping open intervals, and we may define the integrals in S thus

$$\left(\begin{matrix} \text{upper} \\ \text{lower} \end{matrix} \right) \text{integral in } S = \left(\begin{matrix} \text{upper} \\ \text{lower} \end{matrix} \right) \text{integral in } L - \left(\begin{matrix} \text{upper} \\ \text{lower} \end{matrix} \right) \text{integral in } D.$$

The values of the integrals in S are obviously unaffected by removing from L a finite number of intervals which are also contained in D . Hence if L' denote any number of open intervals containing S and D' , the black intervals of S with respect to L' , we infer that the

$$\left(\begin{matrix} \text{upper} \\ \text{lower} \end{matrix} \right) \text{integral in } S = \left(\begin{matrix} \text{upper} \\ \text{lower} \end{matrix} \right) \text{integral in } L' - \left(\begin{matrix} \text{upper} \\ \text{lower} \end{matrix} \right) \text{integral in } D'.$$

If I be the content of S , we can choose L' , so that its content is $< I + \epsilon$, and consequently that of $D' < \epsilon$, where ϵ is any assigned positive quantity. Hence, if $L_1, L_2, \dots \&c.$, be a sequence of sets of intervals containing S , and such that the content of L_r is $< I + \epsilon_r$, where $\lim_{n \rightarrow \infty} \epsilon_n = 0$, then

$$\left(\begin{matrix} \text{upper} \\ \text{lower} \end{matrix} \right) \text{integral in } S = \lim_{n \rightarrow \infty} \left(\begin{matrix} \text{upper} \\ \text{lower} \end{matrix} \right) \text{integral in } L_n.$$

Cor. The integrals in S are numerically less than $M.I.$, where M is the maximum of $|f(x)|$.

On the other hand, if S' be a closed component of S of content $> I - \epsilon$, then

$$\left| \int_{L_n} - \int_{S'} \right| < M(\epsilon + \epsilon_n),$$

where M is the maximum of $|f(x)|$, and

$$\left| \int_{L_n} - \int_S \right| < M\epsilon_n;$$

$$\therefore \left| \int_S - \int_{S'} \right| < M(\epsilon + 2\epsilon_n),$$

for all values of n ;

$$\therefore \left| \int_S - \int_{S'} \right| \leq M\epsilon.$$

Hence, if S_1, S_2, \dots &c., be a sequence of closed components of S , such that the content of $S_r > I - \epsilon_r$, where $\lim_{n \rightarrow \infty} \epsilon_n = 0$, then

$$\int_S = \lim_{n \rightarrow \infty} \int_{S_n}, \quad \text{and similarly} \quad \int_S = \lim_{n \rightarrow \infty} \int_{S_n}.$$

The Integrals in a Measurable Set.

4. Let E be a measurable set, and I its content. It is possible to enclose E in a finite or enumerably infinite number of intervals of content $< I + \epsilon$, where ϵ is any assigned positive quantity. Consider then a sequence of sets of intervals L_1, L_2, \dots &c., such that L_r contains E , and has content $< I + \epsilon_r$. Also, take a sequence of closed components S_1, S_2, \dots &c., such that the content of S_r is $> I - \epsilon'_r$, where the sequences $\epsilon_1, \epsilon_2, \dots$ &c., and $\epsilon'_1, \epsilon'_2, \dots$ &c., are positive, monotone, and have each the limit zero. We have

$$\left| \int_{L_n} - \int_{S_m} \right| < M(\epsilon_n + \epsilon'_m),$$

and

$$\left| \int_{L_{n,p}} - \int_{S_m} \right| < M(\epsilon_{n+p} + \epsilon'_m),$$

$$\therefore \left| \int_{L_n} - \int_{L_{n,p}} \right| < M(2\epsilon_n + 2\epsilon'_m),$$

for all values of m , that is

$$\left| \int_{L_n} - \int_{L_{n,p}} \right| \leq 2M\epsilon_n.$$

Hence, $\int L_n$ has a limit as n increases indefinitely.

Similarly, $\int S_n$ has a limit, and the two limits are equal.

This common limit may now be defined to be the upper integral in E . The independence of the L and S sequences proves that the limit is unique.

The lower integral is defined in an analogous manner.

Cor.—The integrals in a measurable set are numerically less than M. I.

5. A fundamental property of these integrals is given in the following theorem:—

If a measurable set A is the sum of two measurable sets B and C which have no point common, then the

$$\left(\begin{array}{c} \text{upper} \\ \text{lower} \end{array} \right) \text{ integral in } A = \left(\begin{array}{c} \text{upper} \\ \text{lower} \end{array} \right) \text{ integral in } B + \left(\begin{array}{c} \text{upper} \\ \text{lower} \end{array} \right) \text{ integral in } C.$$

First suppose that A , B , and C are closed sets, and let d be the minimum distance (écart) of the sets B and C . Enclose each point of A in an interval of length $< \frac{d}{2}$. By the Heine-Borel theorem, a finite number of these intervals suffice to cover all the points of A . Let L_1 denote those of the intervals that contain B , and L_2 those that contain C . L_1 and L_2 do not overlap. Hence, if D_1 be the black intervals of B in L_1 , and D_2 the black intervals of C in L_2 , it is evident that $D_1 + D_2$ constitute the black intervals of A in $L_1 + L_2$. The theorem follows by § 3.

If the sets are not closed, we need only consider their closed components; the theorem then follows from the definitions in the preceding paragraph.

Theorem:—

6. *The upper and lower integrals of a function taken over the measurable set consisting of its points of continuity are equal.*

Lemma.—If the saltus $< k$ at all points in the open interval $a < x < b$, then

$$\int_a^b - \int_a^b < k(l - a).$$

For a closed interval this follows from a theorem due to Baire.* The truth of the lemma in our case is apparent from the fact that the $\left(\begin{array}{c} \text{upper} \\ \text{lower} \end{array} \right)$ integral in the open interval is limit of the $\left(\begin{array}{c} \text{upper} \\ \text{lower} \end{array} \right)$ integral in the closed interval

$$a + e \leq x \leq b - e,$$

when the positive quantity e is indefinitely diminished.

* Annali di Mathematica, Ser. III, vol. III, p. 15. 1899.

Now let $f(x)$ be defined at all the points in a fundamental segment AB of length L , and let K_n denote the set of points in AB at which the saltus $\geq e_n$, where e_n is one of the numbers of a monotone positive sequence e_1, e_2, \dots &c., having the limit zero. Then K_n is a closed set, and the sequence K_1, K_2, \dots &c., defines an ordinary outer limiting set consisting of the points of discontinuity. Now let E_n be the set complementary to K_n with respect to the fundamental segment AB . E_n consists of a set of non-overlapping open intervals (a trivial exception occurs when A or B is a point of continuity), and the sequence E_1, E_2, \dots &c., defines an ordinary inner limiting set consisting of the points at which the function is continuous. Let this be denoted by E , then

$$\overline{\int}_E = \lim_{n \rightarrow \infty} \overline{\int}_{E_n} \quad \text{and} \quad \underline{\int}_E = \lim_{n \rightarrow \infty} \underline{\int}_{E_n}.$$

Moreover, by the lemma

$$\overline{\int}_{E_n} - \underline{\int}_{E_n} < \varepsilon_n \times \text{content of } E_n < e_n L.$$

Hence $\overline{\int}_E = \underline{\int}_E$ which proves the theorem.

Cor.—From § 5 it is clear that the addition or removal of a set of zero content will not affect the values of the upper and lower integrals in a given measurable set. Hence a sufficient condition for integrability is that those points of the set at which the function is discontinuous should form a set of zero content. That this is also a necessary condition is immediately evident.

The Double Integral.

7. The double integral is usually defined for a closed region whose boundary points have positive plane content. For my purpose it is necessary to define the integral for an open region which may have a boundary of positive content.

The region of integration will be, in the first instance, what Baire* calls an open domain—that is, a set of points such that each point is the centre of a circle which contains in its interior and on its boundary none but points of the given set.

From the point of view of integration it is important to distinguish two types of domains—those whose boundary points have zero plane content, which I will call domains of the first kind, and those whose boundary points have positive plane content, which I will call domains of the second kind.

* *Loc. cit.*

A closed domain is a domain together with its boundary points.

A finite or enumerably infinite number of open domains form an open domain.

An open domain is measurable in Lebesgue's* sense, and its content or measure is identical with the number which Jordan† calls "l'étendue intérieure." An open domain of the first or second kind may be divided (e.g., by parallels to the axes) into a finite number of sub-domains of assignable small diameters, such that the common boundary-points of adjacent parts have zero plane content. If each sub-domain be divided in like manner, and this process be continued indefinitely so that the greatest diameter in the r th stage diminishes indefinitely with r , I shall call this a normal system of subdivisions. The content of an open domain so divided is equal to the sum of the contents of the normal sub-domains at any stage.

Double Integral in an Open Domain.

8. Let $f(x, y)$ be a function of two variables defined at all the points of an open domain D . I define the upper integral in D as follows:—

Let D be divided by any normal system of sub-division, and let $D_{r1}, D_{r2}, \dots, D_{rn}$ be the sub-domains of the r th stage, and $C_{r1}, C_{r2}, \dots, C_{rn}$ their plane contents. Let the upper limit of $f(x, y)$ for all the points in D_{rs} be U_{rs} . Then the limit of the sum

$$\sum_{s=1}^{s=n} U_{rs} \cdot C_{rs}$$

as r increases indefinitely is the upper integral.

That this limit exists and is unique follows by precisely similar reasoning to that employed in establishing the limit as usually defined.

The lower integral is defined in an analogous manner as the

$$\lim_{r \rightarrow \infty} \sum L_{rs} \cdot C_{rs},$$

where L_{rs} is the lower limit of the function for all *internal* points of D_{rs} .

For domains of the first kind there is no difficulty in proving, by an adaptation of the method in § 1, that the above definitions are equivalent to Jordan's.‡

Cor. 1.—If an open domain of the first kind D_1 be a component of any open domain D , the points of D which are external to D_1 form an open domain D_2 , and the

$$\text{content of } D = \text{content of } D_1 + \text{content of } D_2,$$

and

$$\left(\begin{array}{c} \text{upper} \\ \text{lower} \end{array} \right) \text{integral in } D = \left(\begin{array}{c} \text{upper} \\ \text{lower} \end{array} \right) \text{integral in } D_1 + \left(\begin{array}{c} \text{upper} \\ \text{lower} \end{array} \right) \text{integral in } D_2.$$

* Leçons sur l'intégration. Gauthier Villars. 1904. † Cours d'Analyse, vol. i. 1909. ‡ Loc. cit.

Cor. 2.—If D be an open domain of the second kind, we can find a sequence of open domains of the first kind D_1, D_2, \dots &c., such that D_n is contained in D , and that the content of $D = \lim_{n \rightarrow \infty}$ of the content of D_n . Jordan's polygons defining "l'étendue intérieure" may be cited as an example. It is clear from *Cor. 1* that

$$\left(\begin{array}{c} \text{upper} \\ \text{lower} \end{array} \right) \text{integral in } D = \lim_{n \rightarrow \infty} \left(\begin{array}{c} \text{upper} \\ \text{lower} \end{array} \right) \text{integral in } D_n.$$

The Double Integral for a Plane Closed Set.

9. Let a plane closed set S be contained in a fundamental open rectangle R , and let D be the open domain complementary to S with respect to R , then I define the

$$\left(\begin{array}{c} \text{upper} \\ \text{lower} \end{array} \right) \text{integral in } S = \left(\begin{array}{c} \text{upper} \\ \text{lower} \end{array} \right) \text{integral in } R - \left(\begin{array}{c} \text{upper} \\ \text{lower} \end{array} \right) \text{integral in } D.$$

It follows from *Cor. 1*, § 8, that the $\left(\begin{array}{c} \text{upper} \\ \text{lower} \end{array} \right)$ integral in a closed domain of the first kind is equal to the $\left(\begin{array}{c} \text{upper} \\ \text{lower} \end{array} \right)$ integral in the open domain obtained by omitting the boundary points. This is not generally the case for domains of the second kind.

Also, by *Cor. 1*, we may replace the fundamental rectangle by any open domain D of the first kind which contains S . Hence, if D_1 be the open domain formed by the points complementary to S with respect to D , then

$$\left(\begin{array}{c} \text{upper} \\ \text{lower} \end{array} \right) \text{integral in } S = \left(\begin{array}{c} \text{upper} \\ \text{lower} \end{array} \right) \text{integral in } D - \left(\begin{array}{c} \text{upper} \\ \text{lower} \end{array} \right) \text{integral in } D_1.$$

Furthermore, by *Cor. 2* we are enabled to state the more general identity that if D be any open domain of the first or second kind containing S and D_1 the complementary open domain, then

$$\left(\begin{array}{c} \text{upper} \\ \text{lower} \end{array} \right) \text{integral in } S = \left(\begin{array}{c} \text{upper} \\ \text{lower} \end{array} \right) \text{integral in } D - \left(\begin{array}{c} \text{upper} \\ \text{lower} \end{array} \right) \text{integral in } D_1.$$

10. The extension of the definitions and theorems in §§ 3, 4, 5, and 6 now presents no difficulty. It is only necessary to substitute the term "open domain" for "set of open intervals," and "plane content" for "linear content."

The Double Integral as a Repeated Integral.

11. *Frontier of zero content.*—If the plane measurable set S have a frontier F , the remaining points, being internal points, form an open domain D , and we may write $S = F + D$. The part F having zero content contributes nothing to the integral, and the region of integration may be taken to be the domain of the first kind D . The evaluation of the integral by

repeated integrations has been discussed by Jordan. In this case also the method of extending the region of integration so as to include the whole fundamental rectangle, the value zero being assigned to the function at points not belonging to the set, is valid.

Frontier of positive content.—In this case it becomes necessary to evaluate the double integral in a domain of the second kind. Jordan's method does not apply nor is it justifiable to extend the region so as to include the whole fundamental rectangle.

The question then arises—"Under what circumstances may the double integral in an open domain of the second kind be found by repeated single integrations?" We must first express the plane content of such a domain as a repeated integral.

12. *Lemma 1.*—The linear content of an ordinal section of a plane open domain is a lower semi-continuous function of the abscissa.

Let the domain be contained in a fundamental rectangle $ABCD$.

Let $I(x)$ be the content of the ordinal section at the point x .

This section consists of a set of non-overlapping open intervals. Select a finite number of these of total length $> I(x) - \frac{\epsilon}{2}$, and shorten each of these intervals so that the curtailed intervals have total length $> I(x) - \epsilon$.

Each point of the curtailed intervals is an internal point of the domain, and is therefore internal to a rectangle consisting only of points of the domain. By the Heine-Borel theorem, a finite number of these rectangles suffice to cover all the points of the curtailed intervals. Therefore, with x as centre, an interval $x - \delta < x' < x + \delta$ can be constructed such that the ordinate section at x' has content $> I(x) - \epsilon$. Hence $I(x)$ is lower semi-continuous.

Lemma 2.—If $I(x)$ be $> \kappa$ for all points in the interval $\alpha < x < \beta$, the content of the part of the domain bounded by the ordinates at α and β is $\geq \kappa(\beta - \alpha)$. Consider the points on the x -axis in the closed interval $\alpha + \epsilon \leq x \leq \beta - \epsilon$. From Lemma 1 it is evident that each point x is the centre of an interval of length 2δ such that rectangles of area $> 2\delta \cdot \kappa$ are contained in the corresponding part of the domain. By the Heine-Borel theorem a finite number of these intervals cover all the points $\alpha + \epsilon \leq x \leq \beta - \epsilon$. Therefore there is a total rectangular area $> \kappa(\beta - \alpha - 2\epsilon)$ contained in the given domain, where ϵ may be as small as we please.

This proves the lemma.

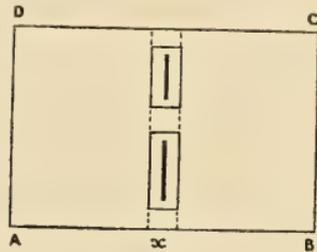


FIG. 1.

Theorem.—The content of a plane open domain $D = \int I(x) \cdot dx$.

The projection of the domain on the x -axis consists of a set of non-overlapping open intervals. Let these intervals, arranged in countable order, be c_1, c_2, \dots &c.

Let A be the content of the domain. By drawing parallels to the axes we can find a rectilinear figure R inscribed in D and of area $> A - \epsilon$, where ϵ is any assigned positive number.

The projection of R consists of a finite number of intervals contained in the c intervals. Choose n so that c_1, c_2, \dots, c_n contain the projection of R . The part of the given domain associated with the remaining intervals c_{n+1}, c_{n+2}, \dots &c., has content $< \epsilon$.

Let C_r be the content of the part associated with c_r . Divide c_r into elementary intervals $\delta_1, \delta_2, \dots, \delta_m$, and let I_r be the minimum of $I(x)$ in δ_r . Then

$$C_r > \sum (I_r - \epsilon_1) \delta_r$$

by Lemma 2 for all positive values of ϵ_1

$$C_r > \sum I_r \cdot \delta_r$$

Proceeding to the limit we have

$$C_r > \int_{C_r} I(x) \cdot dx$$

On the other hand, I_r is greater than the ordinal section of R , and therefore

$$\sum I_r \delta_r > C_r - \epsilon, \quad \therefore \int_{C_r} I(x) dx > C_r$$

Therefore, finally

$$C_r = \int_{C_r} I(x) dx$$

$$\therefore A - \sum_{r=1}^{r=n} \int_{C_r} I(x) dx < \epsilon$$

$\therefore A$ equals the lower integral of $I(x)$ taken over the set of open intervals c_1, c_2, \dots &c.

Cor.—There is no difficulty in modifying the above proof so as to show that the lower integral may be taken over the whole interval AB .

13. I do not find that the usual inequalities can be asserted for the double integral in an open domain of the second kind. However, by an adaptation of Jordan's method I have obtained the following results:—

$$\int_D f \cdot d\epsilon > \int dy \int f \cdot dx,$$

and

$$\int_D f d\epsilon < \int dy \int f \cdot dx.$$

In the investigation given below it will be seen that there are four inequalities, two of which refer to the case when the y -integration is taken over the projection of the domain on the y -axis; the remaining two refer to the case when the y -integration is taken over the side of the fundamental rectangle. The x -integration is in each case taken over a section of the domain parallel to the x -axis.

Let $f(x, y)$ be finitely bounded in an open domain D of the second kind contained in a fundamental rectangle whose sides are parallel to the axes of coordinates. Let F denote the projection of the domain on the y -axis; this projection consists of a set of non-overlapping open intervals. Let G_y denote the section of the domain at an ordinal distance y from the x -axis. G_y consists also of a set of open intervals, and the upper integral of $f(xy)$ over the section G_y may be determined. Denoting this integral by $J_{(y)}$ we can find the lower integral of $J_{(y)}$ over the set F . The result will be shown to be

$$< \int_D f. d\epsilon.$$

Suppose the plane divided into elementary squares by parallels to the axes, and let R denote the rectilinear area formed by those squares which are internal to D . Those points of D which are external to R form an open domain D_1 . We may suppose that the content of D_1 is $< \epsilon$, where ϵ is any assigned positive quantity. Then

$$\left| \int_D - \int_R \right| = \left| \int_{D_1} \right| \leq M\epsilon,$$

where M is the maximum of $|f(x, y)|$.

Now, let a second system of parallels, including the first, be taken, dividing the squares into elementary rectangles. Let the area of the rectangle whose sides are $x = x_r, x = x_{r+1}, y = y_s, y = y_{s+1}$, be denoted by a_{rs} , and let M_{rs} be the upper limit of $f(x, y)$ in a_{rs} , and form the sum $\sum M_{rs} a_{rs}$, extending to all the rectangles contained in R . The second system of parallels can be determined so that

$$\left| \int_R - \sum M_{rs} a_{rs} \right| < \epsilon.$$

Hence,
$$\left| \int_D - \sum M_{rs} a_{rs} \right| < \epsilon + M \cdot \epsilon.$$

Now, let $y_s < y < y_{s+1}$, therefore,

$$\int_{G_y} f(xy) dx \leq \sum_r M_{rs} (x_{r+1} - x_r) + M \cdot I(y),$$

where $I(y)$ is the content of the section of the domain D_1 .

If we integrate with respect to y in the interval $y_s < \eta < y_{s+1}$, or in that part of this interval which contains points of F , we find

$$\int_{y_s}^{y_{s+1}} dy \int_{G_y} f \cdot dx \leq \sum_r M_{rs} a_{rs} + M \int_{y_s}^{y_{s+1}} I_{(y)} \cdot dy.$$

Adding all such inequalities, we get

$$\int_F dy \int_{G_y} f \cdot dx \leq \sum_{rs} M_{rs} a_{rs} + M\varepsilon.$$

Now, ε is at our disposal,

$$\therefore \int_F dy \int_{G_y} f \cdot dx \leq \int_D f \cdot de.$$

The above proof also yields the inequality

$$\int dy \int_{G_y} f \cdot dx \leq \int_D f \cdot de,$$

where the y -integration is taken over any continuous interval containing F . By changing the sign of f we may at once infer the inequalities for the lower double integral.

14. These inequalities are less general than in the usual case, but they enable us to make the following inferences:—

A. If the double integral exists, and if either repeated integral exists, the double integral is equal to the repeated integral.

B. If each repeated integral exists, and if the double integral exists, the order of integration may be reversed.

C. The first integration in the repeated integral is made over a section of the domain; the second integration is made over the projection of the domain on the axis, or over the whole side of the fundamental rectangle unless when it ceases to be integrable in the extended region.

15. There is no difficulty in extending the methods of this paper to sets of any number of dimensions. The inequalities for the n -ple integral in an open domain of the second kind in n -dimensional space are

$$\int dx_1 \int dx_2 \dots \int f \cdot dx_n \leq \int f \cdot de,$$

in which there are $n - 1$ lower integrations,

and

$$\int dx_1 \int dx_2 \dots \int f \cdot dx_n \geq \int f \cdot de,$$

in which there are $n - 1$ upper integrations.

The conditions under which the n -ple integral may be determined by n repeated integrations are not essentially different from those given for the double integral.

The only case of interest in the Riemann integral is when the function is integrable in the given set. In this case the integrals defined in this paper are equal to the Lebesgue integrals.

Subject to the condition A stated above, the determination of the integral in a measurable set of any number of dimensions has been shown to depend ultimately on simple integrations in linear intervals.

Example 1. To evaluate $\int_S x dx$ over a measurable set S of linear content J , and symmetrically disposed in the interval $0 \leq x \leq a$.

Case 1. Suppose S is closed, and that the complementary set of open intervals are $a_1, a_{-1}, a_2, a_{-2}, \dots$ &c., where a_r and a_{-r} are equal in length and equidistant from the point $x = \frac{a}{2}$.

Let the end-points of a_r be x_r and x'_r . Then

$$\int_{a_r} x dx = \frac{1}{2} (x'^2_r - x^2_r),$$

and

$$\int_{a_{-r}} x dx = \frac{1}{2} (x'^2_{-r} - x^2_{-r}),$$

$$\begin{aligned} \int_{a_r + a_{-r}} x dx &= \frac{1}{2} (x'_r - x_r)(x_r + x'_r + x_{-r} + x'_{-r}) \\ &= \frac{1}{2} a \times \text{content of } (a_r + a_{-r}), \end{aligned}$$

$$\int_{\{a\}} x dx = \frac{1}{2} a \times \text{content of the set of intervals } \{a\},$$

$$\int_S x dx = \int_0^a x dx - \frac{1}{2} a (a - J) = \frac{1}{2} a J.$$

Case 2. Let S be an ordinary inner limiting set, and let the defining sets of intervals be $\{a\}_1, \{a\}_2, \dots$ &c. Then

$$\int_S x dx = \lim_{n \rightarrow \infty} \int_{\{a\}_n} x dx = \lim_{n \rightarrow \infty} \left[\frac{a}{2} \times \text{content of } \{a\}_n \right] = \frac{1}{2} a J.$$

Case 3. If S be any measurable set, we can determine an inner limiting set S' , containing S and having the same content as S .

$$\therefore \int_S = \int_{S'} = \frac{1}{2} a J \text{ as before.}$$

Example 2. The integral of a discontinuous function over the set of its points of continuity.

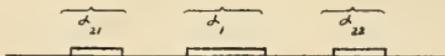


FIG. 2.

Suppose a set of open intervals $\{a\}$ in the fundamental segment $0 \leq x \leq 1$ be defined as follows:—Let a_1 have its centre at the point $x = \frac{1}{2}$. Let a_{21} and a_{22} be two equal intervals occupying the central parts of the remaining segments. Let intervals be similarly constructed in the four remaining segments and so on. We can choose these intervals so that their content is $1 - S$, where S is any positive number < 1 .

Now, suppose that each interval a is divided into an enumerable set of intervals constructed in the same manner as the original set. The whole line is now divided into a set of intervals $\{a^{(1)}\}$, of content $(1 - S)(1 - S_1)$. Let each interval $a^{(1)}$ be again divided, and let this process be indefinitely continued. The sequence of sets of intervals $\{a\}$, $\{a^{(1)}\}$, \dots &c., define an inner limiting set E of content

$$= \lim_{n \rightarrow \infty} (1 - S)(1 - S_1) \dots (1 - S_n).$$

Now, suppose that the numbers S, S_1, \dots &c., have been chosen so that this product converges to a positive limit J . Then the content of $E = J$.

Let a function be defined as follows for all the points $0 \leq x \leq 1$:—

$$f(x) = x + 1 \quad \text{for the points } C\{a\} \text{ complementary to the set of intervals } \{a\},$$

$$f(x) = x + \frac{1}{2} \quad \text{for those points of } C\{a^{(1)}\} \text{ which are not contained in } C\{a\},$$

$$\vdots$$

$$f(x) = x + \frac{1}{2^n} \quad \text{for those points of } C\{a^{(n)}\} \text{ which are not contained in } C\{a^{(n-1)}\},$$

$$\vdots$$

$$\vdots$$

and $f(x) = x$ for the points E .

The function is discontinuous at the points $C\{a^{(n)}\}$ for all values of n . Moreover, the saltus at all the points of $\{a^{(n)}\}$ is $< \frac{1}{2^n}$. Hence the set E consists of the points of continuity of the function.

Now, at all points in $\{a^{(n)}\}$, $f(x) \leq x + \frac{1}{2^n}$;

$$\therefore \int_{\{a^{(n)}\}} f(x) dx \leq \int_{\{a^{(n)}\}} \left(x + \frac{1}{2^n}\right) dx \leq \left(\frac{1}{2} + \frac{1}{2^n}\right) J_n,$$

where $J_n =$ content of $\{a^{(n)}\}$, and

$$\int_{\{a^{(n)}\}} f(x) dx \geq \int_{\{a^{(n)}\}} x dx \geq \frac{1}{2} J_n.$$

Hence

$$\int_E f(x) dx = \int_E x dx = \frac{1}{2} J.$$

Example 3. Let E be the non-dense closed set complementary to the set of intervals $\{a\}$ described in the preceding example. Then the plane set S of points $\{x, y\}$, where x is any point of E and $0 \leq y \leq 1$, is closed. Let us determine the double integral of xy in the set S .

The internal points of the unit-square which are not points of S form an open domain of the second kind D . We have to find

$$\int_D xy \cdot de.$$

The repeated integral

$$\int_{\{a\}} dx \int_0^1 xy \, dy = \frac{1}{4} \text{ content of } \{a\}$$

is found to exist, and is therefore by \mathcal{A} equal to the double integral.

Finally,

$$\int_S xy \, de = \int_0^1 dx \int_0^1 xy \, dy - \int_D xy \, de = \frac{1}{4} - \frac{1}{4} \times \text{content of } \{a\} = \frac{1}{4} J,$$

where J is the plane content of S .

In this example, we have an instance of the possibility referred to in § 14, C .—that the region of the 2nd integration in the repeated integral may not be extensible to the whole interval $0 < x < 1$.

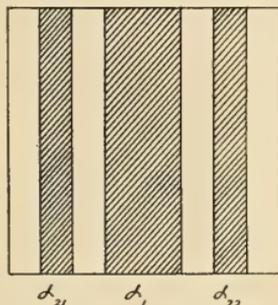


FIG. 3.

II.

ON THE GRAPHICAL CONSTRUCTION OF MAXIMUM BENDING-MOMENTS ON SHORT GIRDERS DUE TO A LOCOMOTIVE.

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To which is added the description of a new Kinematical Model,

By J. T. JACKSON, M.A.I., Assistant to the Professor.

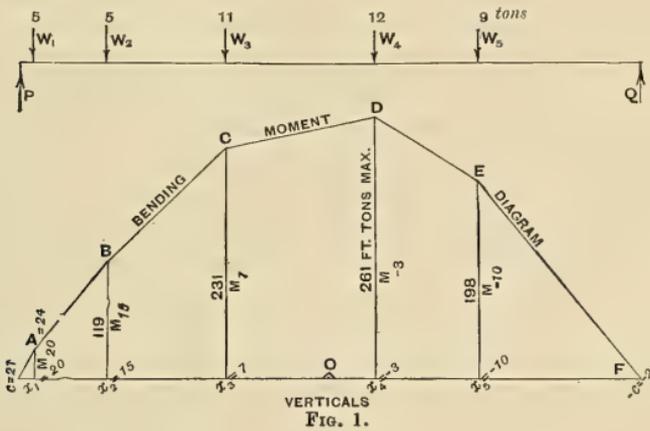
Read JUNE 24. Published AUGUST 31, 1912.

MUCH attention has recently been given to the bending effects upon bridges of short span, due to the concentration of the loads on the wheels of locomotives. The subject assumes special importance on account of the ever-increasing weight of the rolling-stock. In a paper by W. B. Farr, read before the Institute of Civil Engineers in 1900, the subject was discussed at great length, as at that time the Board of Trade had required all the railway companies to strengthen their bridges. Farr, in his paper, contends that a period has arrived when the weight concentrated on any wheel cannot further be increased, so that any further increase of weight must be spread over a longer wheel-base and a greater number of wheels. This would, he held, narrow the problem to that of finding the maximum bending-moment for a span accommodating a locomotive and tender, and a like moment for a series of decreasing spans accommodating portions of the locomotive. Then, for each span, an *equivalent uniform load* was calculated and the rate of this uniform load tabulated for use in designing. Much of the discussion on this paper turned upon the question as to what was the best method of estimating such an equivalent uniform load.

Each type of locomotive and tender gave a special table of its own; and these tables were given in the paper for a large series of locomotives, and were amplified to allow for shock and other important practical considerations, again leading to much important discussion.

It was suggested, too, that each railway company might use a table derived from a hypothetical locomotive, which was an average of their actual passenger engines.

In calculating the bending-moments for each span of one series, Farr used Culman's original method of drawing a link-polygon for the locomotive standing still, then moving the span about within the polygon, and when in a promising position projecting its ends up to the polygon, which is then closed by an oblique chord, having the span for its horizontal projection. The highest ordinate of this closed polygon is scaled off, and gives a maximum bending-moment for that particular position of the span placed under the locomotive



or under some portion of it. Taking a number of those positions, by a sort of trial and error, an approximate value of the maximum of maxima is obtained. As this method is laborious and not quite certain, Farr thought of trying the author's method, which required the use of a parabolic set-square, but found a difficulty in adapting it to the continual change of span.

In the correspondence on Farr's paper the author of this paper proposed his method of using circular arcs, and received inquiries as to that method from engineers both at home and in the colonies.

For the purposes of this paper an ideal locomotive weighing 42 tons is adopted, having its weight divided among five wheels as shown on the under line, while the spacing of the wheels is shown on the upper line, thus—

$$\begin{array}{rcccccc}
 5 & 8 & 10 & 7 & = & 30 \text{ feet.} \\
 5 & 5 & 11 & 12 & 9 & = 42 \text{ tons.}
 \end{array}$$

In the first instance a span of 42 feet is chosen, as it greatly simplifies the description of the graphical constructions to have the span and total load given by a common number. The centre of gravity of the locomotive falls in the

10-foot space, and is 6 feet from the 12-ton wheel and 4 feet from the 11-ton wheel.

The locomotive is shown both on fig. 1 and fig. 2 standing in the same particular position. On fig. 1, the positions of the wheels are given left and right of O , the centre of the span. An instantaneous bending-moment diagram $ABCDEF$ is drawn to scale for that particular position of the locomotive.

On the other hand, fig. 2 gives the position of the wheels left and right of G , the centre of gravity of the load. By inspecting these two figures it will be seen that the wheel $W_4 = 12$ tons, which we will call the *ruling-wheel*, since under it, as will be shown subsequently, the greatest bending-moment occurs, lies $h_4 = 3$ feet to the right of the middle of the span, while G lies 3 feet to its left. On fig. 2 the bending-moment under the ruling-wheel is given to scale by $S_4 A_4$, so that A_4 is identical with the apex D on fig. 1. We now contemplate moving the locomotive left and right of the position on the figures, so as to find the *locus* of the apex D on fig. 1. It is well at this stage to conceive the girder as extending some distance beyond each support as shown on the model, fig. 10, at the end of this paper.

On fig. 2 the locomotive stands with the *ruling-wheel* at a distance $(21 - 3) = 18$ feet from the right abutment, while the centre of gravity G is 18 feet from the left abutment. Since the load and span have the common value of 42, therefore the push-up at the right abutment is 18 tons, because G is 18 feet from the other abutment. The bending-moment under the *ruling-wheel* is 18 tons multiplied by 18 feet less 63 foot-tons, the product of the next wheel load 9 tons by its distance 7 feet from the *ruling-wheel*. The height of D , fig. 1, and of A_4 , fig. 2, is

$${}_4M_{-3} = \overset{\text{tons. ft.}}{18 \times 18} - 63 = 261 \text{ foot-tons.}$$

The subscript figures meaning that the fourth wheel stands 3 feet to the right of the middle point of the span. If the locomotive moves one foot either to the left or right, one of the "eighteens" in the above product becomes seventeen, and the other nineteen, and

$${}_4M_{-2} = \overset{\text{tons. ft.}}{19 \times 17} - 63 \quad \text{or} \quad \overset{\text{tons. ft.}}{4}M_{-4} = 17 \times 19 - 63.$$

These are the common height of the locus of D , fig. 1, at one foot left and right of its figured position according as the *ruling-wheel* W_4 arrives at the one or other point. Hence A_4 , fig. 2, is the *vertex* of a parabolic right segment, its half-base being 18, and its height, 18×18 ; but placed with its vertical axis 3 feet to the right of the middle of the span and with its base lowered 63 units below BC , the base of the bending-moment diagram. It will be

seen that the point 6 feet to the right of the middle and the middle point of the span itself are equidistant about the axis of the parabola, so that the bending-moment is the same at the two points when the wheel W_1 arrives at them respectively.

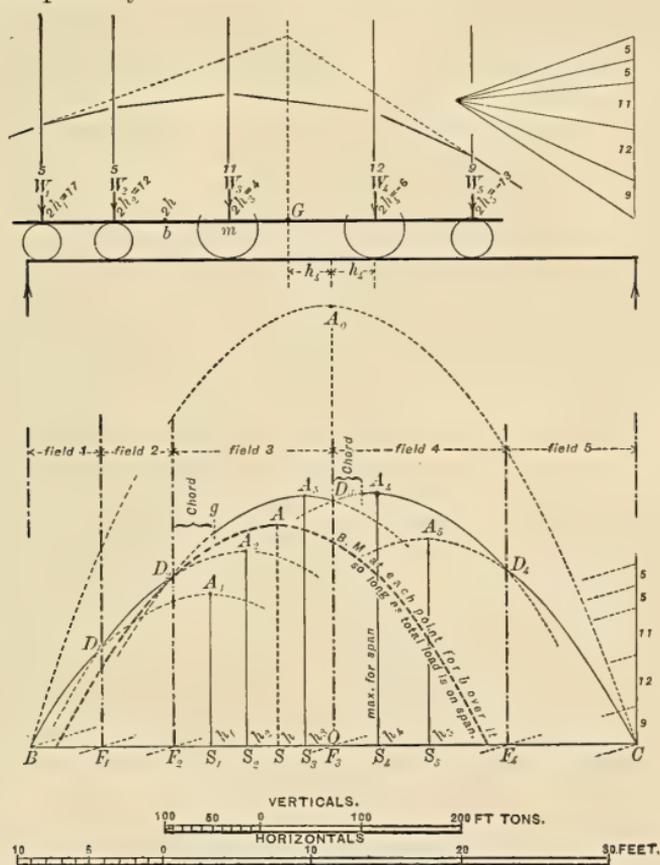


FIG. 2.

To find the locus of the apex C , fig. 1, the locomotive should be shifted till the wheel $W_3 = 11$ tons is 2 feet to the left of the centre, when C will coincide with A_3 , fig. 2; and the height $S_3 A_3$ will be, calculating from the left end,

$${}_3M_2 = \begin{matrix} \text{tons} & \text{ft.} \\ 19 \times 19 - (5 \times 8 + 5 \times 13) = 256 & \text{foot-tons.} \end{matrix}$$

For a movement of one foot left or right the moment has the common value

$${}_3M_3 = \begin{matrix} \text{tons} & \text{ft.} \\ 20 \times 18 - 105 \end{matrix} \text{ and } {}_3M_1 = \begin{matrix} \text{tons} & \text{ft.} \\ 18 \times 20 - 105. \end{matrix}$$

So that A_3 is the *vertex* of a right parabolic segment ; half base, 19 ; height, 19×19 ; placed with its vertical axis 2 feet to the left of the middle of the span, and with its base lowered 105 units below the base of the diagram.

The apexes $A, B, C, D,$ and E of the instantaneous bending-moment diagram, fig. 1, describe the five parabolic loci whose *vertices* are $A_1, A_2, A_3, A_4,$ and A_5 shown on fig. 2. These have their five vertical axes placed about the middle of the span in the same way that the five wheels are placed about the centre of gravity of the locomotive, but at half the distance in each case thus—

OS_1	OS_2	OS_3	OS_4	OS_5
8·5	6	2	- 3	- $6\frac{1}{2}$ feet.

The dotted parabola BA_0C standing on the span is the locus of the apex of the triangle which is the instantaneous bending-moment diagram for a single load of 42 tons rolling on the 42-foot span. This triangle is scalene for every position of the single load, except when the single load is at the middle of the span, when the triangle is isosceles, and its height is then

$$OA_0 = \frac{1}{4} \text{ load} \times \text{span} = 21 \times 21 = 441 \text{ foot-tons.}$$

We see now that all six parabolic loci have this in common that each parabolic right segment has its height numerically equal to the square of its half base. If a *template* of the parabolic right segment BA_0C be made, then the other five segments are drawn from portions of that template. If the template be only a quadrant OA_0C , it is then called a *parabolic-set-square*. A parabolic template, such as BA_0C , whose height OA_0 is 441, the square of its half base, which is $OC = 21$, is said to be of *modulus* unity ; and, further, the height of the template at any other point is the product of the two segments of the base BC into which it is divided at that point. Such a parabolic template or set-square would be far too lofty for actual use ; but any template or set-square of convenient proportions can be used by employing two scales—one for horizontal or feet measurements, and another for vertical or foot-ton measurements. The modulus of the template for drawing the six parabolic loci in fig. 2 is unity, because the ratio of the load to the span is unity. Had the locomotive only weighed half as much, say 21 tons, then the modulus must have been one-half ; still the same template would serve by employing a new vertical scale for foot-tons—in that case twice as coarse.

We may now consider the point D_1 on fig. 2 where the fourth and fifth parabolas intersect. At the point F_1 the bending-moment will have a common value F_1D_1 , whether the locomotive be moved so as to bring W_4 or W_5 to that point. If we put Z for BF_1 in the first case, the distance from B to G will be $(Z - 13)$ feet, so that the push-up of the abutment at C is $(Z - 13)$ tons and the bending-moment at F_1 is $(Z - 13)(42 - Z)$ foot-tons. In the second case the

distance from B to G is $(Z - 6)$, and the bending-moment at F_4 is $(Z - 6)(42 - Z) - 9 \times 7$. Equating these, gives $Z = 33$ feet, which is numerically equal to the sum of the loads on the first four wheels. In this way it is shown that the first parabola is above all the others for the first 5 feet of the span, the second parabola for the next 5 feet, the third parabola for the next 11 feet: that is, each wheel *commands* a portion of the span or a "field," which is the same fraction of the span that the load on that wheel is of the total load. As the load and span have been taken numerically equal, the five fields into which the span is divided are 5, 5, 11, 12, and 9 feet respectively. At any point in any field the maximum bending-moment occurs when the commanding weight is over that point. In the two fields, one on each side of the middle of the span, there is a maximum of the maxima S_3A_3 , 2 feet to the left of the middle of the span, and S_4A_4 , 3 feet to its right. Or in symbols

$${}_3M_2 = 256 \text{ foot-tons} \quad \text{and} \quad {}_4M_3 = 261 \text{ foot-tons.}$$

As the second of these is the greater, we have called the wheel $W_4 = 12$ tons the *ruling-wheel* of the locomotive when riding on a girder or bridge of span 42 feet.

To find a uniformly distributed load which will give the same bending-moment, 261 foot-tons, at the same point, 3 feet to the right of the middle of the span, we can assume a parabolic locus like BA_0C standing on the span, but passing through A_4 . This locus representing the bending-moments due to a uniformly distributed load of intensity w tons per foot, gives if we put $e = 21$ the half span,

$$S_4A_4 = \frac{w}{2} \times BF_4 \times CF_4 = \frac{w}{2} (e + 3)(e - 3);$$

and equating this to 261, we get $w = 1.209$ tons per foot of span.

The author's original graphical solution (fig. 2) was drawn with such a template sliding on a tee-square, and pushed with its vertex up the axes of the five parabolic loci, one after another, taking care to make these loci cross each other on the verticals through the junctions of the fields.

On fig. 3 we now show a method of drawing the five loci without considering the junctions of the fields. It does not give so good a definition, but is instructive. Thus, the locomotive is to be fixed with its centre of gravity over the middle point of the span, and the instantaneous bending-moment polygon $BabcdeC$ drawn to the vertical scale, upon which the height of A_0 reads 441 foot-tons. Now, on page 19 it was pointed out that the locus whose vertex is A_4 has equal heights at 6 feet to the right of the middle point of the span and at the middle point itself. But on fig. 3 the wheel W_4 is 6 feet to the right of the middle of the span. So that the perpendicular

$c'mnb'$ to be the end of a pack of cards stacked vertically into a rectangle, and having the right parabolic segment painted upon it, each vertical hatchment being on the edge of a card. The pack is then to be distorted and packed into the parallelogram $cnmb$, and lifted up till D_3 coincides with A_0 , and D_4 coincides with d_4 . We shall then have the arc of the oblique parabolic segment $CA_0a_4d_4b$ coinciding at every point with the arc of the segment BA_0C . Also E will be above O at a height $D_3A_0 = 189$ foot-tons, and F will be above F_4 at a height $D_4d_4 = 117$ foot-tons. Hence EF is an oblique base whose horizontal range is $OF_4 = 12$ feet, the extent of the fourth field, and the vertical ordinates from that oblique base measured up to the segment BA_0C give the maximum bending-moments at each point of the fourth field individually as W_4 comes over it. The maximum of these maxima is given by $S_4a_4 = s_4A_4 = 261$ foot-tons.

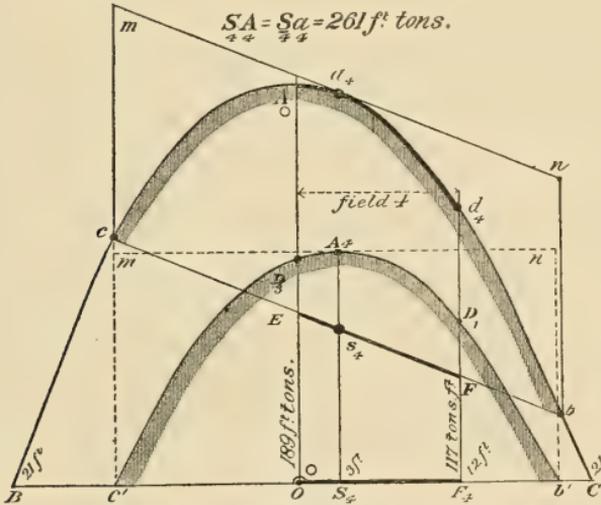


FIG. 4.

If each of the five right parabolic segments on fig. 2 be distorted and lifted up in a like manner, we then have, on fig. 5, only one parabolic right segment of the height 441 foot-tons standing on the span as a base, and a polygon $ACDEFB$ standing on the same base, and on the same side of it, having its four apexes on the lines dividing the five fields from each other. The heights of these apexes are

C	D	E	F
85	145	189	117 foot-tons,

being the same as the depths of the junctions of the arcs D_1, D_2, D_3 , and D_4 below the dotted parabola on fig. 2.

Fig. 4 furnishes a neat geometrical proof of the heights of the apexes C , D , E , and F . Consider the quadrant A_1a_1 ; its base is 3 feet, being half the distance of the wheel $W_1 = 12$ tons from the centre of gravity of the locomotive. The height of the segment is 9 foot-tons, being the square of its half base. Now, the vertical through A_1 meets the tangent mn at a point twice as high above the base. Hence mn slopes at an angle to the horizontal, whose tangent is twice the square of the half base of the segment A_1a_1 divided by its half base. So that the tangent of the slope of EF to the horizontal is given numerically by the distance of W_1 , the 12-ton wheel from the centre of gravity of the locomotive. To get the amount that E is higher than F it is only necessary to multiply OF_1 by this tangent, when we get the product $12 \times 6 = 72$ foot-tons. In the same way the height of F above BC is the tangent of the slope of FC , that is, the distance of the wheel $W_2 = 9$ tons from the centre of gravity multiplied by F_1C when we have the product of $13 \times 9 = 117$ foot-tons.

Then the maximum bending-moment at each point of the span is given by the vertical height from the polygon to the parabola. The maximum of maxima in any field—say, the fourth field—is to be found by producing EF to meet the parabola at b and c , then bc is to be bisected at the black spot where the height to the parabola gives 261 foot-tons, the maximum of maxima; provided that the bisecting point falls, as it does, on the side EF , and all the wheels are on the span. In the same way for the third field, the height at the centre of the chord of the parabola given by DE produced when measured vertically to the parabola gives 256 foot-tons. For the other three sides of the polygon produced to give chords of the parabola, the bisecting points do not fall on the sides. Observe, too, that the black spot bisecting the chord $cEFb$ falls 3 feet, measured horizontally, to the right of the vertical through the middle of the span, so that the graphical diagram, fig. 5, gives the maximum of maxima for the 42-ton loco., crossing the 42-foot girder, to be

$$M_3 = 261 \text{ foot-tons.}$$

that is, when the fourth or 12-ton wheel stands 3 feet to the right of the middle point of the girder.

The polygon $ACDEFB$, which is mechanically subtracted from the parabolic locus on fig. 5, is the bending-moment diagram for four fixed forces acting upwards at the junctions of the fields; 5 tons at C , 8 tons at D , 10 tons at E , and 7 tons at F , as these forces would give the moments 85, 145, 189, and 117 foot-tons of *negative* bending at those points. Generally, then, the polygon is that due to a set of upward *fictional* forces at the junctions of the fields whose magnitudes are numerically the same as the distances between the wheels multiplied by the *ratio of the weight of the locomotive to the length of the span*.

FIRST GRAPHICAL METHOD WITH ONE PARABOLA ONLY.

For the 42-ton locomotive on fig. 5, after finding the centre of gravity G , choose the smallest span which will accommodate the loco. standing with G and the ruling-wheel W_4 equidistant from the two abutments. That span is 40 feet; but we have taken 42 feet, which is only slightly greater, and makes the steps of the construction more evident, and simplifies any arithmetical checks.

Construction, fig. 5.—Lay down the span $AB = 42$ feet on a suitable scale of feet, and divide it into five *fields* proportional to the weights on the wheels of the locomotive. On the left side draw the load-line equal to 42 tons, the weight of the locomotive to a scale of tons judiciously chosen, so that with a *polar distance* of 10 feet a well-conditioned isosceles triangle is formed. Join the pole to the ends of the load-line. Construct the apex of an isosceles triangle standing on the base AB , and having its sides parallel to the extreme vectors from the pole. The height of this apex above the middle of the base should measure 441 foot-tons, being a fourth of the product of 42 tons and 42 feet on a scale *ten times finer* than the ton scale, the polar distance being *ten*. Construct the scale of foot-tons by renumbering the ton scale accordingly. Taking the apex of the isosceles triangle as a *vertex*, construct the parabolic right segment standing on the span AB . Construct the points close together near the vertex, but more sparsely well out from it. A construction is shown in the appendix. It will be seen at this stage that the shape of this parabolic segment depends on the choice of scales.

To construct the polygon $ACDEFB$, draw vertically *upwards* the lines of action of four *fictional* forces through the junctions of the five fields. On the right side draw upwards their load-line 7, 10, 8, and 5 tons, being numerically the distances between the wheels multiplied by unity, the *ratio* of the weight of the locomotive to the length of the span. To a trial pole draw the dotted link-polygon among the four upward forces and the two holding-down forces at A and B . A vector from the trial pole parallel to the closing side gives the junction between the magnitudes of the two holding-down forces. From this junction lay off horizontally 10 feet for the true pole, and construct the link-polygon $ACDEFB$. Otherwise the height of F may be laid up directly to scale as $9 \text{ tons} \times 13 \text{ feet} = 117 \text{ foot-tons}$, being the product of the 9-ton wheel-load and its distance from G . Then the height of E is 189 foot-tons, being 12×6 greater than the last, while the height of D is to be 145 or 11×4 less than the last, also the height of C is 85, or 5×12 lesser again. In this way by taking the *moments* of the weights of the wheels about G , their

the black spot from the vertical through the middle of the span to be 3 feet, and we have

$${}_4M_3 = 261 \text{ foot-tons.}$$

A rival maximum, to be found by producing *DE* the oblique base of the third field; gives

$${}_3M_2 = 256 \text{ foot-tons.}$$

For the other three chords *AC*, *CD*, and *BF*, the bisecting points do not fall in the fields. The fourth weight $W_4 = 12$ is the *ruling-wheel*, and the symbol ${}_4M_3$ means the bending-moment at 3 feet to the right of the middle of the girder when the locomotive stands with its fourth wheel at that point, provided all the wheels of the locomotive are actually on the girder.

To deal with shorter spans which only accommodate a part of the locomotive.

Drop off the 5-ton wheel at the left end of the locomotive, and drop off 5 feet from the left end of the span. Joining *B* to *C* gives *CDEFBC*, the polygon for the reduced span of 37 feet. But *C* is to be projected up to *C'* and the polygon completed on the oblique base *C'B*. Next the side corresponding to *EF* is to be produced both ways to *b'* and *d*, then *b'd* is bisected at the black spot, and the vertical height to the parabola scaled off 214·3 foot-tons. Also the horizontal distance of the black spot from the opening at the middle of the oblique base *C'B* should scale 1·85 feet, being half the distance of the *ruling-wheel*, 12 tons from the centre of gravity of the group of wheels 5, 11, 12, 9 tons.

In like manner another wheel 5 tons is dropped off the locomotive, and 5 feet is taken off the span. Joining *D* to *B* gives *DEFBD*, the polygon for the reduced span of 32 feet. Project *D* up to *D'* on the parabola, and *D'B* is the oblique base. Complete the polygon; produce the side corresponding to *EF* both ways to meet the parabola. Bisect this chord at the black spot, and scale off the height to the parabola 170 foot-tons. Also find the horizontal distance of the black spot from the ring at the middle of the oblique base to be ·734 of a foot.

Further, removing the trailing wheel 9 tons, we have remaining the two driving-wheels 11 and 12 tons. Removing 9 feet from the right end of the span, then *DEFD* is the polygon for the span, 23 feet. Project both *D* and *F* up to the parabola at *D'* and *F'*, then *D'F'* is the oblique base. Complete the polygon, and produce the side corresponding to *EF* to *d'*; bisect *F'd'* at the black spot, and scale off the vertical height to the parabola as 83 foot-tons. Scale off the horizontal distance of the black spot from the ring at the middle of the oblique span *F'D'*, and find it to be 2·4 feet.

To find the equivalent uniform rate of loading to give the maximum bending-moment on each span at the same point of the span, we must double the moment, and divide by the difference of the squares of the half-span and the displacement from the middle of the span of the point at which the maximum bending occurs.

SPAN. Feet.	MOMENT. Foot-tons.	DISPLACEMENT. Feet.	RATE OF LOAD. Tons per foot.
42	261	3.00	1.209
37	214.3	1.85	1.265
32	170	.73	1.331
23	83	2.40	1.312

It will be seen that the rate of loading on the 23-foot span is less than that on the 32-foot span. But the rate should constantly increase as the span decreases. By inspection it will be found that the two driving-wheels, 11 and 12 tons, can be accommodated on a span of 15 feet, instead of 23 feet.

To interpolate spans, slightly smaller or larger than those given by dropping off parts of the span proportional to the loads on the wheels dropped off the locomotive.

Thus to determine the max. bending-moment for a span of 20 feet loaded in the most trying way by the group of wheels 11, 12, 9 tons. Consider the parabolic segment and polygon standing on the oblique base $D'B$, the horizontal projection of which is 32 feet. By adopting a coarser scale for feet we can make this horizontal projection measure 20 feet instead of 32. Now, however, the height of the parabolic segment must also be measured on a coarser vertical scale in the like ratio assumed to save the trouble of re-drawing the parabola. But the polygon must be re-drawn. On fig. 5, then, the ruling-side of that polygon is shown by a hatched line with its two ends set up higher from the oblique base $D'B'$ in the ratio of 32 to 20, and produced each way to h and k ; then hk is bisected by a black spot the height from which to the parabola measures 119 on the old scale. This is to be decreased in the ratio 20 to 32, when we have 74.4 foot-tons, and the horizontal distance of the black spot from the ring at the middle of the oblique base $D'B$ measures on the old scale 1.19, but when altered in the ratio of 20 to 32, we get .734 feet.

Again, if the original locomotive is to ride on a span of 50 feet instead of 42 feet, it is only necessary to lower the side of the polygon EF in the ratio of 42 to 50, shown by a hatched line; produce it each way to m and n ; then bisecting mn in the black spot, and reading the height to the parabola, we have 288.6, which is to be increased in the ratio 50 to 42, giving 343.56 foot-tons.

Also the horizontal distance of the black spot from the middle of the span measures 2.52, which increased in the ratio 50 to 42 brings it to 3 feet.

In this way the shortest span to accommodate any group of wheels may be interpolated. It will require in general two trials, for at the first trial we may find when the deviation of the point of max. bending from the middle point of the span is measured, that placing the ruling-wheel there sets an end wheel off the span altogether. We have then to slightly increase the span and proceed again.

SPAN. Feet.	MOMENT. Foot-tons.	DISPLACEMENT. Feet.	RATE OF LOAD. Tons per foot.
20	74.4	.734	1.495
50	343.56	3	1.115

SECOND GRAPHICAL METHOD WITH CIRCULAR ARCS ONLY.

We have defined a parabolic right segment of *modulus unity* as having the height at any point numerically equal to the product of the two segments

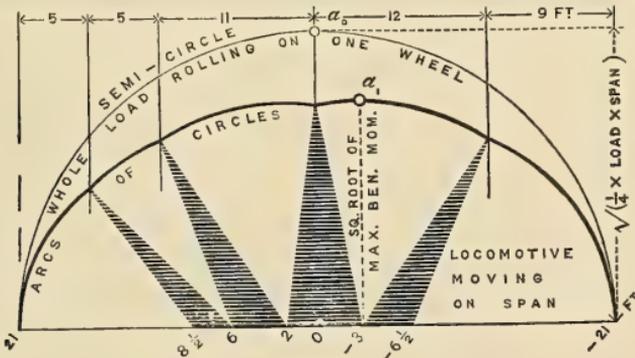


FIG. 6.

into which the point divides the base. And we have also pointed out that it represents the maximum bending-moments for the transit of a single rolling-load, the height of the segment being made to scale in foot-tons an amount equal to one-fourth the product of the load and the span. Now, by Euclid II, 14, a semicircle will serve as a diagram of the square roots of the maximum bending-moments in the same case to a vertical scale upon which the height of the crown of the semicircle shall measure the square root of the above product.

If we suppose every vertical height on fig. 2 to be replaced by a height equal numerically to its square root, we will have the diagram fig. 6, all the parabolas becoming circular arcs with centres at the points $S_1, S_2, \&c.$, as shown on fig. 6, each arc beginning on the vertical line through the junction of the

fields where the last arc ended. On fig. 6 the vertical scale is the same as the horizontal scale because of the load and span being numerically equal. The height of a_1 will scale 16·16 parts on the scale upon which the height of the crown of the semicircle scales 21. Then

$${}_4M_{-3} = (16\cdot16)^2 = 261 \text{ foot-tons.}$$

On fig. 7 is shown the 42-ton locomotive standing on the 42-foot girder. On fig. 8 the span is divided into five fields proportional to the loads.

Then the centres for the arcs are set off about the middle of the span at *half* the distances at which the wheels stand from the centre of gravity of the locomotive.

The centre of gravity of the locomotive is defined by G_{32} on fig. 7, where the end links of the link-polygon meet, the link-polygon being drawn to a polar distance of 10 feet. The five circular arcs are then drawn on fig. 8, each beginning at the junction of a field where the last arc ended. The vertical scale is made so that the height of the crown of the semicircle shall scale 21. Next the crown of the circle in the fourth field is ruled over to the scale and reads 16·16, and this when squared gives

$${}_4M_{-3} = 261 \text{ foot-tons.}$$

The front wheel, 5 tons, is now dropped off when G_{37} fig. 8, defines the centre of gravity of the remaining four wheels; from G_{37} a perpendicular is dropped on the vertical from the ruling-wheel 12 tons; this perpendicular is bisected, and the half scales 1·85 feet. On fig. 8 the new span, with the 5 feet at the left end left off, is bisected at the ring, and the centre for the arc corresponding to the wheel, 12 tons, is laid at 1·85 foot to the right of the ring, and the centres for the other three arcs spaced relative to it. The arcs are then drawn for the second, third, fourth, and fifth fields, and the crown of the arc on the fourth field is ruled over to the scale where its height reads 14·64; and squaring this, we have $M = 214$ foot-tons, a maximum, at 1·85 feet to the right of the centre of the 37-foot span when the 12-ton wheel stands over it.

Dropping off the second 5-ton wheel we have the centre of gravity of the remaining three wheels defined at G_{32} ; and the perpendicular from this point upon the vertical from the ruling-wheel, 12 tons, gives, when bisected, 0·734 feet. This distance is laid off to the right of the ring marking the middle of the 32-foot span and the two remaining centres placed about it as before. The three arcs are then drawn, the highest crown ruled over to the scale, where it reads 13·04. Squaring this we get $M = 170$ foot-tons, a maximum, at a point 0·734 feet to the right of the centre of the 32-foot span when the 12-ton wheel stands over it.

In the same way fig. 8 shows the solution for various spans loaded with various groups of the wheels of the locomotive; and a table is shown giving the equivalent uniform loading.

THIRD GRAPHICAL METHOD, BEING CULMAN'S METHOD RENDERED PRECISE.

Only our original construction, fig. 2, drawn with a parabolic segment, and the diagram, fig. 8, of circles derived from it show which is the *ruling-wheel*. For this purpose it would be well to draw the diagram, fig. 8, in conjunction with Culman's method. Hence we have placed fig. 8 under fig. 7, which is Culman's method rendered precise, so that there is no searching about by trial and error.

Lay down on fig. 7 the load-line 5, 5, 11, 12, 9 tons. Choose a polar distance, some round number—say, 10 feet. The two scales, one for tons and the other for feet, should be so related that the two end-vectors may meet at the pole at a well-conditioned angle. Draw the vertical lines of action through the wheels of the locomotive, and among them draw the link-polygon. Produce the two end-links to meet at G_{42} , which determines the position of the vertical through the centre of gravity of the locomotive. Either the 11- or the 12-ton wheel will be the *ruling-wheel*. By drawing the semicircles on fig. 8 and the locus of circular arcs, we at once find the driving-wheel carrying 12 tons to be the ruling-wheel.

From G_{42} drop a perpendicular on the 12-ton load. Bisect the perpendicular, and from its middle point lay off 21 feet horizontally on each side, that is, half the span. Project the two ends down on to the two end-links, and draw the oblique base closing the polygon. This closed polygon is the instantaneous bending-moment diagram when the locomotive is standing in the most trying position, that is, with the 12-ton wheel 3 feet to the right of the middle of the span. Scale off the depth from the apex on the 12-ton load down to the oblique base, and find it to read on the ton scale 26.1; multiply by 10 feet the polar distance, and we have ${}_4M_{-3} = 261$ foot-tons.

Drop off the 5-ton wheel from the left end of the locomotive, and leave off 5 feet from the left end of the span. For the remainder of the locomotive the two end-links meet at G_{37} . From this point drop a perpendicular upon the 12-ton load, and bisect it; from the bisecting point lay off horizontally 18.5 feet on each side. Project the ends down upon the two end-links, and draw the oblique base, closing a polygon which is the instantaneous bending-moment diagram for the remainder of the locomotive standing on the 37-foot span in the most trying position, that is, with the 12-ton wheel at a point 1.85 feet to the right of the middle of the span. Scale off the depth from the

end, or from both ends of the locomotive, and taking off corresponding segments from the original span. In some cases observe that the 11-ton driving-wheel becomes the *ruling-wheel*.

To find the maximum of maxima bending-moments where there is a given uniform load and the locomotive.

Returning to fig. 5, suppose that on the 42-foot span AB there is 16 tons uniformly spread, which would give a parabolic locus the same as that for 8 tons rolling on one wheel, the height of the locus being $\frac{1}{4} \times 8 \text{ tons} \times 42 \text{ feet}$ or 84-foot tons. To allow for this it is only necessary to adopt a finer scale so that the height of the parabolic segment in fig. 5 shall measure $441 + 84$ foot-tons instead of 441. Adopting this finer scale for verticals, it becomes necessary to lower the chord EF down to the position shown hatched, that is, lower in the ratio of 42 to 50, just as we already noted when we passed from the 42-foot span to a 50-foot span. So that bisecting mn at the black spot, measuring the vertical height to the parabola on the original vertical scale, we get 288.6, but multiplying by the ratio 50 to 42 it becomes 343.56 foot-tons. But in this case the original horizontal scale still obtains, so that the horizontal distance of the black spot from the middle point of AB is only 2.52 feet. In the former case, where mn was the oblique base for a 50-foot span bearing the locomotive only, this 2.52 had to be multiplied by the ratio 50 to 42, which made a product 3 feet, as it must, for on any span that bears the locomotive only, 3 feet to the right of the middle is the most critical point, for then the ruling-wheel, 12 tons, and the centre of gravity of the locomotive are equidistant from the two abutments, or are each 3 feet from the middle of the span. But in the case we are now considering, the ruling-wheel, 12 tons, must stand 2.52 feet to the right of the centre; and it will be found that the centre of gravity, not of the locomotive but of the load made up of the 16 tons spread uniformly, together with that of the locomotive, is 2.52 feet to the left of the middle of the span.

THE KINEMATICAL MODEL AND AN IDEAL LOCOMOTIVE WHICH INCLUDES THE SPREAD LOAD.

By J. T. JACKSON, M.A.I., Assistant to the Professor of Civil Engineering in the University of Dublin.

The similarity between the above construction and that described on p. 25 at once suggests that it must be possible to devise an ideal locomotive which shall produce the same maximum bending-moments at every point of the span as are actually due to the combined effects of the real locomotive and the

uniform load. To see how this may be done let us compare the modification of the bending-moment diagram in fig. 5 to allow for change of span with that for the addition of a uniform load.

(1.) *Change of Span.*—The ordinates of the polygon *ACDEFB*, the unit of length and the unit of bending-moment are all altered inversely as the span, while the unit of load is unaltered.

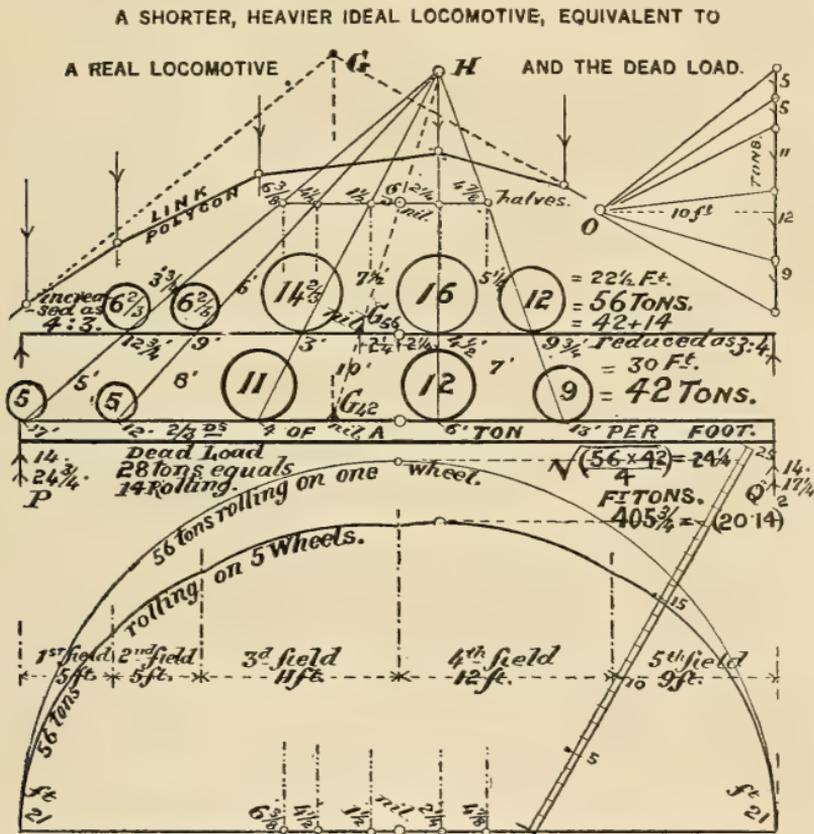


FIG. 9.

(2.) *Addition of Uniform Load.*—The ordinates of the polygon *ACDEFB*, the unit of load, and the unit of bending-moment are all altered inversely as the sum of the rolling load and half the uniform load, while the unit of length is unaltered.

The effect on the *form* of the diagram in fig. 5 of an increase of span from, say, 42 to 56 feet, would then be the same as that due to the addition of a uniform load of $2 \times (56 - 42)$ or 28 tons; i.e. to a load of two-thirds of a ton per

foot-run on a girder of 42-foot span. The effect on the *scales* would, however, be different: in the case of the increase of span the scales both of length and bending-moments would be made finer in the ratio of 42 to 56, or 3 to 4, while in the case of the addition of the uniform load the length-scale would be unchanged, while the load and bending-moment scales are made finer in the above ratio.

It is evident that the diagram of maximum bending-moments for the 30-foot 42-ton locomotive of fig. 5 running on a 42-foot span which already carries a uniformly distributed load of 28 tons and drawn to scales of, say, 3 feet, 4 tons, and 48 foot-tons to the inch is identical in form and size with the diagram for the same locomotive crossing a span of 56 feet, and drawn to scales of 4 feet, 3 tons, and 48 foot-tons to the inch. Now, on changing the scales of the latter figure to 3 feet and 4 tons to the inch, it is seen to represent equally well the diagram of maximum bending-moment for a 22½-foot 56-ton locomotive crossing a 42-foot span. So that the effect on the diagram of maximum bending-moments of the addition of a uniform load is the same as that produced by *shortening* the intervals between the wheels in the ratio of the loco. weight to the sum of the loco. weight and half the uniform load, and making the several wheel loads *heavier* in the reciprocal ratio. This is illustrated in fig. 9, where the derivation of the diagram of square roots of maximum bending-moments for the loco. of figs. 1-5 is effected when the loco. is supposed to cross a bridge of span 42 feet already carrying a uniform dead load of two-thirds of a ton per foot.

The method is useful as illustrating clearly the effect on the bending-moment diagram of the addition of a uniform load; but it requires to be applied with some degree of caution, as it must be remembered that the change in the character of the diagram which takes place when a wheel goes off the span occurs when a wheel of the *real* locomotive goes off, and as the ideal locomotive is shorter than the real, it might readily be forgotten in examining a particular portion of the locomotive that one wheel was off, since the corresponding wheel of the ideal locomotive might be well within the span.

Kinematical Model, demonstrating the variations in bending-moment at all points of a girder-bridge as a locomotive comes across the bridge.

This model is specially designed to exhibit the manner in which the diagram of maximum bending-moments, consisting of arcs of parabolas (as shown in fig. 2), is traced out by the vertices of the link-polygon corresponding to the loads on the wheels of the locomotive, as the locomotive moves across the span. The model (see fig. 10) consists of two parallel plates of mahogany each $18\frac{1}{2}$ in. \times 15 in., the front or face-plate being $\frac{3}{8}$ in. and the back

plate $\frac{1}{2}$ in. thick ; these plates are set $1\frac{1}{2}$ in. apart. On the top of the plates is the model girder constructed to a span of 42 feet on a scale of 4 feet to an inch.

Running on top of the girder is the locomotive, with a wheel-base of $7\frac{1}{2}$ in. (to represent 30 feet on the assumed scale). The girder does not

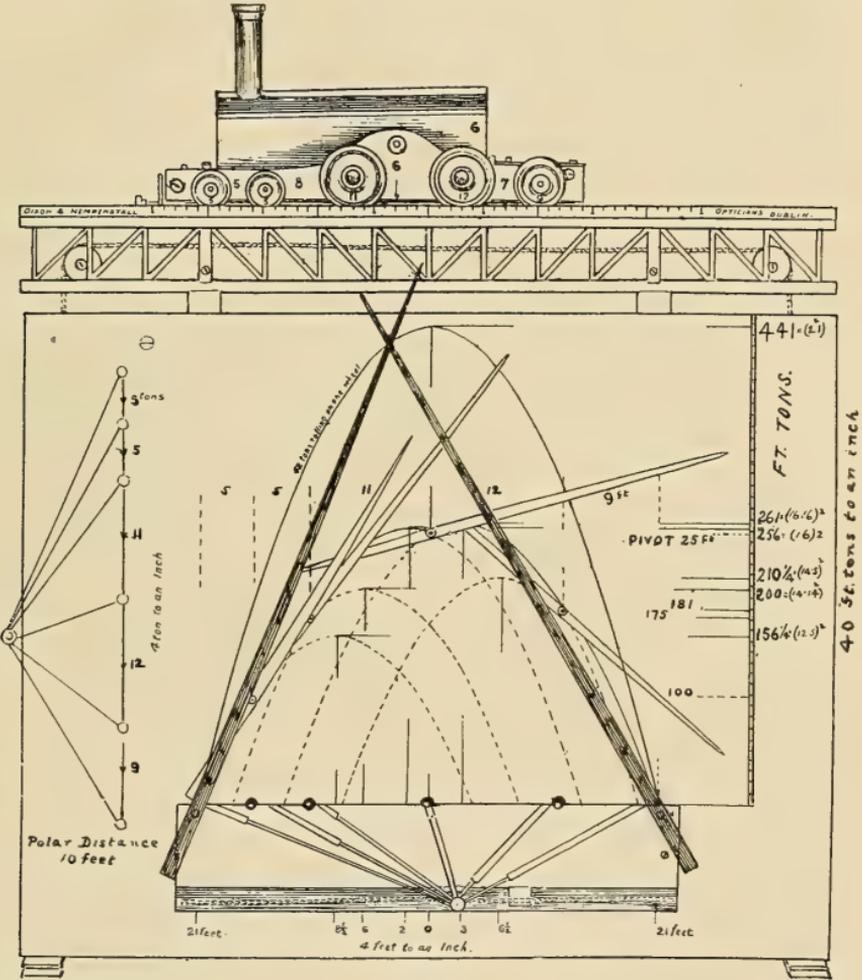


FIG. 10.

terminate at the supports, but overhangs each support by an amount sufficient to prevent any wheel of the locomotive from running off the girder so long as the centre of gravity of the locomotive remains between the supports. The object of this is to avoid the change in the character of the bending-moment

diagram which would ensue if any wheel were regarded as passing completely off the girder.

Passing round the frame and, tightly stretched over four small pulleys set on the back plate near the corners is an endless chain. A stud projecting downwards from the locomotive is attached to the upper horizontal side of this chain, so that the chain carries the locomotive with it as it moves. To the right-hand (vertical) side of the chain is attached a handle, not shown in the figure, by means of which the chain may be moved round the pulleys at the corners of the frame. To the left-hand (vertical) side is attached a slider on which is fixed a small pin over which threads pass, as shown in the figure; these threads passing through eyelets in the face-plate are kept tight by weights behind. The eyelets are arranged in a vertical line $2\frac{1}{2}$ in. (representing 10 feet on the assumed scale) to the right of the pin, and the intervals between them are proportional to the assumed loads on the wheels, so that the line joining the eyelets forms a "load-line" or force-polygon for the loaded girder. The distance between the extreme eyelets is equal to the distance between the supports of the girder, which fixes the scale of force at 4 tons to the inch, and the pin over which the threads pass is attached to the chain at a point which is as far below the highest eyelet as the C. G. of the locomotive is from the right-hand support of the girder. The lines between the eyelets, the pin, and the threads may be regarded as forming a force- or load-polygon, a pole, and a set of polar vectors for the system of loads on the girder.

To the lower (horizontal) side of the chain is attached a slider which moves along a groove in a brass plate attached to the back of the frame, and which carries a horizontal pin (shown above the number 3 at the bottom of fig. 10). This pin is set at the point on the chain which is vertically under the middle of the span when the C. G. of the locomotive is over it. Arranged in a horizontal row on a brass back-plate are six fixed pins, the extreme right and left pin being vertically under the right and left supports of the girder, the intervals between the pins being proportional to the wheel-loads, and the height above the moving pin attached to the chain being equal to the distance of the pin (pole) on the extreme left from the vertical load-line.

The six pins in the horizontal row carry short brass tubular arbors at right angles to which are soldered small sleeves; through these sleeves pass sliding rods attached to the moving pin on the bottom of the chain. To the outer pair of these arbors, and outside the face-plate, are attached two long aluminium hands or pointers, while the remaining four arbors carry short crank-arms behind the face-plate, and so not shown in the figure. Vertically above these four arbors and at heights which on the scale of bending-

moments* represent the maximum bending-moments at the junctions of the fields (i.e. in positions corresponding to the points D_1, D_2, D_3, D_4 in fig. 2) are four other tubular arbors also turning on pins attached to the brass back plate, carrying crank-arms of lengths equal to those on the arbors below, and compelled to rotate in a manner exactly similar to the lower arbors by vertical links between the ends of the upper and lower crank-arms.

Attached to these upper arbors, and in front of the face-plate, are other four light aluminium hands or pointers. The six pointers are set on the arbors at right angles to the direction of the corresponding sliding-rod and sleeve, or as it is evident that the directions of these sliding-rods are perpendicular to the directions of the threads on the left of the model (for the figure below made up of rods and sleeves is simply the force-polygon rotated through a right angle counter-clockwise), it follows that the aluminium pointers move so as to keep parallel with the threads forming the polar rays of the force-polygon. Hence the pointers move exactly as the links of the link-polygon in fig. 1. When the locomotive changes its position, the intersections of the pointers keep vertically under the corresponding wheels of the locomotive, any instantaneous position of the pointers outlines the bending-moment diagram for the corresponding position of the locomotive, and the loci of the intersections of the pointers form the diagram of maximum bending-moments.

A sheet of drawing-paper is glued to the face-plate of the model, and on it these loci are drawn.

The two extreme (blackened) pointers represent the end links of the bending-moment diagram; their intersection lies vertically under the C. G. of the locomotive, and in its motion traces out the parabola which is the diagram of maximum bending-moments for the transit of a single concentrated load equal to the weight of the locomotive.

The model exhibits very clearly the character and shape of the diagram of bending-moments for any particular position of the load, the manner in which the bending-moment at any point varies as the locomotive moves along the girder, the generation and character of the diagram of maximum bending-moments, the position of the locomotive which gives the maximum bending-moment under any wheel, the position of the locomotive which gives the greatest possible bending-moment, the character and extent of the fields into which the span may be divided so that when each wheel is over any point in its own particular field, a greater bending-moment is produced there than can be produced by any other position of the locomotive.

* 40 foot-tons to an inch (since the force scale is 4 tons to an inch, and the polar distance 10 feet).

The graphic solution, with a shifting parabolic set-square, shown on fig. 2, was published in their *Elementary Applied Mechanics* by Alexander and Thomson in 1883, and again in 1902, and was referred to in Professor Hele Shaw's *Report on Graphic Methods* to the Edinburgh meeting of the British Association.

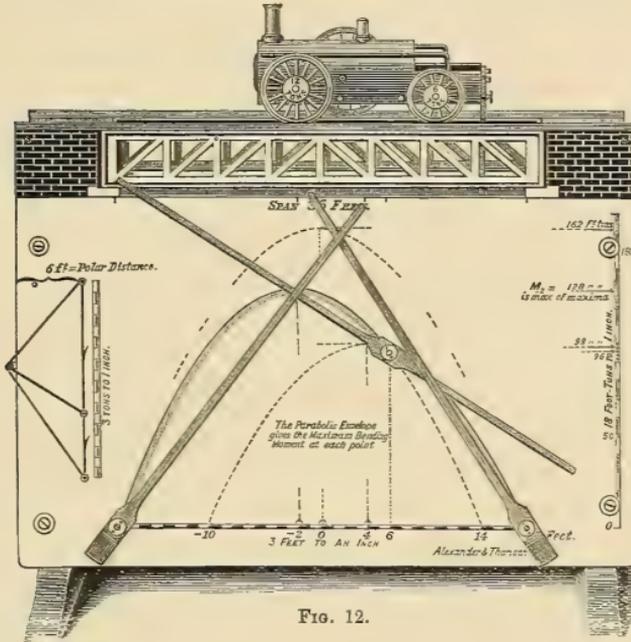


FIG. 12.

Fig. 12 shows a simple model for a trolley with two wheels, which was also described in the *Applied Mechanics*.

These models were made by Messrs. Dixon and Hempenstall, Dublin, through the liberality of the Board of Trinity College, Dublin.

III.

MAGNETIC RESOLUTION OF THE SPECTRUM LINES
OF NIOBIUM.

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I. INTRODUCTION AND PROCEDURE.

THERE is still much to be done towards finding the connexions between the spectrum lines of the elements. A new means of attacking this problem was given by the discovery in 1896 of the Zeeman Effect by Professor Zeeman of Amsterdam; and since that date much time has been given to the investigation of this Effect in the spectrum lines of various elements. Such investigations have resulted in the finding of some new laws, not only establishing a connexion between some lines in the spectrum of the same element, but also between these lines and the lines in the spectra of chemically-related elements. Having studied the Zeeman Effect in the elements molybdenum and tungsten,* both of which belong to the sixth group in the periodic system, I have thought it desirable to examine the Zeeman Effect in niobium, which occupies the same position in the fifth group as molybdenum does in the sixth. The objects of the research therefore were to obtain a record, as complete as possible, of the Zeeman Effect on the spectrum lines of niobium, to test with these results the laws already wholly or partly established, to compare the results for this element with those for other substances, and to seek for new relations.

The grating apparatus of the Physical Institute, Göttingen, was used. References relating to this and to the method of obtaining the photographs will be found in my above-mentioned Dissertation. The carbon electrodes were coated with a thin layer of niobium chloride sublimate. The duration of exposures varied between two and three hours; but owing to an

* "Zeeman-Effekt an Wolfram und Molybdän," Diss., Göttingen, 1908. *Annalen der Physik*, iv, 1032, 1909.

improvement in the apparatus, these times, which were necessary when the photographs for tungsten and molybdenum were taken, might with advantage have been considerably shortened. The observations were made in the direction perpendicular to the magnetic field. Photographs were taken separately of the vibrations perpendicular (*s*) to the magnetic lines of force, and of those parallel (*p*) to these lines. By the aid of those two sets of plates the kind of vibration corresponding to any line could be known, and, further, the cutting out of one set of vibrations made the intervals between the neighbouring components larger, and hence these could be more easily and more accurately measured. Photographs were also made with all the components included, that is, containing the vibrations both perpendicular (*s*) and parallel (*p*) to the field. By means of these a better estimate of the relative intensities of the components could be formed, and the question of the dissymmetrical separation of the components of some of the lines could be studied. The dependence of the relative intensities of the components on the state of polarization of the vibrations when falling upon the grating was first pointed out by Zeeman,* and in my Dissertation (*l. c.*) the effect of the quartz lens used in these experiments on the state of polarization, and hence on the intensities of the components of all the lines in the spectrum, was shown. On account of this the observation of the relative intensities under such conditions is of less importance in some respects than it was formerly supposed to be; but in other respects it may be of much importance. If, however, the spectrum lines are not very far apart, the relative intensities of their components may be used in comparing, since in a short distance the influence of the rotation is small, but for lines further apart a comparison can only be made between the mean intensities of the components for each line.

As in the cases of tungsten and molybdenum, the strength of the magnetic field was determined from the separations of several lines whose intervals are well established. The field was found to be 24,500 C.G.S. units. To facilitate a comparison of the results with those for the above-mentioned substances, the measurements were reduced to a field of 23,850 C.G.S. units. The plates were measured with a dividing instrument by Brunner of Paris, which is in the Observatory, Meudon, Paris. The majority of the lines were measured in the second order, but very many of these were again measured in the first and third orders. The intensities were all reduced to those of the second order. With the dividing instrument one could measure to .001 mm. Owing to such causes as the variation in sharpness of the different lines, the

* P. Zeeman, K. Akad. v. Wet., Amsterdam, Oct., 1907.

differences in their intensities, and the nearness of the components, the accuracy of the measurements varied, but the error would seldom be over .005 mm. From the measurements of the intervals in millimetres the vibration differences per unit length of path (cm.) between the original position of the spectrum line and the positions of the components were calculated, *i.e.*,

$$\Delta \left(\frac{1}{\lambda} \right) \text{ or } - \frac{\Delta\lambda}{\lambda^2}$$

was calculated. For $\lambda = 2700$ this probable maximum error would give an error in the vibration difference, if the measurement were in the second order, of 0.07, and for $\lambda = 4600$ in the same order the error would be 0.02.

II. RUNGE AND RITZ RULES AND EXPLANATION OF THE TABLES.

Runge and Ritz have each formulated rules connecting the intervals between the components of a spectrum line. In 1907 Runge* stated that in all the complicated separations which had been observed up to that time the intervals of the components of the spectrum line from the middle were multiples of an aliquot part of the "normal interval."

$$a = \frac{\Delta\lambda}{\lambda^2} = \frac{e}{m} \cdot \frac{H}{4\pi c}$$

where $\frac{e}{m}$ = the ratio of the charge to the mass of the electron, H = the field strength, and c = the velocity of light. The aliquot parts which had been observed were

$$\frac{a}{2}, \frac{a}{3}, \frac{a}{4}, \frac{a}{5}, \frac{a}{6}, \frac{a}{7}, \frac{a}{11}, \frac{a}{12}.$$

From this normal interval Paschen and Runge, using the mercury lines, have calculated

$$\frac{e}{m} = 1.69 \times 10^7 \left(cm^{\frac{1}{2}} gm^{-\frac{1}{2}} \right).$$

For some lines in tungsten and molybdenum it was necessary to consider the separations as multiples of such a small aliquot part of the normal interval as $\frac{a}{21}$. Now it has been pointed out that, if it be necessary to express the separations as multiples of aliquot parts with such large denominators, Runge's rule has not much value in these cases, for then, considering the

* C. Runge, Phys. Zeit., viii, 232, 1907.

limits of error, the separations might be tabulated as multiples of some other aliquot part.

Ritz* has written a theory, and claims that according to it separations of the components of the complicated types are represented by much smaller numbers, though in some cases the same numbers are required as for the Runge rule. The Ritz law states that if ν_0 = the frequency of the spectral line, H = field strength, m and n = whole numbers, and ω, ω' are two numbers pertaining to the special spectrum line, then the frequencies of the components are given by the following:—

$$\begin{array}{lll} \text{Parallel to } H: & \nu_0 \pm m\omega & m = 0, 1, 2 \dots \\ \text{Perpendicular to } H: & \nu_0 \pm \omega' \pm n\omega & n = 0, 1, 2 \dots \end{array}$$

He has given examples illustrating the advantage of his rule over that of Runge. Further examples of the application of the Ritz rule have been published lately.† In my Dissertation (*l.c.*) I have given other examples; but have also pointed out cases where the Ritz rule does not hold.

Both of those rules will again be applied, where possible, in considering the separations found for this substance. The results obtained by the Runge rule will be found in the columns marked A. For the field-strength to which the observations have been reduced the normal interval $a = 1.07$ (6), and the separations are represented as multiples of rational fractions of a .

The intensities of the components in the second order are given under i .

By $-\frac{\Delta\lambda^\ddagger}{\lambda^2}$ is denoted the alteration in the number of vibrations per cm.

Hence the positive and negative values denote respectively components on the blue and red sides of the original position of the line. If the separation is given in square brackets, then the reading, owing to the want of sharpness of the line, its intensity, or some other cause, is not very accurate. The letters p and s denote respectively that the vibrations are parallel and perpendicular to the magnetic lines of force. Where both letters appear after a value, then the component contains both kinds of vibrations. When two intensities are given opposite an interval representing components at equal distances on the blue and red sides, then the first value always refers to the component having the smaller wave-length. If only one intensity be given to correspond to two components, then both components have the same intensity.

* W. Ritz, *Ann. d. Phys.*, xxv, 660, 1908.

† W. Ritz, *Phys. Zeit.*, ix, 1909.

‡ Here λ is expressed in cms., though when λ denotes a wave-length at other places the unit is the angström.

III. RESULTS AND THEIR DISCUSSION.

There are two lines which have 10 components.

TABLE I.

$\lambda = 4123.99$			$\lambda = 4205.50$		
i	$-\frac{\Delta\lambda}{\lambda^2}$	Λ	i	$-\frac{\Delta\lambda}{\lambda^2}$	Λ
2	± 1.69 s	$14 \times \cdot 120 \left(\frac{\alpha}{9}\right)$	3	± 2.76 s	$18 \times \cdot 152 \left(\frac{\alpha}{7}\right)$
2	± 1.09 s	9	1	± 2.14 s	14
8	± 0.96 p	8	1	$\pm [1.35]$ s	9
3	± 0.50 s	4	3	± 0.95 p	6
8	± 0.34 p	3	3	± 0.30 p	2

As the lines are not far apart, the intensities of the components in each line may be considered in comparing. It is seen that although the parallel components are similar in each as regards intensity and separation yet the perpendicular are totally different in both respects. The Λ -columns show that the intervals are multiples of aliquot parts of α , and that Runge's law holds in these cases. For the first line the interval $\frac{5\alpha}{9}$ occurs between each of the p - and each of the s - components. Corresponding to this there is in the case of the second line the interval $\frac{4\alpha}{7}$, but an exception is found with the components giving the separation 1.35. Owing to the weakness of the components, this reading is not very reliable, but re-measurement always gave approximately the same result, and it cannot be that the error is so great that the correct reading is 1.52, which is the reading which might have been expected. Runge's rule, too, is satisfied by the values obtained, but the Ritz law, though applicable, does not produce the simplification which has been claimed for it. An analysis of the separations of the components of the above two lines gives the following as values of the symbols in the Ritz law.

$$\begin{array}{l}
 \lambda = 4123.99 \\
 \omega = 0.31 \quad \left. \begin{array}{l} m = 1, 3 \\ \omega' = 1.09 \quad \left. \begin{array}{l} n = 0, 2 \end{array} \right\} \right\} \\
 \end{array} \right\} \\
 \end{array}
 \quad \parallel \quad
 \begin{array}{l}
 \lambda = 4205.50 \\
 \omega = 0.156 \quad \left. \begin{array}{l} m = 2, 6 \\ \omega' = 1.50 \quad \left. \begin{array}{l} n = 1, 4, 8 \end{array} \right\} \right\} \\
 \end{array} \right\}
 \end{array}$$

Where some of the whole numbers are wanting in the values for m and n , it is supposed that the components corresponding to them are invisible

through lack of intensity. It will be seen that one must therefore assume here that many components have disappeared. For the second line the intensities are small, and hence it is quite possible that the number of components wanting might thus be explained.

The following three lines have each 8 components.

TABLE II.

$\lambda = 3254.23$			$\lambda = 4163.81$			$\lambda = 4289.62$		
i	$-\frac{\Delta\lambda}{\lambda^2}$	A	i	$-\frac{\Delta\lambda}{\lambda^2}$	A	i	$-\frac{\Delta\lambda}{\lambda^2}$	A
2	± 1.71 s	$13 \times .134 \left(\frac{a}{8}\right)$	5	± 2.40 s	$40 \times .060 \left(\frac{a}{18}\right)$	3	± 1.98 s	$11 \times .179 \left(\frac{a}{6}\right)$
15	± 1.35 p	10	8	± 1.56 s	26	1	± 1.07 p	6
2	± 1.08 s	8	8	± 1.26 p	21	2	± 0.89 s	5
3	± 0.41 s	3	5	± 0.71 s	12	1	± 0.36 p	2

There is no similarity between any of these. Again, it is seen from the A-columns that the Runge rule is applicable. It might be objected that this is not the case for the second line, since the aliquot part $\frac{a}{18}$ is required. However, it must be noted that the components of this line are very sharp, and the intensities are also favourable to a very accurate measurement of the separations. The intervals calculated from these observations agree so well with the stated multiples of this aliquot part $\left(\frac{a}{18}\right)$ that, taken in conjunction with the possibility of accurate readings, there can be no hesitation in advancing the case of this line as for, rather than against, Runge's rule. If these lines be taken as examples for the application of the Ritz law, then the following values are obtained :—

$$\begin{array}{ccc}
 \lambda = 3254.23 & \parallel & \lambda = 4163.81 & \parallel & \lambda = 4289.62 \\
 \omega = 0.67 \} m = 2 & & \omega = 0.42 \} m = 3 & & \omega = 0.36 \} m = 1, 3 \\
 \omega' = 1.08 \} n = 0, 1 & & \omega' = 1.56 \} n = 0, 2 & & \omega' = 0.89 \} n = 0, 3
 \end{array}$$

Thus for all these lines satisfactory agreement is obtained for both of those rules. The frequent repetition of the interval $\frac{5a}{8}$ between the components of the first line will be observed.

Five lines have been found having 6 components.

TABLE III.

$\lambda = 2992.10$			$\lambda = 3484.25$			$\lambda = 4249.61$		
i	$-\frac{\Delta\lambda}{\lambda^2}$	A	i	$-\frac{\Delta\lambda}{\lambda^2}$	A	i	$-\frac{\Delta\lambda}{\lambda^2}$	A
2	± 2.73 s	$2 \times 1.55 \left(\frac{5a}{4}\right)$	4	± 1.62 s	$7 \times .230 \left(\frac{3a}{14}\right)$	1	± 2.34 s	$7 \times .331 \left(\frac{4a}{15}\right)$
4	± 1.37 p	1	6	± 1.14 p	5	2	± 1.32 p	4
6	± 1.31 s	1	4	± 0.46 s	2	1	± 0.31 s	1

$\lambda = 4331.56$			$\lambda = 4345.48$		
i	$-\frac{\Delta\lambda}{\lambda^2}$	A	i	$-\frac{\Delta\lambda}{\lambda^2}$	A
1	± 2.20 s	$7 \times .313 \left(\frac{2a}{7}\right)$	1	± 2.72 s	$15 \times .132 \left(\frac{a}{6}\right)$
2	± 0.92 s	3	2	± 0.91 p	5
3	± 0.64 p	2	1	± 0.74 s	4

No two of these are duplicates. Hence there is not a series of which several of these are members, since, according to Preston, all members of the same series have the same Zeeman Effect. With the diminution of the number of components, the application of the Runge rule becomes more difficult; and the figures given in the A-columns are less definite. For this reason the evidence for or against the truth of the rule diminishes in value as the number of components of the lines decreases. The same is true to a still greater degree as regards the value of such lines in supporting or disproving the Ritz rule. The first, fourth, and fifth lines may be cited in support of the Runge rule. In the second and third lines, however, the denominators of the rational fractions are large, being respectively 14 and 13. Nevertheless, the differences between the observed and calculated values are much smaller than the possible errors due to inaccuracy of measurement, and the mean difference is for each line much smaller than the calculated mean deviation if the intervals had been arbitrary.*

Already those lines do not form good examples for testing the Ritz law;

* C. Runge, Phys. Zeit., viii, 232, 1907.

but still an examination of the separations in the light of this rule may serve to show whatever little value there is, and accordingly this is done.

$$\lambda = 2992.10 \quad \lambda = 3484.25 \quad \lambda = 4249.61 \quad \lambda = 4331.56 \quad \lambda = 4345.48$$

$$\omega = 1.35 \left. \begin{matrix} m=1 \\ \omega'=0 \end{matrix} \right\} n=1, 2 \quad \omega = 1.16 \left. \begin{matrix} m=1 \\ \omega'=0.46 \end{matrix} \right\} n=0, 1 \quad \omega = 1.32 \left. \begin{matrix} m=1 \\ \omega'=1.01 \end{matrix} \right\} n=1 \quad \omega = 0.64 \left. \begin{matrix} m=1 \\ \omega'=1.56 \end{matrix} \right\} n=1 \quad \omega = 0.96 \left. \begin{matrix} m=1 \\ \omega'=1.73 \end{matrix} \right\} n=1$$

For the first four lines the agreement is good, but, considering the nature of the test, it is not good in the case of the fifth line.

There are nine lines with five components.

TABLE IV.

$\lambda = 2846.40$			$\lambda = 2888.93$			$\lambda = 2931.59$		
i	$-\frac{\Delta\lambda}{\lambda^2}$	A	i	$-\frac{\Delta\lambda}{\lambda^2}$	A	i	$-\frac{\Delta\lambda}{\lambda^2}$	A
2	± 1.62 s	$1 \times 1.61 \left(\frac{3a}{2}\right)$	4	± 2.27 s	$2 \times 1.13 \left(\frac{19a}{18}\right)$	3	± 1.85 s	$2 \times .927 \left(\frac{6a}{7}\right)$
8	± 1.59 p	1	6	± 1.12 p	1	3	± 0.93 p	1
4	0 s	0	8	0 p	0	1	0 p	0
$\lambda = 2977.79$			$\lambda = 3014.56$			$\lambda = 3094.30$		
i	$-\frac{\Delta\lambda}{\lambda^2}$	A	i	$-\frac{\Delta\lambda}{\lambda^2}$	A	i	$-\frac{\Delta\lambda}{\lambda^2}$	A
2	± 1.77 p	$5 \times .354 \left(\frac{a}{3}\right)$	1	± 2.43 s	$2 \times 1.22 \left(\frac{8a}{7}\right)$	4	± 2.92 s	$2 \times 1.447 \left(\frac{4a}{3}\right)$
2	± 1.42 s	4	1	± 1.22 p	1	25	± 1.42 s	1
2	0 p	0	1	0 p	0	50	0 p	0
$\lambda = 3225.63$			$\lambda = 4137.27$			$\lambda = 4308.27$		
i	$-\frac{\Delta\lambda}{\lambda^2}$	A	i	$-\frac{\Delta\lambda}{\lambda^2}$	A	i	$-\frac{\Delta\lambda}{\lambda^2}$	A
13	± 1.12 s	$3 \times .372 \left(\frac{a}{3}\right)$	4	± 2.36 s	$2 \times 1.19 \left(\frac{10a}{9}\right)$	1	± 1.75 s	$7 \times .251 \left(\frac{3a}{13}\right)$
13	± 0.37 s	1	7	± 1.21 p	1	1	± 0.51 p	2
50	0 p	0	7	0 s	0	1	0 s	0

Again, there are no lines having the same separation; and therefore no two of these can belong to the same series. For most of those lines there is an obvious simple relationship between the amounts of the separations; and it is further satisfactory to find that these intervals are represented by

multiples with small factors or aliquot parts of the normal interval with small denominators. Hence the greater number of those lines may be mentioned in support of the Runge rule. The lines, $\lambda = 2888.93$ and $\lambda = 4308.27$, seem in this respect doubtful. Fortunately the relations between the intervals in these two cases are evident, and make the choice of factors definite. These simple relationships and the facts that 1.13 and .251 can be represented by rational fractions of a , that the denominators of these have already occurred, that in $\lambda = 4163.81$ the adoption of the aliquot part $\frac{a}{18}$ was thoroughly justified by the possibility of the accurate measurement of the separations and the close agreement between observed and calculated values, and that here again the deviations are very small, all show that these lines are not exceptions to the Runge rule.

It is needless to examine these for evidence in favour of or against the Ritz law. Owing to the absolute freedom in the choice of the values of the symbols in this rule, and the few values for components which have to be satisfied, it is at once evident that the obtaining of perfect agreement is very easy, and the law cannot be considered to have been tested by such examples.

The following eighty-nine lines have each four components.

[Table V, pp. 51, 52, 53.]

With such a small number of components the difficulty of choosing the numbers under A is very great. If one takes into account the possible error, the intervals might in many cases be classed as multiples of different aliquot parts. The various aids to the proper selection have already been mentioned.

One group of three lines has the same separations: 2733.34, 3071.69, 3791.35. These three lines possess all the characteristics necessary in a series. They show the same Zeeman Effect, diminish in intensity in the order from red to violet, and the difference between the frequencies of consecutive members decreases with diminishing wave-length. Four lines are necessary to establish a series. With the aid of three the constants in the series formula are fixed; and the fourth line serves for the necessary test. Using the above three lines constants were calculated; but the tests gave values to which no observed line in the spectrum gave a close enough correspondence. Although the required fourth line would by the rule of diminishing intensities be comparatively weak, still one would expect it to be visible. Any lines on the red side which might belong to the series appear according to the calculations to lie beyond the limits of the observed

TABLE V.

λ	i	$-\frac{\Delta\lambda}{\lambda^2}$	A	λ	i	$-\frac{\Delta\lambda}{\lambda^2}$	A	λ	i	$-\frac{\Delta\lambda}{\lambda^2}$	A
2733.34	5	± 1.63 s	$3 \times .545 \left(\frac{a}{2}\right)$	3049.62	1	$\pm [1.13]$ s	$11 \times .105 \left(\frac{a}{10}\right)$	3208.70	2	± 0.94 s	$6 \times .156 \left(\frac{a}{7}\right)$
	4	± 0.55 p	1		3	± 0.96 p	9		4	± 0.78 p	5
2737.17	4	1.32	$10 \times .131 \left(\frac{a}{7}\right)$	3062.05	1	1.16	$11 \times .107 \left(\frac{a}{10}\right)$	3215.75	30	1.32	$5 \times .263 \left(\frac{a}{4}\right)$
	3	0.91	7		1	0.65	6		15	0.78	3
2753.20	2	0.83	$1 \times .835 \left(\frac{4a}{5}\right)$	3063.21	2	1.30 p	$1 \times 1.30 \left(\frac{6a}{5}\right)$	3222.23	5	1.23	$7 \times .177 \left(\frac{a}{6}\right)$
	6	0.84	1		5	0 s, p	0		3	0.86	2
2780.36	6	1.48	$11 \times .134 \left(\frac{a}{8}\right)$	3071.00	5	1.21 s	$3 \times .400 \left(\frac{3a}{8}\right)$	3223.50	7	1.24	$7 \times .181 \left(\frac{a}{6}\right)$
	10	0.80	6		4	0.39 p	1		7	0.55	3
2841.25	15	1.50	$5 \times .303 \left(\frac{2a}{7}\right)$	3071.69	5	1.59	$3 \times .527 \left(\frac{a}{5}\right)$	3236.58	35	1.29	$11 \times .118 \left(\frac{a}{9}\right)$
	15	0.92	3		5	0.52	1		30	0.95	8
2842.75	15	1.49	$5 \times .303 \left(\frac{2a}{7}\right)$	3080.49	6	1.58	$4 \times .393 \left(\frac{3a}{8}\right)$	3237.85	1	1.32	$5 \times .269 \left(\frac{a}{4}\right)$
	12	0.92	3		6	1.17	3		3	1.10	4
2917.14	1	1.28 p	$1 \times 1.28 \left(\frac{6a}{5}\right)$	3084.52	1	[1.77]	$2 \times .873 \left(\frac{4a}{5}\right)$	3238.17	1	1.64	$5 \times .330 \left(\frac{4a}{13}\right)$
	2, 3	0 s, p	0		3	0.85	1		3	1.00	3
2951.02	20	1.46 s	$1 \times 1.46 \left(\frac{4a}{3}\right)$	3107.12	3	0.94	$2 \times .473 \left(\frac{4a}{9}\right)$	3241.96	1	1.05	$9 \times .118 \left(\frac{a}{9}\right)$
	20	0 s, p	0		3	0.48	1		1	0.84	7
3010.82	1	1.49 s	$7 \times .214 \left(\frac{a}{5}\right)$	3191.20	25	1.26	$2 \times .633 \left(\frac{3a}{9}\right)$	3244.67	1	1.26	$5 \times .251 \left(\frac{3a}{13}\right)$
	1	0.65 p	5		20	[0.64]	1		1	1.00	4
3048.22	1	1.54	$5 \times .306 \left(\frac{2a}{7}\right)$	3205.11	4	[1.21	$9 \times .133 \left(\frac{a}{8}\right)$	3249.68	3	0.74	$5 \times .150 \left(\frac{a}{7}\right)$
	1	0.60	2		3	0.52	4		3	0.61	4

[C*]

TABLE V.—continued.

Λ	i	$\frac{\Delta\Lambda}{\Lambda^2}$	Λ	Λ	i	$\frac{\Delta\Lambda}{\Lambda^2}$	Λ	Λ	i	$\frac{\Delta\Lambda}{\Lambda^2}$	Λ	i	$\frac{\Delta\Lambda}{\Lambda^2}$	Λ
3292.20	20	1.04 s	$4 \times .263 \left(\frac{a}{4}\right)$	3408.53	2	1.33 s	$11 \times .121 \left(\frac{a}{9}\right)$	3709.50	4	1.23 s	$7 \times .175 \left(\frac{a}{6}\right)$	4	1.23 s	$7 \times .175 \left(\frac{a}{6}\right)$
	8	0.80 p	3		2	0.72 p	6		1	† [0.52] p	3		† [0.52] p	3
3304.92	1	0.08	$7 \times .008 \left(\frac{a}{11}\right)$	3455.05	4	1.33 s	$1 \times 1.33 \left(\frac{6a}{4}\right)$	3717.23	20	1.39	$3 \times .425 \left(\frac{2a}{5}\right)$	8	0.41	$3 \times .425 \left(\frac{2a}{5}\right)$
	3	0.99	10		9	0 s, p	0		8		1			1
3324.10	1	1.14	$7 \times .165 \left(\frac{2a}{13}\right)$	3459.80	1	1.67 s	$11 \times .151 \left(\frac{a}{7}\right)$	3791.55	7	1.59	$3 \times .528 \left(\frac{a}{9}\right)$	7	1.59	$3 \times .528 \left(\frac{a}{9}\right)$
	1	0.51	3		3	0.50 p	4		7	0.52	1		0.52	1
3346.88	3	2.47	$14 \times .178 \left(\frac{a}{6}\right)$	3478.95	3	1.72	$4 \times .424 \left(\frac{2a}{5}\right)$	3801.10	1	1.40 s	$1 \times 1.40 \left(\frac{4a}{3}\right)$	1	1.40 s	$1 \times 1.40 \left(\frac{4a}{3}\right)$
	2	0.55	3		3	0.42	1		5, 3	0 s, p	0		0 s, p	0
3348.97	1	1.16	$12 \times .097 \left(\frac{a}{11}\right)$	3481.24	1	0.56	$3 \times .186 \left(\frac{a}{6}\right)$	3884.66	1	1.76 s	$1 \times 1.75 \left(\frac{13a}{8}\right)$	1	1.76 s	$1 \times 1.75 \left(\frac{13a}{8}\right)$
	3	1.27	13		1	0.74	4		1	1.75 p	1		1.75 p	1
3349.22	5	1.19	$1 \times 1.20 \left(\frac{10a}{9}\right)$	3489.29	3	1.32	$11 \times .119 \left(\frac{a}{9}\right)$	3886.22	2	1.25	$7 \times .179 \left(\frac{a}{6}\right)$	2	1.25	$7 \times .179 \left(\frac{a}{6}\right)$
	10	1.21	1		4, 6	0.70	6		1	0.72	4		0.72	4
3354.89	8	1.37	$3 \times .455 \left(\frac{3a}{7}\right)$	3544.16	3	1.07	$4 \times .263 \left(\frac{a}{4}\right)$	3919.85	2	0.83	$7 \times .119 \left(\frac{a}{9}\right)$	2	0.83	$7 \times .119 \left(\frac{a}{9}\right)$
	6	0.45	1		3	0.81	3		2	0.60	5		0.60	5
3391.77	1	1.53	$5 \times .301 \left(\frac{2a}{7}\right)$	3630.76	4	0.81	$2 \times .553 \left(\frac{a}{2}\right)$	3925.16	1	[1.68]	$4 \times .389 \left(\frac{4a}{11}\right)$	1	[1.68]	$4 \times .389 \left(\frac{4a}{11}\right)$
	1	0.58	2		1	[1.09]	1		2	1.14	3		1.14	3
3392.53	3	0.98	$10 \times .098 \left(\frac{a}{11}\right)$	3668.75	1	0.57	$3 \times .154 \left(\frac{a}{7}\right)$	3936.15	2	0.93	$7 \times .132 \left(\frac{a}{8}\right)$	2	0.93	$7 \times .132 \left(\frac{a}{8}\right)$
	4	0.88	9		1	[0.44]	5		3	1.18	9		1.18	9
3395.15	3	1.27	$2 \times .627 \left(\frac{3a}{5}\right)$	3693.50	2	0.79	$1 \times 1.44 \left(\frac{4a}{3}\right)$	3937.68	2	1.57	$16 \times .098 \left(\frac{a}{11}\right)$	2	1.57	$16 \times .098 \left(\frac{a}{11}\right)$
	5	0.61	1		1	1.46	1		5	0.87	9		0.87	9
					1	1.43	1		1					

λ	i	$-\frac{\Delta\lambda}{\lambda^2}$	A	λ	i	$-\frac{\Delta\lambda}{\lambda^2}$	A	λ	i	$-\frac{\Delta\lambda}{\lambda^2}$	A
3966.38	7	± 1.21 p	$1 \times 1.21 \left(\frac{9a}{8}\right)$	4192.21	4	± 1.30 s	$11 \times 1.20 \left(\frac{a}{9}\right)$	4328.58	1	± 1.29 s	$12 \times 1.08 \left(\frac{a}{10}\right)$
	8, 1	± 0 s, p	0		2	$\pm [0.50]$ p	4		1	± 0.76 p	7
3976.78	1	0.78 s	$2 \times 4.00 \left(\frac{3a}{8}\right)$	4195.29	2	0.90	$2 \times 4.52 \left(\frac{3a}{7}\right)$	4375.43	1	1.44	$8 \times 1.78 \left(\frac{a}{6}\right)$
	2	0.42 p	1		3	1.36	3		1	1.58	9
4062.15	1	1.28	$3 \times 4.26 \left(\frac{2a}{9}\right)$	4237.98	1	1.20	$9 \times 1.34 \left(\frac{a}{8}\right)$	4385.08	1	1.26	$13 \times 0.97 \left(\frac{a}{11}\right)$
	1	0.85	2		1	0.67	5		1	0.59	6
4117.05	3	2.01 s	$1 \times 2.01 \left(\frac{15a}{8}\right)$	4254.85	1	1.20	$9 \times 1.34 \left(\frac{a}{8}\right)$	4387.95	1	1.26	$13 \times 0.97 \left(\frac{a}{11}\right)$
	2, 1	0 s, p	0		1	[0.27]	2		1	0.48	5
4129.60	1	1.77 s	$13 \times 1.37 \left(\frac{a}{8}\right)$	4259.10	1	1.24	$8 \times 1.57 \left(\frac{a}{7}\right)$	4388.54	1	1.80	$4 \times 4.48 \left(\frac{5a}{12}\right)$
	4	0.43 p	3		1	0.49	3		1	0.44	1
4139.89	8	1.54	$10 \times 1.55 \left(\frac{a}{7}\right)$	4262.22	5	1.59	$9 \times 1.79 \left(\frac{a}{6}\right)$	4401.37	2	1.07	$11 \times 0.97 \left(\frac{a}{11}\right)$
	5	-0.48	3		5	0.91	5		2	0.58	6
4143.37	3	1.98	$9 \times 2.18 \left(\frac{a}{5}\right)$	4268.83	1	5.31 s	$1 \times 5.31 \left(\frac{59a}{12}\right)$	4410.39	3	1.54	$13 \times 1.18 \left(\frac{a}{9}\right)$
	3	0.86	4		1	0 s, p	0		3	1.30	11
4152.77	30	1.55	$13 \times 1.18 \left(\frac{a}{9}\right)$	4273.12	1	0.98 s	$11 \times 0.90 \left(\frac{a}{12}\right)$	4419.60	1	1.66	$4 \times 4.18 \left(\frac{5a}{13}\right)$
	10	0.89	6		1	0.73 p	8		1	0.43	1
4164.83	30	1.60	$15 \times 1.07 \left(\frac{a}{10}\right)$	4287.13	3	1.53	$10 \times 1.56 \left(\frac{a}{7}\right)$	4456.97	1	1.72	$13 \times 1.31 \left(\frac{a}{8}\right)$
	10	0.85	8		5	1.12	7		1	[0.50]	4
4168.29	15	1.42	$2 \times 7.10 \left(\frac{2a}{3}\right)$	4308.87	1	1.19	$2 \times 6.00 \left(\frac{5a}{9}\right)$				
	15	2.13	3		1	0.61	1				

spectrum. There are also nine pairs with a similar separation for each single pair:—

$$\left(\frac{4a}{3}, \frac{a}{4}, \frac{3a}{5}, \frac{6a}{5}, \frac{a}{6}, \frac{a}{7}, \frac{2a}{7} (2), \frac{a}{9} \right).$$

The peculiar character of the separation which has been repeated in the lines 2917·14 and 3063·21 appears worthy of remark. Two similar lines are of course inadequate for the establishing of a series.

There are 603 lines which break up into three components. Owing to want of space, Table VI, containing these, has been left out; but I shall be pleased to give a copy of the results to anyone who specially desires it. These include many lines with the same separations; and on that account the probability of finding a series should be greater. However, as there is only one interval corresponding to each line, and in addition there is a range of possible error, it will be seen that the number of lines to be considered as having the same separation is in general too large, and the search among those for the lines forming a series becomes one of enormous difficulty. The work connected with this is extremely tedious, and again and again meets with no success. I have sought for series among the lines whose separations are approximately given by 0·72, 0·85, 0·97, 1·09, 1·17, 1·29, 1·82, 2·02, and 2·12. Each of the formulae given by Runge* was tried. Only in two cases where the separations are approximately 2·02 and 1·29 was there a partial success. In those cases the series formula used was

$$\frac{10^3}{\lambda} = a + \frac{b}{m^2} + \frac{c}{m^4}$$

where a, b, c are constants, and m represents the whole numbers taken in order. The following table gives the results.

TABLE VII.

m	λ (calculated)	λ (observed)	Z.E.	i	Difference
2	Used to determine constants.	3537·64	1·98	10, 10	—
3		3155·71	2·00	3, 4	—
4		2894·55	2·05	1, 2	—
5	2765·31	2765·40	2·11	2, 3	- 0·09
2	Used to determine constants.	3127·67	1·27	20, 25	—
3		3044·85	1·29	7, 7	—
4		2980·88	1·29	5, 5	—
5		2946·06	2946·00	1·31	8, 10
6	2925·88	2926·1	—	1 + (Tables)	- 0·22

* C. Runge, "On the harmonic series of lines in the spectra of the elements." Rep. Brit. Assoc., 1888, 576-577.

The final formulae obtained were

$$\frac{10^8}{\lambda} = 39489\cdot70 - \frac{90466\cdot78}{m^2} + \frac{182310\cdot86}{m^4} \quad (1)$$

$$\frac{10^8}{\lambda} = 34758\cdot42 - \frac{22126\cdot18}{m^2} + \frac{43932\cdot78}{m^4} \quad (2)$$

The Zeeman Effect and intensity corresponding to the calculated lines are given where they have been observed. It will be seen that the intensities do not show continuous diminution; but, as has been pointed out, one must not attach too much importance to the intensities. No lines have been observed corresponding to further calculated values. It might be the case that these have disappeared through lack of intensity.

A search has also been made for equal differences between the frequencies corresponding to lines whose separation is approximately 1·17. Many nearly equal differences have been found, but no scheme such as I obtained for tungsten connecting these differences has been discovered. A few of these differences (D) are given below.

TABLE VIII.

n	D	n	n	D	n
28210·42	569·93	27640·49	36266·57	2223·20	33556·82
22166·76	569·93	21596·83	30433·62	2223·20	28210·42
31610·56	1551·64	30058·92	24389·94	2223·18	22166·76
25255·72	1551·62	23704·10	36322·42	4711·86	31610·56
36322·42	3350·57	32971·85	28210·42	4711·92	27640·49
24947·43	3350·60	21596·83			

Included among the triplets are a few of the type first observed by Becquerel and Deslandres, in which the outside components correspond to *p*-vibrations and the centre component to *s*-vibrations.

There are forty-six lines which appear to be unseparated. These are contained in Table IX, which also has had to be omitted. In general the line on the *p*-plates is stronger than on the *s*-plates, though the time of exposure was the same. In the case of the triplets, where all the components are on the same plate, the *p*-components never fall relatively to the *s*-components to the low minimum observed with other substances. This may be a peculiar property of this element.

IV. DISSYMMETRICAL SEPARATIONS AND COMPARISON WITH OTHER SUBSTANCES.

Gmelin* and other observers have shown by various methods that the centre component of the yellow mercury line ($\lambda = 5790$) is displaced towards the red, and the displacement is proportional to the square of the magnetic field. Dufour† has obtained for several lines of chromium displacement of the outside components without displacement of the middle one. In a recent publication‡ I showed that there was apparently a connexion between the rotation of the plane of polarization and the types of dissymmetry observed with the apparatus used by me. It was pointed out that the variation in the amount of rotation corresponded to an alteration in the relative intensity of the middle component of a triplet to the outer components. It was found that with the apparatus used for tungsten, molybdenum, and also for niobium, a minimum intensity of the middle component of the triplets was reached near $\lambda = 2900$, and that corresponding to this turning-point for intensities, there was a change in the type of dissymmetry observed from normal to abnormal. There were a few exceptions, but in general the turning-points in intensity corresponded to turning-points in the type of dissymmetry. The following Table (p. 57) contains the examples of dissymmetrical separations found in the study of niobium.

The letters *a* and *n* denote respectively "abnormal" and "normal" dissymmetry. It will be observed that here again there is a confirmation of what had been observed before. The connexion between the rotation of the plane of polarization and the type of dissymmetry is more firmly established. It is only the *types* of dissymmetry which conform to the rule, since the actual amounts of the dissymmetry appear to be irregular, and the rule even does not hold in all cases. The intensities of the red and violet components are in each case the same, and this also corresponds to what was previously observed.

It is interesting to show, as was done for tungsten and molybdenum, that when a very small displacement is given to one of the kinds of components, the intervals can then be expressed as multiples, with the factors 0, 1, 2, 3, 4 . . . instead of by multiples with factors showing no regularity. This, of course, is a variation of the Ritz law, and also of the Runge one; and two of the points to be noted are that the superposed displacement is in each case small, and that it is not necessary to suppose that so many components have disappeared through lack of intensity. [Table XL.]

* Phys. Zeit., ix, 212, 1908.

† Journal de Physique, ix, 277, 1910.

‡ "Dissymmetrical Separations in the Zeeman Effect in Tungsten and Molybdenum." Proc. Roy. Soc., Edin., vol. xxix, Pt. ii, No. 5.

TABLE X.

λ	Dissym.	Distance from mid. compt. (- towards violet) (+ towards red)	i	Remarks	λ	Dissym.	Distance from mid. compt. (- towards violet) (+ towards red)	i	Remarks
2691.90	n	$\left\{ \begin{array}{l} -0.132 \\ 0 \\ +0.111 \end{array} \right\}$	$\left\{ \begin{array}{l} 6 \\ 6 \\ 6 \end{array} \right\}$		2879.47	n	$\left\{ \begin{array}{l} -0.174 \\ 0 \\ +0.110 \end{array} \right\}$	$\left\{ \begin{array}{l} 2 \\ 3 \\ 2 \end{array} \right\}$	
2697.20	n	$\left\{ \begin{array}{l} -0.135 \\ 0 \\ +0.103 \end{array} \right\}$	$\left\{ \begin{array}{l} 15 \\ 15 \\ 15 \end{array} \right\}$		2880.85	n	$\left\{ \begin{array}{l} -0.149 \\ 0 \\ +0.104 \end{array} \right\}$	$\left\{ \begin{array}{l} 5 \\ 6 \\ 5 \end{array} \right\}$	
2698.99	n	$\left\{ \begin{array}{l} -0.129 \\ 0 \\ +0.109 \end{array} \right\}$	$\left\{ \begin{array}{l} 6 \\ 6 \\ 6 \end{array} \right\}$		2894.55	n	$\left\{ \begin{array}{l} -0.190 \\ 0 \\ +0.168 \end{array} \right\}$	$\left\{ \begin{array}{l} 1 \\ 2 \\ 1 \end{array} \right\}$	
2702.65	n	$\left\{ \begin{array}{l} -0.202 \\ 0 \\ +0.111 \end{array} \right\}$	$\left\{ \begin{array}{l} 3 \\ 3 \\ 3 \end{array} \right\}$		2897.93	n	$\left\{ \begin{array}{l} -0.144 \\ 0 \\ +0.131 \end{array} \right\}$	$\left\{ \begin{array}{l} 15 \\ 15 \\ 15 \end{array} \right\}$	
2764.67	n	$\left\{ \begin{array}{l} -0.190 \\ 0 \\ +0.179 \end{array} \right\}$	$\left\{ \begin{array}{l} 1 \\ 1 \\ 1 \end{array} \right\}$		2899.38	n	$\left\{ \begin{array}{l} -0.141 \\ 0 \\ +0.125 \end{array} \right\}$	$\left\{ \begin{array}{l} 12 \\ 12 \\ 12 \end{array} \right\}$	Minimum intensity of mid. compt.
2765.40	n	$\left\{ \begin{array}{l} -0.177 \\ 0 \\ +0.145 \end{array} \right\}$	$\left\{ \begin{array}{l} 2 \\ 3 \\ 2 \end{array} \right\}$		2947.02	n	$\left\{ \begin{array}{l} -0.171 \\ 0 \\ +0.162 \end{array} \right\}$	$\left\{ \begin{array}{l} 8 \\ 8 \\ 8 \end{array} \right\}$	
2773.32	n	$\left\{ \begin{array}{l} -0.146 \\ 0 \\ +0.098 \end{array} \right\}$	$\left\{ \begin{array}{l} 1 \\ 2 \\ 1 \end{array} \right\}$		3029.90	a	$\left\{ \begin{array}{l} -0.112 \\ 0 \\ +0.195 \end{array} \right\}$	$\left\{ \begin{array}{l} 3 \\ 3 \\ 3 \end{array} \right\}$	
2826.1	n	$\left\{ \begin{array}{l} -0.159 \\ 0 \\ +0.111 \end{array} \right\}$	$\left\{ \begin{array}{l} 1 \\ 2 \\ 1 \end{array} \right\}$		3459.80	a	This is a quadruplet, and appears on plates giving all components as if the parallel doublet had moved towards violet and then there resulted an overlapping of the violet components of the parallel and perpendicular doublets.		
2829.86	n	$\left\{ \begin{array}{l} -0.179 \\ 0 \\ +0.157 \end{array} \right\}$	$\left\{ \begin{array}{l} 1 \\ 2 \\ 1 \end{array} \right\}$						
2835.22	n	$\left\{ \begin{array}{l} -0.167 \\ 0 \\ +0.152 \end{array} \right\}$	$\left\{ \begin{array}{l} 3 \\ 4 \\ 3 \end{array} \right\}$		3949.60	n	$\left\{ \begin{array}{l} -0.296 \\ 0 \\ +0.261 \end{array} \right\}$	$\left\{ \begin{array}{l} 4 \\ 5 \\ 4 \end{array} \right\}$	
2843.75	n	$\left\{ \begin{array}{l} -0.155 \\ 0 \\ +0.142 \end{array} \right\}$	$\left\{ \begin{array}{l} 1 \\ 2 \\ 1 \end{array} \right\}$		3965.82	a	$\left\{ \begin{array}{l} -0.180 \\ 0 \\ +0.236 \end{array} \right\}$	$\left\{ \begin{array}{l} 2 \\ 2 \\ 2 \end{array} \right\}$	

As niobium occupies the same position in the fifth column of Mendelejeff's table as molybdenum does in the sixth, these substances resemble each other in many properties, chemical and physical. Hence it is very probable that this resemblance may also extend itself to their spectra and Zeeman Effect. It is, therefore, of importance to examine for points of similarity and dissimilarity. Like molybdenum, and also tungsten, the spectrum contains many lines. It might be expected from the positions in the periodic system that the resemblance would be greater to the former than the latter. This is

so as regards the sharpness of the lines. Taken generally, the lines in both niobium and molybdenum are not so sharp as those of tungsten, and are also greater in intensity. All three substances resemble each other in having very

TABLE XI.

λ	Displacement		A'
2992·10	s - compt. through	0	1·35 × (1, 1, 2)
3254·23	± ·26	·67 × (1, 2, 2, 3)
3484·25	± ·11	·57 × (1, 2, 3)
4123·99	± ·12	·31 × (1, 2, 3, 4, 6)
4163·81	± ·13	·42 × (2, 3, 4, 6)
4249·61	± ·35	·67 × (1, 2, 4)
4289·62	± ·17	·36 × (1, 2, 3, 5)
4331·56	± ·36	·64 × (1, 2, 4)

many triplets when the light is in the magnetic field. Among those triplets only a small proportion shows the normal interval between the components. This property of having triplets of very varied separations is common to nearly all substances; and it is only by considering the lines which have many components that points of resemblance and difference may be detected. The analysis of the intervals occurring in such lines according to the Runge rule shows that among these multiples a great variety of aliquot parts is to be found, and no general law can be found underlying the aliquot parts occurring in like substances. One finds in the Zeeman Effect of most of the elements lines which break up into 3, 4, 5, and 6 components. On observing the lines which have more than six components in tungsten and molybdenum it is seen that, without a single exception, the numbers of the components are *odd*—W (7, 9, 11, 13,² 15, 17, 19,³)*, Mo (7³, 9, 11). Now, though there are only five lines in niobium which break up into more than six components, the number of components is in each case *even*—Nb (8³, 10²). Tungsten and molybdenum have an even valency, and niobium an odd valency. This suggests the law that substances having an odd valency have an even number of components, and substances with an even valency have an odd number of components for lines which break up into more than six components. This law is absolutely true for these three substances. An examination of all the available results for other substances shows that the law is not general; but that odd numbers

* The index shows the number of times repeated.

of components predominate with an even valency, and even numbers of components with an odd valency. The following table shows the result:—

TABLE XII.

Valency	Components	Valency	Components
I	Cu (8), Ag (8)	II	Mg (7 ² , 9), Zn (9), Cd (9), Ba (8 ²) Hg (7 ² , 8 ² , 9 ² , 13, 14)
III	Al (8), Y (8 ² , 9 ⁵ , 10, 12), Tl (8), Th (7, 8 ³ , 9, 10 ² , 11 ² , 12 ² , 14 ²)	IV	Zr (7 ² , 8 ⁶ , 9 ² , 11 ²)
III or V	Nb (8 ³ , 10 ²)	II or VI	Cr (7 or 8, 9, 15), Mo (7 ⁵ , 9, 11), W (7, 9, 11, 13 ² , 15, 17, 19 ²)

V.—CONCLUSIONS.

(1) The Zeeman Effect in niobium has been completely investigated throughout the whole of the spectrum which could be photographed.

(2) The spectrum contains very many triplets, included among which are some of the type first observed by Becquerel and Deslandres.

(3) Some equal differences between the frequencies of some of these have been found; but no relation connecting those differences has been discovered.

(4) For all lines with more than three components the separations have been given as multiples of the aliquot parts of the "normal interval."

In general, the denominators are small, and the agreement so close that the Runge rule certainly holds. In some cases the denominators are large, and the applicability becomes uncertain, though in some of these also the rule assuredly applies.

(5) The Ritz law has been applied to lines with many components. In many cases it suits very well, and gives an apparently simple relation between the intervals. Sometimes, however, the agreement is not very close; and in other cases it is necessary to assume that many components have disappeared through lack of intensity. Thus, where the law holds it connects the intervals in a simple form, but it is not so generally applicable as the Runge rule.

(6) It has been shown that for most lines with many components if a very small displacement be given to one of the kinds of components, then the separations are multiples with the factors 0, 1, 2, 3,

(7) For substances with *odd* valencies an *even* number of components predominates among the lines with many components: for those with *even* valencies an *odd* number of components occurs most frequently.

(8) Normal and abnormal types of dissymmetry have been observed; and the result obtained by the study of tungsten and molybdenum, namely, that there is a connexion between the rotation of the plane of polarization and the type of dissymmetry, has been confirmed for this substance.

With much pleasure I take this opportunity of expressing my cordial thanks to M. Deslandres, Director of the Observatory at Meudon, Paris, for his great kindness in setting the apparatus necessary for the completion of this research at my disposal.

IV.

THE ELECTRIC CHARGE ON RAIN (PART II).

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AND

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THE present paper deals with the continuation¹ of the work described in an earlier paper. The previous observations were carried out during the months of March, April, May, and June of 1911. The period was a rather dry one, so that while the rain examined was of a very varied character, the total amount was small. Observations were begun again towards the end of October, 1911, and continued up to the end of May, 1912. We have thus been able to obtain a fair sample of the year's rainfall, with the exception of the long-vacation interval. Part of the year, that is from March to June, has been duplicated; and while, as will be seen, the agreement between the two sets of observations is generally good, it is especially good over this particular interval.

The apparatus and method of observation have been described in the previous paper. Some minor replacements and alterations were made, but the form and dimensions of the apparatus remain as before. The method of direct personal observation as against any form of self-recording apparatus has been retained. In the course of our observations of different types of rain, we have found it necessary, in order to obtain accurate readings, to increase the capacity of the electrometer system by amounts varying from .001 to 1 micro-farad. It is clear that no ordinary form of self-registering apparatus could give an adequate record of these widely different types of rain. Something is gained also from an inspection of the character of the rain, the size of the drops, and the conditions under which it occurs. Except in one instance, no observations of potential gradient have been

¹ Proc. Royal Irish Academy, vol. xxix., A. No. 5, February, 1912.

made during this series of experiments. In practically all cases, however, the time of each discharge of the tipping-buckets was noted, so that it is possible to calculate the rate of rainfall at any time, and also to express the charge of the rain as a current per square centimetre of the earth's surface.

Results of Observations.

During the eight months over which this second series of observations extended, rain was examined on sixty-eight separate occasions: on eighteen of these occasions only was there an excess of negative electricity recorded; on fifty occasions the positive electricity was in excess.

The total amount of rain collected in the apparatus was 22,650 c.c., in quantities of 30 c.c. each; of this amount 18,720 c.c., or 82.6 per cent., were positively charged, and the remainder negatively.

This amount of water would correspond to a rainfall of about 4.6 cms. if falling directly into the receiving vessel. The vessel was, however, surrounded by a cylinder rising to a considerable height above it, as described in the previous paper; and as the rain often fell at a large angle to the vertical, the actual rainfall of which we have examined samples is greater than 4.6 cms.

In the previous series of observations, we examined 5113 c.c. of positive rain and 682 c.c. of negative rain. If we combine the two sets of observations, we get 28,445 c.c. of rain, of which 23,833, or 83.8 per cent., are positive.

As to the charge on the rain we find in this series of experiments that 7,112.1 electrostatic units of positive electricity have been brought down as against 2,131.7 units negative. The positive, therefore, forms 76.9 per cent. of the total electricity carried down by the rain. In the previous experiments we had 4151.4 electrostatic units of positive charge, and 289.7 units negative. Combining these results as before, we find a total of 11,263.5 units positive and 2421.4 units negative. Thus the positive forms 82.3 per cent. of the whole. We believe, however, that the results of the present set of observations considered by themselves give a better idea of the general average for the normal year.

That there are considerable variations in the electrical properties of the rain at different times of the year will be seen from the following table, which sets forth a summary made for each month. It furthermore shows the continued predominance of the positively charged rain.

The lowness of the values of the charge per c.c., during the winter months, as compared with the values got in March and May, is readily observed.

TABLE I.

Month.	c.c. of rain examined.		Electrostatic Units of Charge.		Electrostatic Units per c.c.	
	+	-	+	-	+	-
Oct. and Nov.,	5280	600	836.3	234.0	.158	.090
December,	1140	270	129.2	12.4	.113	.016
January,	3870	990	930.8	16.0	.240	.016
February,	3210	960	622.0	22.8	.194	.024
March,	4020	690	3963.8	1811.7	.986	2.63
April,	240	0	11.0	0	.046	—
May,	960	420	629.0	34.8	.656	.083

The previous observations strengthen this point, for the average values of charge per c.c. for March, April, May, and June, 1911, were .81 and .41 for positive and negative respectively. This contrast will also appear if we examine the number of times that different values of the charge per c.c. have occurred. The following tables give the number of discharges of the tipping-bucket, each discharge representing 30 c.c. of rain, which had values of charge per c.c. lying within certain limits.

TABLE II.

A.—*Positive Rain.*

Month.	Charge per c.c. in Electrostatic Units.										
	< .1	.1 - .2	.2 - .3	.3 - .4	.4 - .5	.5 - 1	1 - 2	2 - 3	3 - 4	4 - 5	> 5
Oct. and Nov.,	84	40	27	16	4	5	—	—	—	—	—
December,	25	8	4	—	—	1	—	—	—	—	—
January,	28	35	21	22	13	10	—	—	—	—	—
February,	41	26	19	6	6	10	—	—	—	—	—
March,	37	25	7	2	3	19	23	3	1	1	6
April and May,	26	1	—	—	—	2	8	2	1	—	—
Total,	241	135	78	46	26	47	31	5	2	1	6

[10*]

TABLE II.

B.—*Negative Rain.*

Month.	Charge per c.c. in Electrostatic Units.										
	< .1	.1 - .2	.2 - .3	.3 - .4	.4 - .5	.5 - 1	1 - 2	2 - 3	3 - 4	4 - 5	> 5
Oct. and Nov.,	5	4	2	3	2	2	2	—	—	—	—
December,	8	1	—	—	—	—	—	—	—	—	—
January,	34	—	—	—	—	—	—	—	—	—	—
February,	32	—	—	—	—	—	—	—	—	—	—
March,	9	—	—	—	—	2	4	1	1	—	6
May,	12	—	—	—	2	—	—	—	—	—	—
Total,	100	5	2	3	4	4	6	1	1	0	6

The contrast between the charges observed in winter and those observed at other times is, perhaps, best shown in the case of the negatively charged rain which, as the above table shows, gave practically no charge higher than .1 E. S. unit per c.c. during the months of December, January, and February.

Different Types of Rain.

In the previous paper we drew a distinction between three classes of rain; (1) "Fine rain," consisting of exceedingly small drops which are always negatively charged; (2) "Large rain," consisting of drops relatively very much larger; and (3) "Mixed rain," consisting of a mixture of types (1) and (2). This classification with some extensions still affords a convenient basis for discussing our more extended observations.

"Large" Rain.

The "large rain" is highly charged. The excess of this rain is positively charged, and the average value of the positive charge per c.c. is from 1 to 2 electrostatic units. Very high positive charges sometimes occur, values as great as 12 electrostatic units per c.c. having been observed. The negative charges which occur with this type of rain are always high also; their values are about the same as that of the positive charges, but they occur less frequently. Abnormally high negative charges are also observed, as in the case of the positive. The manner in which the negative charges on this "large rain" appear was noted in the previous paper. The usual positive

charging is interrupted quite suddenly, negative charges appear for a short time, and then there is an abrupt return to the usual positive charges. The occurrence of the negative charges appears to be associated more particularly with the end of the shower, but this does not hold universally. Rain of this "large" class is generally heavy, but the size of the drops is the chief characteristic. It has seldom been observed during the months October to February, and appears to be generally accompanied by the conditions we associate with thunderstorms. In the course of our experiments, however, we have not had the opportunity of taking observations during a thunderstorm.

"Mixed" Rain.

In very decided contrast to the highly charged type discussed above is the class of rain we previously distinguished as "mixed rain." Here the positive predominates again. The values of the positive charge are, however, small, the average being about $\cdot 2$ to $\cdot 3$ electrostatic unit per c.c. No high values are found. The negative charge on this type of rain is even smaller, the values obtained being usually less than $\cdot 1$ electrostatic unit per c.c., and most of them being very much less. Nothing, in fact, serves to separate out the two classes of rain so clearly from one another as this disparity in the values of the negative charges. As regards the size of the drops, this kind of rain would well deserve the title of "mixed," but not as a mixture of two definite classes, large and small; but rather as a mixture of drops of all sizes varying from the fairly large down to the very fine. The manner in which the negative charges occur in this type of rain is, however, very suggestive of the idea of a mixture of two types bearing opposite charges. In this case there is no abrupt transition from large positive to large negative charges, but a gradual shading from small positive into small negative values. There is much fluctuation in the values of these small charges, and the changes of sign are occasionally very frequent. It is often possible, as was pointed out in the previous paper, to associate the appearance of negative charging with an excess in the finer kind of rain. Again, rain of this sort often begins with fine drops which are negatively charged; but as it becomes heavier, and the drops increase in size, a positive charge is observed. It is not asserted that this type of rain is always a mixture of two classes which are oppositely charged, but rather that such a state of affairs appears to exist frequently. This particular type of rain occurs at all times of the year, but is especially marked in the winter months, at which period the heavily charged type is absent. It is frequently heavy, but has not the more violent characteristics of the other type. It occurs often in a steady, continuous downpour, while

the "large rain" is rather of a showery or temporary nature. It would appear also to come generally from low-lying clouds, whereas the highly charged type appears to come from a greater height.

"Fine Rain."

It was pointed out in the previous paper that rain consisting of *exceedingly* small drops was frequently noted and found to be always negatively charged. We have had few cases of this extreme type during the winter months. When it occurred it was, as before, negatively charged. Owing to the very small precipitation of water during this type of rain, only a few observations of the charge per c.c. were made; the average value of the charge was about 0.1 electrostatic unit per c.c.

Current in Ampères per sq. cm.

We may express the charge brought down by the rain as a current per sq. cm. of the earth's surface. As we have previously pointed out, owing to the way in which the receiver is shielded by a surrounding cylinder it gets only a fraction of the total rainfall. The correction to be applied will vary with the velocity of the wind. By comparison with an unshielded rain-gauge we have estimated the correction, and it is believed that the following tables are substantially correct. They show the number of times that values of the current lying between certain limits have been observed:—

TABLE III.

A.—Positive Rain.

Month.	Current in Ampères $\times 10^{-15}$ per sq. cm.			
	< 5	5 - 10	10 - 20	> 20
November,	75	5	8	1
December,	34	1	—	—
January,	104	10	2	—
February,	67	30	3	—
March,	49	9	5	55
May,	19	—	—	13
Total,	348	55	18	69

TABLE III.
B.—*Negative Rain.*

Month.	Current in Amperes $\times 10^{-15}$ per sq. cm.			
	< 5	5 - 10	10 - 20	> 20
November,	5	5	7	3
December,	9	—	—	—
January,	34	—	—	—
February,	31	—	—	—
March,	5	—	—	14
May,	12	—	2	—
Total,	96	5	9	17

Here again we see the contrast between the winter and the spring or summer months. This, of course, is altogether due to the causes which we have pointed out already—namely, that practically all the rainfall of the winter months is made up of the lightly charged type, and that in the summer months the heavily charged type occurs occasionally. As in the previous case we might note that the distinction is even more marked in the case of the negative than in the case of the positive rain.

Maximum Values of Charge.

It is interesting to note specially some of the highest values of the charge that have been observed. Each discharge of the tipping bucket corresponds to 30 c.e., and each observation therefore deals with that amount of rain.

TABLE IV.
A.—*Positive Rain.*

Occasion.	Charge per c.e. in Electrostatic Units.
3rd May, 1911,	3.4
”	3.3
23rd June, 1911,	9.1
”	7.2
”	6.9
”	4.6
”	4.1

TABLE IV.—*continued.*

Occasion.	Charge per c.c. in Electrostatic Units.
5th March, 1912,	12·3
„	10·3
„	8·7
„	8·4
„	6·3
„	5·6
„	4·2
1st May, 1912,	3·2

B.—*Negative Rain.*

Occasion.	Charge per c.c. in Electrostatic Units.
23rd June, 1911,	4·9
5th March, 1912,	9·0
„	8·3
„	7·4
„	6·6
„	6·2
„	3·3

The following table gives the greatest values of current per sq. cm. observed. In this manner of representing the result the rate at which the rain is falling is of course taken into account as well as the charge per c.c.:

TABLE V.

Occasion.	Current per sq. cm. in Ampères $\times 10^{-15}$.
5th March, 1912,	+ 814
„	+ 704
„	+ 580
„	+ 550
„	- 370
„	- 343
„	- 275

Observations on Snow and Hail.

During this series of observations snow occurred on only one day, the 4th February, 1912. Four showers fell during the day, and observations of each were made. The potential gradient was also observed during the showers. Estimates of the quantity of snow falling into the receiver were made by exposing a second vessel near the apparatus from which the snow could be removed at intervals and measured.

The results were as follows:—

- (1) *First Shower.*—The flakes were very small. Fifty-five grammes of snow had a charge of 553 negative electrostatic units. The potential had a very high negative value during the shower.
- (2) *Second Shower.*—The flakes were at first small, and 30 grammes collected during the period had a charge of 176 negative units. Later the flakes were large, and 245 grammes gave a charge of 830 positive units. The potential at first had a high negative value, but after the sign of the charge on the snow had changed it took a high positive value.
- (3.) *Third Shower.*—Little snow fell, and the flakes were very small. Thirty grammes gave a charge of 7 negative units. The potential was small.
- (4.) *Fourth Shower.*—The flakes were again small. A charge of 40 negative units was given by 120 grammes of snow. The potential was small during the fall of the snow; just previously it fluctuated between high positive and high negative values.

The first three showers occurred in rapid succession, while the fourth was some hours later. The most remarkable feature of these few observations on snow is the high value of the charge per gramme both when positive and when negative, and the very high values of the potential gradient during the fall of the snow. During the observations recorded in the previous paper, we observed negative values of the potential during snow, as high as 2500 volts, at a point where the normal potential was about 100 volts. The high values now recorded were of a similar magnitude.

The previous observations on a few snow-showers gave in each case a negative charge; from the present observations it would seem that the larger flakes are positively charged. Simpson usually found a positive charge on snow, and the difference may arise from the type dealt with.

Only two very short showers of hail were observed; and, as in the case of a single shower previously recorded, the charge was positive and of the order of from one to two electrostatic units per gramme.

In the case of one of these showers, it began as hail, then gradually changed to rain. No discontinuity in the electrical effects was noted, the rain being of the highly charged positive type. This fact is interesting, as it puts hail and highly charged rain in the same category; the circumstances of their occurrence are very similar, and in this case identical.

Discussion.

On the main issue of these experiments our work is in agreement with that of Simpson¹ and Baldit;² there appears to be no doubt that a large excess of positive electricity is brought down to the Earth by rain. This holds true, whether the rain is accompanied by thunderstorms as in Simpson's work, or during normal electrical conditions as in the case of our observations. In some details there is not complete agreement between the observations of Simpson, Baldit, and our own. Simpson and Baldit found the highest positive and negative charges in the case of light rain. Our experience has been that the high charges per c.c. are in most cases associated with heavy rain. Again, Baldit states that during light rains the highest charges are generally negative. When the rain consists of exceedingly minute drops, and such rain is usually light, we find the charge always negative, but generally we could not say that the highest charges are usually negative on light rain. As appears from the previous pages, we have found it easier to analyse our results by using the size of the drops rather than the rate of rainfall.

The great excess of positive charge on rain is the common feature of all recent work on the subject, and must be taken into account in future attempts to found a theory of atmospheric electricity. That there should be such an excess under the normal electrical conditions as well as during thunderstorms increases the difficulties of the subject when viewed in the light of our present very imperfect knowledge of atmospheric electric constants. The air-to-earth current due to conductivity in the air is positive under the normal potential gradient, and we have now another current of the same sign due to rain.

The theory of thunderstorms which Simpson has put forward, that the separation of electricity and the charge on rain during thunderstorms is due to the breaking up of raindrops in vertical air-currents, appears to afford an explanation of many of the phenomena of thunderstorms. Our work now shows that the rain occurring under normal electrical conditions is charged, generally speaking, in a similar manner to thunderstorm rain, and it is a question whether the conditions such as vertical air-currents which Simpson assumes can be supposed to exist under normal conditions. More experimental work is required on the breaking up of drops by air-currents and on the exact manner in which the separation of positive and negative electricity occurs. Again, while we have extensive measurements of the small ions in

¹ Simpson, *Phil. Trans.* ccix, 1909, p. 379; *Proc. Roy. Soc.*, lxxxiii, 1910, p. 394.

² Baldit, *Le Radium*, Avril, 1911; *Mars*, 1912.

the atmosphere, little work has been done on the subject of the large ions shown to exist by Langevin. The larger ions are almost certainly of much greater importance than the small ions as regards condensation and atmospheric electricity in general. On these two subjects work is in progress, and we hope to publish further results at an early date.

The experimental results in this paper may be summarized as follows:—

(1) Of the rain tested, 82·6 per cent. was positively charged and the remainder negatively; of the electricity brought down by the rain, 76·9 per cent. was positive.

(2) A distinction is made between different types of rain:—

(a) A type which seldom occurs during winter and of which the drops are relatively large, is distinguished by the high charge it carries, the average value being from 1 to 2 electrostatic units per c.c. The charge on this type is nearly always positive.

(b) A less highly charged type which occurs throughout the year, and especially during the winter months. The drops are relatively smaller, and differ in size. The average charge per c.c. is from 0·1 to 0·2 electrostatic units, and the sign of the charge is usually positive.

(c) Rain consisting of exceedingly minute drops is sometimes observed, and the charge is small and always negative.

(3) Tables are given showing the distribution of charge per c.c. between certain limits. Other tables, in calculating which the rate of fall of the rain is taken into account, show the current in amperes per sq. cm. of the Earth's surface.

(4) Snow was observed with charges of both signs; the charge was negative when the flakes were small, and a positive charge was observed in the case of a shower of large flakes. The charge on snow per gramme was high, and the snow was accompanied by high values of the potential gradient. Hail was observed on only two occasions, and it had a positive charge.

All the observations recorded in this paper were made during what may be called normal electrical conditions. We had no opportunity of observing the electric charge on rain during a thunderstorm.

V.

THE LARGE IONS IN THE ATMOSPHERE.

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IN recent years much work has been done in the study and measurement of the ions in the atmosphere. In practically the whole of this work, however, attention has been devoted solely to ions similar to those produced directly when a gas is subjected to an ionising agent, and having a mobility of the order of 1.6 cms. per second in an electric field of 1 volt per cm. Although Langevin,* in papers published in 1905, drew attention to the existence in the atmosphere of another class of ions of much smaller mobility and even more numerous than the ordinary ions, work on atmospheric ionisation has continued to deal solely with the ordinary ions.

Langevin showed that these large atmospheric ions have a mobility of the order of $\frac{1}{3000}$ cm. per second as compared with 1.6 cm. per second for the ordinary ions, and that they are about fifty times more numerous than the ordinary ions. Further, the theory of the production and nature of these large ions developed by Langevin suggests that they are probably of great importance in general meteorological theory. The only other detailed investigation of these large atmospheric ions is that of Pollock† and Lusby‡ at Sydney in 1909; and their results, while giving a smaller number than Langevin's for the large ions per c.c., agree in showing their general occurrence and importance.

The object of the present investigation is to obtain further data regarding the number of these large ions in the atmosphere, and their origin and properties. Further reference to the important work of Langevin and of Pollock and Lusby will be deferred until we are discussing the observations recorded in this paper.

* Comptes Rendus, 1905, cxi, pp. 232-234; Le Radium, 1907, p. 218.

† Proc. Roy. Soc. N.S.W., 1909, pp. 61-68, and pp. 198-203, Science, 1909, pp. 919-928.

‡ Proc. Roy. Soc. N.S.W., 1909, pp. 55-60.

Description of Apparatus.

To obtain saturation currents when dealing with ions of very small mobility, it is necessary that the gas should either be drawn through a very intense electric field, or else that its time of passage through the field should be prolonged. To allow of the use of moderate potentials, and in order to be able to deal, as we wished, with large volumes of air, the apparatus took the following form. The air was drawn by means of a motor and fan through a

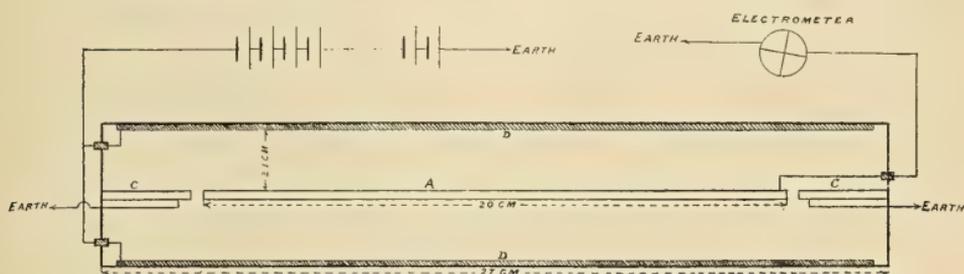


FIG. 1.

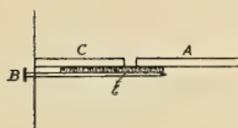


FIG. 2.

long, wooden, rectangular tube about 550 cms. in length. The internal cross-section of the tube is shown in the diagram, fig. 1. It was 27 cms. in width and 4.5 cms. deep. The top and bottom inside surfaces were covered with tinfoil (*D*) laid on a thin sheet of paraffin, the insulation being sufficiently good to enable the tinfoil surfaces to be kept at the desired potential by means of small storage-cells. Half way between these horizontal conducting surfaces there was placed a glass plate (*A*) covered with tinfoil. The plate was supported as shown in fig. 2 on a few small metal rods (*B*) projecting through the sides of the tube, and was insulated from the rods by paraffin wax (*E*), the rods themselves being connected to earth. The top and bottom conducting-surfaces (*D*) were kept at a high voltage, and the middle plate (*A*) was joined to a Dolezalek electrometer by a suitably shielded wire. From the method of support just described, no leak to the electrometer system could occur except through the air. The middle plate and the tinfoil surfaces on the top and bottom of the tube were 457 cms. in length.

so that the air passed along about 90 cms. of the tube before entering the field between the charged surfaces. The distance between the top and bottom surfaces and the plate *A* was 2.1 cms. The plate *A* was 20 cms. wide, and between it and the vertical sides of the tube were placed strips (*C*) of glass coated with tinfoil and earthed, so as to leave a space of about 5 mms. between the earthed strips and the plate connected with the electrometer. The object of the strips was to assist in making the transverse field uniform. All the electrometer connexions were led through tubes coated with tinfoil and earthed, so as to shield the system from external disturbances. The capacity of the apparatus and electrometer was .0011 microfarad; and it was generally necessary to introduce another capacity in order to diminish the rate of motion of the spot of light on the electrometer scale.

The electrometer as usually employed gave about 1,000 scale-divisions for a volt. In most of the experiments the air was drawn through the apparatus by means of a fan. The end of the tube was fitted into a box with an outlet-tube, in which the fan worked. In this tube was placed also an air-metre, which enabled the flow of air to be measured. In some experiments described later, the flow of air was produced and measured by means of a large reservoir constructed like an ordinary gas-holder.

The apparatus described was designed after a number of experiments on a smaller scale. We found it more satisfactory to deal with considerable volumes of air, and the large size of the apparatus constituted no objection. It was placed in such a position that, by opening adjoining windows, the air tested was entering directly from a small quadrangle.

Although this paper is chiefly concerned with the large ions in the atmosphere, we found it desirable to make some measurements of the number

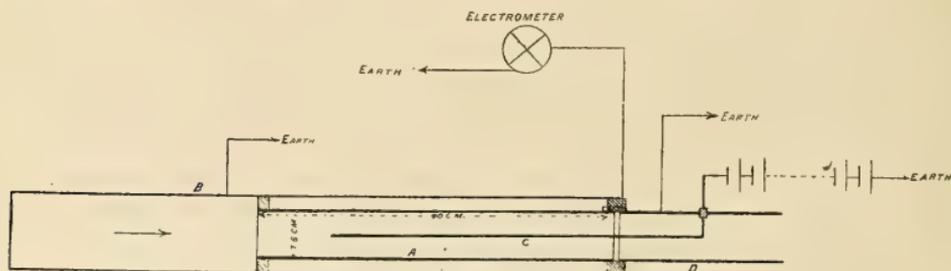


FIG. 3.

of small ions present. The apparatus used for this purpose is shown on fig. 3. It consisted of a cylindrical tube *A*, 3.2 cms. in radius and 40 cms. long, insulated and joined to an electrometer, and shielded by an outer earth-

connected tube *B*. Along the axis of *A* was placed a metal rod *C*, of 2 mms. radius, which was joined to one terminal of a number of small storage-cells. The tube *D* led to the fan used to draw the air through tube *A* and the air-meter to measure the flow. The tube *B* projects beyond the tube *A* so that the stream of air enters *A* with considerable velocity; and the rod *C* is not carried to the end of *A*. This arrangement ensures all the ions of one sign being collected on *A*; they are not prevented from entering by an electric field, as the tube *A* during an observation is never much different from zero potential.

Sufficient voltage was applied to *C* to remove all the small ions; the number of large ions collected was negligible or the necessary correction could be made.

The arrangement was such that the electrometer could readily be joined to the apparatus for measuring the small ions, or to that for measuring the large ions.

Mobility of the Ions.

The first point investigated was the mobility of the large ions; and some care was taken to decide whether the large ions were all of the same mobility, or whether they were a mixture of ions of different masses.

The method consisted in plotting the saturation curve carefully, and the theory of the method is well known. In the larger apparatus, suppose the velocity of the air-stream at a distance *y* from the insulated plate joined to the electrometer is *u*, and that the uniform potential gradient is *V* volts per cm., then the transverse velocity of an ion is *kV*, where *k* is the mobility of the ion. Hence, if *x* is measured along the middle plate from the point where the air leaves the electric field, and if the outer plates are charged positively, we have, for the path of a positive ion the equation,

$$\frac{dy}{dx} = \frac{kV}{u}. \quad (1)$$

If *a* be the width of the tube, then

$$kaV dx = a u dy.$$

Hence, for saturation of the ions of mobility *k*, we require a voltage *V* given by the equation

$$kaVl = a \int u dy, \quad (2)$$

where *l* is the length of the insulated central plate.

But the integral $a \int u dy$ taken over the section between the central and one of the charged plates is the quantity *Q* of air passing through this cross-section per second.

Hence

$$kaVl = Q$$

and

$$k = \frac{Q}{aVl}. \quad (3)$$

The equation (2) also shows that for a voltage V' less than V the ions of mobility k will be taken out of a volume Q' of air given by

$$Q' = kaV'l$$

Hence, if these ions are uniformly distributed through the air, the current obtained by their agency is proportional to the voltage; and the graphical representation of this relation is a straight line through the origin until the saturation point is reached. If there are a finite number n of distinct types of ion, each with definite mobility and uniformly distributed in the air, the relation between current and voltage will be represented by a curve, any ordinate of which is the sum of the ordinates (for the same voltage, of n curves, each of these curves consisting of a straight line through the origin till the saturation voltage is reached, after which the line is parallel to the voltage axis. The curve, therefore, which would represent the relation between current and voltage would be a crooked curve concave to the voltage axis, consisting of n parts, each of which is a straight line, and finally becoming parallel to the voltage axis. If the ions were not divided into distinct groups,

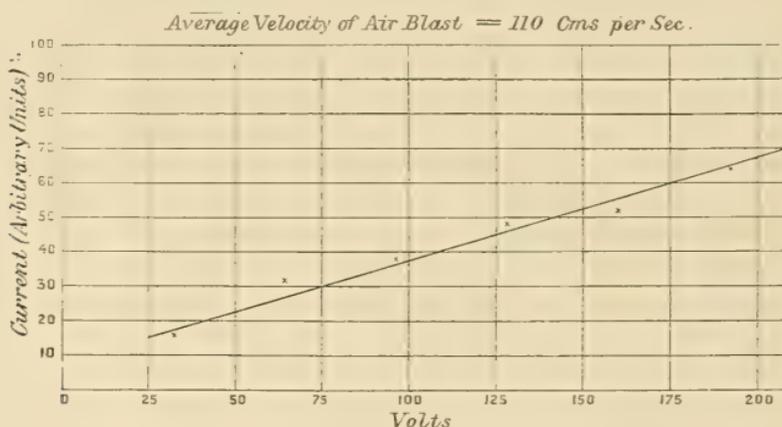


FIG. 4.

but had mobilities merging gradually from one into the other, the graphical representation would be a continuous smooth curve concave to the voltage axis, and finally turning into a straight line parallel to this axis.

In seeking the actual relation between current and voltage, it is not convenient to construct the whole of the curve from saturation downwards in one series of observations, because if an air-blast is used of such velocity that

saturation can be reached with moderate voltages, the current obtained from voltages far away from saturation will be too small for accurate measurement. Further, it is desirable to make observations as rapidly as possible on account of the variable nature of the atmospheric ionisation. The method of procedure, therefore, was to make a separate examination of the part of the curve remote from saturation, using an air-blast considerably greater than that used when it is desirable to obtain saturation. Fig. 4 shows this portion

Average Velocity of Air Blast = 16.7 Cms per Sec.

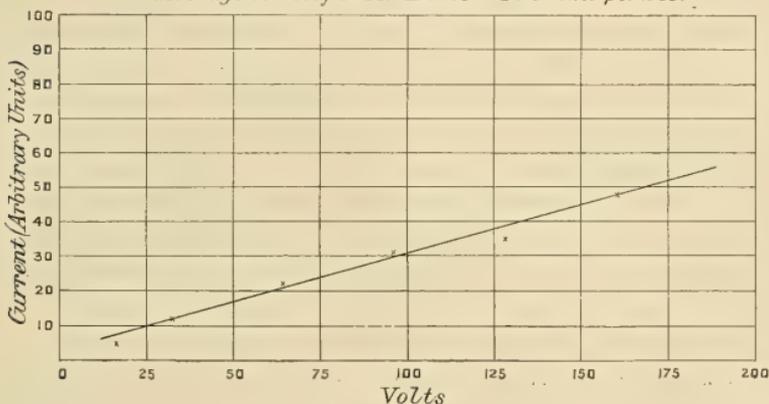


FIG. 5.

of the curve. Here the value of Q was such that the curve includes a range of voltages that would saturate ions of mobilities varying from $\frac{1}{30}$ to $\frac{1}{100}$ cm./sec.

Average Velocity of Air Blast = 53.5 Cms per Sec.

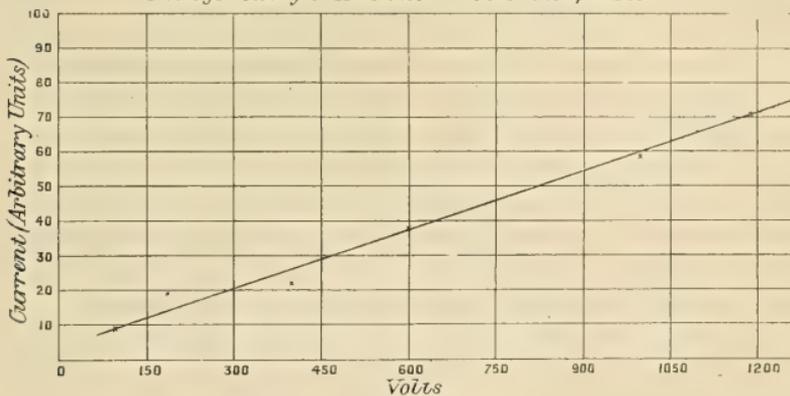


FIG. 6.

There is no evidence of any bend in this portion. Again, the curve (fig. (5)) gives the relation between voltage and current for a range of voltages that would saturate ions of mobilities ranging from $\frac{1}{100}$ to $\frac{1}{200}$ cm./sec., and (fig. 6) the

relation for a range which would saturate ions of mobilities from $\frac{1}{2000}$ to $\frac{1}{20000}$ cm./sec. In none of these curves is there any evidence of a bend indicating any heterogeneity in the ions. It may be mentioned that in all these cases the small ions present would be removed by a fraction of a volt, and their presence is indicated by the fact that the curve produced back does not appear to pass through the origin.

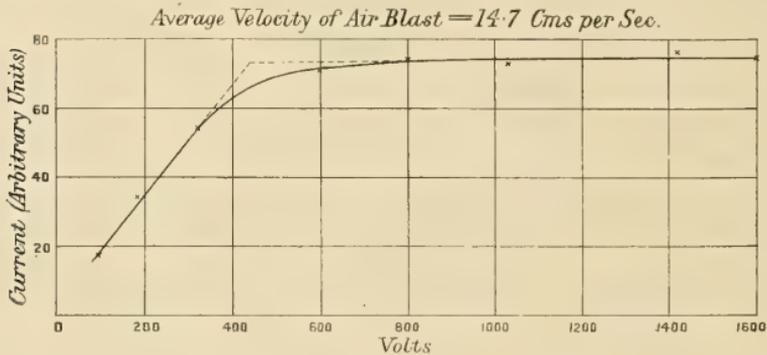


FIG. 7.

The curve (fig. 7) is plotted with such an air-blast and voltages that complete saturation is reached; and if we take 450 as the saturation voltage, the value of Q being 832 c.c. per second, we get the value $\frac{1}{3100}$ for the mobility of the large ions.

It should be observed that it is often a matter of very considerable difficulty to get a satisfactory long series of observations for graphical representation. This difficulty arises from the great and sometimes sudden variations that take place in the number of large ions present. The curves referred to above were only obtained after a great number of trials, retaining those only in which the ionisation remained steady during the time required to take a complete series of observations.

The series of curves just described show that all the large ions present in the atmosphere have approximately the same mobility. Our work gives no indication of the presence of ions of an intermediate size distinguished by a mobility of the order of $\frac{1}{100}$ cms. per second as found by Pollock.

The value of the mobility given above, $\frac{1}{3100}$ cm. per second, is in good agreement with Langevin's observations.

Record of Observations on the Number of large Ions per c.c. of the Atmosphere.

It will be seen later that the number of small ions in the atmosphere is only a very small fraction of the number of large ions. Hence the total

ionisation measured by observing the saturation current in the larger apparatus consists almost entirely of large ions, and their number per c.c. can be at once obtained if we assume that each carries the electronic charge.

Over 400 sets of observations were made of this number; and values were found varying between 3,700 per c.c. and 60,000 per c.c., the average number being about 16,000. The observations extended with intervals for a period of over twelve months from May, 1911, to June, 1912. The number present is subject to large and rapid variations; and the method employed in setting forth the general results of the observations is to give merely the average for any one day, unless when very large variations were observed or other points of interest occurred. These are specially noted.

In the earlier stages of the work we took some care to examine whether there was any difference in the numbers of positive and negative large ions; but we found no evidence of such a difference of appreciable magnitude. In the table N denotes the number of large positive ions per c.c., and n the number of small positive ions per c.c. on the occasions on which they were measured. The small values found for n will be discussed later.

Discussion of Observations.

The following tables show the very wide variations in the value of N . It is difficult in seeking a cause for these variations to associate them with definite accompanying conditions of the atmosphere, particularly when it is considered that sudden changes of great magnitude often take place without any apparent change in the meteorological conditions. Neglecting abnormalities, there is no great difference in the mean value of N for each month over which the observations extended. There is, perhaps, a slight excess for the winter months. The changes seem to follow rather the changes of weather. In the very dry and warm weather of May and June the values of N varied for the most part between 5,000 and 10,000, and similar small values have been found in dry weather in November and during a period of dry frost in January. Damp and wet weather seems, on the other hand, to be accompanied by greater values of N .

Abnormally high values of N were obtained on a few occasions during an exceptionally heavy rainfall. A great number of observations have been made during rain; but the exceptionally high values were on each occasion accompanied by an abnormally great downpour, the rain-drops being very large and falling vertically. On one of these occasions N was 60,000. The value 53,000 was obtained during a very dense "mist" fog. High values were always obtained when observations were taken during fogs. On a few

DATE	<i>N</i>	<i>n</i>	REMARKS.
May 11, 1911	15,000	—	—
„ 12	15,000	—	—
„ 13	8,000	—	—
„ 15	11,000	—	At 11.30 a.m. At 8 p.m. during heavy rain <i>N</i> was
„ 15	32,000	—	32,000. It increased to 60,000 at 9 p.m. during a
„ 15	60,000	—	very heavy downpour, and decreased to 16,000 as
„ 15	16,000	—	the rain ceased about 10.30 p.m.
„ 16	16,000	—	—
„ 18	11,000	—	At 3.30 p.m.
„ 18	20,000	—	At 9 p.m., increasing to 31,000 at 9.30 p.m.
„ 18	31,000	—	Very warm, cloudless.
„ 19	7,000	—	At 4.30 p.m.
„ 19	13,000	—	At 7.30, increasing to 32,000 at 9.30 p.m.
„ 19	32,000	—	Very warm, cloudless.
„ 20	6,000	—	—
„ 22	8,000	—	—
„ 23	5,000	—	—
„ 24	5,000	—	—
„ 26	9,000	—	—
„ 29	12,000	—	—
„ 30	8,000	—	—
„ 31	10,000	—	—
June 1	16,000	—	—
„ 2	11,000	—	—
„ 6	8,000	—	—
„ 7	8,000	—	—
„ 19	6,000	—	—
July 7	17,000	—	—
„ 11	21,000	—	—
Oct. 20	22,000	—	—
„ 23	12,000	—	—
„ 24	17,000	—	—
„ 26	10,000	—	Variation from 10,000 to 16,000 in about a half-
„ 26	16,000	—	hour during transition from light to heavy rain.
„ 26	8,000	—	Later, in about an hour, <i>N</i> changed from 8,000 to
„ 26	43,000	—	43,000, the latter during a very heavy downpour.
„ 26	13,000	—	<i>N</i> then decreased to 13,000 as rain became
			lighter.

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DATE	<i>N</i>	<i>n</i>	REMARKS.
Nov. 1, 1911	7,000	69	Weather dry.
" 2	5,000	74	"
" 4	11,000	74	"
" 6	8,900	44	"
" 8	30,000	48	"
" 9	15,000	147	Average for <i>N</i> on a rainy day. <i>n</i> initially was 147, then diminished and remained steady for a considerable time about 26.
" 9	—	26	
" 10	15,000	41	Average of <i>N</i> and <i>n</i> for a rainy day. <i>n</i> varied from 23 to 70.
" 15	7,000	90	
" 20	16,000	38	
" 27	16,000	—	
" 29	33,000	—	At 11 a.m. thick "smoke fog." Later <i>N</i> varied from 19,000 to 8,000 as the atmosphere became clearer on afternoon of same day.
" 29	14,000	—	
" 30	28,000	—	
" 30	15,000	—	After interval of about two hours.
Dec. 2	19,000	—	
" 4	12,000	61	
" 6	16,000	31	
" 8	16,000	57	
" 13	10,000	69	
" 20	15,000	—	
" 21	18,000	—	
Jan. 1, 1912	17,000	—	Limits of 25 observations taken during this interval.
to Jan. 12, 1912	10,000	—	
" 22	22,000	—	Dense fog previous night; light fog during morning.
" 25	19,000	—	
" 28	10,000	—	
" 29	9,000	—	
" 31	15,000	—	
Feb. 1	15,000	—	At 10.30. Snowstorm at 12 noon during which <i>N</i> rose to 55,000.
" 1	55,000	—	
" 1	54,000	—	In the evening during another shower 54,000 was obtained, falling to 18,000 when snow ceased.
" 1	18,000	—	
" 2	10,000	—	Snow on ground. Dry and frosty.
" 23	53,000	—	A very dense "mist" fog about 9 p.m.

DATE	N	n	REMARKS.
Mar. 27, 1912	8,000	—	Several observations at night varying from 8,000 to
„ 27	20,000	—	20,000.
April 12	8,000	—	—
„ 13	5,000	—	At 3.45 a.m.
„ 13	6,000	—	At 2.15 p.m.
„ 16	23,000	31	At 9.30 p.m.
„ 17	5,500	184	About 20 observations between 6 a.m. and 4 p.m.,
„ 17	9,000	67	N varying from 5,500 to 9,000, and n from 184 to 67.
„ 22	41,000	—	At 9 p.m. Light fog. Very warm, cloudless weather.
„ 23	4,500	—	At 4.15 a.m.
„ 23	12,000	163	At 11.30 a.m.
„ 23	10,000	69	At 5 p.m.
„ 23	19,000	—	At 8.40 p.m.
„ 24	12,000	—	At 4.15 a.m.
„ 24	6,000	149	At 12.30 p.m.
„ 25	7,000	173	At 2.30 p.m.
„ 25	19,000	17	At 9.30 p.m.
„ 26	6,000	79	At 4.15 a.m.
„ 26	5,500	197	At 10.30 a.m.
„ 26	12,000	48	At 7.30 p.m.
„ 26	17,000	43	At 9.15 p.m.
„ 27	19,000	37	At 4.15 a.m.
„ 29	16,000	44	At 9.45 p.m.
„ 30	6,000	—	At 5 p.m.
„ 31	4,200	—	At 4 a.m.
„ 31	3,700	—	At 10.30 a.m.

mornings during which there were “smoke” fogs, the values were high, but decreased as the atmosphere became clearer.

On one day observations were taken during a snowstorm. About two hours before the snow began, N had the value 15,000. The snow fell for about an hour; and during that time N increased to 55,000. In the evening of the same day there was another fall during which the value 54,000 was obtained, diminishing to 18,000 when the snow ceased falling.

The following variation was observed eight times during warm, cloudless weather. The values of N during the day—that is, at different times before 6 p.m. on these occasions—were between 5,000 and 11,000. Between

9 and 10 p.m. the values on the same days were between 16,000 and 41,000. This increase in the evening was found on all occasions on which such observations were taken in that particular type of weather.

Many observations of N were made during the night. In general they showed no striking difference from the values obtained during the day-time.

The table contains many instances of very great changes in the value of N in a short time. The variable nature of N is further emphasized by the diagram (fig. 8), which gives the values of N , taken at half-hour intervals during a prolonged period when the number was not specially unsteady.

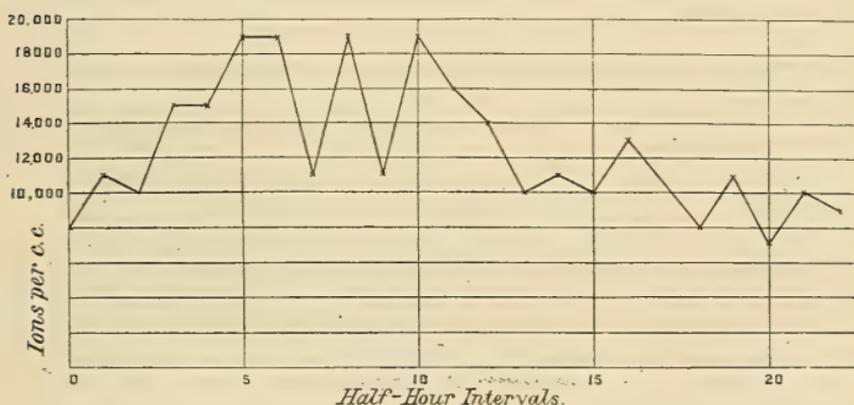


FIG. 8.

On several occasions, long-continued series of observations were made alternately on the number of positive and negative ions. These failed to show any appreciable difference between the numbers of positive and negative at any time.

The values of N obtained by us are, on the whole, much greater than those found by Pollock in Sydney. In his investigation a series of 117 observations gave 5,500 as the maximum, and 600 as the minimum value of N , the mean for the positive ions being 1,914 and for the negative 2,228. The values obtained by Langevin give an average of about 10,000.

Reproduction of the Ions.

With a view of ascertaining the nature and process of formation of the large ions, experiments were made on the reproduction of these ions in air which had been previously freed from them. For this purpose a cylindrical gas-holder with a water-seal was employed. Its capacity was about 450,000

cubic centimetres, and by suitably varying the pressure a very steady air-stream of the required amount could be obtained. The air was drawn into the gas-holder through the apparatus, so that all the large ions were removed during its passage through the electric field, the saturation current c being observed. It was stored for various intervals in the gas-holder and again sent through the electric field, the saturation current c' being again taken. It was found that for different values of c , when the deionised air was stored in the gas-holder for the same interval, the values of the ratio of c' to c were much more concordant than the absolute values of c' . The results of experiments over different intervals are shown in the curve (fig. 9), where the abscissae denote

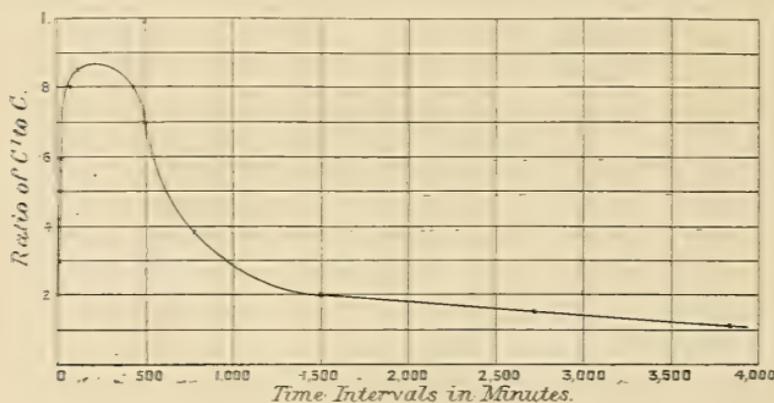


FIG. 9.

the time-intervals during which the air was stored, and the ordinates represent the values of the ratio of c' to c . It will be seen that the value of the ordinate has almost reached its maximum of 0.86 in about an hour, remains more or less constant for a considerable time, and then falls somewhat rapidly at first, and then very slowly towards zero. It seems, therefore, that large ions may be reproduced in air from which they have been removed by an electric field, though not to the same extent as before, and that these ions very slowly disappear again.

To see how long the process of reproduction can go on in a given mass of air from which the large ions are removed at intervals by an electric field, the following experiments were carried out. The air was first drawn into the gas-holder *A* through the electric field, all the large ions being in this way removed. After an interval of ten minutes it was sent through the electric field again into another similar gas-holder *B*, the saturation current being observed. It was sent from *B* to *A* after an interval of ten minutes, the saturation current being again taken; and this process was repeated for several

intervals. The results are represented in the curve (fig. 10), where the ordinates represent the saturation currents in arbitrary units, and the abscissae represent the time measured from the first passage of the air from *B* to *A* at which the successive observations were made. The curve shows that large ions are produced again after the air has been repeatedly freed from them, though the amount produced during any interval is less than that produced during the preceding interval. The air becomes less effective in producing large ions according as those already produced are removed. From this it would seem that the reproduction of the large ions does not depend merely on the state of the air as regards such characteristics as humidity, tempera-

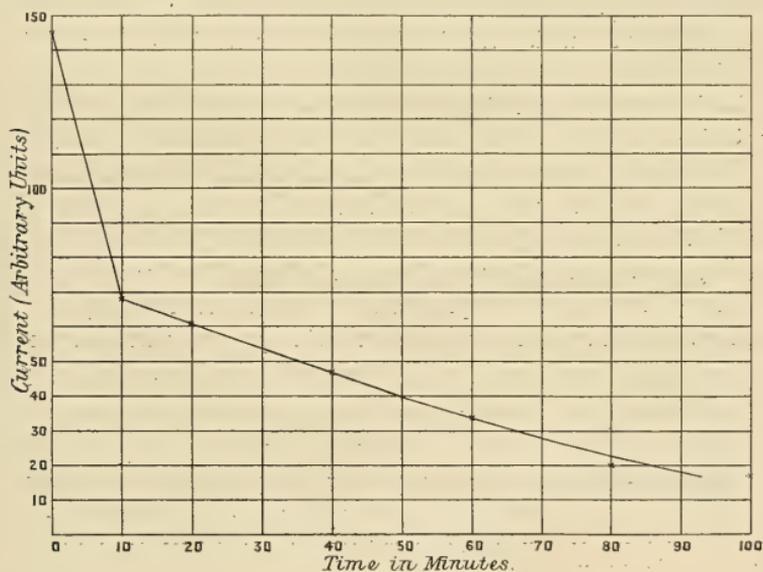


FIG. 10.

ture, or pressure; nor does it depend merely on the amount of radioactive or penetrating radiation to which it is exposed. The air must contain a limited quantity of something from which the large ions are produced and portion of which is removed with the large ions formed from it. From these considerations one is immediately led to examine the possibility of the large ion being formed by a nucleus suspended in the air, originally uncharged, but becoming charged by attracting to it one of the small ions, of which a certain number always exist in the atmosphere. The existence of such nuclei has been abundantly proved by the condensation experiments of Aitken, Wilson, and others.

The truth of this conception of the large ion receives strong confirmation

from experiments performed by us on the effect on the reproduction of the large ions of filtering the air through cotton-wool. The air was drawn into the reservoir through a plug of cotton-wool tightly packed and of considerable length. It was allowed to remain in the gas-holder for about an hour and a half, corresponding to the time for maximum reproduction of large ions in ionised air, and was then examined by passing it through the electric field and taking the saturation current. The saturation current obtained was only $\cdot 14$ of that of the free air. The filter became more and more effective in preventing the reproduction of the large ions as the quantity of cotton-wool was increased, and as it was more closely packed, so that it seems likely that by very perfect filtering the air could be reduced to a state in which no large ions would be reproduced. This is what would happen if all the nuclei present in the air and capable of forming large ions were removed, and corresponds with the fact that no cloud is produced by small expansions when the air is filtered through cotton-wool before being allowed into the condensation chamber. There is, therefore, strong evidence for considering these large ions as being formed by an uncharged centre attracting to it a small ion present in the air.

Having arrived at this conception of the large ions, we must examine more closely the nature and properties of the nuclei necessary for their production. What is probably the most striking characteristic of the large ions is the fact that they are all of the same size. If, therefore, the large ion consists of a small ion and a nucleus, the nuclei must all be of the same size. Chauveau* in examining the nature of the nuclei necessary for the condensation experiments of Aitken considers the sources of "dust" in the form of fine solid particles suspended in the atmosphere; for example, the raising of considerable quantities of matter from the surface of the ground by upward air-currents, especially in desert countries, and the occasional volcanic eruptions which project immense quantities of finely divided matter to a great distance. Though admitting the difficulty of certain proof, he gives reasons for considering it doubtful if in normal air there is a sufficient quantity of solid matter in a fine state of division to account for the experiments of Aitken, who quotes 100,000 per cc. as the number of these nuclei frequently obtained near the ground. There is an incomparably greater difficulty in accepting these solid dust particles as being the nuclei concerned in the formation of large ions; for it is not conceivable that the particles produced without any apparent regular law could be all of the same size.

* *Le Radium*, avril, 1912, pp. 161-169.

On the other hand, the theory which Langevin has developed of the formation of the large ion agrees well in its general outlines with the experimental results in this paper. J. J. Thomson* and Langevin† have shown independently from thermodynamical considerations that water condensed in the form of invisible drops may exist in the atmosphere even when it is far from being saturated with water-vapour, and the probable size of these drops indicated by theory when they are in stable equilibrium is in good agreement with the size of the large ion as indicated by its mobility. Langevin regards these invisible water-drops as the nuclei from which the large ions are formed, when they acquire a charge by collision with a small ion.

Assuming this theory of the production of the large ions, some points regarding the relations between the numbers of uncharged nuclei, small ions, and large ions present at any time may be further discussed.

Langevin‡ considers that the fraction of the liquid nuclei which is charged at any time is independent of the number of small ions. He imagines the large ions as being produced by the diffusion of the small ions to the uncharged centres, the production of large ions being limited by the recombination of the large ions with the small ions of the opposite sign, so that if the small ions of both signs be equally numerous there will be established a permanent state in which a fraction of the particles is transformed into large ions. This fraction he considers independent of the number of small ions at any time, since the formation and recombination both take place to an extent proportional to the number of small ions present.

Experiments conducted by us are not in agreement with this view. These experiments were made on the effect of the γ rays from radium on the rate of production of large ions in deionised air stored in the gas-holder. The results showed that exposure to the γ rays increased the number of large ions produced in any time. When the exposure lasted for somewhat more than an hour corresponding to the time necessary for the maximum value of e'/c (fig. 9), the value now obtained was 2 instead of $\cdot 86$.

When air filtered through cotton-wool was subjected to γ rays, there was no appreciable increase in the number of large ions produced, a fact in agreement with the theory that the failure of filtered air to reproduce large ions is due to the removal of the essential nuclei by the cotton-wool.

Theory would seem to agree with the results obtained by us, if we take into account the recombination of large ions of opposite signs. Consider a

* Conductivity through Gases. † Le Radium, avril, 1912. ‡ Soc. de Physique, 19 mai, 1905.

mass of air, from which all the large ions have been removed by an electric field, but which contains a certain number of liquid nuclei. Large ions will be gradually produced in the air. Suppose N_1 is the number of uncharged nuclei at any time, and N the number of large ions of either sign. An increase in N will be due to further diffusion of the small ions to the neutral nuclei, and the rate of this increase will be proportional to the product of N_1 and the number of small ions of either sign which we shall call n . Opposed to this increase will be the loss due to recombination of the large ions of one sign with the small ions of the opposite sign, the rate of which will be proportional to the product Nn , and also the loss due to recombination of the large ions of one sign with those of the opposite sign, the rate of which will be proportional to N^2 . Hence we have

$$\frac{dN}{dt} = \beta N_1 n - \gamma N n - \delta N^2,$$

where β , γ , δ are constants. Theoretical considerations show that β and γ are each of the same order as a , the ordinary coefficient of recombination of small ions, though somewhat less than this quantity, while δ is very much smaller. The equation shows that N will increase to a maximum when

$$\beta N_1 n = \gamma N n + \delta N^2,$$

after which it will diminish gradually. If the air be strongly ionised, n will be great compared with N , so that δN^2 will be small compared with the other terms. In this case when N is maximum the fraction $\frac{N_1}{N}$ will approach the value $\frac{\gamma}{\beta}$. If, however, the air be exposed to the weak natural sources of ionisation, then

$$\frac{N_1}{N} = \frac{\gamma}{\beta} + \frac{\delta N}{\beta n}. \quad (1)$$

Consequently, when N is maximum, a less fraction of the nuclei then present will be large ions:

The Small Ions.

The number of small ions in the atmosphere at any time is of great importance; and for the past ten years much work has been done in measuring it under very varied conditions. The number usually found per c.c. varies considerably, but generally lies between 500 and several thousands, a mean value being about 1500. These results are usually deduced from observations with Ebert's well-known apparatus. In such calculations, however, no account is taken of the large ions present in the atmosphere; and

considerable doubt has been thrown on their accuracy as giving the correct number of small ions by Pollock, who asserts that in the Ebert apparatus a very considerable fraction of the large ions are collected by the insulated terminal, the result being to give far too high a value for the number of small ions. In Pollock's own measurements of the small ions, using an apparatus and voltage such as to collect all the small ions and only an insignificant fraction of the large ones, he obtained at Sydney values, the maximum of which was 157, the minimum zero, the mean of 128 observations giving 39 for the number of positive and 38 for the number of negative ions per c.c. Langevin measured the small ions in the same way; and his statement that the number of large ions was about fifty times the number of small ones would give the number 200 for the small ions per c.c. This also is far below the values ordinarily quoted. The discrepancy between the values of n quoted by observers who take no account of the large ions, and the values given by those who have considered the large ions, is further emphasized by our measurements made on twenty-three days at different periods of the year. The table shows the maximum observed value of n to be 197 and the minimum 17, the mean value being 78.

Direct observations on the number (q) of small ions produced per second in a cubic centimetre of air by natural ionisation give 5 or 6 as a mean value for this quantity. In the case of natural ionisation in ordinary air, in finding the relation of n and q we must take into account the recombination of the small ions with the large ions of the opposite sign, and also the diffusion of small ions towards uncharged nuclei as affecting the steady state. In the steady state we will therefore have

$$q = \alpha n^2 + \beta N_1 n + \gamma N n, \quad (2)$$

where α is the ordinary coefficient of recombination of small ions of opposite signs, and the other letters have the same meaning as above. In this equation the terms involving the number of large ions and of neutral nuclei will be of far greater importance than the term αn^2 in the case of ordinary air, where n is so small in comparison with N or N_1 . We have at present but very meagre data to compare the value of q obtained from this equation with that found by experiment. Suppose, however, we take β and γ of the same order as α , say 10^{-6} ,* and suppose for N_1 we take the value 50,000, which would be an average value for the number of nuclei per c.c. obtained by Barus by his condensation apparatus; then assuming for n and N the average values 80 and

* The value of α obtained by McClung in filtered air is 1.5×10^{-6} (Phil. Mag., 1902, pp. 283-305).

16,000, we get for γ the value 5. In this calculation we have assumed that all the nuclei of Barus are of the nature of those necessary for the production of large ions. We shall return to this point later. The values of γ , therefore, derived from the results given by Langevin, Pollock, and by our own observations, seem to agree much better with the results of direct measurements than those deduced from the values of n given by observers working with Ebert's apparatus, when we take into account the combination of small ions with large ions of opposite signs and with neutral nuclei. Rutherford* has drawn attention to the effect of finely divided particles suspended in the air in hastening the loss of conductivity of the air, when the source of ionisation has been withdrawn, and, as has been pointed out, this effect will be relatively of very great importance in the case of air exposed only to natural sources of ionisation.

The point referred to above—namely, whether only some or all of the condensation nuclei of Aitken and Barus are identical in character with the nuclei required for the formation of large ions—is one of very great interest. In a series of his experiments Pollock failed to notice any condensation on large ions by expansion. This, however, is explained by the fact that the "dust" was removed by a preliminary process, and very probably with it were removed the large ions and the nuclei from which they are formed. In fact, these experiments are in agreement with our observations that no large ions and no fresh nuclei are produced in a closed vessel containing air from which these nuclei have been removed. Barus† gives a very detailed account of daily values of the number of nuclei present per c.c. during the greater part of the years 1903 and 1904. These values were obtained by condensation methods. They range from 10,000 to 100,000, and are, therefore, of the same order of magnitude as we should expect if they were all of the same nature as the nuclei from which large ions are formed. Similar values have been obtained by Aitken.

All the observations on the number of large ions per c.c. in the atmosphere recorded in this paper were taken at the College buildings situated in the city, and the question arises to what extent the numbers observed may be peculiar to the air of a city, and what results might be expected in purer air. Other work at present being carried on in this laboratory has shown that, in the gases drawn from flames of various sorts, the ions decrease in mobility with time until the same value is reached as we have found for the large atmospheric ions, and their mobility then remains constant. This is in

* *Phil. Mag.*, 1897, pp. 422-440.

† A continuous record of Atmospheric Nucleation. *Smithsonian Contributions to Knowledge*, vol. xxxiv, 1905.

agreement with the results of Bloch.* These results would suggest that possibly a large proportion of the large ions may be due to such causes, and that a much smaller number would be found in air at a distance from large towns. On the other hand, we have frequently observed the large ions present during the night and in the early hours of the morning, and, although on several such occasions the air was being rapidly renewed, the number present was not abnormally small. We hope at an early date and with a more portable form of apparatus to obtain measurements at other places outside the city.

In conclusion we may emphasize the necessity for a more careful study of the action of the recording apparatus used at many stations to measure the ionisation in the atmosphere, as at present it is by no means clear what is being measured.

* Société Française de Physique, 1905, p. 456.

VI.

THE QUADRATIC VECTOR FUNCTION.

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INTRODUCTION.

A LINEAR vector function of a vector contains the independent variable to the first degree. If we represent this variable by ρ , the function, being a vector, may be written $\alpha S\alpha'\rho + \beta S\beta'\rho + \gamma S\gamma'\rho$, a form obtained by resolving the vector along the three vectors α, β, γ . If $\alpha = \alpha', \beta = \beta', \gamma = \gamma'$, the function is self-conjugate; but it is not so in general. This is the most general form of linear vector function of ρ . The properties of this function have been examined very fully by Joly and Tait, following Hamilton. It can always be inverted, that is, we can always find a solution of the equation $\sigma = \phi\rho$, where σ and form of ϕ are given, and ρ is to be determined. We have written $\phi\rho$ for the general linear vector function. A very remarkable property of this function is the following, proved in any treatise on Quaternions* :—Every linear vector satisfies a symbolic cubic equation of the form

$$\phi^3 - m'\phi^2 + m'\phi - m = 0.$$

The meaning of this is that the operator on the left annihilates every vector. ϕ^3 and ϕ^2 are used in their ordinary sense. The coefficients in this cubic are called the *invariants* of the function.

Thus the general linear vector function is easily investigated. It is not so with the general quadratic vector function. This function contains the independent variable to the second degree. It is a vector, and if we resolve it along the three known vectors a_1, a_2, a_3 , the function takes the form $xa_1 + ya_2 + za_3$, x, y, z being scalar quadratic functions of ρ , and therefore may be expressed as $S\rho\phi_1\rho, S\rho\phi_2\rho, S\rho\phi_3\rho$, where ϕ_1, ϕ_2, ϕ_3 are linear vector

* v. Joly, Manual of Quaternions, pp. 93, foll.

functions, and no generality is lost if ϕ_1, ϕ_2, ϕ_3 are taken self-conjugate. So the general quadratic vector function of ρ is of the form

$$a_1 S\rho\phi_1\rho + a_2 S\rho\phi_2\rho + a_3 S\rho\phi_3\rho,$$

where ϕ_1, ϕ_2, ϕ_3 are self-conjugate linear functions. On account of this occurrence of three functions, some results on the invariants and associated functions of three linear vector functions have been prefixed by way of introduction. The symbolic cubic of Φ is found, where

$$\Phi = k_1\phi_1 + k_2\phi_2 + k_3\phi_3,$$

and on working it out in the ordinary way the results of § 1 are evident. It is not difficult to prove that the scalar functions $a_{12}, b_{12},$ and d_{123} are invariants. The methods in the introductory paragraphs are developed from an unpublished MS. of Professor A. W. Conway. They are perfectly general, and their extension to any number of functions is easy. All the relations between the invariants and concomitants of the three functions have not been worked out. In particular, in the case of the results in §§ 5, 6, only those have been written down that were wanted in the actual working.

The invariants and concomitants have not now the same meaning as in the case of the linear function. Defining them as in § 12, the subsequent working is not difficult; yet the results are interesting. Then an attempt has been made to classify these functions by examining conditions that make them binomial or monomial, and not trinomial. The results are not satisfactory, and the general investigation is very difficult. Some particular cases are easy.

The very important question of inversion has only been touched. It is not satisfactory either for the same reason as above. One particular case can be fully investigated. Before the general question of inversion, something has been said on the number of roots for which the function vanishes. Of course this might be regarded as a particular case of the problem of inversion. A word on what Professor A. W. Conway calls the "central axes" of the function concludes the notes.

I.—*Invariants and Covariants of Three Linear Vector Functions.*

1. If

$$\Phi = k_1\phi_1 + k_2\phi_2 + k_3\phi_3,$$

Φ satisfies a symbolic cubic

$$\Phi^3 - m''\Phi^2 + m'\Phi - m = 0,$$

where

$$(A_1) \quad m = k_1^3 m_1 + k_2^3 m_2 + k_3^3 m_3 + k_1^2 k_2 a_{12} + k_2^2 k_1 a_{21} + k_2^2 k_3 a_{23} \\ + k_3^2 k_2 a_{32} + k_3^2 k_1 a_{31} + k_1^2 k_3 a_{13} + d_{123} k_1 k_2 k_3,$$

[15*]

$$(B_1) \quad m' = k_1^2 m'_1 + k_2^2 m'_2 + k_3^2 m'_3 + k_2 k_3 b_{23} + k_3 k_1 b_{31} + k_1 k_2 b_{12},$$

$$(C_1) \quad m'' = k_1 m''_1 + k_2 m''_2 + k_3 m''_3. \quad \text{Where}$$

$$(D_1) \quad a_{12} = \frac{\Sigma S \phi_1 \lambda \phi_1 \mu \phi_2 \nu}{S \lambda \mu \nu}, \quad a_{21} = \frac{\Sigma S \phi_2 \lambda \phi_2 \mu \phi_1 \nu}{S \lambda \mu \nu},$$

$$(E_1) \quad b_{12} = \frac{\Sigma S \lambda (\phi_1 \mu \phi_2 \nu + \phi_2 \mu \phi_1 \nu)}{S \lambda \mu \nu} (= b_{21}),$$

$$(F_1) \quad d_{123} = \frac{\Sigma S \phi_1 \lambda (\phi_2 \mu \phi_3 \nu + \phi_3 \mu \phi_2 \nu)}{S \lambda \mu \nu},$$

λ, μ, ν being any three non-coplanar vectors.

Φ' satisfies the same equation.

2. If we put

$$\chi'_{12} V \mu \nu = V (\phi_1 \mu \phi_2 \nu + \phi_2 \mu \phi_1 \nu),$$

we have

$$(A_2) \quad d_{123} = \chi_{23} \phi_1 + \chi_{31} \phi_2 + \chi_{12} \phi_3 = \phi'_1 \chi'_{23} + \phi'_2 \chi'_{31} + \phi'_3 \chi'_{12}.$$

For

$$S \lambda \mu \nu d_{123} = \Sigma S \phi_1 \lambda \chi'_{23} V \mu \nu = \Sigma S \lambda \phi'_1 \chi'_{23} V \mu \nu,$$

and λ, μ, ν are arbitrary. Evidently $\chi_{23} = \chi_{32}$.

The general function whose components are $\phi_{1a}, \phi_{2b}, \phi_{3c}$, may be treated similarly.

2a. Since

$$a_{12} = \frac{\Sigma \phi_2 \lambda \phi_1 \mu \phi_1 \nu}{S \lambda \mu \nu} = \frac{S \phi_1 \lambda \chi'_{12} V \mu \nu + S \phi_2 \lambda \phi_1 \mu \phi_1 \nu}{S \lambda \mu \nu},$$

$$S \phi_1 \lambda \chi'_{12} V \mu \nu = a_{12} S \lambda \mu \nu - S \phi_2 \lambda \phi_1 \mu \phi_1 \nu;$$

and \therefore , since λ, μ, ν are arbitrary,

$$(A_{2a}) \quad \chi_{12} = a_{12} \phi'_1{}^{-1} - m_1 \phi'_1{}^{-1} \phi'_2 \phi'_1{}^{-1},$$

and similarly

$$(B_{2a}) \quad \chi_{12} = a_{21} \phi'_2{}^{-1} - m_2 \phi'_2{}^{-1} \phi'_1 \phi'_2{}^{-1},$$

with analogous results for ϕ_1 and ϕ_2 .

Equating these and reducing, we get the cubic of $\phi'_1 \phi'_2{}^{-1}$.

$$(C_{2a}) \quad m_2 [\phi'_1 \phi'_2{}^{-1}]^3 - a_{21} [\phi'_1 \phi'_2{}^{-1}]^2 + a_{12} [\phi'_1 \phi'_2{}^{-1}] - m_1 = 0,$$

and the three invariants of $\phi'_1 \phi'_2{}^{-1}$ are

$$m_{12} = \frac{m_1}{m_2}, \quad m'_{12} = \frac{a_{12}}{m_2}, \quad m''_{12} = \frac{a_{21}}{m_2},$$

3. Using the ordinary definition of Ψ , $\Psi V\lambda\mu = V\Phi'\lambda\Phi'\mu$, we get for our function easily

$$\Psi = k_1^2\psi_1 + k_2^2\psi_2 + k_3^2\psi_3 + k_2k_3\chi_{23} + k_3k_1\chi_{31} + k_1k_2\chi_{12},$$

and

$$X = k_1\chi_1 + k_2\chi_2 + k_3\chi_3.$$

4. We may get these results as follows:—

$$a_{12} = \phi_1\chi_{12} + m_1\phi_2\phi_1^{-1}, \quad a_{21} = \phi_2\chi_{12} + m_2\phi_1\phi_2^{-1} \text{ (v. § 2a above),}$$

and from § 1 we have, on substitution for a_{12} and a_{21} in A_1 ,

$$m = \Sigma k_1^3 m_1 + \Sigma k_1^2 k_2 [\phi_1\chi_{12} + m_1\phi_2\phi_1^{-1}] + \Sigma k_2^2 k_1 [\phi_2\chi_{12} + m_2\phi_1\phi_2^{-1}] \\ + k_1 k_2 k_3 [\phi_1\chi_{23} + \phi_2\chi_{31} + \phi_3\chi_{12}].$$

Grouping terms, we get on reduction

$$m = (k_1\phi_1 + k_2\phi_2 + k_3\phi_3)(k_1^2\psi_1 + k_2^2\psi_2 + k_3^2\psi_3 + k_1k_2\chi_{12} + k_2k_3\chi_{23} + k_3k_1\chi_{31}) = \Phi\Psi, \\ \text{as above.}$$

5. Writing this result

$$m(k_1\phi_1 + k_2\phi_2 + k_3\phi_3)^{-1} = \Sigma k_1^2\psi_1 + \Sigma k_2k_3\chi_{23} = \Sigma k_1^2 m_1\phi_1^{-1} + \Sigma k_2k_3\chi_{23},$$

and expressing that the invariants of both sides are equal, we get another batch of identities on comparing the coefficients of k 's, and incidentally can form the symbolic cubic of χ_{12} . We can write down at once

m of $m_i\phi_i^{-1}$ is m_i^2 , m' of $m_i\phi_i^{-1}$ is $m_i m_i''$, m'' of $m_i\phi_i^{-1}$ is m_i' , and

$$a_{ij} \text{ of } m_i\phi_i^{-1} \text{ and } m_j\phi_j^{-1} \text{ is } m_j a_{ji},$$

we shall denote by $a_{i(j)}$, $a_{(ij)i}$ and $\chi_{i(j)}$ the a -invariants and χ -functions of $m_i\phi_i^{-1}$ and χ_{ji} and the symmetrical invariant of these and $m_j\phi_j^{-1}$ by $d_{ij(ij)}$.

$$(\Sigma k_1^3 m_1 + \Sigma (k_1^2 k_2 a_{12} + k_2^2 k_1 a_{21}) + k_1 k_2 k_3 d_{123})^2 =$$

$$\Sigma k_1^6 m_1^2 + \Sigma k_2^3 k_3^3 m_{23} + k_1 k_2 [\Sigma k_2^2 k_3^2 d_{23(12)}] + k_2 k_3 [\Sigma k_1^2 k_2^2 d_{12(23)}] \\ + k_3 k_1 [\Sigma k_1^2 k_2^2 d_{12(31)}] + k_1^2 k_2^2 k_3^2 [d_{123} + d_{(12)(23)(31)}] + k_1^2 [\Sigma k_1 k_2^2 k_3 d_{(12)(23)1}] \\ + k_2^2 [\Sigma k_1 k_2^2 k_3 d_{(12)(23)2}] + k_3^2 [\Sigma k_1 k_2^2 k_3 d_{(12)(23)3}] + 2\Sigma [k_1^4 k_2^2 m_1 a_{21} + k_2^4 k_1^2 a_{12} m_2] \\ + 2\Sigma [k_1^5 k_2 a_{1(12)} + k_2^5 k_1 a_{2(12)}] + 2\Sigma k_1^4 k_2 k_3 a_{1(23)} + \Sigma [k_1^4 k_2^2 a_{(12)1} + k_2^4 k_1^2 a_{(12)2}] \\ + k_1^2 k_2^2 k_3^2 \Sigma a_{(23)1} + \Sigma k_1^2 k_2^2 k_3 a_{(12)(23)} + \Sigma k_1 k_2^2 k_3^2 a_{(23)(12)}. \quad (A_5)$$

$$[\Sigma k_1^3 m_1 + \Sigma (k_1^2 k_2 a_{12} + k_2^2 k_1 a_{21}) + d_{123}] [k_1 m''_1 + k_2 m''_2 + k_3 m''_3] =$$

$$\Sigma k_2^3 k_3 c_{2(23)} + \Sigma k_3^2 k_2 c_{3(23)} + \Sigma k_2 k_3^2 k_1 c_{(23)(31)} + \Sigma k_1^4 m_1 m''_1 + \Sigma k_1^2 k_2^2 m'_1 m''_2 + \Sigma k_1^2 k_2^2 c_{12} \\ + \Sigma k_1^2 k_2 k_3 c_{1(23)}, \quad (B_5)$$

where c_{12} is the symmetrical b -invariant of $m_1\phi_1^{-1}$ and $m_2\phi_2^{-1}$ and $c_{1.23}$ the corresponding function for $m_1\phi_1^{-1}$ and χ_{23} (v. E_1).

Finally

$$(C_5) \quad \Sigma k_1^2 m'_1 + \Sigma k_1 k_2 b_{12} = \Sigma k_1^2 m''_1 + \Sigma k_2 k_3 m''_{23}.$$

[m_{12} , m'_{12} , m''_{12} refer to χ_{12} , not to $\phi'_1 \phi'^{-1}_2$, as in C_3 .]

6. It is not necessary to write down all the relations between the invariants got from these identities. But we have

$$(A_6) \quad m''_{12} = b_{12}, \quad m'_{12} = a_{12} m''_2 + a_{21} m''_1 - c_{12},$$

$$m_{12} = 2m_1 m_2 + 2a_{12} a_{21} - d_{12(12)}.$$

Suppose we find m_{12} directly. Consider the expression

$$S V (\mu v' + \mu' v) V (v \lambda' + v' \lambda) V \lambda \mu' + \lambda' \mu.$$

Reducing, it becomes

$$= S V (\mu v' + \mu' v) [\mu' S v \lambda' \lambda - \mu S v' \lambda' \lambda - \lambda (S \lambda \mu' v + S \lambda \mu' v')] - \lambda' (S \lambda' \mu v - S \lambda \mu v')$$

$$= S \mu' \mu v S v \lambda \lambda' - [S \lambda' \mu v + S \lambda \mu' v + S \lambda \mu v'] [S \lambda \mu' v' + S \lambda' \mu v' + S \lambda' \mu' v]$$

$$- S v \mu' \mu S v' \lambda' \lambda + S \lambda' \mu v S \lambda \mu' v + S \lambda' \mu v' S \lambda \mu' v - S \lambda' \mu' v S \lambda \mu v'.$$

Since

$$S V \mu' v V (V \mu v' V \lambda' \lambda) - S V \lambda' \lambda V \mu' v V \mu v' = 0,$$

and $S \mu' \mu v S v \lambda' \lambda = S \mu' v \lambda' S \mu v \lambda + S \mu' v' v S \lambda' \mu \lambda + S \mu' v \lambda S \lambda' v \mu,$

we get the required expression

$$(B_6) \quad = S \lambda \mu v S \lambda' \mu' v' - (S \lambda' \mu v + S \mu' v \lambda + S v' \lambda \mu) (S \lambda \mu' v' + S \mu v' \lambda' + S v \lambda' \mu').$$

Put $\lambda = \phi'_1 \alpha$, $\mu = \phi'_1 \beta$, $v = \phi'_1 \gamma$, $\lambda' = \phi'_2 \alpha$, $\mu' = \phi'_2 \beta$, $\gamma' = \phi'_2 \gamma$;

then

$$V (\mu v' + \mu' v) = \chi_{12} V \beta \gamma;$$

so finally

$$n_{v12} = a_{12} a_{21} - m_1 m_2.$$

Cor.—

$$d_{12(12)} = 3m_1 m_2 + a_{12} a_{21}.$$

(C₆) Sought cubic is

$$\chi_{12}^3 - b_{12} \chi_{12}^2 + (a_{21} m''_1 + a_{12} a''_2 - c_{12}) \chi_{12} + (a_{12} a_{21} - m_1 m_2) = 0.$$

7. Suppose now ϕ_1, ϕ_2, ϕ_3 are self-conjugate; let ρ and σ be two vectors

$$\phi_1 \sigma S \lambda \rho + \phi_2 \sigma S \mu \rho + \phi_3 \sigma S \nu \rho$$

is a particular case of Φ , $k_1 = S \lambda \rho$, etc. Its discriminant is

$$\Sigma m_1 S \lambda \rho^3 + \Sigma [a_{12} S \lambda \rho^2 S \mu \rho + a_{21} S \lambda \rho S \mu \rho^2] + d_{123} S \lambda \rho S \mu \rho S \nu \rho.$$

If ϕ_1, ϕ_2, ϕ_3 are transformed by any linear substitution, λ, μ, ν are transformed by the contragredient transformation. Suppose, in fact, the ϕ 's transformed

$$\phi_1 = a_{11} \phi_1 + a_{12} \phi_2 + a_{13} \phi_3$$

$$\phi_2 = a_{21} \phi_1 + a_{22} \phi_2 + a_{23} \phi_3$$

$$\phi_3 = a_{31} \phi_1 + a_{32} \phi_2 + a_{33} \phi_3,$$

and suppose $\lambda_1 = A_{11}\lambda + A_{12}\mu + A_{13}\nu$, etc., we have 3 sets of equations like

$$\begin{aligned} 1 &= a_{11}A_{11} + a_{21}A_{21} + a_{31}A_{31} \\ 0 &= a_{12}A_{11} + a_{22}A_{21} + a_{32}A_{31} \\ 0 &= a_{13}A_{11} + a_{23}A_{21} + a_{33}A_{31}. \end{aligned}$$

$$\text{Giving } A_{11} = \frac{\begin{vmatrix} a_{22} & a_{32} \\ a_{23} & a_{33} \end{vmatrix}}{D} \quad D = \begin{vmatrix} a_{11} & a_{21} & a_{31} \\ a_{12} & a_{22} & a_{32} \\ a_{13} & a_{23} & a_{33} \end{vmatrix}.$$

8. Vectors α, β, γ exist such that $\phi_2\gamma = \phi_3\beta, \phi_3\alpha = \phi_1\gamma, \phi_1\beta = \phi_2\alpha$ for $\phi_2\phi_1^{-1}\phi_3\alpha = \phi_3\phi_1^{-1}\phi_2\alpha$, or α is the spin-vector of $\phi_2\phi_1^{-1}\phi_3$ (or $\phi_3\phi_1^{-1}\phi_2$) and $\beta = \phi_1^{-1}\phi_2\alpha, \gamma = \phi_1^{-1}\phi_3\alpha$. We see

$$\begin{aligned} (x_{21}\phi_1 + x_{22}\phi_2 + x_{23}\phi_3)(x_{31}\alpha + x_{32}\beta + x_{33}\gamma) \\ = (x_{31}\phi_1 + x_{32}\phi_2 + x_{33}\phi_3)(x_{21}\alpha + x_{22}\beta + x_{23}\gamma), \end{aligned}$$

or α, β, γ , are co-gredient with ϕ_1, ϕ_2, ϕ_3 . If now we put

$$\lambda = V\beta\gamma, \quad \mu = V\gamma\alpha, \quad \nu = V\alpha\beta,$$

we have, e.g.,

$$V\beta\gamma = V\alpha\beta(x_{21}x_{32} - x_{22}x_{31}) + V\beta\gamma(x_{22}x_{33} - x_{23}x_{32}) + V\gamma\alpha(x_{23}x_{31} - x_{21}x_{33}),$$

or, λ, μ, ν are contragredient to ϕ_1, ϕ_2, ϕ_3 [v. § 7.] Give the λ, μ, ν those particular values in Φ . The nature of Φ will depend on the pencil

$$x_{11}\phi_1 + x_{12}\phi_2 + x_{13}\phi_3.$$

Calling the function $\psi(\sigma\rho)$ we have

$$\psi(\sigma\rho) - \psi(\rho\sigma) = \Sigma\phi_1(V\lambda V\rho\sigma) = \Sigma\phi_1(\gamma S_1^3\rho\sigma - \beta S_1\gamma\rho\sigma) = 0.$$

$$(A_8) \quad \therefore \psi(\sigma\rho) = \psi(\rho\sigma).$$

The third invariant of the former is

$$m = \frac{S\Phi V\lambda\mu\Phi V\mu\nu\Phi V\nu\lambda}{-(S\lambda\mu\nu)^2} = S\phi_{1\rho}\phi_{2\rho}\phi_{3\rho} \cdot S\lambda\mu\nu,$$

so that the cubics $S\phi_{1\rho}\phi_{2\rho}\phi_{3\rho} = 0$, and

$$\Sigma m_1 \Sigma \lambda \rho^3 + \Sigma (a_{12} S \lambda \rho^2 S \mu \rho + a_{21} S \lambda \rho S \mu \rho^2) + d_{123} S \lambda \rho S \mu \rho S \nu \rho = 0$$

are identical.

Also since ϕ_1, ϕ_2, ϕ_3 are self-conjugate, if ρ, σ, τ , are any vectors

$$(B_8) \quad S\tau\psi(\rho\sigma) = S\rho\psi(\sigma\tau) = S\sigma\psi(\tau\rho).$$

9. If $S\sigma\phi_1\sigma = 0, S\sigma\phi_2\sigma = 0, S\sigma\phi_3\sigma = 0$ are three quadrics, the equations of polars of ρ with respect to each are

$$S\rho\phi_1\sigma = 0; \quad S\rho\phi_2\sigma = 0, \quad S\rho\phi_3\sigma = 0.$$

If these pass through a point $S\phi_1\sigma S\phi_2\sigma S\phi_3\sigma = 0$. This is the Jacobian of the three quadrics.

Consider the cubic $S\rho\psi(\rho\rho) = 0$. Put $\rho = \rho + x\sigma$, we have

$$S\rho\psi(\rho\rho) + 3xS\sigma\psi(\rho\rho) + 3x^2S\rho\psi(\sigma\sigma) + x^3S\sigma\psi(\sigma\sigma) = 0.$$

If we regard ρ as fixed, this gives us the intercepts on the line $\rho + x\sigma$, drawn from $\rho \parallel \sigma$ to meet the cubic, so that the properties of cubics may be investigated.

$S\rho\psi(\sigma\sigma) = 0$ may be called the polar cone, and $S\sigma\psi(\rho\rho) = 0$, the polar plane of σ with respect to the cubic.

If the equation in x has two equal roots, we get a condition for σ

$$4[S\rho\psi(\sigma\sigma)S\rho\psi(\rho\rho) - S\sigma\psi(\rho\rho)^2][S\sigma\psi(\sigma\sigma)S\sigma\psi(\rho\rho) - S\rho\psi(\sigma\sigma)^2] \\ = [S\sigma\psi(\rho\rho)S\rho\psi(\sigma\sigma) - S\rho\psi(\rho\rho)S\sigma\psi(\sigma\sigma)]^2,$$

a cone of 6th degree in σ . If $S\rho\psi(\sigma\sigma) = 0$ breaks up into two planes, the line of intersection is along ρ . In this case its discriminant vanishes, or

$$S\phi_1\rho\phi_2\rho\phi_3\rho = 0 = S\phi_1\sigma\phi_2\sigma\phi_3\sigma.$$

Since $\psi(\sigma\rho) = \psi(\rho\sigma) = 0$ (A_3). Thus the Hessian of

$$S\rho\psi(\rho\rho) = 0 \text{ is } S\phi_1\rho\phi_2\rho\phi_3\rho = 0;$$

and $\psi(\rho\sigma) = 0$ gives the relation between corresponding points. This relation may be written

$$\frac{V\phi_2\rho\phi_3\rho}{S\lambda\sigma} = \frac{V\phi_3\rho\phi_1\rho}{S\mu\sigma} = \frac{V\phi_1\rho\phi_2\rho}{S\nu\sigma}.$$

If $S\rho\phi_1\sigma = 0 = S\rho\phi_2\sigma = S\rho\phi_3\sigma$, each of these vectors is parallel to σ . ρ and σ may be interchanged in these formulae.

II.

10. The general quadratic vector function may be expressed in terms of 3 vectors a_1, a_2, a_3 , the coefficients being scalar quadratic functions of ρ . If we denote it by $\chi(\rho\rho)$,

$$\chi(\rho\rho) = a_1S\rho\phi_1\rho + a_2S\rho\phi_2\rho + a_3S\rho\phi_3\rho.$$

Hence it contains in general 18 constants, there being no loss of generality in supposing the ϕ 's self-conjugate.

11. The a 's and the ϕ 's determine the function. Suppose a 's transformed by the substitution

$$a'_1 = k_{11}a_1 + k_{12}a_2 + k_{13}a_3. \quad (\S 7),$$

the ϕ 's are transformed.

$$\phi'_1 = K_{11}\phi_1 + K_{12}\phi_2 + K_{13}\phi_3,$$

where K_{11} , etc., are the minors of the modulus of transformation of the α 's. The transformation is, of course, contragredient.

12. If $P^n f(\phi_1\phi_2\phi_3\alpha_1\alpha_2\alpha_3\rho) = f(\phi'_1\phi'_2\phi'_3\alpha'_1\alpha'_2\alpha'_3\rho)$, where P is the modulus of transformation, f is a concomitant. It is an invariant if ρ is absent, and an absolute invariant if $n = 0$. Invariants may be classified according to the value of n .

13. If we transform $\psi(\rho\rho)$ of § 7, by this substitution we get

$$P\psi(\rho\rho) = \psi'(\rho\rho),$$

where the dash denotes transformed constituents. So $\psi(\rho\rho)$ is a concomitant of our function. It contains ρ to the second degree. Expanding

$$\rho = ix + jy + kz,$$

and operating with ∇^2 we have

$$\nabla^2\psi(\rho\rho) = 2(\phi_1\alpha_1 + \phi_2\alpha_2 + \phi_3\alpha_3).$$

Here ρ is absent, so $\nabla^2\psi(\rho\rho)$ is an invariant.

$$\text{Put } \nabla^2\psi(\rho\rho) = \theta(\rho\rho),$$

$$P\nabla^2\psi(\rho\rho) = P\theta = \nabla^2\psi'(\rho\rho) = \theta'.$$

14. Similarly, if we examine the function

$$\Sigma V_{\alpha_1} V_{\rho} \phi_{1\rho} = \Sigma \phi_{1\rho} S_{\alpha_1\rho} - \rho S_{\alpha_1} \phi_{1\rho},$$

we get for the second Σ

$$\nabla^2 \rho \Sigma S_{\alpha_1} \phi_{1\rho} = 4(\phi_1\alpha_1 + \phi_2\alpha_2 + \phi_3\alpha_3),$$

expressing ρ in the trinomial form. So that

$$\nabla^2 \Sigma V_{\alpha_1} V_{\rho} \phi_{1\rho} = -2[\phi_1\alpha_1 + \phi_2\alpha_2 + \phi_3\alpha_3] = -\theta.$$

$$\nabla^2 [\psi(\rho\rho) + \omega(\rho\rho)] = 0;$$

where $\omega(\rho\rho) = \Sigma V_{\alpha_1} V_{\rho} \phi_{1\rho}$, so $(\psi + \omega)(\rho\rho)$ is harmonic.

$\nabla^2\psi(\rho\rho) = -\theta$ is an invariant, and

$$P\omega(\rho\rho) = \omega'(\rho\rho). \quad P\nabla^2\omega(\rho\rho) = -P\theta = \nabla^2\omega'(\rho\rho) = -\theta'.$$

15. As another example, take $\Sigma V_{\alpha_1} \phi_{1\rho}$,

$$\Sigma V_{\alpha'_1} \phi'_{1\rho} = P \Sigma V_{\alpha_1} \phi_{1\rho},$$

so again $n = 1$,

$$\nabla \Sigma V_{\alpha_1} \phi_{1\rho} = \Sigma i V_{\alpha_1} \phi_{1i} + \Sigma j V_{\alpha_2} \phi_{2j} + \Sigma k V_{\alpha_3} \phi_{3k} = p,$$

we have at once, since the ϕ 's are self-conjugate, $S\rho = 0$,

$$V\rho = \Sigma[\phi_n i S a_n i - a_n S i \phi_n i], \quad n = 1, 2, 3$$

$$= -\phi_1 a_1 - \phi_2 a_2 - \phi_3 a_3 + m_1'' a_1 + m_2'' a_2 + m_3'' a_3 = \chi_1 a_1 + \chi_2 a_2 + \chi_3 a_3,$$

m_n'' being the first invariant and χ_n being second associated function of ϕ_n .

16. The occurrence of $\Sigma m_1 a_1''$ suggests another function. For this, i.e. for

$$\Sigma m_1'' a_1, \quad n = 1, \text{ and } \therefore \text{ for } \chi_1 a_1 \quad n = 1, \because n = 1 \text{ for } \Sigma \phi_1 a_1.$$

17. An absolute invariant is got by taking the quotient of any two invariants where n is of same power in each. Thus the following are absolute invariants:—

$$\frac{\Sigma \phi_1 a_1}{\Sigma \chi_1 a_1}, \quad \frac{\Sigma \phi_1 a_1}{S a_1 a_2 a_3}, \quad \frac{\Sigma \chi_1 a_1}{S a_1 a_2 a_3},$$

the first being a quaternion invariant, the two others vectors. For

$$S a_1' a_2' a_3' = P S a_1 a_2 a_3, \quad \nabla^2 \chi = 2(m_1'' a_1 + m_2'' a_2 + m_3'' a_3).$$

18. On the way to the evaluation of $\nabla^2 \psi(\rho\rho)$ we get

$$V \nabla \psi(\rho\rho) = \varpi_1 x + \varpi_2 y + \varpi_3 z,$$

where $\varpi_1 =$

$$\begin{aligned} & V(i\phi_1 i + j\phi_1 j + k\phi_1 k) S \lambda i + V(i\phi_2 i + j\phi_2 j + k\phi_2 k) S \mu i + V(i\phi_3 i + j\phi_3 j \\ & + k\phi_3 k) S \nu i + V(i\phi_1 i S \lambda i + j\phi_1 i S \lambda j + k\phi_1 i S \lambda k) + V(i\phi_2 i S \mu i + j\phi_2 i S \mu j \\ & + k\phi_2 i S \mu k) + V(i\phi_3 i S \nu i + j\phi_3 i S \nu j + k\phi_3 i S \nu k). \end{aligned}$$

The first three terms vanish for all λ, μ, ν ; and if we use the particular values of λ, μ, ν , as in § 8, $\varpi_1 = 0$ also $\varpi_2 = \varpi_3 = 0$.

So finally $V \nabla \psi(\rho\rho) = 0$.

(A.) This may be proved also as follows

$$d \cdot S \rho \psi(\rho\rho) = 3 S d \rho \psi(\rho\rho),$$

for the special values as in § 8.

$$\therefore \nabla S \rho \psi(\rho\rho) = -3 \psi(\rho\rho);$$

$$\therefore \nabla^2 S \rho \psi(\rho\rho) = -3 \nabla \psi(\rho\rho);$$

$$\therefore V \nabla \psi(\rho\rho) = 0.$$

19. For the function $\Sigma V a_1 a_2 V \phi_1 \rho \phi_2 \rho$, we have $n = 2$, since

$$\Sigma V a_1' a_2' V \phi_1' \phi_2' \rho = P^2 \Sigma V a_1 a_2 V \phi_1 \rho \phi_2 \rho.$$

We can operate on this quaternion with ∇^2 , but the examples worked out are sufficient.

20. Functions where $n = 3$ are

$$S \rho \psi(\rho\rho) \text{ and } S \phi_1 \rho \phi_2 \rho \phi_3 \rho.$$

III.

21. The general function

$$a_1 S \rho \phi_1 \rho + a_2 S \rho \phi_2 \rho + a_3 S \rho \phi_3 \rho,$$

will be binomial if $Sa_1 a_2 a_3 = 0$. This property is invariantal.

It will also be binomial if $k_1 \phi_1 + k_2 \phi_2 + k_3 \phi_3 = 0$, identically. This condition implies 3 scalar equations

$$\begin{aligned} \Sigma m_1 k_1^3 + \Sigma (a_{12} k_1^2 k_2 + a_{21} k_2^2 k_1) + d_{123} k_1 k_2 k_3 &= 0, \\ \Sigma m'_1 k_1^2 + \Sigma k_2 k_3 b_{12} &= 0, \\ \Sigma k_1 m''_1 &= 0. \end{aligned} \quad [A_1, B_1, C_1]$$

On eliminating the k 's between these, we get

$$0 = \begin{vmatrix} m_1 & m_2 & m_3 & a_{12} & a_{21} & a_{23} & a_{32} & a_{31} & a_{13} & d_{123} \\ m'_1 & 0 & 0 & b_{12} & m'_2 & 0 & 0 & m'_3 & b_{31} & b_{23} \\ 0 & m'_2 & 0 & m'_1 & b_{12} & b_{23} & m'_3 & 0 & 0 & b_{31} \\ 0 & 0 & m'_3 & 0 & 0 & m'_2 & b_{23} & b_{31} & m'_1 & b_{12} \\ m''_1 & 0 & 0 & m''_2 & 0 & 0 & 0 & 0 & m''_3 & 0 \\ 0 & m''_2 & 0 & 0 & m''_1 & m''_3 & 0 & 0 & 0 & 0 \\ 0 & 0 & m''_3 & 0 & 0 & 0 & m''_2 & m''_1 & 0 & 0 \\ 0 & 0 & 0 & m''_1 & m''_2 & 0 & 0 & 0 & 0 & m''_3 \\ 0 & 0 & 0 & 0 & 0 & m''_2 & m''_3 & 0 & 0 & m''_1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & m''_3 & m''_1 & m''_2 \end{vmatrix}.$$

Consistent with these relations, the invariants above take special forms.

22. The function $\chi(\rho\rho)$ may be monomial, of the form $V\theta_1\rho\theta_2\rho$. In this case, we have the following connexions between all the functions:—

$$\left[\text{Putting } \beta_1 = \frac{Va_2a_3}{Sa_1a_2a_3}, \quad \beta_2 = \frac{Va_3a_1}{Sa_1a_2a_3}, \quad \beta_3 = \frac{Va_1a_2}{Sa_1a_2a_3} \right.$$

$$\left. V\theta_1\rho\theta_2\rho = a_1 S \beta_1 \theta_1 \rho \theta_2 \rho + a_2 S \beta_2 \theta_1 \rho \theta_2 \rho + a_3 S \beta_3 \theta_1 \rho \theta_2 \rho \right].$$

$$\theta'_1(V\theta_2\rho\beta_1) - \theta'_2(V\theta_1\rho\beta_1) = 2\phi_1\rho$$

$$\theta'_1(V\theta_2\rho\beta_2) - \theta'_2(V\theta_1\rho\beta_2) = 2\phi_2\rho$$

$$\theta'_1(V\theta_2\rho\beta_3) - \theta'_2(V\theta_1\rho\beta_3) = 2\phi_3\rho.$$

It can easily be verified that the functions on the left are self-conjugate. The relations are complicated, but it is worth while following them up a bit. We write them

$$m_1^{-1} V \theta'_1{}^{-1} \theta_2 \rho \theta'_1{}^{-1} \beta_1 - m_2^{-1} V \theta'_2{}^{-1} \theta_1 \rho \theta'_2{}^{-1} \beta_1 = 2\phi_1\rho$$

and two others. Or

$$\begin{aligned} V\chi\rho\gamma_1 - V\theta\rho\delta_1 &= 2\phi_1\rho, \\ V\chi\rho\gamma_2 - V\theta\rho\delta_2 &= 2\phi_2\rho, \\ V\chi\rho\gamma_3 - V\theta\rho\delta_3 &= 2\phi_3\rho, \end{aligned}$$

on making obvious substitutions. From the first

$$\theta'(V\gamma_1\delta_1) = \phi_1\gamma_1, \quad \chi'(V\gamma_1\delta_1) = \phi_1\delta_1, \quad \text{or} \quad S\theta_1\delta_1\gamma_1\delta_1 = S\chi_1\gamma_1\delta_1.$$

The relations simplify if $\theta_1 = 1$.

23. If $a_1S\rho\phi_1\rho + a_2S\rho\phi_2\rho + a_3S\rho\phi_3\rho = 0$, and if $Sa_1a_2a_3 = 0$, we must have $S\rho\phi_1\rho = 0 = S\rho\phi_2\rho = S\rho\phi_3\rho$. Hence, the values of ρ for which the expression $\chi(\rho\rho)$ vanishes are the common solutions of these three equations. If $S\rho(\phi_1 - x\phi_2)\rho = 0$ touches $S\rho(\phi_1 - y\phi_2)\rho = 0$, two solutions are equal.

24. If there is a relation $Sa_1a_2a_3 = 0$ the number of roots is the number common to $S\rho(\phi_1 + a_1\phi_2)\rho = 0$ and $S\rho(\phi_2 + a_2\phi_3)\rho = 0$ for here $a_3 = a_1a_2 - a_2a_3$. For a relation between the ϕ 's we get results similar to these latter.

25. If $\chi(\rho\rho)$ can be reduced to the form $V\theta_1\rho\theta_2\rho$, the axes of $\theta_2^{-1}\theta_1$ (or $\theta_2^{-1}\theta_1$) are solutions for which $\chi(\rho\rho) = 0$.

26. The general problem of inversion is a difficult one. Suppose $\sigma = a_1S\rho\phi_1\rho + a_2S\rho\phi_2\rho + a_3S\rho\phi_3\rho$, we have $S_1 = S\rho\phi_1\rho$, $S_2 = S\rho\phi_2\rho$, $S\rho\phi_3\rho = S_3$, where

$$S_1 = \frac{Sa_2a_3\sigma}{Sa_1a_2a_3}, \quad S_2 = \frac{Sa_3a_1\sigma}{Sa_1a_2a_3}, \quad S_3 = \frac{Sa_1a_2\sigma}{Sa_1a_2a_3}.$$

The complete solution depends on the solution of these equations. For the particular forms $\phi_1\rho = \rho - aSa\rho$, $\phi_2\rho = \rho - \beta S\beta\rho$, $\phi_3\rho = \rho - \gamma S\gamma\rho$, we get $S_1 = \rho^2 + S^2a\rho$, $S_2 = \rho^2 + S^2\beta\rho$, $S_3 = \rho^2 + S^2\gamma\rho$,

and so $\rho Sa\beta\gamma = V\beta\gamma\sqrt{S_1 - \rho^2} - V\gamma a\sqrt{S_2 - \rho^2} + Va\beta\sqrt{S_3 - \rho^2}$.

If $\rho^2 = -x$, we get here a quartic for x . If x' is a solution

$$-x'Sa\beta\gamma = \{V\beta\gamma\sqrt{S_1 + x'} \pm V\gamma a\sqrt{S_2 + x'} \pm Va\beta\sqrt{S_3 + x'}\}^2,$$

for some combination of sign, and for the same combination

$$\pm \rho'Sa\beta\gamma = V\beta\gamma\sqrt{S_1 + x'} \pm V\gamma a\sqrt{S_2 + x'} \pm Va\beta\sqrt{S_3 + x'}.$$

The values of ρ' are, of course, equal and opposite in pairs. The inversion of the general binomial form is exactly similar to the process here.

27. If $\chi(\rho\rho) = V\theta_1\rho\theta_2\rho = \sigma$, we have at once $\rho = xV\theta_1^{-1}\sigma\theta_1^{-1}\sigma$. To get ρ' substitute in first equation

$$\sigma = x'V\theta_1^{-1}\theta_1^{-1}\sigma\theta_1^{-1}\theta_1^{-1}\sigma, \quad x'm, w, V^{-1}V\sigma\theta_1^{-1}\theta_1^{-1}\sigma V\theta_1^{-1}\theta_1^{-1}\sigma = \sigma.$$

Expanding, equating coefficients of σ ,

$$m_1 m_2 x^2 S \theta'_1{}^{-1} \theta'_2{}^{-1} \theta'_1 \sigma \cdot \sigma = 1;$$

or

$$\frac{m_1 m_2}{m_1^2} x^2 S \theta'_1 \sigma \theta'_2 \sigma \theta'_1 \theta'_2{}^{-1} \theta'_1 \sigma = 1;$$

$$x^2 = \frac{m_1}{m_2} \cdot \frac{1}{S \theta'_1 \sigma \theta'_2 \sigma \theta'_1 \theta'_2{}^{-1} \theta'_1 \sigma}.$$

If we put $\varpi_{12} V \lambda \mu = m_1 m_2 V(\theta'_1{}^{-1} \lambda \theta'_2{}^{-1} \mu + \theta'_2{}^{-1} \lambda \theta'_1{}^{-1} \mu)$ by method analogous to that of § 2, using results of § 5, we get

$$(A_{27}) \quad \varpi_{12} = a_{21} \theta'_1 - m_2 \theta'_1 \theta'_2{}^{-1} \theta'_1$$

and x^2 becomes

$$= - m_1 m_2 \frac{1}{S \theta'_1 \sigma \theta'_2 \sigma \varpi_{12} \sigma}.$$

Thus, this monomial form is completely solved.

28. Another particular example is

$$\chi(\rho\rho) = \sigma = V(\phi_1\rho\phi_2\rho + \phi_2\rho\phi_3\rho + \phi_3\rho\phi_1\rho),$$

we have

$$S\sigma\phi_1\rho = S\phi_1\rho\phi_2\rho\phi_3\rho = S\rho\phi'_1\sigma$$

$$S\sigma\phi_2\rho = S\phi_1\rho\phi_2\rho\phi_3\rho = S\rho\phi'_2\sigma;$$

$$\therefore S\rho(\phi'_1\sigma - \phi'_2\sigma) = 0 \text{ and } S\rho(\phi'_1\sigma - \phi'_3\sigma) = 0.$$

$$\rho = x V(\phi'_1\sigma - \phi'_2\sigma)(\phi'_1\sigma - \phi'_3\sigma)$$

$$= x V(\phi'_1\sigma\phi'_2\sigma + \phi'_2\sigma\phi'_3\sigma + \phi'_3\sigma\phi'_1\sigma),$$

where x can be found by substitution as above.

29. Dr. Conway has defined the central axes of the function as those vectors which satisfy $V\rho\chi(\rho\rho) = 0$. So

$$0 = V\rho a_1 S\rho\phi_1\rho + V\rho a_2 S\rho\phi_2\rho + V\rho a_3 S\rho\phi_3\rho,$$

and we get two scalar equations for ρ

$$\frac{S\rho\phi_1\rho}{S a_2 a_3 \rho} = \frac{S\rho\phi_2\rho}{S a_3 a_1 \rho} = \frac{S\rho\phi_3\rho}{S a_1 a_2 \rho}.$$

PROCEEDINGS
OF THE
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PROCEEDINGS

OF

THE ROYAL IRISH ACADEMY

PAPERS READ BEFORE THE ACADEMY

I.

ON HIGHER KETONES AND SECONDARY ALCOHOLS DERIVED FROM THE AMIDES OF PALMITIC AND STEARIC ACIDS.

By HUGH RYAN AND THOMAS NOLAN, University College, Dublin.

Read MAY 13. Published JULY 10, 1912.

AN investigation of the properties of ketones and secondary alcohols derived from the higher fatty acids seems desirable owing to the possibility of the occurrence in waxes, such as beeswax and montan wax, of substances which belong to these classes, and which may have hitherto escaped detection if the chemical properties characteristic of the lower ketones and secondary alcohols are not possessed by the higher members of these series.

The high percentage of "hydrocarbons" found by applying Buisine's method to beeswax may be in part due to the existence in the wax of esters of alcohols other than primary, while the unsaponifiable portion of montan wax may consist of a mixture of hydrocarbons with secondary or tertiary alcohols.

Several of the higher ketones have been obtained by Krafft¹ by destructive distillation of mixtures of the barium salts of the required fatty acids, while others were prepared by Bertrand² and Ponzio and De Gaspari³ by the action of zinc alkyls on the chlorides of the higher fatty acids.

Kipping⁴ obtained the ketones palmitone, stearone, laurone, and myristone,

¹ Ber., xii (1879), p. 1667, xv (1882), p. 1712.

² Bull., Soc. Chim. (3) xv, p. 765.

³ Gaz. Chim. Ital., xxix, 1, p. 471.

⁴ Journ. Chem. Soc., lvii (1890), p. 985, lxiii (1893), p. 458.

by heating the corresponding acids with phosphorus pentoxide, and recently Easterfield and Taylor¹ prepared the ketones of higher saturated and unsaturated fatty acids by heating the latter with iron turnings.

Aliphatic-aromatic ketones, like phenylpentadecyl ketone and p-tolylpentadecyl ketone have been obtained by Krafft² and by Claus and Häfelin³ by the condensation of the chlorides of aliphatic acids with aromatic hydrocarbons. The lower members of the ketone series have also been obtained by the action of alkyl magnesium halides on nitriles⁴ and amides.⁵ We have prepared some higher ketones by the action of alkyl magnesium halides on the amides of palmitic and stearic acids. With aliphatic Grignard reagents poor results were obtained, but with aromatic compounds such as phenyl magnesium bromide by using high concentrations and allowing the reaction to proceed for about three days it was found possible to get a yield of the desired ketone as high as sixty per cent.

In this way we obtained methyl-, phenyl-, p-tolyl-, and α -naphthylpentadecyl ketones and ethyl-, phenyl-, and α -naphthylheptadecyl ketones. The reactions, such as formation of oximes, phenylhydrazones, and semicarbazones, which are characteristic of the lower ketones, were found quite similarly to be characteristic of the higher members.

By reduction of the ketones with sodium and alcohol, secondary alcohols were prepared from phenylpentadecyl, p-tolylpentadecyl, and phenylheptadecyl ketones. Reactions, like the formation of esters with acetic anhydride and sodium acetate and urethanes with phenyl isocyanate, characteristic of the lower secondary alcohols were also obtained with the higher members.

EXPERIMENTAL.

A.—Ketones.

Methylpentadecyl Ketone $\text{CH}_3\text{COC}_{15}\text{H}_{31}$.—Methyl magnesium iodide was prepared by acting on 3 grammes of magnesium with a solution of 20 grammes of methyl iodide in 50 c.c. of anhydrous ether, and to the cold reaction-product, which was contained in a flask fitted with an upright condenser, 10 grammes of dry powdered palmitamide were added. When the brisk evolution of gas, which ensued on the addition of the amide, had subsided, the mixture was heated by means of warm water for five hours, then cooled

¹ Jour. Chem. Soc., xcix (1911), p. 2298.

² Ber., xix (1886), p. 2982, xxi (1888), p. 2266.

³ Journ. für prakt. Chemie. (2) liv, p. 399.

⁴ Blaise, Comptes Rendus, cxxxii (1901), p. 38.

⁵ Béis, Comptes Rendus, cxxxvii (1903) p. 575.

and decomposed by addition of a solution of ammonium chloride in iced water. The ketone was extracted with ether, and after removal of the latter by distillation the residue was boiled for about an hour with alcoholic potash, and then evaporated to dryness. Petroleum ether extracted about one gramme of methylpentadecyl ketone from the dry residue.

The ketone is readily soluble in chloroform, benzene, or ether, moderately soluble in acetone or petroleum ether and slightly soluble in cold, readily in hot, alcohol from which it crystallizes in plates which melt at 48°C.

The compound previously obtained by Kraft's method (*loc. cit.*) also melted at 48°C.

Phenylpentadecyl Ketone $C_6H_5COC_{15}H_{31}$.—On addition of 6.2 grammes of powdered palmitamide to the Grignard reagent prepared by dissolving 1.44 grammes of magnesium in a solution of 9.5 grammes of bromobenzene in 25 c.c. of ether a considerable evolution of heat was observed. The mixture was allowed to remain at the laboratory temperature for three days, and was then warmed for a few hours, cooled, and decomposed by a solution of ammonium chloride. The ketone was extracted with ether, the solvent removed, and the residue was then freed from diphenyl by distilling the latter over in a current of steam. Unchanged amide was removed by evaporating to dryness with alcoholic potash and extracting the ketone from the residue with petroleum ether. It was decolorized by means of animal charcoal, and recrystallized from alcohol. The yield of pure ketone was 50 per cent.

Phenylpentadecyl ketone crystallises in plates which melt at 59°C. It is easily soluble in chloroform, benzene, ether, or warm alcohol, but is only sparingly soluble in cold alcohol.

Phenylpentadecyl Ketoxime was prepared by heating 0.8 gramme of the ketone with an equal weight of hydroxylamine hydrochloride and 1.2 gramme of potash in diluted alcohol for two hours. The mixture was acidified with acetic acid, diluted with water and extracted with ether. On distilling the ether a residue, which was insoluble in potash, was obtained. It crystallized from alcohol in needles which melted at 73–74°C.

0.2072 g. substance gave 8.4 c.c. N at 21.5°C and 769 mm. p. N = 4.6.

$C_{22}H_{37}NO$ requires N = 4.23.

Phenylpentadecyl ketoxime is soluble in warm alcohol, chloroform, benzene, or ether, and is only slightly soluble in cold alcohol or petroleum ether.

p-Tolylpentadecyl Ketone $CH_3C_6H_4COC_{15}H_{31}$.—By a method of preparation analogous with that just described, a yield of 60 per cent. of the pure ketone

was got from *p*-tolyl magnesium bromide and palmitamide. Its melting-point (60° C.) and properties agreed with those previously found by Krafft (*loc. cit.*).

The *phenylhydrazone* of *p*-tolylpentadecyl ketone was got by dissolving 2 grammes of the ketone and 1 gramme of phenylhydrazine in 25 c.c. of absolute alcohol, and letting the mixture stand in the absence of light, with occasional warming, for two days. The phenylhydrazone was filtered and washed with cold alcohol.

0.2367 g. substance gave 14.1 c.c. N at 20° C. and 75.8 mm.p. N = 6.83.

$C_{29}H_{44}N_2$ requires N = 6.66.

It melts at 54 – 55° C., and decomposes readily into an oily substance which has an odour similar to that of phenylhydrazine.

p-Tolylpentadecyl ketone semicarbazone was obtained by dissolving 1.5 gramme of semicarbazide hydrochloride and 1.5 gramme of sodium acetate in a little water, adding 3.3 grammes of *p*-tolylpentadecyl ketone and sufficient alcohol to produce a clear solution at 60° C. The flask was allowed to stand, with occasional warming, for two days, and the mixture was then filtered while hot. The solid, which separated when the filtrate was cooled, was recrystallized a few times from petroleum ether, and then from alcohol.

0.2127 g. substance gave 21 c.c. N at 24° C., and 760 mm.p. N = 11.06.

$C_{24}H_{41}N_3O$ requires N = 10.85.

The semicarbazone of *p*-tolylpentadecyl ketone crystallizes from alcohol in long, silky needles, which melt at 114.5° C. It is insoluble in ether, cold alcohol, or petroleum ether; and is soluble in chloroform, benzene, acetone, or hot alcohol.

α -Naphthylpentadecyl Ketone $C_{10}H_7COC_{15}H_{31}$.—12.5 grammes of palmitamide were added to the Grignard reagent prepared by dissolving 3 grammes of magnesium in a solution of 26 grammes of α -bromonaphthalene in 25 c.c. of ether, and the mixture was heated occasionally for three days. The reaction-product was decomposed by addition of a cold solution of ammonium chloride in water, extracted with ether, and freed from naphthalene by distillation of the latter in a current of steam. The mixture of the ketone and unchanged amide was boiled with alcoholic potash, evaporated to dryness, extracted with petroleum ether, decolorized in alcoholic solution with animal charcoal, and finally recrystallized several times from hot alcohol. In this way were obtained about $1\frac{1}{2}$ gramme of the pure ketone, which melted at 48° C.

0.1718 g. substance gave 0.5340 g. CO_2 and 0.1639 g. H_2O . C = 84.8, H = 10.6.

$C_{26}H_{44}O$ requires C = 85.2, H = 10.38.

The ketone is easily soluble in chloroform, benzene, ether, or hot alcohol, fairly soluble in acetone or petroleum ether, and slightly soluble in cold alcohol.

Ethylheptadecyl Ketone $C_2H_5COC_{17}H_{35}$. This ketone was got by acting on stearamide with ethyl magnesium iodide, but the yield was a poor one.

It is easily soluble in benzene, ether, chloroform or hot alcohol, from which it crystallizes in plates which melt at $57^\circ C$.

0.2308 g. substance gave 0.6854 g. CO_2 and 0.2746 g. H_2O . C = 80.99, H = 13.32.
 $C_{20}H_{40}O$ requires C = 81.08, H = 13.51.

Phenylheptadecyl Ketone $C_6H_5COC_{17}H_{35}$. The preparation of phenylheptadecyl ketone from phenyl magnesium bromide and stearamide was analogous with that of phenylpentadecyl ketone. The yield of the ketone was good.

Phenylheptadecyl ketone crystallizes in plates which melt at $64^\circ C$, and are easily soluble in chloroform, ether, or hot alcohol.

Its *phenylhydrazone*, which was obtained from the alcoholic solution of the components, crystallizes in needles which melt at $54^\circ C$.

0.1791 g. substance gave 10.4 c.c. N at $20^\circ C$. and 758 mm. p. N = 6.62
 $C_{30}H_{46}N_2$ requires N = 6.45

p-Tolylheptadecyl Ketone $CH_3C_6H_4COC_{17}H_{35}$. *p*-Tolylheptadecyl ketone, which was obtained from *p*-tolyl magnesium bromide and stearamide, is easily soluble in chloroform or ether, fairly soluble in benzene or acetone, and slightly soluble in cold alcohol or petroleum ether. It melted at $66^\circ-67^\circ C$.

α -Naphthylheptadecyl Ketone $C_{10}H_7COC_{17}H_{35}$. By interaction of α -naphthyl magnesium bromide and stearamide in ethereal solution α -naphthylheptadecyl ketone was prepared. It crystallized from alcohol in long curved needles which melted at $53-54^\circ C$.

0.1676 g. substance gave 0.5260 g. CO_2 and 0.1620 g. H_2O C = 85.59, H = 10.74
 $C_{28}H_{42}O$ requires C = 85.28, H = 10.66,

α -Naphthylheptadecyl ketone dissolves readily in chloroform, benzene, ether, or hot alcohol.

An attempt to prepare the phenylhydrazone of this ketone was unsuccessful, probably owing to a steric hindrance similar to that exhibited in its attempted preparation by Pinner¹ of the imino-ether of α -naphthoic nitrile.

¹ Ber. xxxiii (1890), p. 2918.

B.—Secondary Alcohols.

p-Tolylpentadecyl Carbinol $\text{CH}_3\text{C}_6\text{H}_4\text{CHOHC}_{15}\text{H}_{31}$. Ten grammes of *p*-tolylpentadecyl ketone were dissolved in 150 c.c. of absolute alcohol, and heated to boiling in a round-bottomed flask attached to an upright condenser through the tube of which 10 grammes of sodium, in small pieces, were added as rapidly as possible. When all the sodium had dissolved, the hot solution was saturated with CO_2 , cooled, and added to a large excess of cold water. The mixture was extracted with ether, the solvent was distilled off, and the coloured oily residue was decolorized by means of animal charcoal. It separated from hot alcohol in prismatic crystals which melted at $44-45^\circ\text{C}$. The yield was 7 grammes.

0.1964 g. substance gave 0.5991 g. CO_2 and 0.2174 g. H_2O C = 83.19, H = 12.24.
 $\text{C}_{23}\text{H}_{46}\text{O}$ requires C = 83.13, H = 12.05.

The carbinol is easily soluble in ether, benzene, warm alcohol, acetone, chloroform, or petroleum ether, and is fairly soluble in cold alcohol. The acetate of the alcohol was got by warming 1 gramme of the latter with an equal weight of anhydrous sodium acetate and 5 c.c. of acetic anhydride for $1\frac{1}{2}$ hour in a flask fitted with an upright condenser. The product was mixed with iced water and extracted with ether. The ethereal solution was washed with a dilute solution of sodium bicarbonate, dried over calcium chloride, and the ether was then distilled off. A colourless, viscid, sweet-smelling liquid was obtained.

A saponification of the acetate with standard alcoholic potash showed that it was somewhat impure.

0.8584 gramme of the ester required 3.8 c.c. $\frac{N}{2}$ KOH for complete hydrolysis.

E.No. = 124.

$\text{C}_{25}\text{H}_{44}\text{O}_2$ requires E.No. = 149.

The alcohol which was recovered from the saponification products melted at $44-45^\circ\text{C}$.

The phenylurethane of *p*-tolylpentadecyl carbinol was prepared by dissolving 1.8 gramme of the carbinol and 0.6 gramme of phenyl isocyanate in 10 c.c. of petrol placed in a small flask exposed to the air, but protected from entrance of moisture by a calcium chloride tube. The solution was heated to 60°C . and allowed to stand for a week. The contents of the flask were filtered from a small quantity of diphenyl-urea and the petrol was evaporated. The yellowish oil which remained was dissolved in benzene, washed with water, then dried with calcium chloride, and the benzene was distilled. On standing for some time the residue solidified. It was dissolved in boiling alcohol, decolorized

with animal charcoal, filtered, and cooled. The colourless needles which were finally obtained melted at 44° C., and when heated with soda-lime evolved aniline.

0.2855 g. substance gave 8.1 c.c. N. at 21° C. and 762 mm.p. N = 3.24.

$C_{30}H_{45}NO_2$ requires N = 3.10.

It is easily soluble in benzene, acetone, ether, light petroleum, chloroform, or warm alcohol.

Phenylpentadecyl Carbinol $C_6H_5CHOHC_{15}H_{31}$. By reduction of phenylpentadecyl ketone in alcoholic solution with sodium as described under p-tolylpentadecyl carbinol the colourless, crystalline phenylpentadecyl carbinol was obtained. It melted at 53° C., and dissolved easily in petroleum ether, acetone, or benzene.

0.2167 g. substance gave 0.6566 g. CO_2 and 0.2296 g. H_2O . C = 82.6, H = 12.3.

$C_{22}H_{38}O$ requires C = 83.0, H = 12.0.

Phenylheptadecyl Carbinol $C_6H_5\cdot CHOHC_{17}H_{35}$. 3.5 grammes of phenylheptadecyl ketone gave 3 grammes of the carbinol, which, when recrystallized a few times from alcohol, melted at 59° C.

0.2112 g. substance gave 0.6424 g. CO_2 and 0.2271 g. H_2O . C = 82.95, H = 11.95.

$C_{24}H_{42}O$ requires C = 82.2, H = 12.14.

It is easily soluble in chloroform, benzene, or ether, and moderately soluble in alcohol, petroleum ether, or acetone.

Its *acetate* was obtained in the form of needles, which melted at a low temperature, and had a sweet odour, by heating the alcohol with sodium acetate and acetic anhydride.

A saponification with standard alcoholic potash showed again that the ester was somewhat impure.

0.4719 g. acetate required 2.15 c.c. $\frac{N}{2}$ KOH for complete hydrolysis.

E.No. = 127.

$C_{36}H_{54}O_2$ requires E.No. = 144.

II.

THE PROBLEM OF THE LIFFEY VALLEY.

BY GRENVILLE A. J. COLE. M.R.I.A., F.G.S..

Professor of Geology in the Royal College of Science for Ireland.

PLATES I-III.

Read JUNE 24. Published AUGUST 21, 1912.

THE COURSE OF THE LIFFEY IN THE UPLANDS.

THE Liffey rises in the county of Wicklow, on the south side of Kippure, at about 1,700 feet (530 m.) above the sea, and is joined in the upper part of its course by the Lugnalee, Ballylow, and Ballydonnell Brooks, all descending as consequent streams from the north-west slope of the "Caledonian" granite range of Leinster. Near Kilbride, the river, now meandering in a considerable flat of glacial drift, turns to the south-west, and joins the Kings River at Baltyboys House, south of Blessington. The Kings River, rising in the great moorland at Wicklow Gap, has already attained far more importance than the Liffey, which unites with it on a drift-platform, almost at right angles (Plate II., fig. 1). The course of the Kings River to this point runs practically parallel with that of the Liffey between Kippure and Kilbride. Both are obviously consequent streams. Their united waters, however, known as the Liffey, are diverted almost immediately to the south and south-west, and have excavated a fine rock-gorge in which the waterfall of Pollaphuca is a striking incident (Plate II, fig. 2). Below this gorge the Liffey meanders far out of its direct course to the sea, along the margin of the Bog of Allen in the drift-covered central plain of Ireland.

The course of the Dodder, rising close to the Liffey, but on the north side of Kippure, remains far more direct, and the contrast between the two rivers has been often pointed out.

THE VALLEYS AT BRITTAS.

The bend in the Liffey at Kilbride appears the first anomaly in its course. As the river enters the drift-filled area, a broad highly matured valley stretches before it to the Slade of Saggart; the Slade is a steeper valley descending northward over the upland edge. The rise in the present drift-filled floor of the valley that leads upwards from Kilbride is only 130 feet,

i.e., from 650 to 780 feet above Ordnance datum, from the loops of the Liffey to beyond Brittas, a distance of $3\frac{1}{2}$ miles. The original field-map of the Geological Survey shows that the granite floor is exposed in the Liffey in the north of Ballyfoyle townland at a height of 660 feet. Hence, the river must be very near its floor of erosion in the adjacent Kilbride loops. The depth of the drift-covering to the north near Brittas is unknown; but the Ordovician slate lies near on either hand as we pass along the broad through valley to the Slade of Saggart. The rock-floor of the valley running up northward at Kilbride, if we could lay it bare again, might be found to have a rise of only 100 feet (30 m.) from the meadows where the Liffey meanders to the watershed near Brittas ponds. (Plate II, fig. 3.)

The Brittas River, far too small for this valley, runs down it to the mountain stream of the Liffey at Ballyward bridge, the water being here about 620 feet above the sea. The Liffey continues south-westward to Blessington, and is joined midway by a very small stream coming down the wide valley in which the main road from Dublin runs. The west side of this valley is formed by the long strike-ridge of Ordovician rock, which we may call after its highest townland, Slievethoul (1,308 feet; 396 m.). This western valley is divided from the hollow of the Brittas River by the rock-ridge of Golden Hill, which includes granite, schist, and slate, and which stands up as a sort of island, the two valleys meeting round its northern end. The western of these valleys, that of the main road, is virtually dry, but presents the appearance of having been occupied by a considerable stream. It has the same old and matured aspect as the Brittas River valley which unites with it. It is difficult to conceive that any rivers generated on the present land-surface to the north can have eroded these large valleys. Their high maturity excludes the suggestion that they are due to overflow waters from the melting ice-sheet that once occupied the Irish plain. They pass northward as a "through valley" into the narrower Slade of Saggart, which has a rapid fall towards the limestone lowland. If we adopt the suggestion that these Brittas valleys were eroded by a river that had its head-waters on limestone land now lost to us,¹ we have still to explain the Slade of Saggart.

THE SLADE OF SAGGART, AND OTHER IMMATURE FEATURES ON THE FOOTHILLS OF THE LEINSTER CHAIN.

The present meandering streamlet in the Slade of Saggart is obviously a misfit or a mere remnant in its relatively majestic valley (Plate II, fig. 4). This

¹ Compare E. Hull, "On the origin of 'the Scalp,'" *Sci. Proc. Roy. Dublin Soc.*, vol. i. (1878), p. 11.

valley, however, starting at 780 feet (238 m.) above the sea, was abandoned by its original stream before it had attained full maturity. We must remember that the upland ice that once lay beyond its southern end gave rise to copious streams on melting, and some of this water may have run northward through the Slade. But the steep valley is of pre-Glacial origin, since it was entered by the northern ice, which deposited an infilling of limestone gravel on its floor, in places more than fifty feet in depth. The head of the Slade served for the passage of an ice-tongue southward, which helped to fill with exotic gravel the great hollow stretching down to Pollaphuca.

To illustrate the features of the Slade of Saggart, we must look beyond the Liffey basin. Throughout the counties of Dublin and Wicklow we find valleys overdeepened and new ravines carved out, and the present streams still actively engaged in these erosive enterprises. Yet the valleys in which they run are often cumbered by glacial drift, and we cannot attribute a Glacial or post-Glacial date to the whole of this series of ravines.

Mr. G. W. Lamplugh,¹ in connexion with his masterly explanation of the Scalp, agrees with Mr. Maxwell H. Close² in assigning a late Glacial origin to the far larger notch of the Glen of the Downs; and rock-ravines certainly occur, like the Gap of Dunran near Killiskey, and St. Kevin's Gap near Hollywood, carved in anomalous positions on the hillsides of Wicklow, and attesting the vigour of the rivers that accompanied the shrinkage of the ice. Immature features, however, that are strikingly contrasted with the forms of the older valleys of the Leinster Chain, occur on a large scale at various levels along the lower slopes of the chain, and notably therefore among the Ordovician and Cambrian foothills. It is difficult to regard the Devil's Glen near Ashford, by which the Vartry River descends from the plateau of Roundwood, as the result of fluvio-glacial flooding. Together with the Dargle ravine at the foot of the mature valley of Glencree, it appears to have originated in pre-Glacial, if late Cainozoic times. At the head of the Devil's Glen, the Vartry notches the plateau at a height of 500 feet (150 m.) above the sea, and its old meanders are now entrenched in the Cambrian slates for a quarter of a mile further on the level land. This latter feature in itself suggests a recent uplift of the country. The Dargle ravine must be regarded in connexion with the hollow of Glencree, rather than with the cirque in the Powerscourt Deerpark, over the cliff of which

¹ "Geology of the country around Dublin," Mem. Geol. Survey (1903), p. 50.

² M. H. Close, "Notes on the General Glaciation of the Rocks in the Neighbourhood of Dublin," Journ. R. Geol. Soc. Dublin, vol. i (1864), p. 12.

the well-known waterfall descends. The ground of the Powerscourt demesne is heavily buried in glacial drift, through which the river now cuts its way. Its unseen floor of rock corresponds with the mature plateau of Roundwood, though cut down to a lower level. At its foot, about Tinnehinch, we drop suddenly into the region of ravines.

Further north, the small Carrickmines River, rising on Three Rock Mountain, occupies a broad mature valley above Carrickmines, in the floor of which it cuts the abrupt notch of Glendruid, where it drops towards the low ground of Loughlinstown on a rock-slope of 45°. This steep hollow, cut in the granite, and set with little waterfalls, repeats the features that are exhibited on a bold scale by the Dargle and the Devil's Glen. Glendruid starts, however, only 220 feet above the sea.¹

The Vale of Ovoca has been overdeepened, and the curve of the earlier broad upland basin is traceable when we look across it from above the mines of Ballymurtagh. The river here runs below us between two conspicuous cliffs, which probably give a measure of the overdeepening. Numerous other instances might be cited, such as the uplifted peneplane of the Tramore coast, to show that the surface of south-eastern Ireland lay much nearer sea-level in late Cainozoic times, and that the streams became rejuvenated by uplift somewhere before the Glacial epoch. If, as is here suggested, the Slade of Saggart was cut by water descending from the Leinster Chain, its relative lack of maturity finds a parallel in the Dargle valley and the Devil's Glen, and is no doubt due to the same causes.

There are obvious difficulties in the above explanation of the preservation of the lower slopes from stream-action until almost recent times. The subsidence required to protect them would have admitted the sea over the Irish lowlands to so wide an extent that Cainozoic marine deposits ought to be common beneath the boulder-clay. These, however, would have been largely removed by glacial scour, and such relics as remain may be those that are buried most deeply and successfully in the drift. Mr. James Brenan, of Ballinabianagh National School, Carlow, has recently called my attention to the occurrence of marine fossils of a decidedly Pliocene aspect, including *Pectunculus* and *Fusus*, in fields 5 miles south of Carlow and some 500 feet (150 m.) above the sea. Mr. T. Hallissy, who has investigated this discovery on behalf of the Geological Survey, reports that the shells lie in a surface-soil derived from boulder-clay. There is no likelihood that they have been brought for manuring purposes into a region rich in limestone, and the fact that their

¹ Mr. J. R. Kilroe has pointed out that Glendruid was at least partly excavated in pre-Glacial times. "Geology of country around Dublin," *Mem Geol. Surv.* (1903), p. 117.

surface is frequently brown does not suggest a modern origin. It is to be hoped that further observations may be carried on in this locality. There is no doubt that the Pliocene sea invaded many lowland areas in Ireland, as in England, and that subsequent elevation played its part in the rejuvenation of the streams. We know that in England this elevation measured at least 800 feet.

The pre-Glacial beach traced by Messrs. H. B. Muff (now Maufe) and W. B. Wright¹ over so wide a stretch of the Irish coast-line, and since recognized in the west of England, lies close to the present sea-level. It represents a time when there was a pause in the fluctuations in the amount of land exposed above the reach of wave-action. But its occurrence along the sides of the drowned valley of Cork Harbour shows that considerable submergence of the coast had taken place before this stationary stage set in. At an earlier epoch, the submergence may have been far greater, and the pre-Glacial beach may mark a pause in the succeeding upward swing.

The late Pliocene or post-Pliocene movement of elevation enabled some of the streams to cut new channels in the slopes exposed by uplift to their action. Other streams merely recovered the submerged portions of their former mature valleys, which were thus restored to them from beneath the sea. This fact provides an explanation of the occurrence of mature and immature valleys on the same slopes side by side.

POSSIBLE PRESERVATION OF THE FOOTHILLS BY CRETACEOUS STRATA.

While the above considerations offer an explanation of the youth of many of the pre-Glacial trenches among the Leinster hills, another cause may have widely operated in preserving the Ordovician and Cambrian foothills, at very different levels, from denudation. Evidence is rapidly accumulating as to the immense amount of Upper Cretaceous strata that has been lost to us in comparatively recent times. Mr. A. J. Jukes-Browne² boldly carries the Senonian sea right across the Irish midlands. We may be inclined to question such an invasion, owing to the probability that extensive patches of Upper Carboniferous strata remained on the midland surface down into Cainozoic times. But the enormous quantity of Cretaceous flint in the south of Ireland, and its abundance off the west Irish coast,³ indicate the justice of Mr. Jukes-Browne's main contention. Large unworn flints are thrown up at the present day on

¹ "The pre-Glacial raised beach of the south coast of Ireland," *Sci. Proc. R. Dublin Soc.*, vol. x (1904), p. 250.

² "The Building of the British Isles," 3rd ed. (1911), p. 333.

³ G. A. J. Cole and T. Crook, "On rocks dredged from the floor of the Atlantic," *Mem. Geol. Surv. Ireland* (1910), pp. 18, 22, &c.

the south coast of the county of Wexford, and they appear to come direct from chalk concealed beneath the sea. We have, then, to reckon with the probability that, even in late Cainozoic times, chalk remained as a cover to many of the slopes now familiar to us. Such a covering would maintain large areas as land during a general subsidence, and would for a long time protect the older rocks from denudation.

The mature features, then, developed on the uplands may have been once continued across lower grounds or foothills of Cretaceous strata. When these rocks were removed, the trenching of the older surfaces was resumed, and the steeper slopes of these surfaces allowed the streams to cut ravines. Protection being afforded at some places longer than at others, the features that are still comparatively immature have no general level along the Leinster foothills.

After this discussion, which offers two causes for the relative immaturity of the Slade of Saggart, both of which have probably been in operation, we may return to connect the Slade with the Liffey basin to the south.

SUGGESTION OF A FORMER FLOW OF THE LIFFEY SYSTEM NORTHWARD.

If the Slade of Saggart was at one time occupied by a large stream, this stream was generated on the uplands to the south. At present, however, these uplands are drained by the Liffey system in an opposite direction. The Slade of Saggart is connected with this system by the through valley of Brittas. As we have seen, a merely slight modification of the floor of the Liffey at Kilbride would suffice to carry its waters through the Brittas valley to the Slade of Saggart. The lower part of the Liffey at the present day is largely fed by the Kings River, coming down from Wicklow Gap. We may ask ourselves if it is possible to bring this river into harmony with the course suggested for the pre-Glacial Liffey, and to picture the joint waters flowing northward through the mature Brittas valleys, and developing features of gorge and waterfall in the Slade of Saggart, as the rocks there became exposed to river action.

THE UPLAND OF THE LIFFEY IN GLACIAL TIMES.

Before we consider the cause of the reversal of drainage which must in that case have taken place, leading to the present Liffey system, it is well to recall the conditions that prevailed in the district during Glacial times. The oncoming of the epoch of refrigeration checked the process of river-erosion, since the land became covered by unmelting snow. Dry arctic conditions set in, which abolished the head-waters of the streams. As glaciers developed

from the snowfields, some of them doubtless proceeded to overdeepen the mature or immature valleys of Pliocene times. The Vale of Ovoca may have been influenced by this process; but the ice occupying the Irish Sea rose up against the eastern foothills, and they were again protected from local agents of denudation. Narrow valleys like the Devil's Glen were choked by ice, and the main glacier currents moved across them. When the ice-constituents of the invading glaciers melted, the stones, sand, and mud that formed a large part of the lower layers remained behind. A return of cold conditions, however, developed the local ice to such an extent that it carried boulders of granite from the central chain of Leinster across the Ordovician and Cambrian foothills, and down upon the plateaus of older drift. These boulders are now found widely scattered, though valleys as large as that of Ovoca intervene between them and their source. The Liffey basin was, of course, affected by all these conditions.

The Slade of Saggart, which was being actively excavated about the epoch of the pre-Glacial beach, became choked by the ice-front that was thrust against it.¹ The valleys to the south were occupied by invading ice, and were ultimately crossed by glaciers from the Leinster Chain, which have deposited numerous granite boulders on the east side of the Slievethoul range, at heights of 500 ft. (150m.) above the main valley-floor.

Long-continued glacial conditions converted the uplands of the granite chain into a "karling"² of the Alpine type. The sterner features that were temporarily produced on the high levels by the sapping action of the ice, and by frost-nibbling following upon occasional sunny hours, have long since been modified by the spread of taluses and the growth of soils. Yet the shaded quarter-inch map (1:253,440) of the Ordnance Survey sufficiently reveals the numerous broad glacier-basins, which became worked back at their heads towards the central axis of the chain. Commonly, these basins join the lower ground by narrow valleys, down which the ice descended as glacier-tongues. These outlets were eroded in the first instance by streams running from the snow-patches that gathered in the incipient cirques.³ They were occupied, as the cirques grew in importance, by the glaciers generated in the basins. As the valley below became filled with ice, the upland glaciers opened on the larger ice-stream, and many of them were overridden and obliterated. When conditions grew milder, the step at the mouth of the cirque again became the

¹ Compare W. B. Wright, "Some results of Glacial drainage round Montpelier Hill, Co. Dublin," *Sci. Proc. R. Dublin Soc.*, vol. ix, (1902), p. 581.

² A. Penck, "Die Alpen im Eiszeitalter," (1902), p. 284.

³ For modern examples, see G. A. J. Cole, "Glacial features in Spitsbergen in relation to Irish geology," *Proc. R. Irish Acad.*, vol. xxix B. (1911), Plate XI.

seat of an ice-fall, and ultimately of a waterfall. In the cases of Glendasan and Glendalough on the east side of the chain, this step-feature remains conspicuous. In the Liffey upland, the great Kings River basin opens on the main valley at Baltyboys House, through a comparatively narrow hollow. The rock-step has been here worn down, and the only indication of its former presence is the narrowness of the valley in the schist region between Lackan and Burgage Bridge. Drift that was piled across the outlet, rather than any residual rock-barrier, no doubt closed the basin as the Ice Age waned, and was responsible for the lake which is traceable in the flat floor of the Lackan hollow.

When the ice melted away, the Slade of Saggart must have run almost dry. The post-Glacial stream has never been a strong one, and it has done little to remove the mass of drift deposited in the valley head.

THE POLLAPHUCA BARRIER (BRITONSTOWN).

The gorge in which the waterfalls of Ballymore Eustace and Pollaphuca (Plate II, fig. 2) occur has been excavated in a barrier of Ordovician slate and volcanic rocks. The north-east side of this barrier runs at right angles to the strike of the strata, so that it is not due to the outcrop of any rock of special hardness. Whatever the direction was in which the pre-Glacial Liffey escaped from its somewhat singular imprisonment among the foothills under the strike-ridge of Slievethoul, the hollow north of the Pollaphuca barrier requires explanation. The barrier connects the drift-covered plateau of Bishopsland (600 ft.; 183 m.) with a height of 1079 ft. (329 m.) in Lugnagroagh upon the granite. Looking south-east along it from a height on the main road of 622 ft. (190 m.), where we stand upon the bare edges of the slates, we realize how sharply it has been cut through by the Liffey, which runs 90 ft. (27.4 m.) below us (Pl. II, figs. 5 and 6). The local ice, in its final extension, after the continental type of ice-sheet had withdrawn, spread across this barrier, and carried granite boulders over it, as it did against the east side of the Ordovician ridge above Tinode. The Liffey gorge, above and below Pollaphuca, has been eroded through this covering of late Glacial drift, and is, I believe, entirely post-Glacial. The river, when it reached the solid rock, began by carving out a ravine which is the main feature of the townland of Britonstown; this is now dry in all but its very lowest portion, where it emerges steeply on the present Liffey gorge below Pollaphuca.¹ This imma-

¹ This ravine was described as an earlier course of the Liffey by Wm. Fitton, "Notes on the Mineralogy of Part of the Vicinity of Dublin" (1812), p. 39. The hollow above the barrier was regarded by Fitton as the basin of a lake.

ture and abandoned hollow, known as the Glen, was accompanied, even in its early stages of development, by the present ravine of the Liffey, and the intervening part of the barrier, on which the hotel now stands, formed an elongated island in the stream. The north-west branch of the river, probably in consequence of its somewhat shorter course,¹ undercut the south-east branch, and drew off the full flow of the stream. At present we may ascend the dry ravine (Plate III, fig. 7), where the vertical rock-walls remain in places unobscured, and emerge at its head on a grassy upland at about 620 ft. above the sea. From this to the Liffey at the ruined Horsepass Bridge (550 ft.) there is a fall of 70 ft. (21·3 m.); this measures the amount of glacial drift which formerly supported the stream, and which has been swept away from above the barrier. Looking south from above Horsepass Bridge, where the old coach-road crossed the river, it is interesting to observe the head of the south-eastern notch on the left of the view, high above the floor of the present gorge (Plate III, fig. 8).

We cannot point to any difference in resistance to erosion between the rocks forming the Pollaphuca barrier and those immediately above it, when we seek to account for the immense contrast in the form of the valley in the ravine region on the one hand, and near Horsepass Bridge upon the other. The Pollaphuca gorge is essentially a young feature, due either to the general rejuvenation of the district, or to the fact that the river has only recently begun to flow in this direction. Both causes may have operated together; but I believe that the latter is by far the more important.

THE BASIN OF BLESSINGTON.

The drift-filled basin above the Pollaphuca barrier (Plate III, fig. 9) cannot have been excavated by a stream flowing south across the barrier. Nor can it have been formed by a stream flowing northward, since such exposures of bare rock as we possess provide good evidence that the slope of its floor is in the opposite direction. We are slow to invoke earth-movements or faulting to account for such a depression. It has all the aspect of a hollow of erosion, subsequently filled and overfilled by glacial drift. Considering that it has been developed in schists and slates, which go to pieces so readily under glacial conditions, its excavation may be most reasonably attributed to prolonged glacial scour.²

¹ Compare B. Dietrich, "Morphologie des Moselgebietes," *Verhandl. naturhist. Vereins der preuss. Rheinlande*, 1911 (for 1910), p. 159.

² On rock-barriers in the course of glaciers and the formation of basins behind them, see A. Penck, "Die Alpen im Eiszeitalter" (1902), pp. 143 and 254.

Reference has already been made to the ice-tongue that pushed through the Brittas valleys from the north, while the ice of the Irish plain overtopped the Slievethoul ridge, and pressed down against that of the main chain. The resultant movement led to a considerable flow southward across Britonstown, even when natural watersheds and snowsheds were obliterated during the maximum of the Ice Age. If, as has been suggested, the floor of the Liffey and Kings River valley then sloped northward, the Britonstown barrier formed a col at the head of a tributary stream, and the ice-flow was forced to ride up over it. When the local ice was free to assert itself during the second glaciation, its denuding action was most powerful as it emerged on the main north-and-south valley across the junction of the granite and the schist, where the geological structure and the resulting form of the pre-Glacial valley-side promoted a steep downward plunge. During both these glacial stages, it is probable that considerable overdeepening of the main valley about Blessington took place. Farther north, near Brittas, where no large valleys opened on the main one, the only serious agent was the ice-tongue from the north. The main scouring therefore occurred near Blessington, and the quantity of limestone drift remaining in the basin shows that the hollow was eroded almost entirely during the earlier and more important glacial stage. The products of local erosion were carried out over the Britonstown col, no doubt abrading and lowering it, but not reducing it to the level of the region to the north, where sub-glacial plucking was most intense. When the ice-movement ceased, a hollow had been formed, by local overdeepening, some 250 ft. below the pre-Glacial valley-floor. Into this, the gravel of limestone and other stones, imported from the north and north-west, sank as the ice-mass stagnated in the valley. This limestone drift, though it was doubtless to some extent incorporated in the later and more local glaciers, fills much of the basin of Blessington at the present day (Plate III, fig. 10). When the ice-shrinkage allowed of the reappearance of ordinary streams, these began to flow on the plateau of glacial drift. If the Pollaphuca barrier had not been by this time sufficiently lowered, the accumulation of drift against it might well have maintained the flow of the Kings River and the Liffey northward. As it was, the general slope of the infilling of drift was southward, and the drainage of the district began to notch out the twin ravines of Britonstown. In proportion as these ravines were deepened, the basin above became cleared of some of its burden of glacial drift. The meanders above Horsepass bridge have not yet found the old ice-deepened floor. It evidently lies here somewhere near 550 ft. (168 m.) above the sea, and the surface of the drift-plateau rises 100 ft. above it.

CONCLUSION.

The main points of the foregoing considerations are as follows:—Both the Kings River and the Liffey, running at first north-west and north, are drawn off to the south-west along angular bends. This suggests an interception of their original courses by a stream working back from the south-west. Before we accept a theory involving a reversal of the drainage-system of this part of the foothills of the Leinster chain, we should be prepared to indicate a previous outlet for the rivers of this system. The large mature valleys near Brittas, now occupied by insignificant streamlets, may at one time have held the Liffey, which reached the plain by a rapid fall in the Slade of Saggart. This steep valley is considered in relation to others on the margins of the Leinster chain, and the conclusions arrived at are, it may be remarked, independent of the question of its former occupation by the Liffey. When we examine the possible cause of the reversal of drainage, it is found in a considerable scouring and overdeepening of the valley-floor near Blessington by glacial erosion. Even when the basin so formed had become choked by glacial drift, its surface was lower at Britonstown than at the junction of the Kings River and the Liffey, which now began to flow again after the Ice Age. The point of junction, moreover, was lower than that of the entry of the post-Glacial Liffey on the main valley near Kilbride. Hence the new flow was directed southward, over the barrier that remained under the drift at Britonstown. The Pollaphuca gorge results from the post-Glacial trenching of this barrier, and the river is now removing the infilling of drift in the glacially eroded hollow around Blessington. The floor of this hollow represents a local overdeepening of about 250 feet (77 m.) in the easily eroded Silurian slates, and this, by its excess over the small overdeepening near Kilbride, suffices to draw the Kings River and the Liffey southward. The Liffey at Kilbride has consequently been able to lower its bed as the Pollaphuca outlet deepened, and the small local drainage from the gap at Brittas runs down into it along large valleys once excavated by the river in its northward course.

There is much in the foregoing pages that must be regarded as suggestive, rather than capable of proof. I have attempted, however, to state the problems that are raised by the phenomena in the field. It is hoped that the general considerations involved may aid in the more extended study of the surface-features of south-eastern Ireland.

DESCRIPTION OF PLATES.

PLATE I.

Drainage-map of the country between Saggart and Pollaphuca. (Based on the maps of the Ordnance Survey.)

PLATE II.

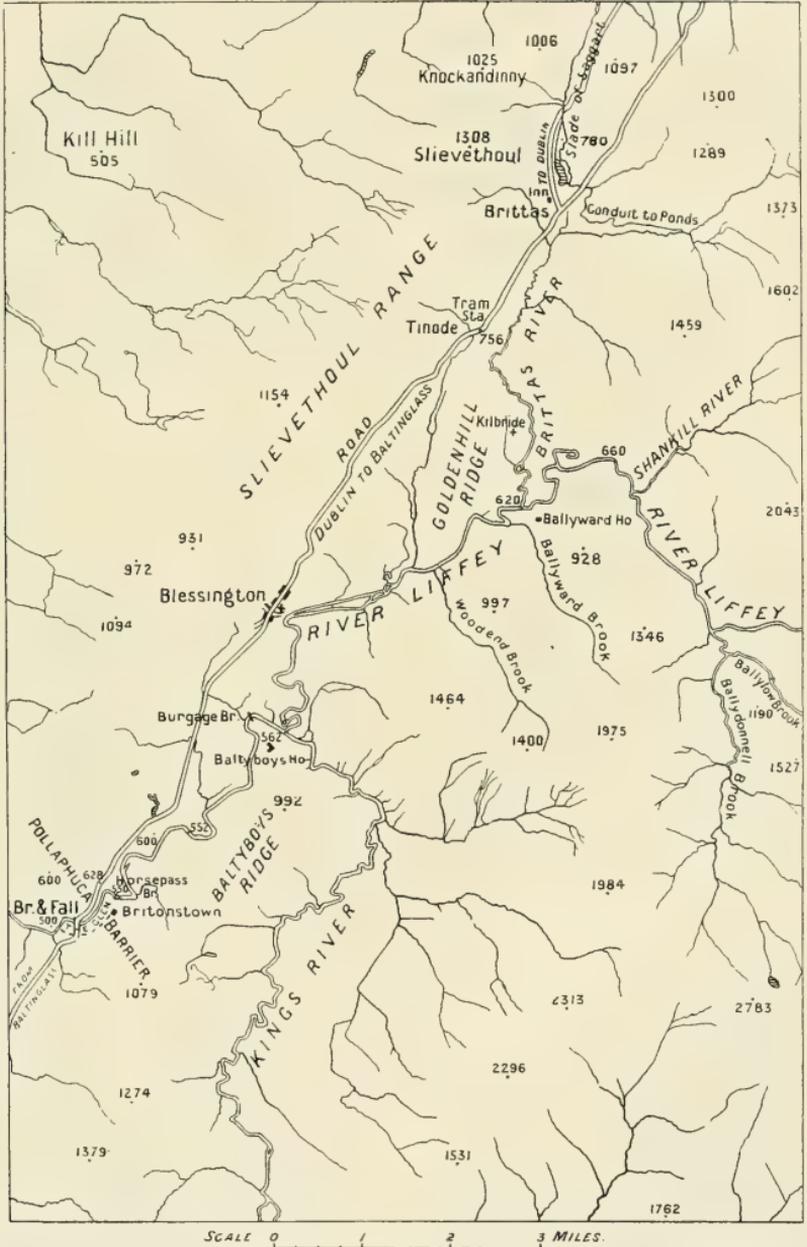
Fig.

1. Junction of the Liffey and the Kings River. The Liffey meanders in a broad drift-filled valley, descending from Kilbride. The Kings River crosses the view in front.
2. The Pollaphuca fall in flood-time.
3. Mature valley of the Brittas River, looking down from near Brittas towards the Liffey valley at Kilbride.
4. The Slade of Saggart; evening.
5. View looking south-east along the Pollaphuca barrier and across the Liffey gorge.
6. The Liffey gorge above Pollaphuca.

PLATE III.

7. The Glen in Britonstown, looking up. Former course of the Liffey across the Pollaphuca barrier.
8. The Pollaphuca barrier from the north. The head of the dry ravine opens beyond the white house among the trees in the middle distance on the left. The present ravine of the Liffey is seen on the right.
9. The drift-filled basin of Blessington, looking north-east from the Pollaphuca barrier. The head of the Liffey gorge lies in the foreground.
10. Drift terrace in process of erosion by the Liffey, showing the glacial infilling of the Blessington basin. View north from above Horsepass bridge.

(The figures are from photographs by the author).



Drainage-map of the country between Saggart and Pollaphuca. (Based on the maps of the Ordnance Survey.)

COLE.—PROBLEM OF THE LIFFEY VALLEY.



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.



Fig. 6.



Fig. 7.



Fig. 8.



Fig. 9.



Fig. 10.

III.

THE PLANKTON OF LOUGH NEAGH: A STUDY OF THE SEASONAL
CHANGES IN THE PLANKTON BY QUANTITATIVE METHODS

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PLATES IV-VI.

(BEING THE ELEVENTH REPORT FROM THE FAUNA AND FLORA COMMITTEE.)

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PREFACE.

TWENTY-TWO years ago Hensen, the veteran physiologist of Kiel, founded the Kiel School of Quantitative Plankton Research. Whatever may have been said in criticism of Hensen's work, there is no doubt that he provided a new stimulus which set plankton investigations on a different basis and aroused fresh enthusiasm in this line of research.

Whether the investigations have been carried out quantitatively or qualitatively, they have, since the detailed work of Hensen and his colleagues, been placed on a systematic foundation. Attempts have been made to determine the periodicity of the plankton, that is to say, the changes taking place throughout the year. In the succession of years it has been found that these changes take place in a regular and, on the whole, similar manner. Yet different years are perhaps marked by small variations in the time at which the different organisms attain their maximum development. Again, different lakes (varying in latitude, altitude, or environment) present interesting deviations, some large and some small, which have led to the study of the correlation of changes in the plankton with environment and meteorological phenomena.

The interest in the fresh-water plankton has advanced perhaps more rapidly than the interest in the marine plankton. This is probably due to the ease with which problems could be investigated in fresh-water owing to the foundation of biological stations. This applies particularly to the Continent,

where biological research is being pursued with so much energy at present. If it had not been for Sir John Murray and the Messrs. West, the British Islands would have been left hopelessly behind in investigations of this kind.

It is quite impossible for us to treat the historical side of fresh-water plankton research, for it has expanded to an enormous extent during the last twenty years. From the pioneer work represented by that fine monograph, "Le Léman" of Forel, it has extended until numerous specialists have taken up and treated not the plankton in general, but finally perhaps one particular genus alone.

It is only fitting that mention should be made here of the death of Forel, which occurred as this paper was nearing completion. He passed away on August 7 at the age of seventy-one years. Professor F. A. Forel was born at Morges on the shores of Lake Geneva, the lake to which he devoted his life in study. From 1868 onwards numerous papers have been given to the world dealing with the hydrobiology and hydrography of its waters. His great monograph on "Le Léman" which appeared between 1892 and 1904, is a foundation of scientific limnological research, and is remarkable for the wide range of knowledge, extending over very many sciences, possessed and turned to good account by the author.

It is perhaps in connexion with the theories of Seiches that Forel will be best remembered. Unfortunately we have not been able to treat at all the interesting subject of oscillatory movements in the waters of Lough Neagh. Little attention has, however, been paid to this subject; and Forel's contributions are known almost only to the specialists, and in this country to those keen workers on the Scottish lochs. There, Wedderburn and Murray have extended the theories of Forel to temperature oscillations.

Forel's life was devoted to science; and he leaves behind a lasting record of knowledge wrung from nature's hidden book.

The lakes of the Arctic Regions have been investigated by Ekman, Wesenberg Lund, Scourfield, Penard, and others. The North Temperate lakes have been treated in enormous detail, particularly the Baltic Lakes, for which there is a prodigious amount of literature. Amongst workers there may be mentioned Bachmann, Wesenberg Lund, West, Murray, Ostenfeld, Huitfeldtkaas, Ekman, Lemmerman, Lilljeborg, Zacharias, Apstein, and Seligo.

The Alpine Lakes have been investigated in very considerable detail. In America, we may note the work of Birge on Lake Mendota, Reighard on St. Clair, and Kofoid on the Illinois River. The lakes in Asia and the Tropics have also been investigated. The seasonal zooplankton of Irish lakes and

rivers is, however, but little known. The phytoplankton of Lough Neagh has been examined by the Messrs. West; but the catches were made only during a very short season of the year. As a matter of fact, we now know that a visit to a lake like Lough Neagh would only permit us to describe the planktonic flora or fauna at the particular time of the visit. The change of the seasons is just as clearly marked by the changes in the plankton, that is the appearance and disappearance of characteristic organisms, as by the opening of the buds in spring or the fall of leaf in autumn. Up to the present time extremely little has been known of the periodicity of the British fresh-water plankton.

The relation of the lakes of Scotland to those of Europe was referred to in the course of Sir John Murray's investigation of the Scottish lochs. This year a paper appeared by the Messrs. West, which may be said to be the first detailed paper on the subject of periodicity. It deals with the phytoplankton alone, however, and that only of certain lakes in Scotland and the English Lake District. It is furthermore only a qualitative research. The present paper is the first quantitative research on the plankton (phyto and zoo-plankton) of the British lakes.

The research was commenced by one of us whilst on the staff of the University of Belfast, and was enabled by the aid of grants from the Royal Society and the Royal Irish Academy. To both these bodies our thanks are due. Expeditions were made to the lake at first twice in three weeks; but as time went on and one of the authors' came to Liverpool, the length of the periods had to be increased. With the exception of two visits to the lake, all the catches were made by one of the authors, and thus we were assured of the uniformity of procedure, &c.

A discussion concerning the use of quantitative methods is given in the text. It may be said here, however, that whilst we consider certain features of the Kiel methods of absolute importance, we do not consider the detailed practice of the Kiel School to be the only practicable way of carrying out plankton research, nor is it always possible. Furthermore, we do not consider the Messrs. West justified in asserting that "the more detailed work concerning the phytoplankton, which, so far as we can see, in the British Lake areas will be quite of subordinate value, can be done piecemeal at any time by sufficiently qualified persons who possess the necessary means and time."² At the very most the above might apply to lakes they had investigated.

We are very much indebted to Professor Gwynne Vaughan, of Belfast University, for his great kindness, which alone enabled visits from Liverpool to Lough Neagh being made once every three weeks for a period. We wish

¹ Dakin.

² W. West and Professor G. S. West: "Periodicity of the Phytoplankton of some British Lakes." *Journ. Linn. Soc. Bot.* xl. 1912.

to thank Professor Lemmerman of Bremen and Mr. Scourfield for help in confirmation of systematic work, and Mr. Whitehouse of Belfast for help on various occasions.¹

LOUGH NEAGH.

Lough Neagh, the largest lake in the British Isles, is a rectangular-shaped expanse of water, with a superficial area of 153 square miles. It is situated due west of Belfast, and about 13 miles distant from that town. It has its greatest area in Antrim; but Tyrone, Armagh, and Londonderry also contain some more or less considerable part of the lake. It lies in a depression, but a shallow depression only, and over the greatest part of its area the depth averages only 40 feet. The depth, as a matter of fact, is remarkably uniform. The maximum depth of 102 feet is attained in a narrow depression, which is a kind of continuation of the River Bann. The length of the lake is 17 miles, the breadth 10 miles. Thus, looking across from shore to shore, the opposite banks appear far distant, and often, on misty days, are out of sight. This is so accentuated by the lowness of the banks that a view is often obtained which is probably seen nowhere else in the British Isles. Thus one stands looking out across a fresh-water lake which appears to extend far beyond the horizon. This idea of great size is often increased by the great waves, due to the possibility of the wind blowing unhindered down and across miles of water. Lough Neagh is certainly a characteristic lake. Its low-lying shores, however, have robbed it of the beauty of the Scottish or English lakes. Its storms do not encourage the tourist to visit its waters. There are very few islands, and these are small. The following figures will give a relative idea of its size, compared with that of some famous lakes:—

Lough Neagh,	area,	153 square miles.	
Lake Superior,	"	31,200 "	" "
Loch Lomond,	"	27 "	" "
Lake Geneva,	"	225 "	" "
Lough Neagh,	depth average,	40 feet.	Maximum, 102 feet.
Lake Superior,	"	"	1,008 "
Loch Lomond,	"	"	623 "
Lake Geneva,	"	"	1,015 "
Loch Ness (Scotland),	"	"	754 "
Lough Neagh,	volume of water,	161,000 million cubic feet.	
Lake Superior,	"	413,000,000 "	" "
Loch Lomond,	"	93,000 "	" "
Lake Geneva,	"	3,175,000 "	" "
Loch Ness,	"	263,000 "	" "

¹ Professor Karl Pearson very kindly made suggestions concerning certain biometrical calculations.

Geology.—The lake lies in a volcanic area on basalt of Miocene age; and this basalt rises from the lake on three sides until it reaches altitudes of about 1,500 feet. On the south of the lake, and forming a very low marshy ground here, is a thick deposit of clays and sands, with lignite and clay ironstone. The banks are formed of drift, etc., which covers the basalt and also the clay above mentioned. This great southern clay deposit is of considerable thickness, lying, according to the British Association Report of 1874, under 50 feet of drift, and consisting of more than 260 feet of stratified grey and blue clays and sand. This may be taken as the former delta of either the Upper Bann or the river Blackwater. The opinion of Edward Hardman, of the Geological Survey, is that the lake was formed at the close of the Miocene period before glacial times, and that after the basaltic flow had ceased, subsidences took place over a large area, producing a depression. In all probability the area of the lake was formerly very considerably greater than it is now.

The drainage channels into the lake and the outflowing rivers must have varied during Glacial times; but the question of this must be left to the geologist. We should like to emphasize at this point the necessity for the geologists to say whether Lough Neagh has ever been an arm of the sea or been occupied by salt water. As will be seen later on, there are features, such as the presence of *Mysis relicta* in the waters of the lake, which have given rise to the theory that Lough Neagh was once an arm of the sea, and that it was occupied by salt water. This question will be discussed later; but the presence of *Mysis relicta* supplies no evidence for the history of the lake. This must be left to the geologist.

At the present time the water of Lough Neagh is derived chiefly from the inflowing rivers, the Upper Bann, Blackwater, Ballinderry, Moyola, and Main Water. There are in addition several smaller rivers, one of which, the Six-mile Water, enters the lake at Antrim. It was from the mouth of this river that the collecting expeditions set out. It will be rather important to know from what ground this drainage-water comes. The Upper Bann flows over Silurian rocks and Miocene basalt. Near the lake it flows over clay and alluvium. In all the details which follow it must be remembered that the formations given are covered to a certain extent with boulder clay, alluvium, or bog; and the amount of actual rock-cutting that is carried out by the rivers is therefore not indicated. As a general rule, in the upper courses of the rivers the rocks are exposed. The Blackwater flows over Carboniferous limestone and Triassic rocks, the latter predominating, and further over bog and alluvium. The Ballinderry flows over Triassic rocks and Miocene basalt; the river Moyola chiefly over Miocene basalt; the Main Water flows over basalt, and the same applies to the Six-mile Water.

Thus it will be seen that Lough Neagh water is not derived from areas corresponding to older Palaeozoic outcrops. The following table, taken from the Reports on the Bathymetrical Survey of the Scottish lochs, shows the composition of the water of Lough Neagh and three other lakes for purposes of comparison:—

ANALYSIS OF LAKE WATER.

Dissolved Matter in parts per thousand.	Lough Neagh, 0·155.	Lake Geneva, 0·169.	Lake Champlain, 0·067.	Lake Baikal, 0·069.
Percentage Composition of Dissolved Matter.				
Ca	17·7	27·8	21·2	23·4
Mg	1·3	4·0	4·2	3·5
Na	15·4	1·2	8·8	5·8
K	—	0·9	—	3·4
CO ₃	36·9	37·3	45·8	49·8
Cl	5·7	0·6	1·8	2·4
SO ₄	10·7	25·7	11·0	6·9
SiO ₂	3·3	2·5	5·6	2·0
(AlFe) ₂ O ₃	6·7	trace	1·6	1·4

It will be noticed that the Lough Neagh water contains an exceptional amount of sodium, chlorine, and iron. The presence of sodium chloride is probably due to wind-blown salt from the sea. We have already seen that the lake is situated not far from the sea; and its surface exposed to the air is probably greater in proportion to the total volume of water than in most lakes of its size in the world.

The range of temperature of the water of Lough Neagh throughout the year is very great. This is what one would expect in a lake of such great area and slight depth. There is a great contrast here with the Scottish lakes, whose annual temperature-variation is only about 5–15° C. The summer temperature of these Scottish mountain-lakes is not high; and in many cases the water does not freeze during the winter. Lough Neagh has been frozen on several occasions in recent years, and to an extent to permit of skating. During that part of the winter falling in the period of our observations, the temperature of the air was rather mild in north-east Ireland, and the water of the lake did not freeze. During the summer a temperature of 20° C. is recorded; and this must have been far exceeded during the summer of 1911. The temperatures of the surface water are as follow:—

A.

TEMPERATURE OF SURFACE WATER.

1910—Feby. 23 ;	March 5, 4·4° ;	March 17, 5·5° ;	March 30, 7·2° ;
April 13, 7·7° ;	April 27, 8·6° ;	May 11, 9·5° ;	May 25, 14·3° ;
June 10, 15·0° ;	July 13, 20·0° ;	July 27, 16·5° ;	Aug., 17·3° ;
Sept. 8, 17·5° ;	Sept. 29, 14·5° ;	Oct. 21, 12° ;	Nov. 11, 7·5° ;
Dec. 1, 5·0° ;	Jan. 12, 4·6° .	1911—Feby. 3, 5·0° .	

Probably the summer temperature always exceeds 18° C. The high summer temperature is probably caused in the same way as that of the Danish lakes, by the broad littoral zone, where the water is heated up, and then distributed by currents.

The colour of the water of lakes is affected by four factors. First, we have the natural colour of pure water, due to selective absorption of the colours towards the red end of the spectrum and the reflection of blue rays. Secondly, there is the reflection of other rays of the spectrum by the bottom in shallow waters, and by mineral particles in suspension. Thirdly, it is affected by the plankton; and fourthly, by matter in solution. The colour is, to a large extent, therefore bound up with transparency. We were not able to make any determinations of the transparency of Lough Neagh, with either white screens or photographic methods. The water is, however, but slightly transparent; and the white plankton net disappeared at a depth of a few feet. The colour of the water is most marked. This is due to the large quantity of plankton present; and in this respect Lough Neagh presents the same contrast to the Scottish lakes as do those of Denmark.

The colour of the Scottish lakes appears to vary but little with the seasons, and never to show the turbid yellowish-green colour characteristic of the Danish lakes between May and November. Furthermore, they are but rarely covered with the "water-bloom" produced by the blue-green algae.

Lough Neagh, like the Danish lakes, is characterized by the yellowish-green colour due to the plankton. In the spring of 1910, the colour of the water was a dark olive green in March, but very much more blue in April; and the plankton catches in April were deep blue in colour. In May the colour of the plankton attained the yellowish-green hue, and became almost *yellow* in July.

Water-bloom was observed in Lough Neagh on March 30th, 1910, on an extremely calm day after several days' brilliant sunshine. This is, however, an early appearance. The greatest formation of water-bloom occurred in September. It was observed by one of us then on September 8th, but had been present for three days before this visit. On this occasion the surface of

the water was a bright green, with an alga (*Gomphosphaeria*), and the very slight breeze blowing was drifting this in long streaks towards the banks near Antrim. At the shore of the lake the water seemed to have been covered with a layer of green paint, so thick and so intense was the heaped-up "water-bloom." (See Microphoto.) This phenomenon, known as the "breaking of the meres" in England, is often seen in small and shallow lakes.

Features of Lough Neagh common to the Danish lakes are, then, the shallowness, the gently sloping shores, rectangular outline, high temperature of water in summer, small transparency, and yellow-green colour of the water, due to the plankton. On the other hand, Lough Neagh is much larger in area, and probably the chemical constitution of the water is different. The Scottish lakes, of great depth, and long, narrow shape, with steep shores and clear water, form a well-marked contrast.

The photographs (Plates IV and V) give some idea of the characteristic scenery of Lough Neagh, and they are especially intended as illustrations of the type of bank.

Photographs 1 and 3 are views taken looking over the lake from Toome. They show rather well the low-lying distant banks, and the large expanse of water, which seems to extend right on to the horizon. It is only on a very few days that, looking out from Antrim, one can see the opposite banks as a dim line in the distance.

Shane's Castle (Plate IV, fig. 2), as will be seen by reference to the map is situated to the north of Antrim. It was always passed on our way out to the plankton station. A flat sandy beach, with ripple-marks, extends here for some distance on certain occasions after the limit of vegetation is passed. It looks very like a sea-shore, in fact. This flat expanse is part of the shallow submerged bank. It is possible to wade out from the banks at Antrim for some distance, and a depth of 6 or 7 feet is common quite a little way out from the shore.

This beach at Shane's Castle is covered or free according to the direction of the wind and the amount of water in the lake.

Figs. 4 and 7 are pictures of the pollen-nets drying and of the hauling in of a net.

In this latter the pollen-nets are being used close inshore, in water only 8-10 feet deep, and the net has been set out in a circle just as a seine-net is used. The boat is the one used for our plankton observations. The Lough Neagh fishing-boats are characteristic craft, built on the lake, and capable of withstanding the terrific pounding caused by the short waves.

Fig. 5 is a photograph of the entrance of the Six-mile Water at Antrim.

It is the river whose mouth is used as a harbour for the pollen-fishing boats, and from here the plankton fishery was always carried on.

The low banks with grasses and dense wood should be noticed.

The remaining picture is very characteristic of the Lough Neagh shores near Antrim. The shores shelve gradually to the water, and are thickly wooded. The trees extend almost to the water's edge, and then a margin of grasses, often very prominent as in the photograph, completes the scene.

The banks are sandy, and many rare plants—rare for such an inland situation on the banks of a lake—are to be found.

METHODS EMPLOYED.

The method adopted in the course of this work has been to make a series of catches, all of which have been vertical hauls, with a well-known standard plankton net, at one station on Lough Neagh. The catches have been taken at close intervals throughout a year, even though this necessitated travelling from Liverpool each time the investigations were made. The total number of expeditions made to the lake was twenty-one. On each occasion a sailing-boat was chartered from Antrim; and a line was followed until a point about $1\frac{1}{2}$ miles S.W. of the entrance of the Six-mile Water was reached. A series of marks were taken on the first expedition, so that the same position could be reached each time. The depth of the water was 40 feet on the first visit to the lake in 1910, but this was reduced to 38 feet after several weeks of dry weather. The weather conditions were always observed, and the catches were made as nearly as possible at the same time of day. Midnight catches have also been taken for completeness. A sounding was always taken before any net-work was carried out, and the boat was then anchored. It was necessary to anchor the boat in order that no drifting should take place whilst the net was being lowered.

In order to obtain absolutely complete knowledge of the plankton of Lough Neagh, it would be necessary to adopt the centrifuge. Such an intensive study would have been far beyond the powers of the two workers, and would have required the co-operation of many specialists. There is no doubt, however, that many species common in the water of Lough Neagh have never been captured.

From work carried out in April, 1912, at Port Erin, in the course of which sea-water was filtered first through net and then through a Chamberland filter, it was seen that the very minute phytoplankton formed no small part of the total plankton present in the water. These forms belonging to the Nannoplankton¹ must occur in Lough Neagh in great numbers, and probably very many unrecorded species exist there.

¹ Lohmann, Nannoplankton, 1911.

The Nansen net has been used in preference to the Hensen nets, chiefly because of convenience in handling. The whole aim of the work has been to *compare* a series of catches made throughout a year. To this end the most important point to keep in view was the taking of catches in a uniform manner with the same net.

In several cases we notice that *horizontal* hauls of a net have been used for a study of the periodicity of plankton (no mention whatever is made of methods in the Report of W. West & Professor G. S. West). This is a very unsafe method, accentuated when used by non-scientific workers. On several occasions on calm days we found at Lough Neagh that the plankton was concentrated in the upper few inches of water. On another day, perhaps within twenty-four hours, the same plankton was scattered anywhere between the bottom and surface by rough weather. Imagine the great difference between two horizontal hauls taken at these times. A vertical haul would have given true pictures of the plankton present.

Again, even on the calmest days it is impossible to tow a net so that it remains in the same layer of water. It would be quite possible on a calm day for two boats making horizontal hauls close to each other to have entirely different catches both in quantity and relative composition. This *could not* occur if vertical hauls were made. Hence, for the study of variation in plankton (periodic), vertical hauls must be made.

The Nansen Net.

The Nansen net is a closing net of bolting silk made by Andersen, of Christiana, Norway. It has been used largely by Herdman in the Irish Sea; and one of the authors, who made the catches at Lough Neagh, has had considerable experience with it in marine work. Four definite sizes are manufactured—diam. 35, 50, 75, and 100 cm.; and we have therefore a uniform set of nets here if workers buy from the maker. The net is conical in shape, with a mouth having a diameter of 35 cm. The length from mouth-opening to end of bag is 228 cm., but this is not all composed of filtering-tissue.

From the net-ring (which supports the mouth), extending down for about 58 cm., is a cylinder of non-filtering sailcloth. To this mouthpiece the actual net is attached. It is 170 cm. in length. The silk used (No. 20) runs seventy-two meshes to the centimetre; at the end of the silk bag there is a brass filtering bucket (fig. 2, *B*), which is attached by a bayonet-joint to a brass ring fixed to the silk, and also connected with the net-ring by three ropes. To these ropes, which are continued below the bucket, a heavy weight

is attached. The method of suspension of bucket and weight is such that neither is supported by the delicate silk.

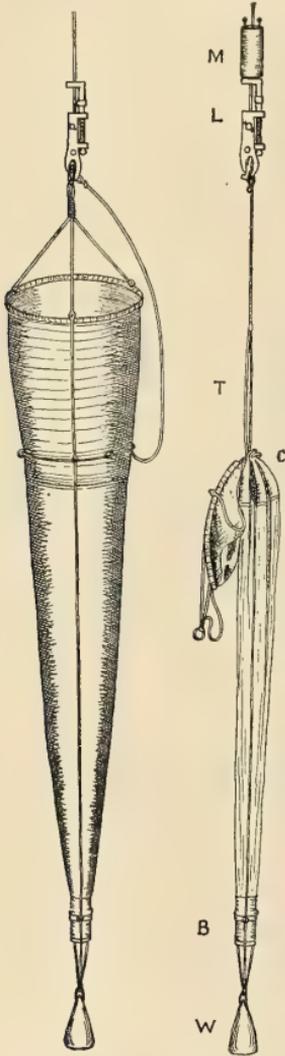


FIG. 1.—Nansen Net open, as it descends and as it fishes.

FIG. 2.—Nansen Net closed, as it is hauled in after fishing.

M, messenger to effect closing; *L*, releasing apparatus; *T*, throttling noose; *C*, sailcloth part of net; *B*, brass bucket containing the catch; *W*, weight.

The net-ring is connected by three head-ropes to a small ring (fig. 3, *t*). In addition to this a rope passes round the non-filtering part of the net through brass rings and forms a noose, the function of which is to throttle the net when the rope (fig. 3, *th*) is pulled.

The closing mechanism release is of brass. For use it is connected to the line from the boat. This line (fig. 3, line) is attached to it by the screw *a* (fig. 3). To the other end of the release mechanism are attached both the small ring (fig. 3, *t*) and the end of the throttling noose (fig. 3, *th*). The latter is, however, permanently attached, and, in fact, is the only rope securing permanently the net to the closing mechanism, and consequently to the lowering rope. The small ring which supports the net mouth is hooked on to the closing mechanism by the movable jaw *j* (figs. 3 and 4), which swings on the pivot *p*. This movable jaw is held closed by a spring-catch at *w*. When the ring *t* is hooked on to the releasing mechanism by the jaw *j*, the net is suspended in such a way that the mouth is horizontal and open. In this position the net is always lowered. The method of using the net is as follows:—The hauling rope is first attached to the releasing mechanism by the screw *a*. The net mouth is supported by the small ring which is hooked on to the releasing mechanism by the jaw *j*. In order to do this the bolt *b* is pressed down, and then allowed to catch the upper end of the jaw, which it secures, and keeps in position.

The throttling line is tied securely to the lower end of the releasing mechanism.

If the net is now held by the hauling rope, it hangs open with the mouth horizontal. To close the net a weight (known usually as a messenger) is allowed to run down the hauling rope. This

strikes with force the bolt *b*, and as a consequence the bolt is depressed. This sets free the jaw *j*, which revolves, and allows the ring supporting the net-mouth to fall out (fig. 3). As a result the net falls away until the throttling rope becomes taut, tightens round the net, strangling it, and supports it in such a position that if the net is now pulled through the water it can neither catch nor lose anything (fig. 2).

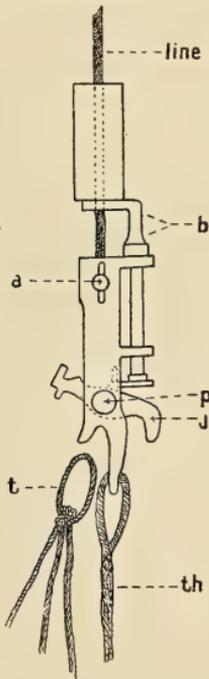


FIG. 3.—Closing Mechanism of Net with Messenger.

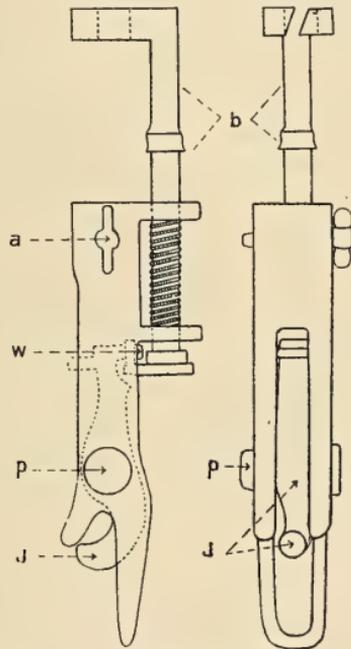


FIG. 4.—Closing Mechanism of Nansen Net.

The depth of water at the observing station was 40 feet. The net was used open all the way from the bottom to the surface, the catch being thus taken from the whole column of water. In addition to this, catches were taken from the top 20 feet, the top 10 feet, bottom 20 feet, and bottom 10 feet of water. The method of procedure for the bottom 20 feet and the top 20 feet is essentially the same as that for the bottom 10 feet and top 10 feet. To catch the organisms in the bottom 10 feet, the net is attached to the closing mechanism and lowered open, care being taken that the descent is perfectly vertical. It is lowered until the mouth is one foot above the bottom. This is determined by sounding first to note exactly the depth. One can then easily lower the net to the correct point by observing the line paid out, which should be marked off in half fathoms. The net is next drawn

up carefully through 10 feet. and then the messenger sent down the line. This releases the jaw, the ring falls out, and the net is supported solely by the throttling line, which, of course, throttles the net. It can fish no longer on the way up to the surface. One point which must be mentioned here is that as the net could fall suddenly when the messenger reaches the closing apparatus, the line should be hauled rapidly for a second or two so that the throttling rope remains taut whilst coming into action. Hensen is not strictly accurate in stating that a loss of plankton will occur, because the plankton is to be found on the silk and not on the non-filtering part. If the net be used carefully in the still water of a lake, there is no chance of any plankton escaping when the net is released. At the same time it must be observed that the net is an inaccurate method always—practically all our plankton methods are—and the only thing we can do is to make sure that the mode of usage is at least uniform. In Lough Neagh, where the catches were made always in calm water at the same station, with the same depth and in exactly the same way, the risks of non-uniform methods of working were reduced considerably. Certainly, compared with marine work, there can be no comparison of the accuracy. For the bottom to surface catches, the net was simply lowered open and pulled up to the surface open all the way. For the top 10 feet the net was lowered until the mouth was 10 feet below the surface, and then raised open all the way. In every case the catch was collected in the bucket by washing down the net from the outside. It was then removed, and fixed at once (in the boat) in a 5 per cent. solution of formalin.

EXAMINATION OF CATCHES.

A rough comparison of the catches may be made by measuring the volumes. This estimation is carried out by allowing the plankton to settle in tubes terminating in a cone. Centrifuge tubes are very satisfactory. The period given should be about a week.

For detailed comparison, however, the method of counting the organisms has been adopted. In any comparisons of plankton catches, the authors consider that counting is absolutely necessary. This unfortunately means great fatigue and huge demands on time. There is no need to detail again the irrefutable reasons for enumeration of the organisms. The reader is referred to Apstein (1905). It is, of course, quite impossible to count every individual in a catch. Millions may be present.

The method adopted by the authors has been therefore to dilute the catch down to 150 cc. of 5 per cent. formalin to which a small amount of glycerine had been added. The glycerine tends to keep the organisms from settling when the mixture has been shaken, and also prevents the drop used in enumeration from drying up too quickly.

The plankton is shaken up in this 150 cc. for about one minute until the organisms are uniformly distributed. $\frac{1}{10}$ cc. is then removed with a Hensen "Stempel" pipette. This amount is placed on a glass-plate ruled with parallel lines, and with the help of a large mechanical stage the whole drop is passed slowly under the objective. Each organism is enumerated as it passes under the objective. The personal equation in a comparison of catches is eliminated by this method, and such vague and relative terms as 'very rare,' 'rare,' 'common' are deleted. If the number of any species of organism in $\frac{1}{10}$ cc. of the above dilution was too great to enumerate easily, the species was counted in a greater dilution. Similarly, if there were too few individuals in $\frac{1}{10}$ cc. of 150 cc. dilution, the catch was filtered and used more concentrated. In every case a factor was noted; and the number of individuals in the count multiplied by the factor gave the number of individuals in the catch. A certain error enters owing to the non-uniform distribution of organisms in the shaken-up catch.

In Hensen's first paper on the method of quantitative plankton investigations instructions were given for a very elaborate counting. There is no wonder that Haeckel, in his "Plankton Studien," remarked, "Wie eine solche arithmetische Danaiden-Arbeit ohne Ruin des Geistes und Körpers durchzuführen ist, kann ich nicht begreifen." Still later it was advised that several plates be counted for each dilution. In practice most of these theoretically exact ways have been abandoned even by the Kiel workers themselves.

We have counted on an average four or five plates for each catch, the dilutions being different according as the species to be counted was frequent or rare.

In order to determine the probable error in the withdrawal of organisms by the pipettes, an organism was adopted which could be easily observed and was not broken up by much shaking. *Ceratium hirundinella* was taken for purposes of the test; and a catch containing this species was diluted until about 140 occurred in $\frac{1}{10}$ cubic centimetre. A $\frac{1}{10}$ cc. was abstracted from this diluted catch after proper shaking and the *Ceratium* correctly enumerated. This process was repeated fifty times, the results being as follows:—

146	118	126	146	126
141	132	121	126	136
133	133	123	166	143
144	162	131	125	129
136	136	148	121	129
156	138	135	121	137
149	141	122	159	142
137	125	112	117	157
144	138	141	133	177
143	121	147	122	128

If we arrange these figures, we can determine certain constants which are of great importance. The *probable error*, for example, will give us the measure of unreliability of the counting and abstraction of the samples. To this effect the numbers found in the various counts have been arranged in classes, where five is the number of units in the class-range and 138 has been taken as a mean, though correctly 136.4.

Now, the probable error is given by the formula:—

$$\pm 0.6745 \times \text{standard deviation} = \pm 0.6745 \times \sigma.$$

The standard deviation σ is given by the formula:—

$$\sigma = \sqrt{\frac{\text{sum of } [(\text{deviation of class from origin})^2] \times \text{frequency of class} - (\text{distance from origin to mean})^2}{\text{number of variates}}}$$

$$\therefore \sigma = \sqrt{\frac{\sum (x^2 \cdot f)}{50} - \bar{x}^2}.$$

$$\text{This is } \sqrt{\frac{9225}{50} - (1.6)^2} = \sqrt{184.5 - (1.6)^2}$$

$$\therefore \sigma = 13.49.$$

$$\text{The probable error} = \pm 0.6745 \times 13.49$$

$$= \pm 9.1029$$

Thus we have a figure showing to what extent the number of Ceratium in one of our counts is probably correct.

The probable error in the withdrawal of organisms by the pipette and the quantitative enumeration by counting is small, but at the same time is greater than it ought to be. We may take from the above, however, that for this particular case a difference of about 30 above or below the mean in a count would be required before we could assume an actual difference in the constitution of the catch. We are not aware that a series of experimental counts with a plankton organism has been worked out before in this way.

From a paper in "Biometrika," vol. v, p. 351, it would appear that in such counts as ours the σ should = $\sqrt{\frac{m}{M}}$, where m is the mean number per unit volume and M is the number of unit volumes counted. This in our case is $\sqrt{\frac{136}{1}}$, but $\sqrt{136}$ is rather different from $\sqrt{182}$, and shows there was some heterogeneity in our samples.

The serious errors in quantitative work are in the process of catching by means of net or other apparatus. It is obvious that unless the organisms are more or less uniformly distributed in the water horizontally, the sample

abstracted by a haul of the net will not be a fair sample of the constitution or quantity of the plankton at the time. This was the grave objection brought against the quantitative work by Haeckel in his "Plankton Studien." Haeckel asserted that the planktonic organisms occurred in swarms. Hensen, on the other hand, upheld the view that where hydrographical conditions were uniform the plankton would be found to be distributed uniformly. By this he recognized vertical distribution, and, what most of his critics forget, the possibility of a non-uniform distribution where the hydrographic conditions are variable,

It would be outside the limits of this paper to discuss the opinions brought forward on this subject. Amongst the foremost workers must be included Herdman; and one of the authors of this paper has spent some very considerable time working with him on the marine plankton of the Irish Sea.

Herdman has demonstrated the non-uniform distribution in that area, but has shown that by an intensive study with stations a few miles apart we may still follow out changes in the plankton quite easily. We must emphasize the fact, however, that the Irish Sea as a whole is a stretch of moving water under all kinds of variable factors. It is impossible to take the catches at the same time each day without taking them under very different tidal conditions. The water our catches were taken from yesterday has moved away to some new place to-day. Our conditions of light at the time of taking the catches may have had no effect on the plankton, which has perhaps been affected by the meteorological conditions of some other place when the water was in that region. Furthermore, the plankton includes numerous pelagic larvae, of bottom animals which have, as everyone would expect, a very non-uniform distribution. In fresh-water lakes all these sources of error are absent. We have the very best conditions for quantitative work and the elucidation of plankton problems. We deal with the same water, and can follow out all the meteorological conditions to which it has been subjected.

Now, it may be said that at the present time most practical workers agree with the views supported and discussed by Apstein, Lohmann, Zacharias, Burekhardt, and Diffenbach, that the horizontal distribution is uniform. The same applies to Lough Neagh outside the littoral regions. Thus in a lake like Lough Neagh we may take our catches as giving a true picture of the conditions prevailing. Were great differences in uniformity present, they would have affected the curves to an obvious extent. In any case the variations in constitution of the plankton which have been taken as seasonal are quite distinct from accidental variations due to inaccuracy in catches.

The following list gives the weather conditions prevailing at times of making catches. The midnight catches are not included in this series:—

1910.

- Febr. 23, . Time 2.0 p.m. Brilliant sunshine. Blue sky. Sea moderate. Breeze fresh S.W. Previous days, heavy rain. Depth of water 40 feet at station.
- March 5, . Time 2.0 p.m. Brilliant sunshine. Wind S.E. to E. and fresh. Sea calm. Surface temp. 4.4°.
- March 17, . Time 2.30 p.m. Cloudy. Sea rough. Wind W. strong. Surface temp. 5.5°C.
- March 30, . Time 2.30 p.m. Brilliant sunshine. No wind. Calm.
- April 13, . Time 3.0 p.m. Cloudy, previous day dull and heavy rain. Sea calm. Wind fresh N. Plankton deep blue in colour. Surface temp. 7.7°C.
- April 27, . Time 2.45 p.m. Dull. Rain. Much wind S. Previous days, similar weather. Surface temp. 8.6°C.
- May 11, . Time 2.50 p.m. Brilliant sunshine. Hot after several days of rain, hail, and snow. Sea moderate. Wind strong S.E. Colour of plankton again different—now yellow-green. Surface temp. 9.5°C.
- May 25, . Time 3.15 p.m. Brilliant sunshine, after hot weather. Sea calm. No wind. Surface temp. 14.3°C.
- June 10, . Time 3.0 p.m. Brilliant sunshine, after previous days of rain and wind (three fine days before the 10th). Sea choppy. Wind strong N. Depth of water now only 38 feet. Surface temp. 15°C.
- July 13, . Time 2.55 p.m. Brilliant sunshine. Surface temp. of H₂O highest recorded 20°C. Sea calm. Wind slight N. Plankton yellow.
- July 27, . Time 3.0 p.m. Brilliant sunshine. Blue sky and clouds. Wind fresh S. Sea calm. Surface temp. 16.5°C.
- August 18, . Time 2.30 p.m. Sea rough. Wind S.S.E. Very dull and much rain. Surface temp. 17.3°C.
- Sept. 8, . Time 2.0 p.m. Brilliant sunshine. Blue sky. No wind. Previous days similar. Thick water-bloom. Surface temp. 17.5°C.
- Sept. 29, . Time 2.15 p.m. Dull. Slight breeze S.W. Calm. Surface temp. 14.5°C.
- Oct 21, . Cloudy. Wind light E. Sea calm. Surface temp. 12.0°C.

1910.

Nov. 11, . Sun and clouds. Previous weather cloudy. Sea calm.
Wind light S. Rain and very rough weather for previous
fortnight. Surface temp. 7.5°C.

Dec. 2, . Bright sun. Clouds. Strong east wind. Sea variable (wind
off land). Frost on previous days. Surface temp. 5.0°C.

1911.

Jan. 12, . Sun at intervals. Wind S.W. Some rain. Sea moderate.
Surface temp. 4.6°C.

Febr. 3, . Bright sun. Sea calm. No wind. Surface temp. 5.0°C.

DISCUSSION OF INDIVIDUAL SPECIES PRESENT IN THE PLANKTON OF LOUGH NEAGH.

PHYTOPLANKTON.

The species of algae occurring in the plankton of Lough Neagh are as follows:—

Tabellaria.

Tabellaria fenestrata var. *asterionelloides* Grunw.—*Tabellaria* is undoubtedly our most characteristic plankton organism. It occurs in prodigious quantities, and is easily first on the year's catches. At times the plankton is almost entirely composed of this form. Another extremely interesting point is that *Tabellaria fenestrata* always occurs in the "star" colonies. One or two very isolated chains have been found in the millions of stars. These results differ greatly from those observations on the lakes of Denmark, where *Tabellaria* is rare everywhere as a plankton organism, and occurs both in chains and in stars.

In Ennerdale Water in the English Lake District the star-shaped form of colony is practically absent; in Wastwater it is entirely absent. In Lough Lomond, which, so far as *Asterionella* is concerned, presents some agreement with Lough Neagh, we find *Tabellaria* occurring more frequently. West's data do not allow of a comparison so far as numbers are concerned, but there is nothing to show that *Tabellaria* var. *asterionelloides* ever attains the position which it occupies in August in Lough Neagh; and we never find the chain form which is present in Loch Lomond.

Moreover, *Coelosphaerium* is the dominant form in Lough Lomond when *Tabellaria* is at its maximum. This is not the case in Lough Neagh. In Lough Neagh the number of *Tabellaria* present drops after August; but it remains quite common *all the year round*, and though a minimum occurs in

March (agreeing with Lough Lomond), the number of colonies in the bottom and surface catch was 55,000, so that it could not be said to be rare even at that time.

Tabellaria fenestrata has been recorded by some observers to occur in chains in winter and stars in summer (Bally for the Zurichsee). For form-variation in Lough Neagh see p. 68.

Tabellaria fenestrata is one of the characteristic diatoms of the Arctic lakes. It is somewhat rare in Central European lakes. It turns up again, however, in the Alpine lakes of Switzerland, and has been recorded as occurring in enormous quantities, just as in Lough Neagh, in Zurich See by Schroeter. It has also been noticed in the brackish water of the North Sea. Schroeter makes an observation of some interest on the quantity of plankton in the Zurich See when mostly *Tabellaria*. He estimates that at this period for a depth of 8 metres, 1 square metre of surface water corresponded to about 1000 cc. of plankton. It would have required a goods train with seven waggons to have removed the dry plankton, while the silica present would have been sufficient to have made a quartz block 2.25 metres square with a weight of 303.8 cwts.

T. fenestrata Kütz occurs in the waters of the Illinois River, but the variety *asterionelloides*, common in Lough Neagh, is not recorded by Kofoid. The species was only found on one occasion in the Illinois River.

Asterionella.

Asterionella gracillima and *A. formosa* both occur in the lake. They have been united, as it is very probable that they are only variations of one and the same species. *A. gracillima* was by far the most frequent form, *A. formosa* being present in an almost negligible quantity.

Asterionella is extremely common in the plankton of Lough Neagh, and is present all the year round. The minimum with us occurs during early March. A maximum occurs *during the summer months* from May to August, and the numbers fall gradually to March. The maximum number obtained in a bottom-to-surface haul was practically 2,000,000; the minimum was 20,000. The individuals occur at all depths, but more commonly in the surface waters.

The maximum of the diatoms seems to be largely influenced by temperature, probably with light and other unknown factors aiding. Usually the chief maxima occur at temperatures below 15° or 16° C., and in the Irish Sea diatoms are rare in the summer months. *Asterionella* seems capable of having a maximum at any temperature. Thus Wesenberg Lund records a curious maximum which took place just before the freezing or immediately after the

breaking up of the ice in December and lasting through January. No maxima occurred, however, at the time in those lakes which did not freeze. Lough Neagh did not freeze during the year of our visits; and as will be seen from the tables, the numbers present in the winter months are not far removed from a minimum. The usual dates for maxima given by other observers agree with that for Lough Neagh—July–August. These dates are recorded by Lemmerman, Wesenberg Lund, and the Messrs. West. In Loch Lomond, just as in Lough Neagh, the maximum occurs in June–August, and is associated, just as with us, with *Tabellaria*.

There is, however, considerable difference in the two types of lake. Our curves for *Asterionella* agree almost exactly with those of Messrs. West for Loch Lomond. In Windermere, on the other hand, there are two maxima recorded for *Asterionella*, one in May–June, and another in November. Ennerdale Water is again very different, and this is a Desmid lake. Form variations are recorded elsewhere (p. 68).

A. gracillima and *A. formosa* both occur in Illinois River, the latter being very much less abundant than the former.

A. gracillima attains its maximum about the end of April, there being no autumnal maximum. It practically disappears from the plankton in July until January.

A. formosa was recorded by Kofoid in November–December, and from February to April. The maximum occurred towards the end of March. He remarks that “this species is distinguished with difficulty from *A. gracillima* and may include only old, and in our planktons often heavily incrustated, individuals, or it may be only a low-temperature variety of the species above named, which, in the grand total of all our collections, outnumbered it ten thousand to one.” We are inclined to agree with this statement, as our observations of these species in Lough Neagh point to the same conclusions.

Melosira.

- Melosira italica* subsp. *subarctica* O. Müller.
islandica „ *helvetica* O. Müller.
crenulata Kütz.
varians Ag. bottom species.
arenaria Moore.

The above species have been recorded by us from Lough Neagh. The three last are also recorded by West with the addition of *M. granulata* (Erent) Ralfs. We have considered all the species together in our counts. The most common appear to be the three first-named above.

Melosira occurs throughout the year, but differs from Asterionella and Tabellaria in the great variation in quantity. Thus, for example, it vanishes almost completely from September until February, that is, during the winter months. Our maximum occurs in late February and early March, and continues more or less towards the end of May. There is, however, only one maximum, and no other maximum appears in October or September as recorded by Apstein and Wesenberg Lund. In the same months, from June onwards, Melosira is remarkably scarce with us.

In the English lakes, Messrs. West record Melosira as completely absent from Ennerdale Water. It is very rare in Wastwater. On the other hand, the figures for Windermere agree almost exactly with those for Lough Neagh, there being one maximum in April. In Loch Lomond Melosira is abundant and dominant in June. At this period, moreover, a Melosira plankton is present, and this never occurs in Lough Neagh. Melosira is one of the Central European forms, and occurs chiefly in shallow and warm lakes. In no other case do the observations on times of maxima show such remarkable variation according to district. Thus the maximum has been recorded in November, December, September, October, June, April, February, July, and May. Melosira has often been noted as forming the food of crustacea—Bosmina, Daphnia, and Diptomus.

Kofoid records *M. granulata* var. *spinosa* and *M. varians* from the Illinois River, the former being very much more abundant. *M. varians* is perennial, and exhibits two well-defined maxima, a vernal one in April–May and an autumnal one September–October. In July and August, 1894, 1895, and 1896 it was almost absent, also in December, February in 1896–97 and 1898–99.

Fragilaria.

Fragilaria crotonensis is the only species that we have met with in the plankton of Lough Neagh. This form was present throughout the year except February, 1911. It was present, however, in considerable quantity in February, 1910. The maximum occurred in March–April, and then the numbers went down during May, June, and the first half of July. The numbers were again up in August. The early maximum agrees with that found by other workers, but occurred much earlier than is usually the case (May onwards, Wesenberg Lund for the Danish Lakes, and July onwards, Lemmerman for Plöner Sea). If the increase in July and August can be called a second maximum, it is earlier again than the second maximum recognized on the Continent in September. Obviously the Lough Neagh conditions are very different from those observed in the Baltic and Danish lakes.

Fragilaria crotonensis is recorded as occurring commonly in the Central European lakes. In Lough Neagh it is quite common. Now we find a striking contrast to this in England and Scotland. In Messrs. West's records the genus is absent from Ennerdale Water. The species *Capucina* is the only one present in Wastwater, and is rare there, and this species is again the only one, and rare in Loch Lomond. Thus there is a marked difference between the Scottish lakes and Lough Neagh. *F. crotonensis* is recorded as occurring in Lough Neagh by West, and also, in another paper, Proc. Roy. Soc. 81 B, in Scottish and English lakes. It is added, however, that "Fragilaria is somewhat rare, and of the species which occur *F. capucina* is the commonest." This does not hold good for Lough Neagh. Kofoid records *F. crotonensis* from the Illinois River, where it is much less abundant than the species *F. virescens*. It is predominantly a vernal plankton, having its maximum on May 10th. It appeared in February and disappeared after May 17th. In other years it was only found in April, May, and December.

Coscinodiscus.

Coscinodiscus lacustris Grun.—The order Centricae, on the whole, includes a small proportion of the Diatoms, and only a few fresh-water forms. The family Coscinodiscaceae includes only three genera inhabiting fresh water in the British Isles; and it is noteworthy that all three occur in the plankton of Lough Neagh—Cyclotella, Stephanodiscus, and Coscinodiscus. Only one species of the latter genus occurs in fresh water in the British Islands, and that not always in the plankton. Now, in Messrs. West's records of the Scottish lakes and English lakes, *Coscinodiscus lacustris* is recorded as absent. In Wesenberg Lund's great treatise on the plankton of the Danish lakes, no mention is made at all of *Coscinodiscus lacustris*. It is not recorded by Apstein for the lakes at Plön.

Thus it is, perhaps, one of the most remarkable features of Lough Neagh to find that *Coscinodiscus lacustris* occurs in very considerable quantities in the plankton. The species seems to be present right through the year, with a maximum in spring. The highest numbers occurred in March and April; the smallest in the months September to February. In the marine plankton, *Coscinodiscus* is one of the most important diatom genera. *Coscinodiscus* is not recorded by Kofoid from the waters of the Illinois.

Stephanodiscus.

The genus *Stephanodiscus* is represented by the species *astraea* in the plankton of Lough Neagh. Like *Coscinodiscus*, this genus is not recorded from the Scottish Lakes (except by Bachmann) or the English lake district.

Unlike *Coscinodiscus*, however, it occurs in some considerable quantity in the Danish lakes; and Wesenberg Lund states that it seems to be of much more importance there than in lakes abroad. It has also been recorded from the Swiss lakes and the Central European lakes, but does not appear to be common.

The maximum occurs in spring, the highest numbers being found in April. It remains common until August, and then the number falls rapidly, so that practically none were present in September, and extremely few from that time onward until February.

Stephanodiscus astraea seems also to be an Arctic plankton diatom. This species is not recorded by Kofoid from the Illinois River.

Cymatopleura.

The genus *Cymatopleura* is represented by the species *elliptica* and *solea*. The species *elliptica* is far the most common, and for this form curves have been made for the year. Wesenberg Lund records *Cymatopleura elliptica* as a bottom diatom, occurring, however, as a typical plankton organism. Perhaps the shallowness of Lough Neagh has something to do with the relative abundance of *Cymatopleura* as a plankton organism.

Cymatopleura elliptica occurs all the year round in the plankton, and the range of variation is not very high. The maximum occurs in July and August, at the same time as the small second maximum of *Fragilaria*. The numbers are also high in February and March, although not as high as the July and August maxima. After September there is a great decrease, and the number then remains about constant and small until the spring.

Cymatopleura does not occur in the English or Scottish lakes investigated by Messrs. West, but has been recorded by them for Lough Neagh and the Orkneys and Shetlands.

A species of *Cymatopleura* occurs in Victoria Nyanza. *C. elliptica* occurs in European and Alpine lakes. Kofoid records *C. solea* from Illinois River, where it occurs in small numbers during the colder months, with also some isolated individuals in the summer months.

We have observed it as isolated specimens in April, May, June, and October.

Surirella.

Surirella biseriata is the most common species in Lough Neagh plankton; though *S. ovalis* Bréb., and *S. robusta* Ehrenb., also occur, the latter often in considerable quantity.

This genus is fairly common in the plankton, but is inferior in numbers to most of the algae which were present in such quantity as to be easily

followed throughout the year in our counts. The maximum numbers occurred in April, the total for all catches being 35,000 on the 13th April. This number may be compared with the maximum numbers of the following:—

Asterionella,	2,722,500
Tabellaria,	78,810,000
Fragilaria,	819,000
Stephanodiscus,	103,500
Coscinodiscus,	1,540,000

The spring maximum of the *Surirella* extends from February onwards until May. A great depression occurred in June and July, and was then followed by high numbers again in late July and August. After this the numbers diminished considerably, though the genus was always present.

Surirella biseriata is recorded as rare in Ennerdale Water, and present in December, January, March, May, and June. In Wastwater it was present chiefly in February. In Loch Lomond, April was the month for *S. biseriata*, and later August. *S. robusta* var. *splendida* also attained its maximum in the months of March and April. On the whole, *Surirella robusta* var. *splendida* appears to be the most common form in the British lake plankton.

Surirella biseriata is recorded for the Danish lakes, and lakes of Central Europe and the Alps. Kofoid records only the *S. ovalis* and *S. spiralis* from the Illinois River.

Synedra.

Synedra Revaliensis Lemm.—This species, which is now recorded for the first time from Lough Neagh, has been the most interesting species of *Synedra* in the plankton. In the first place, other species occurred so very rarely that they did not come out in the counts at all. This species was unrecorded for all the months from the first catches made in February to end of May. On June 10th it first appeared, and then was present only in the bottom water of the lake. The numbers steadily increased until August, when a maximum was reached quite suddenly—37,500 colonies were present in the top 20 feet catch alone! 30,000 colonies were present in the bottom 20 feet. Thus, on this date, more colonies were present in the surface catches. This sudden maximum was followed by just as sudden a fall, and whilst it was recorded for the surface catches in October, the number was only 300. After this date it disappeared once more. In no other case, except *Dinobryon* and *Peridinium*, were such a sudden appearance and maximum observed in the phytoplankton of the lake.

Synedra Revaliensis occurs in lakes in west and south-west Ireland (Messrs. West); but this is not recorded for Scotland and England.

Very few diatoms have a maximum in the height of the summer, as this species of *Synedra* appears to possess. Another interesting feature is the marked origin from the bottom of the lake and the gradual ascent to the surface waters. The *Synedra* species recorded by Wesenberg Lund for the Danish lakes attain their maxima in April and May.

In all cases *Synedra Revaliensis* occurred with us in the form of star-shaped or radiating colonies.

Kofoed does not record this species from the waters of the Illinois River.

Pleurosigma W. Sm. *Gyrosigma* Hassall.

Pleurosigma attenuatum Kütz occurs in the plankton of Lough Neagh in small numbers. The highest numbers occur in July and August, viz. 16,500 in the combined catches. It diminishes during September and October, and is absent altogether during November, December, and January.

Messrs. West do not record *Pleurosigma* in their paper on the seasonal variation in the British lakes examined by them. They have observed it in the plankton from the Orkneys and Shetlands and from west and south-west Ireland.

Neither Wesenberg Lund nor Apstein makes any mention of *Pleurosigma*.

CYANOPHYCEAE.

The Cyanophyceae play a great part in the plankton of Lough Neagh, and in this respect we find Lough Neagh agreeing with the Danish lakes. Just as in the Danish lakes, we have few species but large numbers of individuals; and at times the phenomenon known as "water-bloom," or the "breaking of the meres," is produced by rapid reproduction on calm days, when the organisms can concentrate in the upper inch of surface-water.

Oscillatoria.

Oscillatoria Agardhii Gomont. is the most frequent of the *Oscillatoria* in Lough Neagh. This is not recorded for Lough Neagh by Messrs. West, though they have noted its presence in other lakes in Ireland, and in England and Scotland. The dominant species is *O. rubescens* De Candolle.

The Cyanophyceae are characteristically summer plankton forms, though sometimes a maximum occurs in the winter months. *Oscillatoria Agardhii* reaches its maximum with us in May. It was present in large quantities, however, in March, April, May, June, and July; and with *Anabaena* was responsible for "water-bloom" on March 30th. This date is early for water-bloom, and the phenomenon was not nearly so well marked as in late summer.

Oscillatoria rubescens has been discovered to be dangerous to the fishery in Zurich See. The filaments form a kind of network with mud over the fish-eggs on the bottom, and prevent the eggs from reaching the hatching-point, or suffocating the young larvae. As a matter of fact, more than one blue-green alga has been considered as a dangerous element in lakes; and though it is not known to what extent the development of these forms has increased or remained stationary in Lough Neagh, it will be well to remember that they occur in considerable quantity at present.

The smallest quantity of *Oscillatoria* is present in the months of September to January; and, as a matter of fact, the genus seemed to be totally absent from the plankton in January, 1911.

Oscillatoria Agardhii is recorded by Messrs. West in their seasonal studies of the plankton of the English and Scottish lakes. It is, however, never recorded as more than rare. It is usually absent during many months of the year, and it seems to appear in very different months in different lakes. Against this, it is one of our most common species in Lough Neagh, and present almost the whole year through.

Under the heading *Oscillatoria* spp. Kofoid includes several species which may include *O. Agardhii*, Gomont, although no special mention is made of this form. *Oscillatoria* occurred in every month of the year until the 1st of October. The seasonal curve is most irregular and variable, and Kofoid regards it as a possible adventitious or only temporary plankton.

Anabaena.

Anabaena is represented in Lough Neagh chiefly by the species *flos-aquae* (Lyngb.) Bréb., though *A. Lemmermanni* is also recorded by Messrs. West.

The Cyanophyceae are on the whole characteristic of Central European lakes, and are absent from the Arctic lakes. *Anabaena Flos-aquae* is, however, recorded from north Sweden and Russian Lapland. It is common in the Central European lakes and the Danish lakes. In Messrs. West's latest paper it is only recorded for Loch Lubnaig in Scotland, and is then noted as occurring only in August. It has, however, been recorded by them for lakes in all parts of the British Islands. There is no doubt that it is on the whole very rare in the Scotch and Welsh lakes. It is, on the contrary, very common in Lough Neagh, and is present in every month of the year. The maxima occurred in April (15,000,000 filaments in all catches), but high numbers were present through February, March, April, May, and June. The numbers were lower in the hot months of July, August, September, October, and very low from November onwards until January. In the Danish lakes the maxima occur later; in June and in the case of other species the maxima synchronize with the

time when the water attains its highest temperature. During the winter months *Anabaena* seems to be absent from the Danish lakes altogether.

Anabaena spiroides is the only species recorded from the waters of the Illinois by Kofoid, where it occurred in the water-bloom from June to October. The data were insufficient for determination of maximum.

Gomphosphaeria Naegeliana (Unger) Lemm.

The species *Gomphosphaeria Naegeliana* (Unger) Lemm. occurs in enormous quantities in the Lough Neagh plankton. It is probably either the *Coelosphaerium Kutzingianum* of Messrs. West or *C. Naegelianum* Unger of their records. They state, however, that *C. Naegelianum* Unger is probably only a form of *C. Kutzingianum*. They record both, and there seems to be some little confusion about the name of the genus.

Lemmermann himself has identified our specimens, and states that *G. Naegeliana* is quite different from *C. Kutzingianum*. It is, as a matter of fact, a different genus, *i.e.* *Gomphosphaeria*. The cells of *G. Naegeliana* are oblong or obovate, and are fastened at the ends of branched hyaline gelatinous stalks. The cells of the *Coelosphaerium Kutzingianum* are globose, and there are no stalks. The cells are arranged just within the periphery of the colony.

Wesenberg Lund only refers to *Coelosphaerium Kutzingianum* in the Danish lakes; but we should not be surprised if this is the same as our species *G. Naegeliana* of Lough Neagh.

Gomphosphaeria Naegeliana occurs in large quantities throughout the entire year in Lough Neagh. Its curve shows two maxima. The numbers rise in March, and a small maximum with 1,317,500 colonies (all catches added) is reached in April. The numbers then fall slightly to about an average of 400,000 for the months of June, July, and August, and then an enormous increase takes place. In November the number of colonies in all catches was 13,646,500; and this maximum lasted throughout December. The maximum in November was responsible for water-bloom and also in September. As a matter of fact during the period September to November, any succession of very calm days brought up the alga to the surface. The lake seemed covered with a green layer blown into long streaks by the wind. Our maximum for *Gomphosphaeria* seems to be remarkably late. *Coelosphaerium* is usually recorded for autumn; but Messrs. West give for Loch Lomond August, September, October, and November. In Loch Katrine it appears from their figures to be most common in August and September. It is recorded for the English lakes by Messrs. West (Proc. Royal Soc., 1908), but appears to be

absent from the lakes investigated in the lake district in their research on the seasonal changes (Linn. Soc. Jour., 1912). *Gomphosphaeria lacustris* is however, present. Wesenberg Lund records this alga as being rare in April and May and reaching its maximum in autumn.

C. Naegelianum has been recorded from Russian Lapland, and so occurs in the Arctic lakes. It is remarkably common in many Central European and Baltic lakes. The species is recorded from certain of the alpine lakes—Katzen See, Zurich See, etc. *Coelosphaerium* is stated to be absent from the African lakes.

On the whole, Loch Lomond seems to resemble Lough Neagh so far as *Coelosphaerium* is concerned more than any other lake, for which we have details, in the British Isles. There, for example, we find *C. Kutzingianum* almost all the year round and attaining a maximum in September–November, with low period in December–January. Messrs. West state that it occurs in slightly contaminated lakes. No record is given of this genus by Kofoid from the Illinois River.

Microcystis Kütz. (*Polycystis* Kütz. *Clathrocystis* Henfrey.)

Microcystis is represented in Lough Neagh by the species

- M. firma* (Bréb. et Lemm.).
- M. aeruginosa* Kütz.
- M. holsatica* Lemm.

M. firma and *M. holsatica* are recorded for the first time for Lough Neagh. *M. prasina* (Wittr.) Lemm., *M. stagnalis* Lemm., and *M. roseopersicina* (Kütz), West, are recorded by Messrs. West in addition to the above. We have for purposes of this report added the various species together.

Microcystis is never common in Lough Neagh. It reaches a maximum in February of 41,600 in the bottom-to-surface catch, and diminishes rapidly. It is very rare from September to February.

Wesenberg Lund records *M. aeruginosa* and *M. flos-aquae* in all the Danish lakes examined except Esromso, in which the former alone occurs. It reaches its maximum in July, which may be very high. It is absent from Ennerdale Water, Wastwater, Loch Earn, and Loch Lubnaig.

M. elabens and *M. flos-aquae* both occur rarely in Loch Lomond in October and November and in August respectively. *M. flos-aquae* occurs in very small quantities in June in Loch Katrine.

Never in Lough Neagh, so far as we know, does *Microcystis* form "water-bloom." This is not the case on the Continent, where it often is the characteristic blue-green alga occurring in water-bloom. It has been observed on

the Continent, too, that a great development of *M. aeruginosa* accompanied by "water-bloom" phenomenon was followed by the death of the fish. This was probably due to the decomposition gases.

Microcystis is absent from the arctic lakes. It is very rich indeed in the Central European lakes, while it occurs and forms water-bloom in Alpine lakes. *M. aeruginosa* appears to have a very wide range, and occurs in the lakes of Ceylon.

Clathrocystis aeruginosa (Kütz.) Henfr. is present in the Illinois plankton, where it is predominantly a midsummer species. It attains its maximum in August and September (108,000). It is not very abundant, *Microcystis ichthyolabe* being much more frequent. Other species may have been counted with the latter owing to the lack of striking characteristic differences. *M. ichthyolabe* attains a maximum in August-September or September-October, and is present throughout the year.

Chroococcus.

C. limneticus Lemm. is the only species of the genus which is at all common in Lough Neagh, though *C. minimus* also occurs. Most species of *Chroococcus* are not found in the typical plankton of large lakes. It can hardly be called common in Lough Neagh; 3600 colonies was about the largest of the bottom to surface catches in August. It was absent altogether or else present in very small quantities indeed in April, May, January, and February. Messrs. West say that it was very abundant in Lough Neagh. Their catches probably represented the maximum time of occurrence, July or August, though it was certainly never abundant in our year of examination.

C. limneticus occurs in the Danish lake plankton, but is never abundant and appears to reach its maximum during the winter. Wesenberg Lund adds that if this is the normal it differs from all the other Cyanophyceae which reach maximum usually at higher temperatures. Our largest numbers seem to occur in summer, though a very large catch was made in February. (February catch abnormal—new net.)

Chroococcaceae seem to be very abundant in some of the African lakes. *Chroococcus turgidus* has been recorded from arctic lakes in Russian Lapland.

DINOFLAGELLATA.

Ceratium.

The genus *Ceratium* is represented in our plankton by the species *C. hirundinella*, and perhaps no other fresh-water protozoan or protophyton has been so much discussed as this organism. Whilst *Ceratium* is represented by

many marine species, there are only two fresh-water species; and one of these, *C. cornutum* Clap. and Lachm., is a pond-form and does not occur in Lough Neagh. *Ceratium* is apparently absent in January and February alone. We say apparently because it was only after the investigation of a large quantity of December plankton that some odd individuals were found. It is very probable therefore that a few isolated individuals occur right through the year. In many lakes *C. hirundinella* is known to be altogether absent in the winter months. Wesenberg Lund states that it begins to appear in May in the Danish lakes. We have found a few resting cysts, and probably in this form as well as in isolated individuals the genus survives through the winter. It appears in definite numbers in the Lough Neagh plankton in March, but it is then very rare. A gradual increase takes place from this time until its maximum is reached in August. At this time it is one of the organisms occurring in greatest numbers in the plankton. Its maximum coincided with the maximum of *Tabellaria* and *Asterionella*; otherwise it would have been the most numerous organism in the plankton. As it is, it practically comes second. Both three-horned and four-horned individuals occur; but the four-horned is by far the most common when the maximum is reached.

For details of the form-variation, reference should be made to p. 69, where this has been discussed.

After the maximum in August, the number drops very suddenly (from 2,086,500 individuals in all catches to 233,710 on September 8th). There are about as many present in October as in June. Thus *C. hirundinella* has one very definite maximum, and this agrees with the marine species in occurring in the warmer months.

Apstein records *C. hirundinella* in the Baltic lakes, where it has one maximum in the summer months and is absent during the winter. Messrs. West record *C. hirundinella* from the Scottish lakes, Orkneys, and Shetlands, west and south-west Ireland, the Welsh lakes, the English lakes, Lough Neagh, and Lough Beg.

In Ennerdale Water it is common in September and October, when it reaches its maximum. There is a smaller maximum during June and July. The species is absent from December to April. It does not occur in Wastwater at all. *C. hirundinella* is present in Loch Lomond, but not common. The maximum for this lake is attained in September. The species is absent altogether from November to May.

C. hirundinella does not appear to be present at all in Loch Katrine, whilst in Lough Earn it is only recorded for August, and even then it is rare. Messrs. West do not find it in Lough Lubnaig.

Wesenberg Lund states that *C. hirundinella* appears in May in the Danish lakes, and its maximum coincides with the highest temperatures of the water. During September and October it disappears, often very suddenly. The species is present in large quantities in the Baltic lakes.

The Dinoflagellata, on the whole, play only a secondary part in the arctic lakes. The species *C. hirundinella* occurs in the lake of Enore in the three-horned form and without seasonal variation. Richard found three- and partly four-horned individuals.

C. hirundinella is the chief Dinoflagellate found in the European alpine lakes, where it occurs in large quantities. The same species occurs also in quantities in the north European lakes, in Iceland and in the Faröes. Kofoid records it from the Illinois River during the summer of 1896, but not in 1898. It was present from June to October, and attained its maximum (19,200) on June 6th.

Peridinium.

West records the species *P. Willei*, *P. tabulatum*, and *P. cinctum* from Lough Neagh. The species *P. tabulatum* and *P. cinctum* alone occur in sufficient quantities for counting purposes. The genus is at no time very abundant; and from the latter part of September until April it has not been observed in the plankton. In August the maximum, 54,000, is reached, in the bottom-to-surface catch. This occurs quite suddenly, as in July and September there are not more 6,000 individuals present in the catch.

West records *P. inconspicuum* and *P. Willei* from Ennerdale Water. The former occurs from May to November, with its maximum in August; the latter occurs from January to July, with its maximum in July. In Wastwater, *P. Willei* occurs throughout the year, and attains its maximum in July. In Loch Lomond it is absent from November to April, and reaches its maximum in September. In Loch Katrine *P. Willei* is absent from October to February, and reaches its maximum in July. It is present in Loch Earn and Loch Lubnaig in August.

In the British lakes Peridinium, although generally present, never occurs in very abundant quantities, and its maximum occurs at different times in the various lakes.

Wesenberg Lund finds that in the Danish lakes *P. tabulatum* attained a large maximum in April and a smaller one in October. *P. cinctum* is also present in the Danish lakes. According to Apstein, *P. tabulatum* appears in April in the Plöner Sea and Dobersdorfen Sea, and reaches its maximum in July. It disappears towards the end of November.

In the arctic lakes the Dinoflagellata are unimportant, but *P. Willei*, *P. cinctum*, and *P. umbonatum* have been recorded.

P. Willei occurs in the plankton of the north European lakes and also other species. It seems to be absent from the Baltic lakes, its place being taken by *P. cinctum*, while other species also occur. They rarely attain a large maximum. In the central European alpine lakes *P. tabulatum* is recorded as common.

We see that although *Peridinium* is widely spread, it is nowhere very abundant.

P. tabulatum is recorded from the Illinois River by Kofoid. It is perennial, although rare, during the cold months. It attains its maximum about July or August. It plays quite an insignificant part in the plankton of this river.

DINOBYRYON.

This genus is represented in the Lough Neagh plankton almost entirely by *D. cylindricum* var. *divergens* (Imhof) Lemm. *Dinobryon protuberans* and *D. sertularia* var. *thyrsoideum* also occur, but in such small quantities that it is not worth while counting them separately. As a matter of fact, there seems at present to be great confusion amongst specialists as to the different species, and temporal variations require to be worked out. In Lough Neagh Dinobryon is not a very abundant constituent of the plankton until July is reached, when it attains a maximum of 462,000 colonies (in all the catches of the day combined). It is absent altogether from September to March, and does not begin to increase very much until June.

Messrs. West record species of Dinobryon from Ennerdale Water, Wastwater, Loch Lomond, Loch Katrine, and Loch Lubnaig, but they are exceedingly rare, and occur only during a few of the summer months, and then only in very small quantities. The genus appears to be more common in Loch Lomond and Loch Lubnaig in September and August respectively.

The Danish lakes are poor in Dinobryon, though a great *spring* maximum has been known to occur in May in certain lakes. Apstein found great quantities of Dinobryon in the Baltic lakes. Two species predominate, *D. divergens* and *D. stipitatum*. He found the genus common in one lake in April, and it increased steadily until June was reached. There was a great recession in July, and only a few were present in September. In another lake, however, the numbers were greatest in June and July, when ten individuals were present in every cc. of water, or a colony of twenty individuals to every 2 cc.

Lauterborn finds a maximum in May, and even finds what may be termed a Dinobryon plankton. His numbers diminished during June, July, and August, but there was a second maximum in October. Apstein, as the result

of investigations, divided lakes into Chroococcus and Dinobryon lakes. The characteristic conditions are stated by him to be as follows:—

	Chroococcus lake.	Dinobryon lake.
Chroococcaceae, . . .	common, . . .	rare.
Dinobryon, . . .	none or rare, . . .	numerous.
Chydorus, . . .	pelagic, . . .	littoral.
Plankton in general, . . .	rich, . . .	poor.
Water, . . .	muddy, . . .	clear.

One of the first objectors to this theory was Zacharias. Apstein states that if there is much Clathrocytis, for example, in a lake there is little Dinobryon. Reighard, however, for St. Clair, showed that the features were not as Apstein's theory would have made them. He found

Clathrocytis, . . .	common.
Dinobryon, . . .	common.
Plankton, . . .	poor.

We find Chroococcaceae common, Dinobryon common during certain months, and plankton rich. The theory does not seem to hold good, and only expresses conditions seen perhaps in the lakes examined by Apstein.

Dinobryon is recorded for Greenland and Lapland often under the ice. It occurs in the alpine lakes, and is recorded by Kofoid for the Illinois River. Kofoid considers all the species as growth varieties of the one species.

Pediastrum.

The genus *Pediastrum* is represented in our plankton chiefly by the species *P. Boryanum*, *P. Boryanum* var. *longicorne*, and *P. duplex* var. *clathratum*, *P. duplex* var. *reticulatum* Lagerh. *Pediastrum* is a fairly frequent constituent of the plankton. It is absent only in December. The two species were studied separately, but the varieties were counted together.

P. Boryanum (Turp.) Menegh. has two maxima, one in April, when it reaches 37,200 in all the catches, and another slightly larger in August, numbering 39,000. In July it diminishes to 1500. After the August maximum it diminishes until December, when none were found in any of the catches. From February onwards it is present in fair quantities.

P. duplex Meyen (= *P. pertusum* Kütz) has a similar seasonal variation to *P. Boryanum*, but is usually somewhat less abundant. After the early maximum in April it diminished until the early part of July, when none were found at all. In August it reaches a higher maximum than *P. Boryanum*, viz., 45,500 in all the catches. Then it diminishes suddenly and is absent altogether in December and January.

Wesenberg Lund records both these species for the Danish lakes, but does not state in what quantities they occur or in what month they attain their maximum. Apstein records a double maximum for *Pediastrum* in the Baltic lakes, one in spring and a larger one in August.

It is absent from Ennerdale Water, Wastwater, Loch Lomond, Loch Katrine, Loch Earn, and Loch Lubnaig. West records the genus for the Scottish lakes, Orkneys and Shetlands, west and south-west Ireland, Welsh lakes, Lough Neagh and Lough Beg; but it is very uncommon.

Pediastrum is widely distributed in the arctic lakes; in the north European lakes it occurs, but only in small quantities, although the number of species may be large. Numerous species of *Pediastrum* have been recorded from the Baltic lakes, but they occur only in small numbers.

P. Boryanum occurs in the plankton of the Illinois River in small numbers during every month of the year. There are vernal and autumnal maxima in May and September at similar temperatures. *P. duplex* is much more abundant than *P. Boryanum* in the Illinois River; in fact, it is the most abundant representative of the Chlorophyceae in these waters. The seasonal variation is practically the same for both species.

Staurastrum.

Numerous species of this genus occur in the plankton of Lough Neagh, but by far the most frequent species is *S. paradoxum* var. *longipes*. For the purpose of this work all the species have been counted together.

It occurs throughout the year, but from the month of March until early in July it is present only in very small quantities. In September it reaches a maximum of 388,540 for all the catches.

Wesenberg Lund states that *S. gracile* and *S. paradoxum* var. *longipes* occur in the Danish lakes, the latter only rarely and the former in small quantities. *S. gracile* reaches its maximum in the summer months, viz., July and August. Apstein records *S. gracile* from the Baltic lakes, where it attains its maximum in August. It is at its minimum or absent altogether from March to June.

W. and G. S. West record several species of *Staurastrum* from Ennerdale Water, *S. jaculiferum* West forma *biradiata* being the most common. It reaches its maximum in August, and is rare in January and March. In Wastwater, *S. jaculiferum* West (f. *triradiata*) is very common from June to November, and rare from February to April. *Staurastrum* is present in small quantities in Loch Lomond, while in Lough Katrine it occurs in much larger quantities. Here West finds that *S. paradoxum* has its maximum from May to July, while *S. paradoxum* var. *longipes* has its maximum from August to

December. *Staurastrum* is also present in Loch Earn, but is absent from Loch Lubnaig.

In the Baltic lakes only a few species of *Staurastrum* occur, and they never attain great abundance. *S. paradoxum* is not recorded by Kofoid, but *S. gracile* was present in the waters of the Illinois in small numbers from March to January, with a maximum of 14,000 in September.

Sphaerocystis.

Sphaerocystis Schroeteri Chodat.—This species occurs in the plankton of Lough Neagh more frequently than any other member of the Palmellaceae or the Protococcaceae, although it is not very abundant. From November to February it is absent. In March it occurs in small quantities, and increases rapidly until in May it reaches a maximum of 121,000 colonies in the bottom-to-surface catch.

Messrs. West record *S. Schroeteri* from Ennerdale Water, where it reaches its maximum in June. It differs from the same species in Lough Neagh by being absent in August, but present in very small quantities during the winter months, whereas in Lough Neagh it is fairly abundant in that month, and absent in the winter months. In Wastwater it reaches its maximum in October and November, while in Loch Lomond it occurs most abundantly in July, August, September, and October. In Loch Katrine it is always very rare. The same is true of Loch Earn, while it is absent altogether from Loch Lubnaig.

Wesenberg Lund records *S. Schroeteri* from some of the Danish lakes. It appears in May, has its maximum in June, and disappears in August to September. Apstein does not record *S. Schroeteri* from the Baltic lakes.

It is one of the main forms of the Eulichlorophyceae occurring in the arctic freshwater plankton. In the north European lakes *Sphaerocystis Schroeteri* is the most abundant of the Chlorophyceae. In the Baltic lakes *S. Schroeteri* is much less common; while in the central European alpine lakes it occurs in still smaller quantities.

Dictyosphaerium.

D. pulchellum Wood occurs in the plankton of Lough Neagh in very small quantities. Its maximum is probably in August–September, although it occurred in fair quantities in February. It was absent again from October to January and from May to July.

Messrs. West record it from Ennerdale Water, where it reaches its maximum in August and September. It also occurs fairly commonly in

March, and is absent in June and January. It appears to have a double maximum; but as it occurs in such small quantities, it is difficult to state this definitely. It is not recorded from Wastwater, Loch Katrine, or Loch Lubnaig. It is present in extremely small quantities in Loch Lomond in January and in Loch Earn in August.

Wesenberg Lund records *D. pulchellum* from the Danish lakes. In Lake Esromso it reached a great maximum in September.

D. pulchellum is typical of the North European lakes only.

Eudorina.

Eudorina elegans Ehrenb. occurs in the plankton of Lough Neagh in very small numbers from July to December. The numbers are at their highest from August to October, reaching 18,500 in all the catches combined. It disappears in January, and does not appear again until July.

Messrs. West do not record *Eudorina* from those lakes examined quantitatively by them. Apstein records *E. elegans* from the Plöner See, where it occurs from July to November, reaching its maximum in August. Wesenberg Lund observed *Eudorina* in all the Danish lakes examined by him. *Eudorina elegans* has been recorded from east and west Greenland and from Nova Zembla. It occurs also in the north European lakes and the Baltic lakes. It is fairly common in the central European alpine lakes.

This species is recorded from the Illinois River by Kofoid, where it occurs from February to October and in smaller numbers, and sporadically, during the colder months. The maximum occurred in April.

Tribonema.

Tribonema bombycinum, forma *depauperata* Weille, occurs in Lough Neagh in fairly large quantities, although it is never so abundant as *Oscillatoria* or *Melosira*. It is almost identical with *Oedogonium*, and has probably been mistaken for the latter. Messrs. West make no mention of *T. bombycinum*. Our species has been kindly determined by Lemmerman.

It is present in the plankton of Lough Neagh through the year, reaching its maximum in March (950,000 in the bottom-to-surface catch). During April and May it diminished to 100,000; and in August it rose again to 420,000. It is at its minimum during November, December, and January.

Messrs. West do not record *Tribonema bombycinum* from any of the British lakes examined by them, but *Oedogonium* sp. (sterile), with which it may have been confused, occurs in all these lakes very rarely.

In Loch Lomond *Oedogonium* is less rare in March, August, and in September, while in Loch Katrine it is fairly common in August, September,

November, and December. In Loch Lubnaig it is fairly common in October, but very rare in March. Thus the times of the maxima of *Oedogonium* in these lakes differ from each other and from *Tribonema* in Lough Neagh.

Wesenberg Lund records *T. bombycinum* forma *depauperata* from all the lakes examined by him in Denmark. It reached a very large maximum in June and July in Esromso.

No mention is made elsewhere of the occurrence of *Tribonema bombycinum* in the plankton, but this is probably due to its very close resemblance to *Oedogonium*.

ZOOPLANKTON.

ROTIFERA.

Anurea.

Anurea cochlearis var. *tecta* Gosse.—This is the most abundant rotifer in the plankton of Lough Neagh. It is present throughout the year, and reaches its maximum (142,500 in all catches) towards the end of July. The minimum occurs early in February, and the numbers remain low until late in May. Very much attention seems to have been given to this Rotifer, and hence its biology is now rather well known. Its temporal variation in form has been discussed elsewhere. Its length of life has been determined as about thirteen days at 18° C. It forms part of the food of *Abramis brama*.

Concerning distribution and times of maxima in other lakes the following may be said. Wesenberg Lund records the species from lakes, ponds, and ditches in Denmark, and finds the maximum earlier than we, i.e. in May or June. In the Baltic lakes Apstein finds the species with a maximum at the same time as ours—at the end of July in the Plöner See, but earlier in the Dobersdorfer See. In the Scotch lakes *Anurea cochlearis* is of general occurrence, and sometimes is so numerous as to render the water turbid. *A. cochlearis* is a common feature of the arctic plankton, which is rich in Rotifers; and in short it well fills a place in that small community of species designated by Wesenberg Lund as cosmopolitan.

Anurea aculeata Ehr.—This species occurs in the plankton of Lough Neagh in small numbers only. It appears late in March, reaches its maximum in July, and disappears completely towards the end of September. Wesenberg Lund reports *A. aculeata* from most of the ponds and lakes of Denmark, where it appears to be perennial. It reaches its maximum between April and June. In the Baltic lakes, the Plöner See and Dobersdorfer See, this species reaches its maximum in June, and is only present for part of the year.

In the Scottish lakes Murray and Pullar state *Anurea aculeata* is only of rare occurrence, and then only in the smaller lakes. This species with *A. cochlearis* belongs to the cosmopolitan community of Wesenberg Lund.

Kofoid records the species from the waters of the Illinois River, where it appeared in March, 1898, and increased to a maximum in May. It then declined and disappeared in June. There were, however, scattered occurrences throughout the winter months, and in 1894 Kofoid records an autumnal pulse in September.

Polyarthra.

Polyarthra platyptera Ehr.—Occurs in Lough Neagh in fairly large numbers. Except for *A. cochlearis*, it is the most frequent of the Rotifers. It appears towards the end of May, and increases rapidly until it reaches its maximum in August and September (51,000 in the combined catches). It disappears completely in January, and is absent throughout the winter and spring months. Murray and Pullar record *P. platyptera* as general in the Scottish lochs and in the rest of Europe. Wesenberg Lund states that in the larger Danish lakes the species is dicyclic, the sexual period occurring during March and April being the most marked. This differs strikingly from the state of things found in Lough Neagh, as here *P. platyptera* is absent altogether from the plankton until late in May. In the ponds in Denmark the species is polycyclic. In the Baltic lakes Apstein records *P. platyptera* from the Dobersdorfer See, where it is present in all the months except March. It reaches its maximum in July to August. In the Plöner See it is present throughout the year, and reaches its maximum in May. *P. platyptera* is included in Wesenberg Lund's list of the cosmopolitan species of Rotifers. *P. platyptera* is recorded by Kofoid from the waters of the Illinois, where it is one of the most abundant of the Rotifera. It is perennial; but during the colder months, October–April, it occurs only in small numbers. It attains its maximum in April; but it is polycyclic and has monthly recurring pulses. In addition to the widespread distribution of *Polyarthra* indicated above, it may be added that the species has been sometimes found to occur in the brackish water of the Baltic.

Notholca.

Notholca longispina Kell. is another Rotifer of widespread distribution, and belongs to the cosmopolitan plankton community of Wesenberg Lund. The long spines present in this species are probably, like many other long processes developed in active plankton organisms, for giving stability in movement—orientating organs—and not organs for buoyancy.

The species occurs in the plankton of Lough Neagh in small numbers; but it seems to be present throughout the year. It is not recorded for November

or January; but as it was present in December, it is likely that the numbers were too small to be represented in the counts. The maximum was reached in June (9,000 in all catches). Other periods of maxima have been recorded between May and August; and in some places—North American lakes—it develops exceptionally in winter. In other lakes it appears to have two maxima, as in the Achen See, where there is a spring maximum in March and April, and a chief maximum in August.

Wesenberg Lund records the species for all the lakes investigated in Denmark. It was present throughout the year, and reached its maximum between May and August. Apstein records the species from one of the Baltic lakes—Plöner See—where it reaches its maximum in August, and is absent during November, December, and January. It seems to be more common in Scotland than with us; for Murray and Pullar record the collections of plankton as sometimes brick-red in colour, through *Notholca longispina*. Kofoid notes *N. longispina* only once in the plankton of the Illinois River, January, 1895.

Triarthra.

Triarthra longiseta Ehr.—Occurs in Lough Neagh in fair quantities, being, after *Anurea cochlearis* and *Polyarthra platyptera*, the next important Rotifer in frequency. It appears about the end of March, and increases slowly in numbers at first, attaining its maximum in July (39,000 in all the catches). After this the numbers drop away suddenly, and in November it disappears completely.

Wesenberg Lund records the species from all the lakes investigated in Denmark, where it is perennial, the sexual period occurring in May. Apstein does not record *T. longiseta* from the Dobersdorfer See; but in the Plöner See it is present. The maximum occurs there in August. In the Scottish lochs, Murray states that *T. longiseta* is comparatively rare, and is locally distributed. The species is cosmopolitan. Kofoid records *T. longiseta* from the Illinois River, where it occurs throughout the year. Their numbers are more frequent from May to October, and the maximum is reached in September.

Notholca.

Notholca striata Ehr.—A less common constituent of the plankton of Lough Neagh. It is absent from the end of April to September. In October and the following months it occurs in small numbers, and it reaches its maximum in February and March (22,000 in the combined catches).

Wesenberg Lund records *N. striata* from most of the lakes of Denmark, where it attains its maximum in the period December to April. It was never observed in summer. Apstein records *N. striata* from the Plöner See in

north Germany during the months of February, March, and April, when it occurred in very small numbers. Murray records *N. striata* as a pond species, rare at the margins of lakes in Scotland. *N. striata* is recorded by Kofoid in the Illinois River. It is a winter plankton, appearing in November, and attaining its maximum in March and disappearing in April.

Thus it will be seen that in Lough Neagh, Denmark, the Baltic lakes, and America the species occurs in the same period of the year—a striking example of the uniformity of fresh-water species with cosmopolitan distribution.

Mastigocerca.

Mastigocerca capucina Zach. and Wierz.—Appeared in the plankton of Lough Neagh in extremely large numbers in August and September. It was not observed at any other time.

Wesenberg Lund records it from the lakes of Denmark, where it occurs from May to October–November. In Furesø it was observed on January 31st. Apstein records it from Dobersdorfer See, where it appears in June, attains its maximum in August, and disappears in November. In the Plöner See it occurred in July, 1893. In 1892 it reached its maximum in the latter part of September, and was absent in November.

Murray does not record it from the Scottish lakes.

It is absent from the arctic region, and occurs as a summer form in the north European, Baltic, and the Swiss lakes. Amongst other Rotifers occurring were:—

Metopidia lepadella Ehrenbg.

M. oscipternum Gosse.

Synchaeta pectinata Ehrenbg. (specimens fully contracted).

COPEPODA.

Cyclops strenuus Fischer.—Occurs in the plankton of Lough Neagh in large numbers. It is present throughout the year. In July there is a maximum of 3,425 in the combined catches, after which there is a descent to 1,600 in September. The number then rises rapidly until it reaches 4,722 in October, after which the numbers remain high until February.

Wesenberg Lund has obtained a similar seasonal variation for *C. strenuus* in the Danish lakes, although the first maximum there occurs in spring. Apstein does not record *C. strenuus* from the Baltic lakes; but it is probably present, and recorded in later works. Murray records it as general in the Scottish lakes, where it occurs all the year round. *C. strenuus* occurs in the plankton of the arctic regions, where it is one of the main forms of the large

lakes. It is also the most important species of Cyclops in the north European region. In the Baltic lakes, *C. strenuus* is common; but the chief form is *C. oithonoides*, while *C. strenuus* is here mainly a winter and deep-water form. *C. strenuus* is also the commonest form occurring in the Alpine lakes, more especially in the high ones.

This species of Cyclops far outnumbers all others occurring in Lough Neagh. In fact, the other species are somewhat rare, *Cyclops viridis* being present in small numbers. It gives, as will be referred to in another part of the paper, an arctic feature to the plankton of the lake.

Diaptomus gracilis Sars.—Is the most abundant Copepod in the plankton of Lough Neagh. It is present throughout the year, and, like *Cyclops strenuus*, has two maxima, one in May (4,903 in all the catches), and one in October (5,336 in all the catches). The numbers remain high until February.

Wesenberg Lund finds this species in several of the Danish lakes; but there is no strongly marked sexual period. Females with eggs are, however, most frequent in May; and in September to October there is another sexual period which is even less marked than in spring. Murray records *D. gracilis* as general in Scotland, where it is perennial in some of the lochs. In certain lochs at high elevations it has a seasonal limitation. It is the commonest species in Scotland, as in Europe generally. *D. gracilis* is one of the main forms of the large lakes in the arctic district designated by Wesenberg Lund. It is also the chief form of the north European lakes, the Baltic lakes, and the central European alpine lakes. The distribution of the genus *Diaptomus* has been worked out recently in very great detail. A further reference to this will be found on page 77.

CLADOCERA.

Daphnia hyalina Leydig.

D. hyalina var. *lacustris* occurs in Lough Neagh in large quantities during certain months of the year. It appears for the first time in April, and increases slowly at first. In June it suddenly reaches its maximum (6690 in all the catches). It then decreases slowly, and disappears completely in January.

Wesenberg Lund finds this variety, which he terms subspecies, in Viborgso and Haldso only. In Viborgso, it has a great maximum during the summer and a second great maximum towards winter, after which it disappears completely. In Haldso, the species has a great maximum in the early summer and a smaller maximum towards winter, throughout which it is present.

Murray finds that *D. hyalina* is general in Scotland, where it may be perennial. In some of the higher lochs it dies out in the winter. Kofoid records *D. hyalina* from the plankton of the Illinois River. The individuals appeared in spring and attained their maximum in June, and disappeared in July. Apstein finds that *D. hyalina* occurs in the plankton of the Baltic lakes from September to July, attaining its maximum in November to January.

The period of reproduction differs very considerably in different districts. In the arctic regions it is monocyclic, while in the low-lying Swiss lakes it is acyclic. It has been known to reach its maximum in spring, in winter, or in both, and may be perennial or present in the plankton during a few months of the year only. The species is common all over Europe, the arctic and the tropical zones. In the Baltic lakes it is less common than in the arctic lakes, and occurs more frequently as a pond form than in the pelagic region of the large lakes. In L. Neagh at the time of its maximum it is the most common crustacean in the plankton.

Bosmina.

Bosmina is one of the plankton forms that has been most studied from the point of view of seasonal variation. More interesting still, however, is the study of the distribution. The species of *Bosmina* that are common seem to be very definitely distributed, so much so, in fact, that definite regions in Europe can be mapped out by the presence or absence of certain forms.

In L. Neagh *Bosmina* appears to be our most abundant Cladoceran caught in the net-catches. The records for these forms in Ireland seem to be very thin; and in Lough Neagh the form recorded by Kane is *Bosmina mixta* (stated by him to be not previously known from the British Isles). This species is certainly one of the lesser characteristic forms; and it renders it all the more curious that Kane has not recorded *Bosmina obtusirostris* from Lough Neagh—a form which is somewhat closely approached by *B. mixta*. We have found two species in large numbers, viz. *Bosmina obtusirostris* and *Bosmina longirostris*. This, of course, does not preclude the existence of other species in small numbers. As mentioned before, the work has not been of a detailed systematic kind.

We have discussed in another part the remarkable character—*Bosmina obtusirostris* and *B. longirostris* occurring together in considerable numbers and their relations from the point of view of distribution. In the table the two species have been lumped for convenience in counting. In Scotland the most common species appears to be the arctic form *B. obtusirostris*. In Lough Neagh *B. longirostris* appears to occur in the greatest numbers, although both

are very common. *Bosmina* was present in the first catch taken, February 23rd, 1910; and the number steadily increased until the maximum was reached on May 11th. From that date the numbers fell until September 8th, after which no others were recorded. The maximum occurs, therefore, in late spring.

Wesenberg Lund records the maximum for *B. longirostris* in the Danish lakes in May and the beginning of June, agreeing with ours. He states also that its disappearance from the pelagic region after the maximum is marked by the presence in the littoral regions. Kofoid records *B. longirostris* from the Illinois River. It is perennial with a maximum at the end of May or beginning of June and an abrupt descent after the maximum. The numbers from October to May are very small. It is very striking that in two places so far removed and so dissimilar as Kofoid's region and Lough Neagh such similar sequences should be observed. The maxima seem to occur at the same time: we have the abrupt descent, and none are present at all from September onwards. *B. longirostris* occurs generally in American waters.

TEMPORAL VARIATION IN PLANKTON ORGANISMS.

Perhaps one of the most interesting and important sides of fresh-water plankton studies has been the discovery and investigation of the changes taking place in the form of plankton organisms during the seasons. These changes in form have been seized by systematists, who have made countless new species and varieties on the variations presented to them.

During the last fourteen years or so, however, many workers, especially those investigating the plankton throughout long periods, have supported the view that the variations in shape and size could not be used as indicating new species, but were simply changes in one species produced by alterations in the environment. This view has been proved correct in many cases by taking up one organism and following its changes in the same water-area throughout a year. One then finds a great series of steps linking up perhaps two such different forms that might well have been termed different species. No study of this side of the plankton can be taken up without causing one to feel the utter absurdity of making new species among the Protozoa and Protophyta from one single individual as has often been done. Even when a group of like individuals is found, they may be bearing merely a local and temporal change in form which does not breed true. One of the results of this work, pointed out by Wesenberg Lund, is that G. O. Sars, who founded numerous species of plankton Cladocera, has gone back to such an extent that probably more than fifty of the old species and subspecies of planktonic *Daphnias* are now referred to a single species.

Wesenberg Lund has been foremost in the discussion and investigation of the temporal variation ; and we take from him the classes of form-variations that may be recognized. There are four different kinds—individual variations, age variations, local variations, and seasonal variations.

Little is known of the two first ; but the latter kinds have now been investigated by a large and ever-increasing number of continental workers, most of whom have associated themselves with some group or genus. Moreover, it is the local and temporal variation which has been responsible for the creation of new species.

Seasonal variation has been studied by Lauterborn in a quite famous case of the Rotifer *Anurea cochlearis*. Langhans has treated other species of zooplankton. Wesenberg Lund himself has directed attention to the Diatoms as well as to most of the other groups of plankton organisms.

Temporal variation has, in fact, been so far discussed in connexion with the following species :—

ZOOPLANKTON CLADOCERA.	Hyalodaphnia.
	Daphnia (various species).
	Ceriodaphnia.
	Bosmina longirostris.
	Acroperus.
	Evadne.
	Podon.
COPEPODA.	Cyclops strenuus.
	Diaptomus gracilis.
ROTIFERA.	Anurea cochlearis.
	„ aculeata.
	Asplanchna.
	Triarthra longiseta.
	Notholca.
	Polyarthra.
	And others.
DINOFLLAGELLATES.	Ceratium hirundinella.
FLAGELLATA.	Dinobryon.
PHYTOPLANKTON DIATOMACEAE.	Fragilaria crotonensis.
	Asterionella.
	Tabellaria.
	Cyclotella.
	Stephanodiscus.
	Melosira.

The variations observed in the above cases affect the size, shape, and presence or absence of longer or shorter spines. It would be quite impossible here to refer to the extensive literature on the subject. Reference should be made to Wesenberg Lund (1) and to numerous papers in the *Revue Internationale de Hydrobiologie* during the last few years. There is very much work to be carried out yet on this subject; but it is necessary that observers make a special study of some particular group.

The cause of these temporal variations has been ably discussed by Wesenberg Lund; and it is to this worker that we owe the first attempts to explain the variations by a common phenomenon. Wesenberg Lund's view was that the organisms reacted to an external stimulus, and that this stimulus was a change in the specific gravity of the water caused by changes in temperature. Form-variation was therefore an effort to bring the specific gravity of the organism into equilibrium with the altered specific gravity of the water at certain times of the year. It was observed that seasonal variations were not commonly found in arctic, alpine, and other lakes where great annual fluctuations of temperature did not occur. The relation of Lough Neagh to the Scottish lochs is an example of this, and will be referred to again below.

Numerous workers have noticed that the size of many plankton organisms becomes smaller as the summer approaches. Wesenberg Lund's view was modified and accepted more readily after the work of Ostwald. Ostwald showed that the changes in specific gravity of the water were very small, owing to the small ranges in temperature, but that this temperature-variation strongly affected the viscosity of the water, the property possessed by a liquid of resisting movement through it, or, in short, the friction.

The power of flotation possessed by a plankton organism depends upon its specific gravity. If an organism is heavier than water, bulk for bulk, it will sink. The speed of sinking depends upon the area of the surface in contact with the liquid relatively to the volume of the object, and upon the shape of the sinking body. A third factor, however, stands in important relationship to the specific gravity and shape, namely, the viscosity of the water. We may experiment with the same object in two fluids having the same specific gravity—for example, alcohol and melted wax. It will be seen clearly that the speed of sinking depends on the nature of the liquid—on its viscosity. Temperature affects the viscosity; for example, the speed of sinking is twice as fast at 25° as it is at 0°. The addition of salt in solution in water decreases the speed of sinking. These physical questions throw very considerable light on the factors governing the biology of plankton organisms; and we might infer that the decrease in size of an organism in the summer

is for the purpose of increasing the superficial area relatively to the volume, and hence increasing the *resistance* due to the viscosity of the water.

As Wesenberg Lund has since pointed out, Ostwald's theory had been put forward before that time by two other workers, O. Müller and Krogh. Krogh, however, believes that changes in the viscosity are not the main cause of seasonal variations, and takes up the view that seasonal variations are occasioned by varying condition of nutriment. He has been supported by Langhans, Steuer, and more recently by Woltereck and his pupils, who have experimented in great detail on Cladocera and Rotifers. Woltereck's work in particular has thrown great light on the biology of the Daphnids.

It seems to us that the satisfaction with which the theory of viscosity and the relation of form to changes in viscosity has been received is tending to keep back experiments on the subject. The occurrence of form-changes, which go hand in hand with temperature-changes, and the delightfully simple way of correlating the two by considering the changes in form as adaptations called forth by alterations in viscosity, may be nothing more than building up a structure on a mere coincidence. We do not want to deny absolutely the theory of Wesenberg Lund-Ostwald, but we wish to show how the whole theory must be considered as not proven and the necessity for further observation.

In the first place, it is difficult to see how changes in viscosity could call forth a different shape or size as an adaptation. Natural selection can hardly avail, because we are dealing with one species, the individuals of which are affected separately and temporarily. The change in form simply means that any individual may be modified by the external medium, and may itself give rise to forms which may or may not be like the parent according to the conditions under which they live. Are we to conclude, then, that this change in form which is caused by some change in the external medium is an adaptation because it fits in with a theory, or that it is a response to some stimulus the result of which happens to have fitted in with a theory of flotation, only as a coincidence? For example, most of the pelagic eggs of fish have been found to have a greater diameter as the water became less dense. For instance, the eggs of the Flounder from the Baltic (in salt water) had a diameter of 1.054 to 1.216 mm., whilst in the more saline water of the North Sea the eggs of the same species possess a diameter of 0.915 and 0.970. The specific gravity of these eggs is nicely adjusted to that of the water, and yet the figures above are in striking contrast to what should be expected on the Wesenberg Lund-Ostwald hypothesis. We should expect smaller eggs—eggs with a greater superficial area to the volume—in the less viscous water. The opposite is the case.

Again, in the sea it is characteristic to find organisms of greater size in the arctic seas than in the tropics, *whether pelagic or not* (Molluscs, Crustacea, Ascidia, etc.). That is to say, the difference in size and shape is a direct result of some external force, which may or may not happen to be of slight advantage from the point of view of flotation.

Now let us look more closely at the supposed advantage. The workers who have taken up these theories seem to have considered the organisms as dead shells. As far as we know, in floating organisms the protoplasmic part which is of the greatest importance in flotation or buoyancy is directly affected by the constitution of the external medium. The specific gravity of Plance eggs depends directly upon the specific gravity of the external medium. At the same time it has been shown by Ostwald that changes in the specific gravity of fresh water caused by temperature-variations are but slight. Surely, then, planktonic organisms which are actually lighter than water will remain lighter than water whatever be the changes due to the small variations in our lakes. Moreover, no experiments have ever shown that organisms whose specific gravity is less than that of water in spring would sink in the water of summer. Thus it seems to us that all organisms which float without active movement must be ruled out altogether from the resistance and viscosity theory. Let us look now at the organisms which sink in water and are yet pelagic. They are found at the surface because of active movements. Now suppose that one of these organisms sinks 2 centimetres in x seconds in cold water; the animal by active motion must lift itself 2 centimetres against the resistance of the water if it is to remain floating. Suppose that this organism gave rise to others which retain the same size and shape in summer. On the Wesenberg Lund-Ostwald theory, which is quite correct so far as this point is concerned, the animal would sink more than 2 centimetres in x seconds because the resistance of the water was less. At the same time this might *not* be disadvantageous so far as floating was concerned, because the animal could keep itself up with *less energy* for the same reason—the reduced viscosity of the water.

Against all this theory we have the actual experiments of Woltreck, Sachse, Diffenbach, and others, which show that given a constant temperature, different-sized organisms can be produced by differences in nutrition. We know that temperature of the water can affect shape. Wesenberg Lund's discovery and that of most observers, including ourselves, show that many fresh-water organisms are reduced in size in the summer months, and furthermore that the changes are most marked where temperature-variations are greatest. This, however, simply means that growth is greater in the colder water, and we must not jump to the conclusion that the smaller size in

summer is another wonderful case of adaptation. How many times have neat theories been propounded to account for some features in animals which are probably no advantage to them whatever, but are allowed to remain by natural selection because they are bound up with some character of great importance? We have actual experiments to show that nutrition affects size. In the case of Crustacea, the constitution of the external medium affects the size (Woltereck is at present working at this subject). Temperature-changes affect size and form. In short, we may say that numerous temporal variations may be called forth by just as diverse changes in environment, environment being taken in its widest sense to include all external factors affecting organisms.

The investigations of the Scottish fresh-water lochs already referred to have thrown practically no light on form-variation; for, in the only lochs examined throughout the year, such changes are stated to have been exceedingly small. The lochs, however, where these observations were carried out are, according to James Murray, amongst the largest, while the annual range of temperature-variation is low. Yet the statement is made that, in the different lochs, all the different forms of *Asplanchna*, *Daphnia*, *Bosmina*, etc., occur. Referring to *Ceratium hirundinella* we find, from Hewitt's paper, that variations occur with temperature which do not agree with those observed in continental lakes nor in Lough Neagh, and which are in opposition also to the viscosity theory. All this tends to support our view that the conditions and factors governing form-variation are not so simple as is generally supposed.

So far as Lough Neagh is concerned, we have not done more than examine some few species to determine whether form-variation occurs; and it is probable that another paper will have to be published as a separate study in this connexion. On the whole, we find the normal variation similar to that recorded in Danish and continental lakes.

Fragilaria crotonensis.

In this species we find, as did Wesenberg Lund, great variation in size. Moreover, these variations in size are present at one and the same time. Taking as a matter of fact any one of our catches, there is just as great variation in the size as in a year's observations of averages. We have not dealt with very large numbers; but our figures indicate that, in all probability, three forms occur so far as size is concerned. It is practically impossible to say, therefore, from our figures whether any seasonal change in size takes place.

Tabellaria fenestrata.

In the Danish lakes this appears in stellate form in the summer months June, July, and in chains for the greater part of the year. Schroeter also found stars in summer, but chains in winter. In Lough Neagh *Tabellaria fenestrata* is common all the year round, and is always found in stars. A few zigzag chains may sometimes be found in the cooler months; but they are rare and often end in a star. We have made tables illustrating the number of cells in the colonies, and find rather an interesting variation. Taking the average number of individuals in a colony from several counts, we have the following table:—

Average Number of Individuals in the Colonies of Tabellaria.

1911—Feb. 23,	4·85;	March,	3·8;	April,	3;	May,	5·7;	June,	5·3;
July,	5·5;	Aug.,	6·6;	Sept.,	4·3;	Oct.,	7·2;	Nov.,	8·1;
Dec.,	8·3.	1912—Jan.,	7·6;	Feb.,	6·1.				

The maximum occurs between June and September. The largest number of individuals in colonies occurs *just after* this maximum. The smallest number of individuals in colonies occurs in March and April *just after* the minimal catches were made.

The variation in size is extremely slight, as the following figures show:—

1911—Feb. 23,	·336;	March 5,	·337;	April 13,	·326;	May,	·338;
June,	·338;	July,	·348;	Aug.,	·328;	Sept.,	·333;
Oct.,	·322;	Nov.,	·306;	Dec.,	·306.		
1912—Jan.,	·31;	Feb. 3,	·307.				

These figures show that the smallest occur in the winter and when the largest number of individuals are found in the colonies.

Asterionella gracillima.

In the case of *Asterionella* we have also tabulated the number of individuals in stars or colonies.

The variation is as follows:—

1911—Feb. 23,	5·45;	Mar.,	3·3;	April,	4·4;	May,	5·7;	June,	5·6;
July,	4·6;	Aug.,	5·4;	Sept.,	5·8;	Oct.,	8·0;	Nov.,	6·7;
Dec.,	6·3.	1912—Jan.,	7·05;	Feb.,	5·9.				

Thus in both *Tabellaria* and *Asterionella*, for some reason, the largest colonies occur in the months October to January. Another similarity is that this maximum number of individuals in colonies occurs in both forms after the great maximum of colonies in the plankton. The smallest numbers in the

colonies occur in March and April, and that is just after the minimum. Wesenberg Lund considers that the star-formation from the chain is an adaptation from a littoral to a pelagic life. This may be the case; but from the above figures it would hardly appear that it is the buoyancy that determines the change; for we should then expect stars when the water reached the highest temperature.

The size of the cells of *Asterionella* varies a little more than in the case of *Tabellaria*. They are as follows:—

1911—Feb. 23, .318;	Mar., .377;	April, .361;	May, .39;	June, .35;
July, .398;	Aug., .374;	Sept., .34;	Oct., .342;	Nov., .337
Dec., .323.	1912—Jan., .309;	Feb., .318.		

The smallest individuals occur in the period December to February, that is just below the minimum, with low numbers present, and the largest occur irregularly between March and August, when the quantity present is great. As a matter of fact, the largest cells measured occur in July and May, when the number present was very great.

Thus, though there is a slight difference between *Asterionella* and *Tabellaria*, there is a general agreement in that the largest cells occur in the summer months—a fact in complete opposition to the buoyancy theory of Wesenberg Lund-Ostwald. Moreover, the large size seems to be correlated with the large number present in the plankton and with small colonies.

Ceratium hirundinella.

Many observers have studied variation in *Ceratium hirundinella*, and their original papers must suffice for a detailed study of this form. A few observations have been made by us to determine whether variation takes place in the Lough Neagh waters.

C. hirundinella occurs as usual in Lough Neagh in two forms, the three-horned and the four-horned. The three-horned form has been stated by most workers to be the commonest and to be the predominant form under arctic conditions. The four-horned forms are supposed to occur chiefly in the summer months. These facts have been recorded for German and Swiss lakes. Some authors have stated that both forms are equally frequent at all seasons. The variations recorded by Wesenberg Lund seem to indicate that the size increases from May to June, then decreases during July–August, and then remains constant.

Krause has made the most detailed observations on variation in *C. hirundinella*. This author agrees with the work of Ostwald, and describes

the Ceratium as varying so that, while all sizes may be met with at the same time in the same waters, the number of the large forms steadily increases from June to September. He also states that both three- and four-horned forms may be found together in the same lake. We should not like to draw any definite conclusions as to the cause of the variations from Krause's results. We do not agree that viscosity is the sole factor or even the most important one in causing temporal variation in Ceratium.

So far as our figures go, the size-variations are as follows:—

	Apical.	Antapic (longest).	Total length.
Jan., Feb., Mar.	Practically absent from plankton.		
April 13, . . .	·625	·345	1·335
May, . . .	·560	·33	1·196
June.	·540	·32	1·137
July 13, . . .	·463	·25	1·097
August 18, . . .	·375	·233	·925
Sept. 8, . . .	·45	·245	1·03
Oct. 21, . . .	·415	·25	·98

So far as we can determine the variation is not of great importance. There is, however, no doubt whatever that the Ceratium are *largest* when they first appear, and there is a very steady and most marked reduction in size as the water increases in temperature. There is practically no increase in size as the temperature falls in autumn. It looks as if the change in size was not exactly due to viscosity changes. Thus we see in Lough Neagh the same seasonal variations present, which agree in most respects with those discovered by Wesenberg Lund. In the late summer months almost all the Ceratium are of the four-horned variety. This fits in with the viscosity theory; but it may be due to other factors, as we have suggested above. In May most individuals possessed three horns, and in June the fourth horn was present, but very small.

ROTIFERA.

Perhaps the most classic example of temporal variation is that of *Anurca cochlearis*, so well worked out by Lauterborn. Lauterborn arranged the variations observed into series which all follow on from certain original "subspecies." The size of the animal is in inverse proportion to the height of the water-temperature, and the winter forms are characterized by long posterior spines.

A curious discrepancy appears in the literature. Lauterborn, whose researches are stated by Wesenberg Lund to have been generally accepted,

states that the long spine is characteristic of winter forms, and is reduced or disappears in the summer. Wesenberg Lund states, on the other hand, that the posterior spine is longer in summer than in winter. It is also stated by Wesenberg Lund that seasonal variation is not so well marked, or is lacking altogether in arctic-alpine lakes and in the pelagic regions of larger lakes.

We have ourselves found that seasonal variation is very definite in its course. The tecta series is most abundant at all times; but we have seldom found individuals with no posterior spine, though it may be slightly reduced in length.

Anurea cochlearis (total length).

1911—Feb. 28,	1·215;	March,	1·22;	April,	1·33;	May,	1·275;
June,	1·258;	July,	1·285;	August,	1·033;	Sept.,	·988;
Oct.,	1·02;	Nov.,	1·048;	Dec.,	1·075.		
1912—Jan.	1·11;	Feb.	1·148.				

The series of averages given above are very remarkable indeed, in the fact that the curve for length is extremely irregular. There can be no shadow of doubt from the above figures that the size of *Anurea* varies in an extremely irregular manner. Moreover, there is a decrease in size with rise in temperature after April, and after September an increase in size with fall of temperature. This is in perfect agreement with the Wesenberg Lund-Ostwald theory; but there is no reason why the increase in size should continue regularly until the month of April. As a matter of fact, the *Anurea* agree better with the Ostwald viscosity theory than any other species of zoö- or phytoplankton; and yet it is in the Rotifera that experiments have shown other factors are determinants, because they happen to run a parallel course to form-variation. The temperature factor might act in other and more direct ways.

The only spineless form found occurred in September, when the smallest individuals were observed. On the Ostwald hypothesis we should have expected small individuals *with long spines* in the summer months. This reduction in size of the spine agrees with Lauterborn's own researches, and gives no explanation of Wesenberg Lund's statement that the spines were longer in summer forms.

So far as the Crustacea are concerned, we have had no time as yet to make detailed series of measurements, though from the observation of catches we know that the definite changes in the shape of the head take place.

GENERAL OBSERVATIONS ON THE PLANKTON OF
LOUGH NEAGH.

A general observation of any charts showing the distribution of aquatic organisms will at once show that there are far more species present in the sea than in fresh water. Some groups of animals like the Echinodermata, Coelenterata, Porifera, Brachiopoda, and Tunicata are practically entirely marine. Other groups are represented by a vast majority of marine forms. A few groups of animals are characteristic of fresh water. Until the Lough Neagh research was taken up, the authors had studied almost entirely the marine plankton. The distribution and variation of marine forms had been observed at Kiel, Heligoland, Naples, and the Irish Sea. This familiarity with the marine plankton has enabled us, perhaps, to note with particular interest many small characters of the fresh-water plankton of Lough Neagh that would have been passed by perhaps without much notice by the fresh-water planktologist. We do not say that he would have missed them, or even under-estimated them. Many features, however, will undoubtedly have been seen by us from a different point of view; and, as a matter of fact, it is rare in literature to find a discussion of fresh-water plankton by the marine planktologist.

The first point that aroused our attention in Lough Neagh was the quantity of plankton present in the water. The quantity of plankton present in the Lough Neagh water is by no means characteristic of fresh water; but, unfortunately, no quantitative measurements have been made by using a similar net under similar conditions in different lake-areas and in the sea. We have, however, used our net in the Irish Sea at all seasons of the year, and throughout a year in Lough Neagh. As before mentioned, so great is the quantity that the water of Lough Neagh is coloured by the plankton.

The hauls of a Nansen net off the Isle of Man are given by Herdman, Scott, and Dakin in their Irish Sea work of 1909.

The following table shows the volume of plankton in the catches; and it must be remembered that the net has been hauled through *three times* the depth of our Lough Neagh catches.

IRISH SEA PLANKTON, 1909.

Nansen Net Hauls.

March, 0·2–0·7 cc.;	April, 0·7–18·7 cc. (average about 4·0 cc.);
May, 14 cc.–2·5 cc.;	June, 5·5–1·5 cc.;
August, 0·1–1·0 (average about 0·4 cc.).	

1910.

April Catches (time of max.).	August Catches.	September.
3·0 11·5 6·0	1·5 1·5 11·5 3·0	0·5 0·9
3·7 7·5 8·7	1·5 5·2 5·7 4·0	1·8 1·5
2·0 8·2 3·6	0·9 6·5 4·2 1·0	1·7
2·7 8·5 2·7	2·5 2·5 5·8 2·0	3·0 etc.
	2·3 3·8 6·6 1·3	2·6
	3·5 0·8	
	1·3	

The average Nansen catch in *three times the volume of water* in the Irish Sea is about 0·5 cc., except in late April and May, when the spring maximum occurs, and later on in September when another, but smaller, maximum occurs. During these times the average catch is about 6·0 cc. We have seen, however, this catch jump suddenly in volume to 40 cc. Every year there is a most marked increase in volume in the spring.

Now the volumes of the plankton caught in Lough Neagh are remarkably uniform. For example, in 1910 the bottom-to-surface hauls (only 40 feet) gave:—

Feb., 13 cc.;	March 5, 12·0;	March 16, 9·0;	April 13, 12·5;
April 7, 10·0;	May 11, 12·0;	May 25, 9·0;	June 10, 17·0;
July 13, 8·5;	July 27, 4·0;	August 18, 13·0;	Sept. 8, 3·5;
Sept. 29, 7·5.			

Thus there is no doubt that for the greater part of the year there is far more plankton in the Lough Neagh water than there is in the Irish Sea. Moreover, whilst the different organisms are appearing and disappearing in Lough Neagh, and passing through their maxima, the total volumes of the plankton are not disturbed to any great extent. It is very doubtful if the great spring maximum found usually in the Irish Sea is enough to bring the marine figures near to the figures for the fresh-water plankton of Lough Neagh.

Now the appearance of the Lough Neagh plankton suggests, before any microscopic observations are made, that the phytoplankton almost always far exceeds the zooplankton in quantity. The zooplankton is most abundant at the beginning of the summer and through the summer months.

In our marine catches of plankton the catch might be predominantly phytoplankton; it might be entirely composed of zooplankton; or it might even be composed entirely of one species. On the whole, the number of species, however, was much greater than in the fresh-water catches from

Lough Neagh. For example, the number of species each present in large quantity may be taken as about fifty. Against this the number of species that could be easily counted in our fresh-water catches was only about thirty-five. This feature was very striking. Most of our catches under the microscope consisted of enormous quantities of a few species. This rendered the enumeration of some of the more rare organisms quite impossible. If the catch was diluted enough to thin out the individuals, none of the rare species would be perhaps on a counting-plate. If, on the other hand, the dilution was arranged to bring a considerable number of the rarer species on the plate, they were completely obscured by thousands of individuals of perhaps one or two species. These two differences, 1st, the quantity, and 2nd, the constitution, were perhaps the most marked ones observed.

The constitution of the marine phytoplankton is almost entirely of species of Diatomaceae and Peridineae. In the composition of the Lough Neagh phytoplankton the Diatoms, Desmids, and Myxophyceae play a great part. The Peridineae are represented by *Ceratium hirundinella*, which often occurs in great quantities, and Peridinium. The Myxophyceae, which are amongst the most conspicuous forms in the Lough Neagh plankton, are represented by Oscillatoria, Gomphosphaeria, Anabaena, as well as some other less frequent species.

From the observations on phytoplankton of other fresh-water lake-areas, we notice that the arctic plankton is characterized by the absence of the Myxophyceae, the presence of large quantities of Tabellaria, Melosira, Asterionella, and the presence of Fragillaria, Stephanodiscus, etc.; a few Dinoflagellates also occur, and species of Dinobryon.

The central European lakes and especially the Baltic lakes, the best known so far as their plankton is concerned, are characterized by the abundance of Myxophyceae and by *Fragillaria crotonensis*, Asterionella and Melosira amongst the diatoms. Tabellaria is somewhat rare.

Our phytoplankton is characterized by the presence, first and foremost, of *Tabellaria fenestrata*, which is present all the year round, and attains 34,000,000 colonies in one catch; then

Oscillatoria Aghardhii (Gomont).

Gomphosphaeria Naegelianiana (Unger) Lemm.

Anabaena flos-aquae (Lyng.) Brét.

Melosira sp.

Asterionella.

Fragillaria crotonensis.

Ceratium.

Thus the phytoplankton of Lough Neagh contains in great abundance the

characteristic forms of the arctic and also the central European plain plankton. Thus, so far as the phytoplankton is concerned, we have a most interesting mixed flora.

While Lough Neagh agrees with the Danish lakes in the relative abundance of the phytoplankton, the characteristic species present in both areas are different. Many of our species are also found in large quantities in the Danish lakes, but on the whole there is a considerable difference. Thus *Tabellaria* does not play such a striking part, nor do apparently the Myxophyceae, except at certain seasons.

The Scottish lochs seem to be relatively poor in the Myxophyceae. *Melosira* is rather rare. *Stephanodiscus astraea* never occurs commonly as a plankton organism, and *Fragillaria crotonensis* is rather rare. On the other hand, as Messrs. West have shown, the Scottish lakes are characterized above everything by an extraordinary abundance of Desmids. So far as Lough Neagh is concerned, the only Desmid occurring in very large quantity is *Staurastrum*. This occurs in great quantities in September (158,000 in one catch), but is far behind the numbers of other Chlorophyceae.

Lough Neagh is by no means a "Desmid lake." Messrs. West have propounded a theory to account for the prevalence of Desmids in certain of the British Lake areas. Wesenberg Lund and James Murray have also discussed the problem. So far as our observations of the district go, the facts entirely support Messrs. West. These workers have noticed that the rich Desmid lakes occur in areas belonging to the older geological formations. Wesenberg Lund has stated that Desmids thrive best in water rich in humic acids from peat bogs, and James Murray has also objected to the theory; but there seems little doubt at present that Messrs. West's theory agrees best with the facts observed.

Practically all the water of Lough Neagh is from drainage areas of more recent than Jurassic times; and we have already seen that Lough Neagh is not a Desmid lake. No doubt a drainage water derived from bogs and peat-beds in general is of considerable importance; and it is very probable that other factors besides the geological formation are determinants, yet the coincidence of Desmid areas with old-formation lakes is most marked.

The phytoplankton of Lough Neagh is practically at all times in excess of the zooplankton, and to our minds always sufficient as food for the zooplankton. Now this brings into our discussion the startling theory propounded by Pütter that the planktonic organisms are not present in sufficient quantity to be food for aquatic animals, and that most of the latter feed on organic carbon compounds in solution. Pütter's work itself has been largely confined to marine organisms, and has been seriously questioned, and, to a great extent,

proved incorrect. As this question, however, is still being investigated, it will not be discussed here except in so far as our observations on Lough Neagh are concerned. The Copepods and Daphnids are most certainly feeding upon the phytoplankton, upon Diatoms and smaller green flagellates, most of which are not captured by the net (in the same way as one of us has shown the marine Copepoda feed). Now as this phytoplankton is extremely abundant, we should expect the zooplankton and other animal dependents to be also very abundant. This is strikingly the case; and at the top of the scale we have the phenomenal abundance of the famous Pollan. The food of this fish will be discussed below.

At the same time, if organic carbon compounds are found in solution, there is no doubt that in many cases they will be made use of by aquatic animals. Though no analyses for organic carbon have been made on Lough Neagh water, we would suggest, from the quantities of phytoplankton, that all the conditions for a large quantity of organic carbon in solution are to be found, and that no doubt the water of the lake is just as abundant in detritus and organic carbon in solution as could possibly be expected for a lake of this size unless abnormally contaminated with organic matter.

“Water-bloom” has occurred on two occasions. One of the most extraordinary “water-blooms” was that caused by *Gomphosphaeria Naegelianae* in September and November. This blue-green alga is extremely prolific in Lough Neagh and occurs frequently all through the year. On November 11th it was present in an extraordinary amount, and formed a compact layer on the surface of the water. Now this alga differs from all others we have dealt with in marine or fresh water in a curious way which has not been noticed before so far as we are aware. It always rises to the surface of the lake if the water is undisturbed, and this buoyancy is a character which, unlike that of all our other planktonic organisms, is retained after fixation and preservation. In our tubes of plankton, containing 5 per cent. formalin, which have stood for two and a half years and have been shaken up at intervals, the plankton forms the normal layer at the bottom of the tube, with, however, *another layer at the surface of the liquid*. Thus it is impossible to estimate the volume of the catch by allowing it to settle, for part “settles upwards” and the rest downward. The material at the surface is entirely composed of one form. Thus in our catches it is possible to remove completely all the *Gomphosphaeria* by simply taking off the surface layer.

If the catch is transferred to 75 per cent. spirit, the alga falls to the bottom on standing like the other constituents, and thus the remarkable difference in buoyancy is not observed.

The zooplankton of fresh water differs greatly from that of such an area as the Irish Sea, not only in the entire absence of certain groups, but in the marked absence of larval forms. Very many marine organisms belonging to the bottom fauna have pelagic larvae which aid in distribution, and this is, above all things, characteristic of the plankton of seas like the Irish, Baltic, and North Sea. The suppression of a free-swimming larva is, however, one of the characteristic features in the life-history of fresh-water animals, and hence one great change in the character of fresh-water plankton. Another feature in such plankton as that from Lough Neagh is the part played by the Rotifera. As has been pointed out above, however, the most characteristic feature of the fresh-water zooplankton is the small number of species present compared with the thousands of the sea. Again, we never find large plankton organisms in the fresh-water zooplankton. The zooplankton of Lough Neagh is almost entirely made up of the following species:—

SCHIZOPODA,	<i>Mysis relicta.</i>
COPEPODA,	<i>Diaptomus gracilis.</i> <i>Cyclops strenuus.</i>
CLADOCERA,	<i>Bosmina obtusirostris.</i> <i>B. longirostris.</i> <i>Daphnia hyaline var. lacustris.</i>
ROTIFERA,	<i>Anurea cochlearis Gosse.</i> <i>A. aculeata Ehrenb.</i> <i>Notholca longispina Kellicott.</i> <i>N. striata Ehrenb.</i> <i>Polyarthra platyptera Ehrenb.</i> <i>Triarthra longiseta Ehrenb.,</i> and other more rare genera.
HELIZOA,	<i>Acanthocystis.</i>
FLAGELLATA,	<i>Dinobryon cylindricum var. divergens (Imh.) Lemm.</i> <i>D. protuberans Lemm.</i> <i>D. sertularia var. thyrsoideum Lemm.</i>

Probably no distribution has been so well discussed as that of *Diaptomus* in the recent paper of Tollinger's.¹ From this we can obtain some information as to the geographical distribution of *Diaptomus gracilis*, which is one of the commonest species of *Diaptomus* in Europe. It occurs in Russian Lapland, Sweden, Norway, Finland, Denmark, France, England, Scotland, many lakes in Ireland, Germany, Austria, Switzerland, Tirol, Russia, Asiatic Russia.

¹ Die geographische Verbreitung der Diaptomiden. Von M. A. Tollinger, Zool., Jahr 1911.

That is to say, it is, above all things, characteristically European. It is usually found in lakes of the plains. Altogether, therefore, it does not lend any particular character to Lough Neagh.

The Cladocera, however, are very different. In the first place, we find two species of *Bosmina*, which rarely occur together, both abundant at the same time. *Bosmina longirostris* and *B. obtusirostris* have been recorded before as occurring together, but this is by no means common, and, as will be seen below, taken together with discoveries in the distribution of the phytoplankton, it is extremely interesting.

Bosmina obtusirostris is an arctic species, and was found in the Scottish lake survey in all but the lowland lakes of the south-east. In these lakes *Bosmina longirostris* was common. In the Baltic and north European lakes *Bosmina obtusirostris* is characteristically absent. As a matter of fact, Wesenberg Lund has divided Europe into three regions on the distribution of the *Bosmina* species:—

1. *A Northern partly arctic region.*—Characterized by presence of *Bosmina obtusirostris*. Scandinavia, north Russia, arctic lands.
2. *Central European region.*—Characterized by the absence of *B. obtusirostris*, whilst *B. longirostris* is rare, and *B. Coregoni* is most common.
3. *A southern region.*—Where the longispina group attains the highest development.

Thus the *Bosmina* amongst the zooplankton indicates the same admixture of arctic and central European forms as did the phytoplankton.

Those Rotifera which we have considered in our counts are remarkable for their cosmopolitan character. Thus,

Anuraea cochlearis,
A. aculeata,
Notholca longispina,
Triarthra longiseta,
Polyarthra platyptera,

are recorded for Greenland, Lapland, and the arctic regions generally, from the central European lakes, and from the alpine lakes. James Murray records most of these forms as general and common in the Scottish lochs; but *Triarthra* has not been found in the great lakes, and *Anuraea aculeata* is very rare, and also absent from the great lakes. *Triarthra longiseta* is common with us, but *Anuraea aculeata* is rare—so much for features of distribution from the point of view of latitude.

Now, let us consider briefly the plankton as a community determined by environment—the environment including all external factors whatever that can act upon the organisms.

The marine plankton is often divided, by those who work at this particular branch of the subject, into oceanic and neritic. Oceanic plankton forms are naturally characteristic of ocean waters far from land. Neritic species are typical of the seas like the Irish Sea. This division, which may appear quite simple, is no simple matter when looked into. Many forms occur both in the oceanic regions, and also in coastal waters and enclosed seas. It is a matter of considerable difficulty to say, with reference to many species, whether a plankton organism is then an oceanic or a neritic form; if, however, we look at the plankton as a whole, there are many features which are peculiar to the plankton of an enclosed coastal area like the Irish Sea or North Sea. The plankton bears some character which stamps it as belonging to an inland sea (using the term to denote an arm of the ocean). Moreover, a comparison will show that while all seas of this kind have the same general character, they each bear sub-characters which individualize them. All plankton communities bear a specific character. They are like the human races, but with still greater marks of difference. Now, the difference between an oceanic and a neritic plankton community is a result of environment. That environment is not, however, merely the different nature of the water. The plankton of an area like the Irish Sea is perhaps marked most by the large number of larval forms present—larvae of fixed organisms which in adult life do not belong to the plankton at all. As examples might be mentioned, *Balanus* larvae, Echinoderm larvae, Crustacean larvae of crabs, lobsters, &c., worm larvae, and so on. Now, oceanic plankton forms, which perhaps could live equally well in coastal water so far as the chemical conditions alone are concerned, would have to enter into competition with those organisms whose special home is in the shallow water. It is probably this very competition that has driven them out in the first case, so that the impossibility of coming back is obvious. Thus we have a particularly good example of the action of other planktonic organisms forming part of the environment for any special form that we may take.

In fresh water the same holds good. Lough Neagh plankton, examined in general, has a particular character which is peculiar to the lake. It is a property of this community, and renders it different from other lake planktons even though they may contain almost all the species.

Moreover, this character, which we shall speak of as the Ethos of the plankton, differs for the seasons, as a glance at the photo-micrographs will show. These photos are of slides, each made by taking a drop from the same

dilution from different catches. They have not been treated to give as many different organisms as possible in any catch in the field of view at once. Neither have they been made to indicate different species. They serve to show the appearance of the plankton at the different dates named, as seen in a low-power view. What determines, then, the character of the Lough Neagh plankton? We may give the following known factors:—

1. Physical environmental factors—

- (a) Latitude—climate.
- (b) Depth of water, affecting temperature, relation to bottom, light, &c.
- (c) Geological nature of rocks drained by lake-water.
- (d) Area of surface.
- (e) Purity of water—chemical condition of water.

2. Biological environmental factors—

- (a) Character of vegetation on banks and bottom.
- (b) Interaction of animals and plants of the plankton.
- (c) Interaction of animals and plants present in the water other than plankton.

Now, we have dealt with several features which give a characteristic plankton-ethos to Lough Neagh plankton. Briefly enumerated, they may be taken as—

- 1. Large quantity of plankton present always.
- 2. Great development of the blue-green algae.
- 3. Huge quantities of Gomphosphaeria, Oscillatoria, Tabellaria.
- 4. Presence of arctic and central European organisms together.
- 5. Desmid flora and prodigious quantities of certain species of *Staurastrum* at special times.
- 6. Great abundance of *Mysis relicta*.
- 7. The relative abundance of all the different organisms that make up the Lough Neagh plankton.

It seems to us that this study of the plankton-ethos has been rather neglected. In only a few cases have attempts been made to correlate the presence of peculiarities with other features in the physical or biological environments.

It is owing to the complex interaction of so many conflicting factors that the plankton of two lakes in the same country and at the same latitude may be entirely different.

Very many of the fresh-water plankton organisms are cosmopolitan. Notwithstanding this, the plankton-ethos of any lake is quite marked.

In Lough Neagh we have a plankton which differs considerably from the lake planktons of the English lakes and Scottish lochs, and resembles that of a district far removed—Denmark. At the same time there are many differences between these two plankton communities. The resemblances are no doubt due to the environment. The lakes have the same shallow waters and large surface-area, the same shelving banks. The presence of *Mysis relicta*, no doubt, is due in both cases to biological factors. The possibility of *Mysis* reaching the waters of a lake is not sufficient alone to account for its presence now. It must have found the conditions suitable for its continued existence.

Messrs. West have shown how the Desmid characters of the English and Scottish planktons are due to certain geological factors. We have emphasized the complex interaction of all the organisms in the lake-waters. A profound study of the plankton in this way should lead finally to the enunciation of certain laws, and, given the climate, physical features of a lake and certain predominant organisms occurring there, it may ultimately be found possible to write off at once a list of organisms that should be found to occur in the plankton, *with their respective abundance* and seasonal changes.

Mysis relicta.

This report would perhaps not have been considered incomplete if no mention were made of the interesting relict Schizopod for which Lough Neagh has become famous.

Mysis relicta abounds in Lough Neagh waters, and has been collected by numerous naturalists, amateur and professional, by using a light dredge on the bottom. Nowhere in the literature is it spoken of as a common plankton form; and it has certainly been regarded by most workers as a creature living on the bottom or rising at times a few inches above the mud.

It only occurred in a whole year's daylight-plankton catches on one date. On that occasion there was a very heavy sea running, and the bottom net brought up quantities of mud.

Paradoxical as it may appear, *Mysis relicta* is as important a plankton form as any other species of plant or animal caught in the lake. In fact, one might say it was *the most common Crustacean in the plankton*. *Most surprising feature of all, it is present in the plankton of the surface-water for probably the whole year, and in considerable quantity.* Why, then, has *Mysis relicta* been practically entirely absent from the catches? Why have not observers commented upon the fact of a large shrimp-like creature being present in considerable quantities in the water? The answer is that plankton-workers

and others have made their catches under a peculiar condition which prevails for exactly half a year only—that of day, and have apparently considered that the conditions of night and darkness make no difference or only a slight change. It is well known, of course, to all marine biologists that many plankton forms—Schizopods, Cumacea, and Polychaete larvae—rise towards the surface at night. Many, if not most, of these forms occur, however, in the plankton by day. The difference between day and night surface-plankton in the Irish Sea, for example, is probably in the relative numbers of forms present both by day and night. In Lough Neagh, on the other hand, a year's plankton catches by day gave no species larger than Cladocera. The first midnight catch was a striking contrast. It was a calm night with a full moon hidden completely by clouds. The sky gave a kind of dull yellow-green light which just served to make out the outlines of brightly painted or white articles in the boat. A surface haul of a few minutes only was taken, and on the net being emptied in a large vessel of water the latter was simply boiling with *Mysis relicta* actively swimming. The light from the electric torch drove them all to the bottom of the vessel in a few seconds, where they formed almost a solid mass, so numerous were they. No marine catches taken at night ever have shown such startling contrasts as the day and night catches on Lough Neagh. The water was 40 feet deep where these *Mysis* were taken at the surface. An hour and a half at the same place next morning gave not a single individual in the water!

On many an occasion whilst in Belfast and district, I was informed that Lough Neagh was once an arm of the sea, cut off, and gradually converted into fresh water. The proof of this was the presence of *Mysis relicta*; and apparently this was considered quite sufficient by many naturalists to indicate the origin of the lake.

Before discussing this question, we must refer to the origin of the fresh-water plankton. On the whole, the fresh-water plankton differs greatly from the marine plankton. Numerous details were constantly before our eyes—especially when we compared our Irish Sea plankton with that of Lough Neagh. Probably but few fresh-water plankton forms are direct immigrations from the sea, and we must look for some other origin. Wesenberg Lund has treated this subject very carefully, and considers it extremely probable that we must look to the littoral and bottom fauna and flora for the origin of our pelagic organisms. Whether we take this as correct or not, we must look to the sea for the ultimate origin of the limnoplankton, and the question of the migration into fresh water must remain for some time longer unsettled. There is, however, a striking resemblance between many alpine and arctic plankton forms; and other details, too, have led many

planktologists to the view that a large number of the European and North American limno-planktonic organisms have migrated south from the northern regions. Other workers have maintained that in addition to the cosmopolitan forms present, there are others, arctic in appearance, in the alpine lakes which are relics of a fauna which existed in Glacial times, and which migrated partly north and partly south with the melting of the ice. Many of the forms have been considered as relicts. This term has had, however, a very chequered career.

In 1860 a paper was read by Lovén on a marine arctic fauna which was found to occur in certain lakes in Sweden. Amongst the species supposed to represent marine forms were *Mysis relicta* Lov., *Idothea entomon* L., two species of Gammarus, and *Pontoporeia affinis* Lindstrom. Lovén assumed that this fauna had migrated from a Polar sea which once covered Finland, into an arm of the sea which eventually was reduced to the fresh-water lakes examined. The old marine fauna did not disappear entirely, but left some organisms which had adapted themselves to the new external medium. These lakes were termed relict lakes, and the marine species, now in fresh water, "relicts." This relict hypothesis was very favourably received; and many lakes containing organisms of supposed marine origin were supposed to be ancient sea-basins. Again, other species of both plants and animals which occur in regions outside their centre of distribution have been regarded as resulting from Glacial influence, and consequently termed Glacial relicts. Both uses have been carried much too far. Where should one end? Credner's paper in 1898 demonstrated that in a great many cases the marine organisms had mounted the rivers. Other causes may have been at work which resulted in the transference of a species arctic in character or marine to another region. It is necessary always to count on the possibilities of a migration *active* or *passive*; and a relict species is not so easily defined as was at one time imagined. The formation of so-called relict forms is, as a matter of fact, a phenomenon of to-day, and of pre-Glacial times as well as Glacial. Bearing this in mind, we can now consider one of the most characteristic of so-called relicts—one which Lovén met with in the Swedish lakes, and to which reference has already been made.

Mysis relicta or, better, *Mysis oculata* Fab. var. *relicta* (Lovén) G. O. Sars, occurs in Swedish lakes, Lake Ladoga, Finnish lakes, Russian lakes, Lakes Superior and Michigan, in Great Lakes of North America, Madü, Dratzig See and Tollen See in North Germany, and Lough Neagh and Loch Erne in Ireland. All these lakes would be considered, according to the work of Lovén, as having been formerly, in the time when *Mysis relicta* first occurred, arms of the sea. The distribution is indeed great; and, according to Tattersall, there

is no doubt that *Mysis relicta* of the Great Lakes in America bears the same characters as *M. relicta* in Ireland and Germany.

Wesenberg Lund has investigated the *Mysis relicta* of the Fureso lake in Denmark, and finds the presence of this organism is to be accounted for in a similar way to that supplied by the theory put forward by Samter and Weltner for the lakes in north Germany. In the latter case the distribution is intimately bound up with the glaciation of northern Europe. As the ice disappeared, the present Baltic Sea area was flooded by a salt icy sea flowing in from the north-east by the White Sea, and later communicating with the North Sea. This was the "Yoldia Sea" (so called from deposits of the mollusc *Yoldia*), and in it lived a Schizopod—*Mysis oculata*.

As the land was elevated, the Yoldia Sea became more and more land-locked, and was then gradually freshened by melting ice, until an inland fresh-water sea—the Ancylus Sea—took its place. In the course of this change the arctic *Mysis oculata* was slowly converted into *Mysis relicta*. Finally, owing to another communication with the North Sea, salt water streamed into the Ancylus Sea, bringing in the marine fauna now present in the Baltic. *Mysis relicta*, however, fled before the invading salt water up the rivers into the lakes of north Germany, where it is now found. This was the sequence of events in Europe. Obviously, for those lakes like Lough Neagh and the Great Lakes of North America, other methods may have been adopted; and the derivation of the same form is due to the same conditions acting upon the widely distributed *Mysis oculata*. Now, so far as Lough Neagh is concerned, we see that one of two methods might have been in play. Either Lough Neagh was connected with the sea, was an arm of the sea, and flooded with salt water, in which *Mysis oculata* lived, or else *Mysis oculata* migrated actively up the river, and was slowly converted into *Mysis oculata* var. *relicta*.

The two forms are very similar, for Sars remarks that the differences between *M. oculata* and *M. relicta* vanish if we compare the adult individuals of one with specimens of the other that have not attained full development. In other words, young *M. oculata* are like adult *M. relicta*. How are we to decide the origin of *M. relicta* in Lough Neagh? The details recorded show that it is simply impossible to state that any lake was an arm of the sea merely because certain marine modified forms occur. The decision lies in the hands of the geologist; and we have only to go back to the end of the Glacial period, Dwerryhouse states,¹ "a most interesting stage being reached when the Antrim Plateau was free from ice, except along its seaward margin. The valleys of the Bann and Lagan were closed near their mouths; and the then more

¹ Dwerryhouse. British Association Report, 1911.

extensive Lough Neagh drained through the now streamless valley at Poyntzpass to Newry, and so into Carlingford Lough; and at another stage by Monaghan, Smithborough, and Clones into the valley of the Erne. Still later, Lough Neagh, which was then continuous with the Lake Belfast of the Geological Survey, drained through the Dundonald valley from Belfast to Newtownards, and so into Strangford Lough." We may assume that at the beginning of these times, *Mysis oculata* occurred in the seas connected with the lake. Perhaps it was even there that *Mysis oculata* underwent its modification into *Mysis oculata* var. *relicta*.

One important point, however, is the connexion between Lough Neagh and the valley of the Erne. This probably means one origin for the *Mysis relicta* in both Lough Neagh and Lough Erne; and it may be that Lough Erne derived the Schizopod from Lough Neagh, or that Lough Neagh derived it from the sea, via Lough Erne.

The Pollan.

It is impossible to conclude this account of the plankton of Lough Neagh without some reference to the fish fauna which, though forming no part of the plankton, is so closely bound up with it. Whether the plankton is looked upon as the direct or indirect food of the larger aquatic organisms, there is no doubt that it forms an important and essential link in the chain. Moreover, it must be regarded in some cases as a source of danger to fishes. In Lough Neagh we have seen there is present very much plankton, there is much phytoplankton and correspondingly much zooplankton. There is abundant evidence, too, that the water is well provided with organic substances in solution.

We should therefore expect a large quantity of fish. That this is the case is well known, for there is a famous fishery of one fish alone which provides work for many people, and as the following figures will show is of great value. The most famous fish of the lake is the Pollan. This is a species of salmonoid fish of the genus *Coregonus*. It is rather like a herring in appearance, but with the small dorsal adipose fin of the Salmon. The fish occurs in huge numbers, and is caught with nets. The species *Coregonus pollan* of Lough Neagh is peculiar to the lake. Two other Pollan occur in Ireland, the Lough Erne Pollan (*Coregonus altior*) and the Shannon Pollan (*Coregonus elegans*). It is rather curious that in Loch Lomond, where we have noted many plankton resemblances to Lough Neagh, there is a fish, the Powan, *Coregonus clupeoides*, very like the Lough Neagh Pollan, and also caught in large numbers.

Now it seems rather curious that more work has not been carried out on the Lough Neagh fish, which is of such great importance. The fishermen

have described certain migrations to me, but no account of these migrations seems to exist anywhere. It would be of great interest to follow this line up. Moreover, there seems to be some difficulty even in getting figures for the quantity of fish captured. The following figures have been kindly given by Mr. E. W. L. Holt of the Irish Fisheries, and show the estimated captures for seven years, 1905-1911:—

1905,	. . .	427 tons.	1909,	. . .	300 tons.
1906,	. . .	384 „	1910,	. . .	377 „
1907,	. . .	386 „	1911,	. . .	240 „
1908,	. . .	233 „			

We were usually given to understand in Belfast that the Pollan fed on *Mysis*—nothing else seemed to be mentioned. Tate Regan records the staple food to be *Mysis relicta* (which he incorrectly terms an Entomostracan), but mentions that examination of their stomachs shows that they appreciate insect larvae, shrimps?, small bivalves, and the fry of other fishes. We have examined large numbers of stomachs. In the summer months of 1910 we never found *Mysis relicta* at all in the fish captured at Antrim. The alimentary canals were literally black with the late pupal stages of *Chironomus*. Now *Chironomus* larva occur in prodigious numbers in the mud at the bottom of the lake. Other Pollan caught in summer, and particularly at Antrim, had been feeding on Crustacea, both bottom and pelagic forms being included.

From 45 Pollan, 851 *Mysis relicta* were taken on another occasion. The easiest way to obtain *Mysis relicta*, except by plankton-netting at night, is to catch the Pollan and examine the alimentary canals. From 43 Pollan the following were taken:—

- 204 Asellus,
- 99 Molluscs (Bivalves and Gastropoda),
- 5 Insect larvae,

and numerous smaller Crustacea, in addition to *Mysis relicta*.

Huge numbers of Daphnids have been taken from the same Pollan. The species include *Daphnia hyalina* and *Bythotrephes longimanus*. The most extraordinary thing, however, was that on most occasions when Daphnids were found in the alimentary canals, practically nothing else was present. The Crustacea were present in thousands. Moreover, we have never found *Bythotrephes* in our catches at all.

There is still a very great deal to learn about the feeding methods of aquatic animals, both vertebrate and invertebrate. At present, however, since a detailed investigation is being conducted (Moore and others, 1912), any discussion of this subject is inadvisable.

The following account of the movements of the Pollan is very interesting, but it is only culled from the observations of the fishermen. As remarked above, it seems a subject that is well worth following up. The Pollan spawning season commences towards the end of November, and at this time the fish, curiously enough, migrate to the stony or gravelly bottom quite close to the shore. The eggs are left here, and the fish in January travel outwards to the "muddy" bottom, where they remain for some time. Thus in the spring, when our plankton catches were being taken, the fishing was being worked some distance away from Antrim in water of about 40 feet depth. As the summer comes on, in June, the fish once more migrate inshore and occur in hundreds in water of 6 to 12 feet deep. The summer fishing, therefore, is in this shallow water, within a stone's throw of the bank. During the summer the fish appear to be influenced in some way by meteorological conditions, and it is said that they travel irregularly out and inshore. The fishing certainly varies in this way, as our observations have shown. In autumn the fish pass outwards to the muddy bottom areas, where they remain until the month of November and the breeding-season. Such are the facts that are known to fishermen. So far as our knowledge is concerned they seem to be correct for the Antrim corner of the lake.

From the figures kindly supplied by the Irish Department of Agriculture and Technical Instruction it will be seen that there is a steady but small decrease in the amount of Pollan captured. The fishermen all agree that the Pollan fishery is becoming worse, and all the evidence that could be gathered at Antrim goes to show that the year 1912 is so far the worst on record. We are of opinion that the fisheries should be carefully looked into. It may be that the blue-green alga increasing in amount has something to do with the decrease. Other causes, however, are certainly at work, and though there are regulations limiting the size of fish to be caught, and rendering the capture of small fish illegal, we are told that this fishery is regularly carried on. Apparently the officers can only investigate fish which are landed for sale. These are of the normal size, and caught with nets of legal mesh. The small Pollan are captured with other nets and are then actually used to bait lines for the eel-fishery. Thus they escape the authorities' notice, and render futile any regulations that may exist.

[TABLES.

L. NEAGH.—Number of organisms in the total catch (Vertical Haul) of

—	Feb. 23.	Mar. 5.	Mar. 17.	Mar. 30.	April 13.	April 27.	May 11.	May 25.
<i>Asterionella gracillima</i> , ..	42,000	82,500	119,500	173,500	299,000	451,000	715,500	2,052,000
<i>Fragilaria crotonensis</i> , ..	258,000	609,500	819,000	501,300	575,500	415,500	271,500	123,000
<i>Synedra revaliensis</i> ,	—	—	—	—	—	—	—	—
<i>Synedra sp.</i> ,	—	—	—	—	—	—	1,500	—
<i>Amphipleura</i> ,	500	—	—	—	—	—	1,500	—
<i>Epithemia</i> ,	—	1,500	6,000	4,500	—	2,100	—	—
<i>Cymatopleura elliptica</i> , ..	40,500	119,500	162,000	63,000	44,000	84,800	30,000	25,500
<i>Cymatopleura solea</i> ,	—	—	—	—	3,000	600	1,500	1,500
<i>Tabellaria fenestrata</i> , .. <i>var. asterionelloides</i> .	82,000	327,000	375,000	428,000	530,000	624,500	391,500	541,500
<i>Surirella</i> ,	13,500	18,000	24,000	12,000	35,000	29,900	10,500	24,000
<i>Melosira sp.</i> , (only bottom-surf. catch.)	18,600,000	9,050,000	(Not counted)	(Not counted)	4,400,000	(Not counted)	800,000	(Not counted)
<i>Stephanodiscus astrea</i> , ..	—	19,000	44,000	25,000	41,000	103,500	42,000	64,500
<i>Coscinodiscus lacustris</i> , ..	258,000	1,271,000	1,540,000	909,000	631,500	1,481,000	478,500	260,200
<i>Pleurosigma sp.</i> ,	3,000	9,000	15,000	2,500	7,000	9,600	1,500	3,000
<i>Closterium</i> ,	—	9,000	21,300	12,000	5,000	10,600	13,500	3,000
<i>Cosmarium</i> ,	—	—	—	—	2,500	5,225	1,500	3,000
<i>Staurastrum sp.</i> ,	—	13,500	19,500	12,000	5,000	9,600	1,500	4,500
<i>Pediastrum boryanum</i> , ..	30,000	31,500	36,000	8,500	13,000	37,200	20,500	15,000
„ <i>duplex</i> ,	12,000	32,500	27,000	10,500	18,000	31,100	24,200	6,000
<i>Kirchniriella obesa</i> (bottom-surf. only.)	—	1,000	—	—	—	—	—	—
<i>Sphaerocystis schröteri</i> , .. (bottom-surf. only.)	—	1,000	(Not counted)	(Not counted)	39,000	(Not counted)	121,000	(Not counted)
<i>Dictyosphaerium pulchellum</i> ,	13,000	3,000	—	—	3,000	—	—	—
<i>Scenedesmus</i> ,	—	—	3,000	3,000	8,000	11,600	11,000	3,000
<i>Eudorina</i> ,	—	—	—	—	—	—	—	—
<i>Tribonema</i> , (bottom-surf. catch only.)	400,000	950,000	(Not counted)	(Not counted)	300,000	(Not counted)	100,000	(Not counted)

Nansen Net through $\left\{ \begin{array}{l} \text{top, 10 ft.; bottom, 10 ft.,} \\ \text{top, 20 ft.; bottom, 20 ft.,} \end{array} \right\}$ and all the way.

Line 10.	July 13.	July 27.	Aug. 18.	Sept. 8.	Sept. 29.	Oct. 23.	Nov. 11.	Dec. 1.	Jan. 11.	Feb. 3.
0,000	1,242,000	955,500	2,722,500	334,340	378,500	278,000	269,500	176,600	316,000	312,700
5,000	174,000	404,500	418,500	13,500	4,750	1,500	1,640	1,500	1,500	—
1,500	6,000	27,000	126,000	1,000	2,000	300	—	—	—	—
4,500	—	27,000	177,000	3,220	16,250	2,800	4,500	—	—	—
—	—	3,500	1,500	—	—	—	—	—	—	—
—	—	—	7,500	—	—	—	—	1,500	—	—
3,500	9,000	145,000	100,500	10,610	4,250	8,900	4,240	6,550	2,000	4,010
1,500	—	—	—	—	—	1,800	—	—	—	—
3,000	1,471,500	3,579,000	78,810,000	344,720	400,000	381,000	1,224,700	935,550	1,239,000	595,200
—	1,500	19,500	21,300	4,610	11,000	12,800	8,900	4,100	9,000	3,720
0,000	350,000	(Not counted)	180,000	1,500	1,000	500	800	—	500	—
9,000	46,500	12,000	9,000	2,500	—	300	700	550	—	—
1,500	184,000	84,000	148,500	10,100	9,750	11,100	22,100	7,950	3,000	7,900
9,000	16,500	12,000	16,500	1,000	—	1,500	—	—	—	210
9,500	10,500	48,000	39,000	3,000	2,250	4,500	12,000	8,050	4,550	1,500
5,200	10,500	12,000	15,000	5,000	500	300	3,000	550	—	—
3,000	9,000	36,000	240,000	388,540	207,350	250,600	244,000	110,350	49,000	14,820
7,500	1,500	12,620	39,000	2,000	1,000	7,900	7,200	—	5,500	1,710
1,860	—	6,000	45,500	4,110	3,250	3,300	12,400	—	—	720
—	—	—	1,200	—	—	—	—	—	—	—
3,100	(Not counted)	—	25,200	4,000	—	500	—	—	—	—
—	—	—	6,000	1,000	—	—	—	—	—	—
—	—	—	1,500	—	—	—	—	—	—	—
—	1,500	—	13,500	8,720	18,500	17,700	1,780	550	—	—
0,000	150,000	(Not counted)	420,000	23,000	(Not counted)	34,000	11,200	15,000	12,500	50,000

—	Feb. 23.	Mar. 5.	Mar. 17.	Mar. 30.	April 13.	April 27.	May 11.	May
Anabaena flos-aquae, ..	1,864,500	2,005,000	1,147,000	1,238,500	15,612,500	8,159,500	10,410,500	4,42
Oscillatoria Agardhii, (bottom-surf. catch only.)	10,350,000	2,650,000	(Not counted)		18,050,000	(Not counted)	18,450,000	(No count
Gomphosphaeria Naegeliana,	286,000	562,500	698,500	902,000	1,317,500	732,000	954,000	313,6
Microcystis spp.,	41,600	6,500	—	—	12,000	—	5,000	—
(bottom-surf. catch only.)								
Chroococcus,	5,200	1,000	—	—	—	—	—	—
(bottom-surf. catch only.)								
Dinobryon,	—	—	10,500	9,000	1,500	—	2,500	3,0
Peridinium,	—	—	—	—	500	—	—	—
Ceratium,	—	500	—	—	8,000	7,000	10,500	1,5
Carchesium,	—	—	—	—	—	—	—	—
Tintinnidium,	—	1,500	9,000	6,000	3,500	7,300	1,500	3,0
Acanthocystis,	3,000	—	16,500	15,500	24,000	13,075	16,500	4,4
Diaptomus gracilis,	880	1,080	1,352	1,169	3,620	2,879	3,200	4,4
Cyclops (chiefly strenuus), ..	160	160	200	250	500	240	520	732
Bosmina spp.,	280	430	548	1,952	8,580	4,794	27,800	242
Daphnia hyalina, var. lacustris.	—	—	—	—	120	162	1,520	1,4
Nauplii (copepod),	4,500	4,500	7,500	6,500	18,000	12,137	7,500	6,0
Anurea cochlearis,	10,500	16,000	16,500	14,000	13,000	12,300	12,000	25,1
Anurea aculeata,	—	—	—	1,500	—	2,000	1,500	6,0
Polyarthra platyptera,	—	—	—	—	—	—	—	4,3
Notholca striata,	13,500	22,000	13,500	3,000	500	—	—	—
Notholca longispina,	3,000	1,500	2,500	7,000	4,500	—	5,500	3,0
Triarthra longiseta,	—	—	—	1,500	500	5,700	1,500	3,0
Mastigocerca,	—	—	—	—	—	—	—	—
Rotifera spp.,	—	—	1,500	6,000	7,500	—	4,500	7,3
Mysis relicta,	—	—	40	—	—	—	—	—

June 10.	July 13.	July 27.	Aug. 18.	Sept. 8.	Sept. 29.	Oct. 21.	Nov. 11.	Dec. 1.	Jan. 11.	Feb. 3.
811,500	90,000	111,000	582,000	99,330	77,600	186,500	8,200	1,500	3,000	10,000
900,000	14,200,000	(Not counted)	420,000	8,500	(Not counted)	5,500	1,600	(Not counted)	—	50,000
70,000	243,000	361,500	760,500	1,372,940	6,562,500	9,431,500	13,646,510	9,469,000	4,605,000	1,118,670
1,100	500	600	2,400	500	—	500	1,500	1,000	500	400
1,100	500	—	3,600	500	—	500	500	500	—	—
25,500	121,500	462,000	12,000	220	—	—	—	—	—	—
—	6,000	10,500	90,000	3,000	1,500	—	—	—	—	—
16,500	106,500	421,500	2,086,500	233,710	149,750	12,500	940	500	—	—
—	—	—	13,500	10,050	3,000	—	—	—	—	—
—	—	3,000	12,000	1,000	—	1,500	2,400	1,500	1,500	1,500
1,100	3,000	14,120	—	—	—	—	—	1,500	—	—
2,420	2,520	3,935	2,979	2,160	4,195	5,336	3,807	2,812	5,170	1,600
1,230	2,560	3,425	1,717	1,550	2,630	4,722	2,536	2,050	2,482	1,460
1,190	800	380	40	—	—	—	—	—	—	—
6,690	3,160	1,405	1,463	400	380	345	40	40	—	—
13,500	6,000	16,500	25,500	28,220	13,000	19,900	7,200	7,100	7,500	7,230
33,000	24,000	142,500	136,500	14,160	33,750	57,800	29,600	18,454	28,500	3,130
6,000	4,500	8,000	1,500	500	—	—	—	—	—	420
6,000	7,500	28,500	51,000	47,720	29,250	20,800	2,140	4,650	—	—
—	—	—	—	—	—	1,500	280	500	800	400
9,000	6,000	4,500	6,000	3,000	500	1,500	—	8,000	—	3,000
15,000	33,000	39,000	1,500	2,000	—	1,500	—	—	—	—
—	—	—	7,800	3,000	—	—	—	—	—	—
13,500	9,000	90,000	22,500	6,000	13,000	8,000	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—

APPENDIX.

LIST OF MOLLUSCA OCCURRING IN LOUGH NEAGH.

The following list of the mollusca occurring in the lake has been very kindly drawn up by Mr. R. Welch, M.R.I.A. :—

GASTROPODA.

LIMNAEIDAE.

- Ancylus fluviatilis* Müller.
lacustris Thompson.
Limnaea pereger (Müller).
stagnalis (Linné).
palustris (Müller).
truncatula (Müller).
Planorbis albus Müller.
carinatus Müller.
spirorbis (Linné).
contortus (Linné).
fontanus (Lightfoot).

PHYSIDAE.

- Physa fontinalis* (Linné).

PALUDESTRINIDAE.

- Paludestrina jenkinsi* Smith.
 Rare in 1900. Now present in
 myriads.
Bithynia tentaculata (Linné).

VALVATIDAE.

- Valvata piscinalis* (Müller).
cristata Müller.

LAMELLIBRANCHIATA.

UNIONIDAE.

- Anodonta cygnea* (Linné).

CYRENIDAE.

- Sphaerium corneum* (Linné).
lacustre (Müller).

- Pisidium amnicum* (Müller).
subtruncatum Malm.
pulchellum Jenyns.
obtusale Pfeiffer.
pusillum (Gmelin).
milium Held,

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EXPLANATION OF PLATES.

PLATE IV.

FIG.

1. Lough Neagh. Typical view looking over lake. Near Toome.
2. Shore of Lough Neagh, showing sand-flats exposed at Shane's Castle.
3. Banks of Lough Neagh and lake view.

PLATE V.

4. Pollan-nets drying on banks of Lough Neagh, near Antrim.
5. Mouth of Six Mile Water, near Antrim.
6. Banks of Lough Neagh, near Six Mile Water, showing grasses and wooded nature of country.
7. Fishing-boat hauling Pollan-nets near banks. This boat was used for the plankton investigations.

PLATE VI.

8. Type of Plankton. April, 1910. Chiefly *Oscillatoria* and *Gomphosphaeria*.
9. Type of spring Plankton.
10. Type of Plankton, July 27, 1910.
11. Type of Plankton at time of *Tabellaria maximum*, August 18, 1910.
- 12 and 13. Surface Plankton during period of water-bloom, late September, 1910.



Fig. 1.—Lough Neagh, near Toome.



Fig. 2.—Shore of Lough Neagh at Shane's Castle.



Fig. 3.—Lough Neagh—typical view.

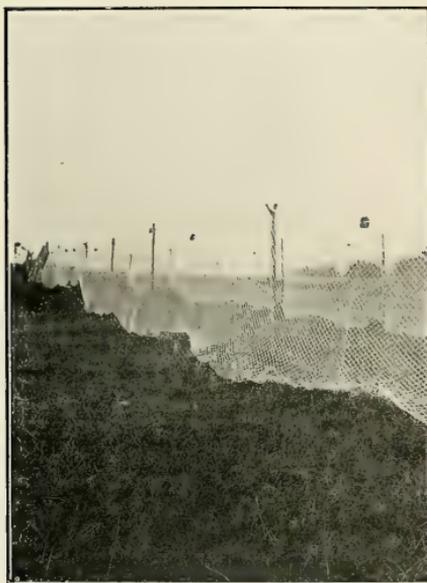


Fig. 4.—Pollan-nets drying. Lough Neagh, near Antrim.



Fig. 5.—Mouth of Six Mile Water, Lough Neagh, Antrim.



Fig. 6.—Lough Neagh. Banks near Six Mile Water.



Fig. 7.—Pollan Fishing-boat. Lough Neagh, near Antrim.

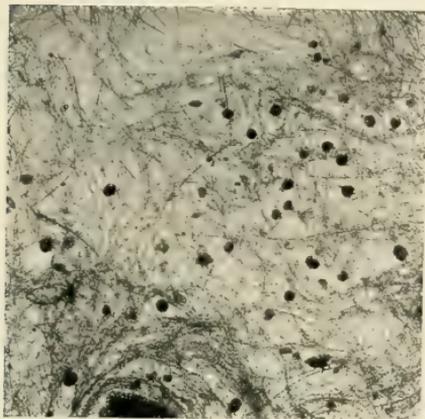


Fig. 8.

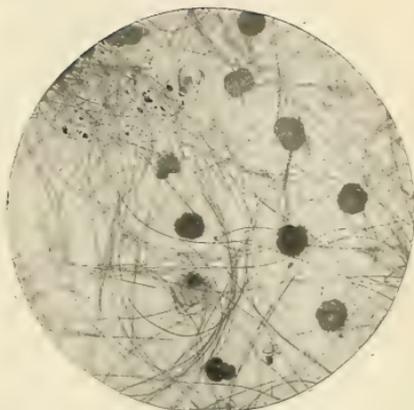


Fig. 9.

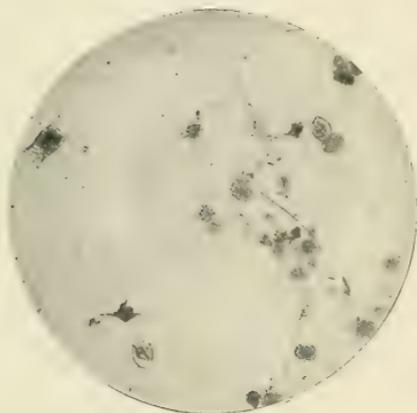


Fig. 10.

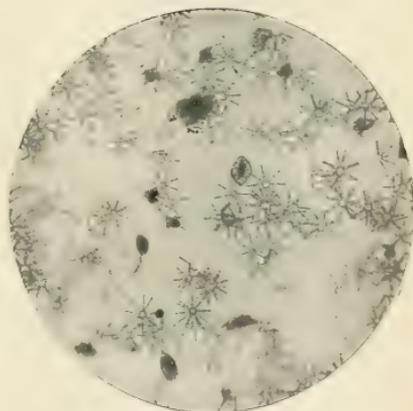


Fig. 11.

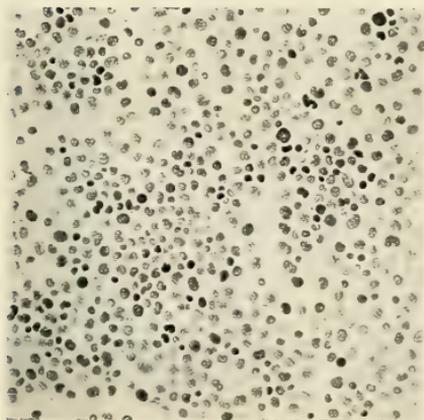


Fig. 12.

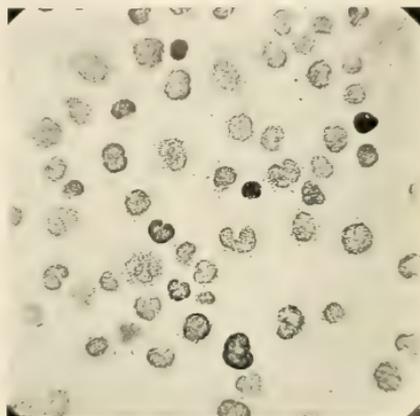


Fig. 13.

IV.

MONTANIC ACID AND ITS DERIVATIVES.

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Read JANUARY 13. Published FEBRUARY 12, 1913.

MONTAN wax, which is prepared by distilling lignite in a current of superheated steam, contains about fifty per cent. of montanic acid. To extract the latter, the wax is dissolved in hot alcohol, excess of alcoholic potash is added, and the mixture is boiled under a reflux condenser for several hours. The alcohol is then evaporated off, and the dry residue is extracted with petroleum ether in a Soxhlet apparatus until all the unsaponifiable matter has been dissolved out. Free montanic acid is obtained by warming the potassium montanate with hydrochloric acid. The crude acid is decolorised with animal charcoal and recrystallised several times from hot alcohol. The pure substance melts at 83° C., and its composition as determined by Ryan and Dillon¹ agrees sharply with the formula $C_{28}H_{56}O_2$. Recently Easterfield and Taylor,² when preparing montanone, found the titration value of montanic acid to be exactly that required by the above formula.

On the other hand, the formula for montanic acid given by Hell,³ by von Boyen,⁴ and by Eisenreich⁵ is $C_{29}H_{58}O_2$. It seemed unlikely that this formula could be correct, owing to the fact that all the higher saturated fatty acids, which occur naturally, and whose empirical formulae have been satisfactorily determined, contain an even number of carbon atoms in their molecules. Various theories have been put forward to explain the manner in which the formation of these higher natural fatty acids takes place. Pfeffer⁶ has shown that the fatty acids are formed from the carbohydrates present in the plant. Emil Fischer⁷ suggests that a kind of aldol condensation, taking place between a number of simple carbohydrates, forms higher sugars.

¹ Proc. R. D. Soc., xii, 1909, p. 202. ² Jour. Chem. Soc., 1911, p. 2302.³ Zeitsch. f. Angew. Chem., xiv., 1900, p. 556.⁴ Zeitsch. f. Angew. Chem. xiv, 1901, p. 1110.⁵ Chem. Rev. Fett- u. Harz-ind., xvi, 1909, p. 211. ⁶ Jahrb. wiss. Bot., 8.⁷ Organische Synthese und Biologie.

The latter then undergo a powerful reduction, with the formation of a saturated fatty acid. This theory accounts equally well for the formation of fatty acids containing either an even or an odd number of carbon atoms in the molecule. If, however, all the higher fatty acids which occur naturally contain an even number of carbon atoms, then the theory suggested by Raper¹ and by Buchner and Meisenheimer² is in better agreement with the facts. The latter have shown that, in the formation of fatty acids from carbohydrates, lactic acid is the first product, and that when the lactic acid decomposes into acetaldehyde, carbon dioxide, and hydrogen, condensation of the aldehyde may take place, leading to the formation of higher fatty acids. Raper finds that, contrary to Lieben's rule, in successive condensations of acetaldehyde, a straight and not a branching chain is formed. Curtius³ supports this theory by showing that $\alpha\beta$ -hexylene aldehyde, which occurs in various plants, is in the case of the latter the probable starting substance for the formation of the fatty acids. The hexylene aldehyde may be formed by the condensation of acetaldehyde.

Now it is clear that, if the higher natural fatty acids are formed by the condensation of acetaldehyde, only those acids which contain an even number of carbon atoms in the molecule can occur in plants, and that consequently the number of carbon atoms in the molecule of montanic acid must be an even one.

The analyses of the derivatives of montanic acid described in the experimental portion of this paper agree in every case with the formula $C_{22}H_{42}O_2$ attributed to the acid by Ryan and Dillon (*loc. cit.*).

An unsuccessful attempt was made to convert ceryl alcohol into montanic acid by means of the malonic ester synthesis. The formation of ceryl malonic ester from ceryl iodide and sodium malonic ester was not effected even when the reaction was tried under the most varied conditions.

The converse operation—the preparation of ceryl alcohol from montanic acid—was unsuccessfully attempted. The method employed was similar to that used by Miss E. Jeffreys⁴ in the preparation of pentadecylmethylurethane and pentadecylamine. The reaction was tried several times with montanamide, but in every case the yield was extremely small, and the difficulty of removing traces of amide from the product was so great that a pure urethane was not obtained.

In all the preparations in which the "Grignard reaction" was employed, the tertiary alcohol was isolated with a good yield, except in the cases of the

¹ Journ. Chem. Soc., 1907, p. 1831. ² Ber., 1908, xli, p. 1410.

³ Ann. cccxc, 1912, p. 89. ⁴ Ber. 30 (1897), p. 1558.

di-tolyl and the di-naphthyl compounds. The preparations form an interesting illustration of the great range of the "Grignard reaction," successful results having been obtained by us with an ester containing thirty carbon atoms in its molecule.

The various derivatives of montanic acid described in the experimental part of this paper show very little variation in physical properties, the amide being the only one which melts at a somewhat high temperature. The melting-points of the tertiary alcohols differ only very slightly from one another.

EXPERIMENTAL PART.

Preparation of Esters.

Methyl Montanate, C₂₇H₅₅COOCH₃.

Five grms. of montanic acid were dissolved, in a round flask, in about 120 c.cs. of boiling methyl alcohol. About 5 c.cs. of concentrated sulphuric acid were added, drop by drop, to the hot solution until the ester began to separate on the surface in an oily layer. A further 2 or 3 c.cs. of acid was then added, and the mixture heated on the water-bath for half an hour. The white cake of ester which formed on cooling was removed, washed with water, and dissolved in chloroform. The solution was then dried over calcium chloride, filtered, and the chloroform evaporated off. The ester was recrystallised from ethyl alcohol and dried on a porous pad.

As the ester was found to contain a trace of free acid, it was dissolved in hot alcohol, the free acid exactly neutralised with alcoholic potash, and the alcohol then driven off on the water-bath. The pure ester was separated from the potassium montanate by extraction with petroleum ether.

The yield was almost quantitative.

0.2138 gm. of the ester gave 0.6198 gm. of CO₂ and 0.2539 gm. of H₂O, corresponding to carbon 79.06 per cent. and hydrogen 13.29 per cent. C₂₇H₅₅O₂ requires carbon 79.35 per cent., hydrogen 13.33 per cent.

Methyl montanate is a white waxy solid melting at 66° C. It is soluble in cold chloroform and benzene, but almost insoluble in cold alcohol, acetone, acetic ester, ether, or petroleum ether. It dissolves readily in these solvents on warming, and crystallises in long curved needles.

Ethyl Montanate, C₂₇H₅₅COOC₂H₅.

This ester was prepared in a manner similar to that described for the methyl ester. A quantitative yield of the pure ester melting at 64°–65° C. was obtained.

0.2129 grm. of the ethyl ester gave 0.6196 grm. of CO_2 and 0.2536 grm. of H_2O , corresponding to carbon 79.38 per cent., and hydrogen 13.33 per cent.

$\text{C}_7\text{H}_{13}\text{O}_2$ requires carbon 79.56 per cent., and hydrogen 13.36 per cent.

Ethyl montanate is very readily soluble in cold chloroform, and soluble in cold benzene or petroleum ether. It is almost insoluble in cold ether, acetone, alcohol or acetic ester, but dissolves easily in these solvents on warming. It crystallises in curved needles.

n-Propyl Montanate, $\text{C}_{27}\text{H}_{53}\text{COOC}_3\text{H}_7$.

Three grms. of montanic acid were dissolved in about 25 c.c.s. of normal propyl alcohol, and the preparation proceeded with as in the case of the methyl ester. The resulting ester was recrystallised several times from petroleum ether, and, when pure, melted at 63.5°C . The yield was somewhat smaller than in the previous cases.

0.1993 grm. of the ester gave 0.5835 grm. of CO_2 and 0.2377 grm. of H_2O , corresponding to carbon 79.84 per cent., and hydrogen 13.35 per cent.

$\text{C}_{27}\text{H}_{53}\text{O}_2$ requires carbon 79.74 per cent., and hydrogen 13.39 per cent.

n-Propyl montanate crystallises in curved needles, and resembles the ethyl ester in its solubilities.

PREPARATION OF TERTIARY ALCOHOLS.



0.5 grm. of clean magnesium ribbon was placed in a small, dry, conical flask fitted with a dry reflux condenser, and about 20 c.c.s. of anhydrous ether added. 2.9 grms. of methyl iodide were then added, together with a small particle of iodine. After a short time a vigorous reaction set in, the flask being kept cooled in iced water. When all the magnesium had disappeared, 3.6 grms. of methyl montanate were gradually added. A reaction readily took place between the ester and the "Grignard" compound. The mixture was heated on a water-bath for several hours, and then allowed to stand overnight. The compound thus obtained was decomposed by the addition of small pieces of ice. It was then shaken up with dilute hydrochloric acid, and extracted in a separating funnel with ether, in which the tertiary alcohol is readily soluble. The ether was driven off, and the residue evaporated to dryness with 50 c.c.s. of semi-normal alcoholic potash. The tertiary alcohol was extracted from the dry mixture by means of warm petroleum ether. The crude alcohol was recrystallised several times from petroleum ether, and finally dried in a vacuum desiccator. The yield was 75 per cent.

0.2074 grm. of the compound gave 0.6247 grm. of CO₂ and 0.2647 grm. of H₂O, corresponding to carbon 82.14 per cent. and hydrogen 14.18 per cent.

C₃₀H₆₂O requires: carbon, 82.19 per cent.; hydrogen, 14.15 per cent.

Dimethyl-heptacosyl carbinol is a white solid which melts at 63°–64° C., and is readily soluble in cold ether or chloroform. It is soluble in cold benzene or petroleum ether, somewhat soluble in cold acetone, and almost insoluble in cold alcohol. It dissolves readily in hot alcohol or acetone, and crystallises in small curved needles.



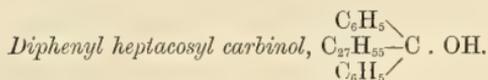
The method employed was similar to that just described. 0.9 grm. of magnesium and 6 grms. of ethyl iodide were taken, and 6.5 grms. of ethyl montanate added. After the addition of the ester to the "Grignard" compound the mixture was heated for several hours, and then left standing for two days. The crude tertiary alcohol, which was dark yellow in colour, was decolorised by boiling its alcoholic solution with animal charcoal, and was freed from some unsaturated hydrocarbon, which it contained, by recrystallising several times from absolute alcohol.

The pure tertiary alcohol melts at 59°–60° C. A yield of about 60 per cent. was obtained.

0.2015 grm. of the compound gave 0.6065 grm. of CO₂, and 0.2576 grm. of H₂O, corresponding to carbon 82.09 per cent., and hydrogen 14.20 per cent.

C₃₂H₆₆O requires: carbon, 82.30 per cent.; hydrogen, 14.25 per cent.

Diethyl-heptacosyl carbinol is a white solid which crystallises in curved needles. It is very similar to the dimethyl compound in its solubilities.



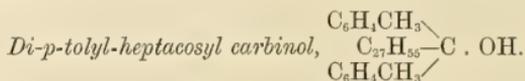
The quantities taken in this preparation were 0.7 grm. of magnesium, and 4.6 grms. of bromobenzene. The "Grignard" compound formed very readily, and when the reaction was complete 5.8 grms. of powdered ethyl montanate were added. The preparation was then proceeded with, as in the previous case.

The yield was about 60 per cent.

0.1949 grm. of the tertiary alcohol gave 0.609 grm. of CO₂, and 0.207 grm. of H₂O, corresponding to carbon, 85.20 per cent., and hydrogen, 11.88 per cent. C₄₀H₈₆O requires: carbon, 85.33 per cent.; hydrogen, 11.83 per cent.

Diphenyl-heptacosyl alcohol is a white solid which melts at 58° C., and

is readily soluble in cold ether, chloroform, or benzene. It is soluble in cold acetone or petroleum ether, and almost insoluble in cold alcohol, but dissolves readily in these solvents on warming. It crystallises from alcohol and acetone in curved needles.



The crude, waxy product resulting from the action of 6 grms. of ethyl montanate on the "Grignard" reagent obtained from 0.81 gm. of magnesium and 5.67 grms. of *p*-bromotoluene, was subjected to a steam distillation to free it from bromotoluene and di-tolyl. The residue was dissolved in chloroform, the solution dried over calcium chloride, and the chloroform evaporated off. The residual wax melted at 47° C., and was found to absorb bromine. It therefore seemed probable that it was an unsaturated hydrocarbon.

0.194 gm. of this compound gave 0.6223 gm. of CO₂, and 0.2136 gm. of H₂O, corresponding to carbon, 87.48 per cent., and hydrogen, 12.23 per cent.

The composition of the unsaturated hydrocarbon $\text{C}_{27}\text{H}_{54}$: $\text{C} \begin{array}{l} \text{C}_6\text{H}_4\text{CH}_3 \\ \text{C}_6\text{H}_4\text{CH}_3 \end{array}$ is: carbon, 87.77 per cent., and hydrogen, 12.23 per cent.

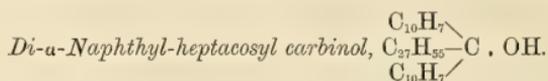
The compound obtained in this preparation therefore appears to be above unsaturated hydrocarbon. The yield was 50 per cent.

Another preparation was undertaken with 1.3 grms. of magnesium, 9.17 grms. of *p*-bromotoluene, and 9.7 grms. of ethyl montanate. The compound obtained was repeatedly recrystallised from hot alcohol, and by this means was separated into two portions. The part more soluble in alcohol (the major portion) melted at about 47° C., and therefore appeared to be identical with the hydrocarbon obtained in the first preparation. The remainder consisted of a very small quantity of wax melting at from 51° to 52° C.

0.1809 gm. of the latter portion gave 0.5655 gm. of CO₂, and 0.1934 gm. of H₂O, corresponding to carbon, 85.25 per cent., and hydrogen, 11.88 per cent.

$\text{C}_{32}\text{H}_{70}\text{O}$ requires carbon 85.42 per cent., hydrogen 11.86 per cent.

Di-*p*-tolyl-heptacosyl carbinol is a white solid, crystallising in curved needles, and resembling the di-phenyl compound in its solubilities.



In this preparation the "Grignard" compound had to be heated for about two hours before all the magnesium dissolved.

0.79 grm. of magnesium was added to 6.86 grm. of *a*-bromonaphthalene dissolved in anhydrous ether, and 6 grms. of ethyl montanate introduced when all the magnesium had disappeared. The crude product was freed from naphthalene by distillation with steam, boiled with alcoholic potash and extracted with petroleum ether. The extract was recrystallised from alcohol, but did not melt sharply. It was then extracted with boiling methyl alcohol, leaving behind a portion which was almost insoluble in hot methyl alcohol. The soluble portion melted at from 51° to 53° C. and was probably the corresponding ketone. The insoluble portion was recrystallised from alcohol and melted at from 57° to 58° C. The yield was about 35 per cent.

0.2002 grm. of the latter substance gave 0.6358 grm. of CO₂, and 0.2008 grm. of H₂O, corresponding to carbon, 86.61 per cent., and hydrogen, 11.14 per cent. The tertiary alcohol $\begin{matrix} \text{C}_{10}\text{H}_7 \\ \text{C}_{27}\text{H}_{55} \\ \text{C}_{10}\text{H}_7 \end{matrix} \cdot \text{C} \cdot \text{OH}$ requires: carbon, 86.93 per cent., and hydrogen, 10.65 per cent.

The ketone C₂₇H₅₅CO · C₁₀H₇ requires carbon 85.39 per cent. and hydrogen 11.61 per cent.

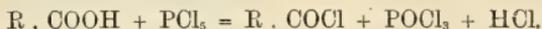
The portion which melts at from 57° to 58° C. appears therefore to be mainly the tertiary alcohol, containing a small percentage of ketone. Di-*a*-naphthylheptacosyl carbinol is a white solid, which crystallises in curved needles, and is soluble in cold chloroform, benzene, ether, or hot alcohol. It is soluble in cold petroleum ether, somewhat soluble in cold acetone and almost insoluble in cold alcohol.

Montanyl Chloride, C₂₇H₅₅COCl.

This preparation was first attempted by heating a mixture of phosphorus trichloride and montanic acid on a water-bath for about an hour, care being taken to prevent water-vapour having access to the mixture. Quantities were taken in accordance with the equation:—



The chloride was freed from phosphorus compounds by dissolving it in petroleum ether, filtering, and evaporating off the ether. This method was found to be unsatisfactory; and better results were obtained by the use of phosphorus pentachloride, according to the equation:—



8.13 grms. of montanic acid were mixed with 3.98 grms. of phosphorus pentachloride in a dry round flask fitted with a dry reflux condenser. The mixture was heated for an hour on an oil-bath at a temperature of 120°–130° C.

It was then heated in vacuo at this temperature so as to distil off phosphorus compounds. The chloride was recrystallised several times from chloroform and from toluene, giving a substance which melted at 63° – 65° C.

1.5189 grms. of this substance gave 0.3529 gm. of AgCl, corresponding to chlorine 5.73 per cent.

$C_{27}H_{55}COCl$ requires chlorine 8.02 per cent.

Several unsuccessful attempts were made to isolate the pure chloride.

Montanamide, $C_{27}H_{55} \cdot CONH_2$.

Mentanyl chloride was prepared as described above. The crude chloride was not freed from phosphorus oxychloride, but was melted and poured slowly into a large excess of strong aqueous ammonia, the mixture being kept cool and well stirred. The mixture was thoroughly shaken for some time and allowed to stand overnight. It was then filtered, washed with water and recrystallized from hot alcohol. The resulting compound was extracted with cold ether, and by this means was separated into two parts; a small portion, soluble in cold ether, and melting at from 60° to 65° C.; the remainder was recrystallised from hot alcohol and melted sharply at 109° C. The small portion melting at 60° – 65° C. was probably impure montanonitrile. The part melting at 109° C. was found to be montanamide.

0.2658 gm. of the latter portion gave 8.1 c.c.s. of nitrogen at 20.5° C. and 768 mm. pressure, corresponding to nitrogen 3.51 per cent.

$C_{28}H_{57}NO$ requires nitrogen, 3.37 per cent.

Montanamide is a white solid which crystallises from ether in curved needles. It is soluble in cold chloroform or benzene and in hot alcohol. It is sparingly soluble in cold ether, petroleum ether, or acetone, but dissolves readily in these solvents on warming.

Heptacosyl-methyl-urethane, $C_{27}H_{55} \cdot NH \cdot COOCH_3$.

4.2 grms. (1 mol.) of montanamide were dissolved in about 200 c.c.s. boiling methyl alcohol, and 1.6 grms. (1 mol.) of bromine added. 0.47 gm. (2 atoms) of sodium was dissolved in 15 c.c.s. of methyl alcohol and added to the solution of the amide immediately after the addition of the bromine. The mixture was heated on a water-bath for about fifteen minutes; a slight excess of acetic acid was then added, and the alcohol was evaporated off. The residue was thoroughly washed with cold water until free from sodium salts, and recrystallised from hot alcohol. The compound thus obtained was separated into two portions by extracting with hot ligroin. The part soluble in hot

igroin melted at from 65°-67° C., the remainder melted at 73°-74° C. The latter gave on analysis:—

0.2252 grm. gave 6.8 c.cs. of nitrogen at 11.5° C. and 752 mm. pressure, corresponding to nitrogen 3.54 per cent.

$C_{29}H_{59}NO_2$ requires nitrogen 3.09 per cent.

Ceryl Alcohol from Chinese Wax.

30 grms. of purified Chinese wax were dissolved in hot ligroin, and 250 c.cs. of normal alcoholic potash added. The mixture was heated under a reflux condenser for six hours. The excess of alkali was neutralised by passing carbon dioxide through the solution, and the alcohol and ligroin finally removed by distillation. A solution of calcium chloride was added to the residue, and the solid which separated was filtered and dried on a porous plate. When dry it was extracted with hot acetone, the acetone evaporated off, and the residue finally extracted with petroleum ether. On evaporation of the petroleum ether, ceryl alcohol was obtained.

Ceryl Iodide, $C_{26}H_{53}I$.

9.5 grms. of ceryl alcohol were heated to 100° C. with 2.6 grms. of red phosphorus in a small round flask placed in an oil-bath; 3.2 grammes of iodine were slowly added and the heating was continued for about three hours. When the reaction had ceased the residue was extracted with chloroform and filtered. The filtrate was washed with dilute sodium carbonate solution, then with water, and finally after drying over calcium chloride the chloroform was evaporated off. The yield was nearly quantitative, and the ceryl iodide after recrystallisation from alcohol melted at 55-56° C.

The percentage of halogen in the substance determined by the method of Stepanow was found to be:—

	I 25.22
$C_{26}H_{53}I$ requires	I 25.8.

V.

ON THE IDENTITY OF BAPHINITONE WITH
HOMOPTEROCARPIN.

BY PROFESSOR HUGH RYAN AND REV. R. FITZGERALD,
University College, Dublin.

[Read JANUARY 13. Published FEBRUARY 12, 1913.]

PRELIMINARY to an investigation of the red dyes which are found contained in sanderswood (*Pterocarpus santalinus* and *P. indicus*) and barwood (*Baphia nitida*), we deemed it desirable to examine the colourless crystalline substances discovered by Cazeneuve¹ in 1874, and by Anderson² in 1876, associated with these dyes, in the expectation that their study might throw some light on the constitution of the dyes.

By the extraction of a dried mixture of sanderswood and slaked lime with alcoholic ether and evaporation of the solvent, Cazeneuve obtained a mixture of platy crystals of pterocarpin ($C_{20}H_{16}O_{16}$) and needles of homoptero-
carpin ($C_{24}H_{24}O_6$). The latter substance melted at 82–86° C., and in an approximately 5 per cent. solution in chloroform had a specific rotatory power:—

$$[\alpha_j] = - 199^\circ,$$

while the specific rotation of pterocarpin was found to be:—

$$[\alpha_j] = - 211^\circ.$$

Cazeneuve and Hugouneq³ described two bromine derivatives of homoptero-
carpin, the one having the formula $C_{24}H_{23}BrO_6$ and the other the
formula $C_{24}H_{18}Br_5O_6$.

By exhausting barwood with anhydrous methylated ether and evaporating the greater part of the solvent, Anderson obtained a small quantity of platy crystals, which he termed baphic acid ($C_{24}H_{22}O_{10}$); while the parent liquid from these crystals gave, after addition of alcohol, on standing a few days, an impure substance, baphiin ($C_{12}H_{10}O_4$)_n. By repeatedly crystallising the baphiin from alcohol or ether, it was obtained as colourless plates or needles, which melted in part below 200° C., and in part above that temperature. The

¹ Comptes Rendus, civ, p. 1722. ² Journ. Chem. Soc., p. 582. ³ Comptes Rendus, cvii, p. 737.

substance, which was obviously a mixture, gave a precipitate of impure lead baphate with an alcoholic solution of lead acetate, and the filtrate on addition of water yielded acicular crystals of baphinitin ($C_{24}H_{24}O_8$). On boiling the baphiin with aqueous potash he obtained, in addition to baphinitin, two other substances, one melting at $164.1^\circ C$, and another melting near $88^\circ C$. The latter substance he named baphinitone.

By the action of bromine on an ethereal solution of baphinitone, Anderson obtained a derivative which crystallised in small needles, melted at $180.2^\circ C$, and had apparently the formula $C_{26}H_{23}Br_3O_6$.

Recently, B. T. Brooks¹ showed that narrawood contains pterocarpin and homopterocarpin, and found that the correct formula of the latter is $C_{17}H_{16}O_4$.

We find that baphinitone, the chief colourless constituent of barwood, is identical with homopterocarpin, which occurs in sanderswood. In agreement with Brooks, we find that the formula of baphinitone or homopterocarpin is $C_{17}H_{16}O_4$. The only crystalline bromine derivative of it which we were able to isolate had the formula $C_{17}H_{14}Br_2O_4$. Cazeneuve's statement that hydriodic acid reacts with homopterocarpin to form methyl iodide, we find to be incorrect. Homopterocarpin contains no methoxy group; but, nevertheless, a phenolic substance is obtained by the action on it of hydriodic acid.

EXPERIMENTAL PART.

Ground barwood, contained in a 10-litre flask, was percolated for a few days, first with warm alcohol, next with ether, and finally with chloroform. The extracts were distilled, and the mixed residues were exhausted with ether. The ethereal solution was washed with dilute potash until nearly colourless, and then distilled. The residue, thus obtained, formed, when recrystallised from hot alcohol, colourless acicular crystals, which melted at $84^\circ C$. It was sparingly soluble in cold alcohol, readily in ether or chloroform, and insoluble in aqueous potash. On analysis the following results were obtained:—

0.1446 gave 0.3790 CO_2 , and 0.0736 H_2O ,
 corresponding to C 71.5, H 5.7.
 $C_{17}H_{16}O_4$ requires C 71.8, H 5.6.
 $(C_4H_4O)_n$ requires C 70.6, H 5.9.

1.0046 gramme of the substance raised the boiling-point of 18.5 c.c. chloroform by $0.53^\circ C$. Mol. wt. 266.

¹ Philippine Journal of Science, v, 1910, A, p. 439.

1.0124 grammes of the substance raised the boiling-point of 16 c.c. chloroform by 0.61°C . Mol. wt. 270.

$\text{C}_{17}\text{H}_{16}\text{O}_4$ (Brooks) requires Mol. wt. 284.

$\text{C}_{26}\text{H}_{26}\text{O}_6$ (Anderson) requires Mol. wt. 434.

$\text{C}_{24}\text{H}_{24}\text{O}_6$ (Cazeneuve) requires Mol. wt. 408.

Similarly, santalin was exhausted with ether and the ethereal extract, after decolorisation by repeated washing with dilute potash, left on evaporation a mixture of crystals, which was separated into its constituents, homopterocarpin and pterocarpin, by means of carbon disulphide, a method previously employed by Cazeneuve.

In appearance, solubility, and melting-point, homopterocarpin is identical with baphinitone, also a mixture of homopterocarpin with baphinitone melted at the same temperature, 84°C . as each of its constituents.

The specific rotatory power of homopterocarpin determined by Cazeneuve is too low. On redetermining it, we found that in an approximately 4 per cent. solution in chloroform,

$$[\alpha_D] 20^{\circ}\text{C}. = - 211^{\circ}.$$

As would be expected, we found that baphinitone is laevorotatory, and that its specific rotatory power in a 4 per cent. chloroform solution is

$$[\alpha_D] 20^{\circ}\text{C}. = - 211.7^{\circ},$$

which is the same as that of homopterocarpin.

We have therefore no hesitation in saying that homopterocarpin is a constituent of barwood, and that the substance described in chemical literature under the name baphinitone is homopterocarpin.

By the gradual addition of bromine to a solution of homopterocarpin in chloroform, in the presence of bright sunlight, a copious evolution of hydrobromic acid occurs, and as the reaction proceeds colourless needles separate. When the chloroform was evaporated at a low temperature, and the residue was dissolved in hot alcohol, the latter solution gave on cooling a precipitate which consisted of colourless needles which melted at 200°C , while the parent liquid gave on further concentration a yellowish amorphous solid. The analysis of the colourless, crystalline bromine derivative gave the following results:—

0.1107 gave 0.2543 CO_2 and 0.046 H_2O , corresponding to C 46.3, H 3.4.

0.1173 gave 0.0989 AgBr , corresponding to Br 35.9; $\text{C}_{17}\text{H}_{11}\text{Br}_2\text{O}_4$ requires C 46.1, H 3.2, Br 36.16.

PROCEEDINGS
OF THE
ROYAL IRISH ACADEMY

VOLUME XXX

SECTION C—ARCHÆOLOGY, LINGUISTIC, AND
LITERATURE.



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1912—1913

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- p. 114, l. 4. *For park read gate*
- p. 175, col. 1, l. 11 from end. *For park read gate*
- p. 184, col. 2, l. 22 from end. *For υΔ μαϑαμéιν ? read μαϑ Ξηδδδδδδδδδδ*
- p. 185, col. 2, l. 11 from end. *For Meath read Kells*
- p. 230, note 3. *For Oxoniensis read Oxoniensia*
- „ note 4. *For Brecani read Brendani For O'Hanlon read O'Donoghue*
- p. 231, note 2. *For Gustaldi read Gastaldi*
- p. 233, note 2. *For Terram read Terrarum*
- p. 239. *For the buss of Emanuel Frobisher's fleet read the buss Emanuel of Frobisher's fleet*
- p. 240, note 4. *For Kretscher read Kretschmer*
- p. 273, last line (foot-note). *For Cénmair read ² Cénmair*
- p. 276, last line (foot-note). *For ; read :*
- p. 280, col. 1, l. 13 from end. *For michair. read michair,*
- p. 281, col. 1, l. 19. *For arthand read tarthand*
- p. 367, last line. *For portatores read potatores*
- p. 368, line 7. *For Bandus read Boindus*
- „ line 10. *For Ecclentissimo read Ecclentissimo*
- p. 394, second paragraph, line 22. *Delete “The ring tower . . . 1003.”*
- „ note 1. *For “90 cows” read “6 cows, worth 20 shillings.”—Not “each.”*
- p. 395, note ¹ should be placed at the word “law” in line 7.
- p. 398, line 12. *For it read Ross*
- p. 414. *For Zarina read arina*
- p. 418. *For GLANARO read GRANARO*
- p. 421. *For Ocordo, 1360; read Ocxordo;*
- p. 461, l. 24. *After 1742 add and of Armagh to 1746.*
- p. 472, l. 5. *Read amorini instead of amourini*
- p. 474, l. 28. *Read S'ROBERTI instead of SI · BERTI :*

PROCEEDINGS
OF
THE ROYAL IRISH ACADEMY
PAPERS READ BEFORE THE ACADEMY

I.

HIBERNO-LATIN MANUSCRIPTS IN THE LIBRARIES OF
SWITZERLAND.

BY MARIO ESPOSITO.

PART II.

Zürich (Stadtbibliothek), and Bern.

Read FEBRUARY 26. Published MARCH 30, 1912.

IN my previous communication on this subject, published in March, 1910,¹ I gave an account of the MSS. of interest to students of mediæval Hiberno-Latin literature preserved in the libraries of Basel, Einsiedeln, Schaffhausen, St. Gallen, and in the Cantonal Library at Zürich. I shall now deal with those found in the City-Libraries at Zürich and Bern.

Zürich, Stadtbibliothek.

The City-Library at Zürich is said to contain about 4500 MSS., some of which are of great value. Unfortunately no printed catalogue of these MSS. has yet been issued.

1. MS. C. 68.

A quarto parchment MS., consisting of 127 numbered folios written in single columns with from twenty-three to twenty-five lines to the page. It

¹ Proc. R.I. Acad., 1910, vol. xxviii, Section C, pp. 62-95.

was formerly the property of the monastery of St. Gallen,¹ but was removed to Zürich in 1712. This ms. was copied in Germany, apparently by a scribe named Ruadkerus, about the year 879. Titles are in red, and there are a few marginal notes. A very full and, I found, perfectly accurate account of the contents of this ms. has already been given by Johannes Huemer (*Wiener Studien*, ii, 1880, pp. 71, 82 sq.; *Sedulii Opera Omnia*, 1885, pp. xii, xiii, and *Iuveni Evangeliorum Libri* iv, 1891, pp. xxxi, xlvi, ap. *Corp. Script. Eccles. Lat. Vindob.*, tom. 10. 24. See also Schenkl, *Poetae Christiani Minores*, 1888, p. 520, ap. *Corp. Script. Eccles. Lat. Vindob.*, tom. 16, pars 1). It is therefore unnecessary for me to repeat it here.

On fol. 2^{ro}-2^{vo} occurs a rhythmical poem in thirty-six lines on the ten Eusebian canons. This poem has for its author an Irishman named Laurentius, who must have lived towards the end of the sixth or the beginning of the seventh century. Laurentius is the Latinized form of the Irish Lorcan. Nothing whatever is known of this personage beyond the fact that he was the scribe of the splendidly illuminated copy of the Gospels written in an Irish hand, which is now preserved in the Oettingen-Wallersteinsche Fideicommiss-Bibliothek² at Maihingen in Bavaria. This poem was printed for the first time by André Du Chesne (*Alcuini Opera*, Parisiis 1617, p. 1686) from a ms. in the monastery of St. Bertinus near St. Omer. This ms. is apparently no longer in existence. Du Chesne's edition was reprinted by Frobenius in 1777 (*Alcuini Opera*, Ratisbon 1777, tom. ii pars 1, p. 204). In 1855 Dom Pitra, who was unaware of the previous editions, published the poem from a ms. in the library at Poitiers (*Spicilegium Solesmense*, tom. iii, 1855, pp. 407-408). This edition appears to have entirely escaped the notice of the subsequent workers. In 1878 and 1879 the poem was printed independently by Bartsch (*Zeitschrift für Romanische Philologie*, 1878, ii, pp. 216-217), and by Dümmler (*Anzeiger für Kunde der deutschen Vorzeit*, 1879, xxvi, pp. 80 sq.), both editors employing the Maihingen ms. mentioned above. Since then the metre has been investigated by Wilhelm Meyer (*Sitzungsberichte der K. B. Akademie, Philos.-Philol. Classe*, München, 1882, Heft i, p. 91; see also Du Ménil, *Poésies populaires latines antérieures au xiii^e siècle*, 1843, p. 85n; Wattenbach, *Anzeiger für Kunde der deutschen Vorzeit*, 1869, xvii, pp. 289-293, and *Revue Celtique*, 1870, i, pp. 27-31; Dümmler, *Mon. Germ. Hist., Poetae*, i, 1881, pp. 164, 631; Huemer *Iuveni Evangeliorum Libri* iv, 1891, p. xxvii,

¹ The stamp of the monastery occurs on fol. 125^v.

² This important library contains some 1504 mss. As far as I am aware that section of the very summary index dealing with the Theological mss. has not yet been published, cf. Weinberger (*Sitzungsberichte der K. Akad. in Wien, Philos.-Hist. Klasse*, Bd. 161, Abth. 4, 1909, p. 64), and for information as to the origin of this library cf. Keile (*ibid.*, Bd. 143, Abth. 15, 1901, pp. 1-8).

ap. Corp. Script. Eccles. Lat. Vindob., tom. 24; Manitius, *Geschichte der Christlich-Lateinischen Poesie bis zur Mitte des 8 Jahrhunderts*, 1891, pp. 379, 481).

Besides the lost St. Bertinus ms., the text of which has been preserved by Du Chesne and Frobenius, and which I shall designate by the letter B in the variant readings,¹ three mss. have thus preserved the poem of Laurentius for us:—M, the Maihingen ms. of saec. vi/vii, fol. 1v^o, apparently written by Laurentius himself.² It was formerly preserved in the monastery of Saint-Arnoul at Metz. For a description see the memoirs of Wattenbach, Bartsch, and Dümmler quoted above. I give the readings of this ms. from the edition of Bartsch, that of Dümmler not being available to me.

P, Poitiers, Bibliothèque de la Ville, ms. No. 17. A splendidly written uncial ms. of saec. viii/ix. The ms. employed by Dom Pitra. A full description of it has been given in the *Catalogue général des Manuscrits des Bibliothèques Publiques de France, Départements*, t. 25, Paris, 1894, pp. 4-5. The poem of Laurentius occurs on fol. 26 r^o. This ms., which formerly bore the number 174, contains the four Gospels and is elaborately illuminated.

T, the Zürich ms., Turicensis C. 68, saec. IX. ex., fol. 2 r^o-2 v^o, which had not hitherto been collated.

KANON EUANGELIORUM.³

In nomine divino trino atque uno.⁴

i. Quam in primo⁵ speciosa⁶ quadriga
Homo, leo, uitulus et aquila,

Ixxi. Septuaginta⁷ unum⁸ per⁹ capitula,¹⁰
De Domino conloquuntur¹¹ paria.

ii. In secundo subsequente¹² protinus¹³ 5
Homo, leo, loquitur et uitulus,
Quibus inest ordinate positus

cviii. Centum in se¹⁴ atque nouem numerus.

¹ I quote from the edition of Frobenius.

² M. Berger (*Histoire de la Vulgate*, 1893, pp. 52, 393) assigns this ms. to the beginning of saec. viii, and identifies Laurentius with the scribe of the celebrated Martyrology of Echternach; see also Wattenbach (*Neues Archiv*, etc., xii, 1887, p. 234).

³ Title only in M. ⁴ This line is only in P. ⁵ prima P; imprimis B; inprimis T.

⁶ pretiosa P; spetiosa T. ⁷ LXX M. ⁸ uno P. ⁹ et P. ¹⁰ capitulo P.

¹¹ colloquuntur B; conloquuntur paria de Domino P; conloquuntur de dño paria T.

¹² subsequenter T; subsequuntur B; ¹³ protenus P.

¹⁴ decim in se P; decem ipse T; decimus B.

- iii. Tum¹ deinde tercio² in ordine
Homo et bos³ loquitur cum uolucere, 10
- xxii. In⁴ numero quo consistunt antiquae⁵
Alfabeti⁶ Ebreorum⁷ litterae.⁸
- iiii. Quarto loco⁹ fatentur¹⁰ aequalia,¹¹
Vna leo, homo¹² atque aquila ;
- xxvi. Vno ore loquentes kapitula¹³ 15
Verbi summi sena atque uicena.¹⁴
- v. Quinta uice concordant in loquela,¹⁵
Homo prudens atque mitis hostia,
- lxxxiii. Iesu Christi emicantes¹⁶ agmina ;
Iuda sine salvatori¹⁷ credula. 20
- vi. Ecce sexto pari¹⁸ sonant¹⁹ clamore
Natus Adam cum clamoso leone,
Computata²⁰ traditis pro munere
- xlvi. Sacerdotum oppidis in²¹ honore.
- vii. En loquuntur²² septies in septimo, 25
vii. Homo, avis, consona de Domino.
- viii. In octauo nunc leonis²³ catulus²⁴
Dei uerba profert atque²⁵ uitulus²⁶
- xiii. Quorum simul²⁷ computatur²⁸ numerus
Adiecto²⁹ Paulo apostolicus.³⁰ 30
- viii. Nonus ordo in quo duo pariter
Conloquuntur³¹ uitulus et uolucer,
- xxi. Inspirati sensu spiritaliter³²
Proloquuntur³³ ternum septipliciter³⁴
- x. Homo nimpe³⁵ uerbum profert proprium 35
Ixii. Sexaginta³⁶ et per duo numerum.³⁷

¹ tunc B. ² tertio T; tertius B. ³ homo pecus T. ⁴ in om M. ⁵ antique T.

⁶ alfabeti B. ⁷ Hebreorum P; hebraeorum T B. ⁸ littere T; literae B.

⁹ in loco T. ¹⁰ fantur B. ¹¹ equalia T B; in pagina P. ¹² una homo leo P T B.

¹³ capitula P T B. ¹⁴ uicina B. ¹⁵ conloquio T. ¹⁶ eminentes P; imitantes T B.

¹⁷ salvatore P; salvatoris B. ¹⁸ patri B. ¹⁹ sonante P; sonat B.

²⁰ computati P; computantis T; computatis B. ²¹ pro T. ²² loquuntur P T B.

²³ leonius B. ²⁴ uitulus T. ²⁵ et T. ²⁶ This line is missing in B.

²⁷ uerbi P; uerbo T; uerborum B. ²⁸ conprobatur P; comparatur T; comparatur B.

²⁹ This line is a syllable short. Is Adiecto to be scanned as four syllables? T has est adiecto.

³⁰ apostolitus T; apostolo B. ³¹ conloquuntur P T; colloquuntur B.

³² spiritaliter P. ³³ proloquuntur T B; conloquuntur P. ³⁴ septipliciter P; simpliciter B.

³⁵ nimpe P T B. ³⁶ XL B. ³⁷ T breaks off here. The last six lines are in M P B.

- xi. Rugientemque¹ leonem audies,²
 xviii. Solum sane decies et nouies.³
 Bouem solum fatentem⁴ inuenies,
 lxxii. Verba Dei bis⁵ et septuagies. 40
 Subuolantem ad astra repperies,⁶
 xcvi. Nonagies loqui atque septies.⁷

For the subject of this remarkable poem see Apoc. iv. 7, and Manitius (loc. cit. supra, p. 481). With regard to the metre, each line consists of eleven syllables with a caesura after the fourth. The verses rhyme in groups of four, two, and six. See further the memoirs of Bartsch, Wilhelm Meyer, and Manitius already quoted.

Laurentius has also left us an acrostic and telestic poem in ten bad hexameter lines, which is found on the last page of the Maihingen ms. It was published by Wattenbach (loc. cit. supra), and has since been reprinted by Riese (*Anthologia Latina*, tom. i, pars i, ed. 2, 1894, p. 30). See also Manitius (loc. cit. supra, p. 379).

2. MS. C. 78 (451).

A quarto parchment ms. dating from the end of the ninth or beginning of the tenth century, of great importance from the point of view of Carolingian Latin poetry. It has been described very fully by Orelli (*Helperici sive ut alii arbitrantur Angilberti Carolus Magnus et Leo iii, Turici 1832*,⁸ pp. 2-5). Formerly it belonged to the monastery of St. Gallen. On fol. 159 r^o occurs a poem in 120 rhythmical lines by St. Columbanus, which is found only in this ms. It has been edited by Gundlach (*Mon. Germ. Hist., Epistolae*, iii, 1892, pp. 155, 188-190). See also Dümmler (*Mon. Germ. Hist., Poetae*, i, 1881, pp. 2, 88, 270, 358, 441; ii, 1884, p. 474); Bæhrens (*Poetae Latini Minores*, iii, 1881, pp. 103-105, 209; v, 1883, p. 262); Gundlach (*Neues Archiv der Gesellschaft für ältere deutsche Geschichtskunde*, xv, 1889, p. 514); Riese (*Anthologia Latina*, i, pt. 2, ed. 2, 1906, pp. 38, 59, 82, 130, 134, 158); Manitius (*Geschichte der lateinischen Literatur des Mittelalters, Erster Teil*, 1911, pp. 186-187, 248n, 546-547).

3. MS. C. 99.

A parchment ms. written in the ninth century. It consists of thirty-one folios and contains only the important commentary of Sedulius Scottus on the grammarian Eutyches. A description has been given by Hagen, who has

¹ rugientem quem B.

² audaciter B.

³ noies M; nonies P.

⁴ fantem B.

⁵ uerbi diuis B.

⁶ repperies B.

⁷ sexies P.

⁸ cf. *Index Lectionum Vniuersitatis Turicensis*, 1835-36.

published the tract in full (*Anecdota Helvetica*, 1870, pp. lxxiii-lxxix, 1-38, ap. Keil, *Grammatici Latini, Supplementum*). See also Dümmler (*Mon. Germ. Hist., Epistolae*, vi, 1902, p. 206n); Esposito (*Hermathena*, 1909, xv, p. 361), and Manitius (*Geschichte*, etc., 1911, p. 318).

Bern, Stadtbibliothek.

The City-Library at Bern possesses one of the most important collections of mss. in Switzerland.¹ An excellent catalogue of the 722 most ancient and important of them was compiled by Hermann Hagen in 1875.²

1. MS. No. 19.

A folio parchment ms. of saec. x/xi, consisting of 68 folios with splendid illuminations (Hagen, *Catalogus*, etc., p. 12). It contains the Latin translation of the works of the Pseudo-Dionysius made by Joannes Scottus, the preface of Anastasius, and the latter's translation of the scholia of St. Maximus. The work of Joannes was edited by Floss (*Migne, Patrologia Latina*, 122, 1853, cols. 1023-1194), to whom this ms. was unknown. It belongs to Traube's first or "Franco-Gallic" group, in this respect resembling the Basel ms. O. iii, 5, described in my first paper (*Proc. R.I. Acad.*, 1910, xxviii, Section C, pp. 66-68). See further Traube (*Mon. Germ. Hist., Poetae* iii, 1896, p. 525); Dümmler (*Mon. Germ. Hist., Epistolae*, vi, 1902, p. 158); Manitius (*Geschichte*, etc., 1911, p. 333).

2. MS. No. 167.

A quarto parchment ms. of saec. ix/x (Hagen, *Catalogus*, etc., pp. 234-35). It contains on fol. 6 v^o-214 v^o Vergil's works with the so-called "Scholia Bernensia," compiled by an Irishman named Adananus, who is, no doubt, identical with the celebrated Adamnan of Hy. See Hagen's edition (*Jahrb. für Class. Philol., Vierter Suppl. Bd., Heft 5*, 1867, pp. 690-91), and Stokes (*The Academy*, xxx, 1886, p. 228); Riese (*Anthologia Latina*, i, pt. 1, ed. 2, 1894, p. 212; pt. 2, 1906, pp. 100, 145); Esposito (*Hermathena*, 1909, xv, p. 354; 1910, xvi, p. 63); Manitius (*Geschichte*, etc., 1911, p. 239). The same work occurs in the ms. next to be mentioned.

3. MS. No. 172.

A quarto parchment ms. of the tenth century (Hagen, *Catalogus*, etc., p. 237). It contains Vergil's works with the "Scholia Bernensia" as in the previous ms. No. 167. See the references just given.

¹ Amounting in all to about 3400 volumes.

² *Catalogus codicum Bernensium*, Bernae, 1875.

4. MS. No. 212.

A quarto parchment ms. of saec. ix/x (Hagen, Catalogus, etc., pp. 260-61). On fol. 123 r^o-126 r^o occur five acrostic poems by an Irishman named Josephus Scottus (fl. c. 790). They have been published by Dümmler (*Mon. Germ. Hist., Poetae*, i, 1881, pp. 149-159, cf. pp. 168, 442; ii, 1884, p. 690). See also Riese (*Anthologia Latina*, i, pt. 2, ed. 2, 1906, pp. 6, 383); Esposito (*Proc. R. I. Acad.*, 1910, xxviii, Section C, pp. 73-74; *Hermathena*, 1911, xvi, p. 329); Manitius (*Geschichte*, etc., 1911, pp. 542-549).

5. MS. No. 258.

A quarto parchment ms. dating from the ninth century (Hagen, Catalogus, etc., pp. 288-90). Among other things it contains a glossary to the books of the Old Testament, which Güterbock (*Zeitschrift für vergleichende Sprachforschung*, 33 [N.F. 13], 1895, p. 103) has shown to be partly the work of Joannes Scottus. See further Whitley Stokes (*The Academy*, xxx, 1886, p. 228); Stokes and Strachan (*Thesaurus Palaeohibernicus*, i, 1901, pp. xiii, 2).

6. MS. No. 265.

A folio parchment ms. of saec. x/xi (Hagen, Catalogus, etc., pp. 298-299). It contains on fol. 68 sq. the commentary on the *Opuscula Sacra* of Boethius by Joannes Scottus, which has been studied and edited by Rand (*Johannes Scottus*, München, 1906, pp. 4, 28, 99, ap. Traube, *Quellen und Untersuchungen*, etc., Heft 2). See also Esposito (*Proc. R. I. Acad.*, 1910, xxviii, Section C, pp. 71, 79); Manitius (*Geschichte*, etc., 1911, p. 337). The same commentary occurs in the two following MSS.

7. MS. No. 510.

An octavo parchment ms. of saec. ix/x (Hagen, Catalogus, etc., p. 431). On fol. 1 sq. is found the commentary of Joannes Scottus just mentioned. See Rand (*loc. cit.*, pp. 4, 28, 98), and the references given in the preceding paragraph.

8. MS. No. 517.

An octavo parchment ms. of saec. ix/x (Hagen, Catalogus, etc., p. 433). On fol. 22 sq. occurs the commentary of Joannes Scottus found in the two MSS. just described. See the authorities already cited.

9. MS. No. 363.

This most important ms., which has been very frequently studied and described, was reproduced in photographic facsimile at Leyden in 1897 with

an introduction by Hagen (*Codices Graeci et Latini Photographice depicti duce Scatone de Vries*, tom. ii, *Lugd. Bat.*, 1897). It was written by wandering Irish monks, friends of Sedulius Scottus, somewhere in North Italy, towards the end of the ninth century, and abounds with Old-Irish glosses. On fol. 194 v^o, 196 v^o, 197 v^o occur eight short poems which Dümmler (*Neues Archiv*, etc., iv, 1879, p. 317 sq.) has attributed to Sedulius Scottus. They have been edited by Traube (*Mon. Germ. Hist.*, *Poetae*, iii, 1896, pp. 153, 232–237). See also Hagen (*Catalogus*, etc., pp. 347–350); Baehrens (*Poetae Latini Minores*, v, 1883, p. 262); Whitley Stokes (*The Academy*, xxx, 1886, p. 228); Stokes and Strachan (*Thesaurus Palaeohibernicus*, ii, 1903, pp. xxv, 235); Riese (*Anthologia Latina*, i, pt. 2, ed. 2, 1906, pp. 29, 40); *Album Palaeographicum duce Scatone de Vries* (*Lugd. Bat.*, 1909, pp. xxv–xxix); Manitius (*Geschichte*, etc., 1911, p. 323).

10. MS. No. 582.

An octavo parchment MS. of the tenth century (Hagen, *Catalogus*, etc., p. 470). On fol. 1r^o–46r^o occurs Adamnan's tract *De Locis Sanctis*. There is a gap in the middle owing to the loss of several folios of the MS. The text has been well collated by Tobler and Molinier for their edition (*Itinera Hierosolymitana et Descriptiones Terrae Sanctae*, tom. i, *Genevae*, 1879, pp. xxxiii, 139 sq.). This MS. contains the plans, which have been reproduced from it by Heisenberg (*Grabeskirche und Apostelkirche*, Teil i, 1908, plate x). See also Halm (*Sitzungsberichte der K. Akademie in Wien*, *Phil.-Hist. Classe*, Bd. 50, 1865, pp. 112, 117, 136); Beazley (*The Dawn of Modern Geography*, i, 1897, pp. 518, 519); Geyer (*Adamnanus, Abt von Iona*, Theil ii, *Programm*, *Erlangen*, 1897, p. 20 sq.; *Itinera Hierosolymitana*, saec. iii–viii, 1898, p. xxx, ap. *Corp. Script. Eccles. Lat. Vindob.*, tom. 39); Esposito (*Proc. R. I. Acad.*, 1910, xxviii, Section C, pp. 75, 81–83; *Hermathena*, 1911, xvi, p. 329).

11. MS. No. 123.

A folio parchment MS., measuring 35.5 cms. by 23. The cover is in parchment, and on it is written: *Clemens Scotus de partibus orationis*. The MS. consists of 128 folios, written in single columns, with thirty-four lines to the page. The writing is in the ordinary tenth-century Caroline minuscule hand. Sewn up with this MS. are four leaves, two at the beginning and two at the end, in a somewhat dilapidated condition, and with writing in a much older hand, probably of the seventh century. They contain ecclesiastical matter. This MS. formerly belonged to the Benedictine monastery of Fleury-sur-Loire, near Orleans. In the upper margin of fol. 119 v^o is written: *Liber sc̄i Benedicti*

Floriacensis, and the same inscription occurs in the upper margin of fol. 123 v^o.¹ The first ten folios are in a rather mutilated state, and in some places the writing is no longer legible. There are a number of marginal notes, most of which are in a modern hand.

This ms. contains a number of grammatical treatises, which are of great importance for the history of grammatical doctrines in the Middle Ages. They have been studied by Hagen (*Catalogus, etc.* p. 178; *Anecdota Helvetica*, 1870, pp. xxxii–xxxvii, cli, clv, clxxxv, cxc, excii, ccli, celv, 189–201, et passim, ap. Keil, *Grammatici Latini, Supplementum*), and by Manitius (*Geschichte, etc.*, 1911, pp. 127, 132, 281, 468). I am here only concerned with the first work in this ms., which occupies fol. 1 r^o–31 v^o. This is an incomplete copy of the *Ars Grammatica*, compiled by an Irishman named Clemens Scottus, who emigrated to France in the time of Charlemagne, and was teaching at the Court-School under the latter's successor, Louis the Pious. A full and excellent account of him has been given by Manitius (*Geschichte, etc.*, 1911, pp. 456–458, 67, 188; see also Esposito, *Hermathena*, 1907, xiv, pp. 523, 528; 1909, xv, p. 360; 1911, xvi, p. 329).

The work of Clemens is found entire in a tenth-century ms. at Bamberg, M.V.18, fol. 1 r^o–70 v^o. Portions of it occur in mss. at Rome, Leyden, Paris, Munich, and Valenciennes (see Manitius, *loc. cit.*, p. 458). It has not yet been printed.

The Bern ms. comprises the greater part of the treatise:—

Fol. 1 r^o–16 r^o: In a more or less injured condition. The beginning is missing, owing to the loss of the first quaternion of the ms.

Fol. 16 r^o–21 r^o: The section dealing with pronouns.

Fol. 21 r^o–23 r^o: De Verbo.

Fol. 23 r^o–27 v^o: De Adverbio.

Fol. 27 v^o–28 v^o: De Participio.

Fol. 28 v^o–30 r^o: De Coniunctione.

Fol. 30 r^o–31 v^o: De Prepositionibus.

The additional matter which follows in the Bamberg ms. is wanting here.

The work of Clemens Scottus is, like the other grammatical treatises of the early Middle Ages, merely a compilation from the writings of previous grammarians. But none the less the publication of these treatises offers a real interest, as M. Roger (*Ars Malsachani*, Paris, 1905, p. vii, sq.) has well pointed out:—“Si les ouvrages de ce genre n'ont pas de valeur intrinsèque, ils présentent un réel intérêt pour l'histoire de l'enseignement grammatical au

¹ On fol. 127 v^o in the upper margin: Liber sc̄i Benedicti Floriacensis Monasterii.

moyen âge. Faute d'avoir sous la main les livres de classe des maîtres qui enseignèrent au vii^e, au viii^e et au ix^e siècle, on se fait quelques illusions sur leurs connaissances; la publication de traités comme celui de notre grammairien, comme ceux de Clément l'Irlandais, de Smaragde, etc., permettra de réformer ou de préciser ce que nous savons à cet égard, et contribuera ainsi à éclairer une époque peu connue." I may add that they are also of importance for the textual criticism of the earlier grammarians they quote, as frequently they worked on better mss. of the latter than we now possess. Sometimes, too, they preserve passages from grammarians whose works are no longer extant.

By far the greater portion of the compilation of Clemens comes from Priscian and Donatus. In addition he quotes many passages from Pompeius,¹ Cominianus,² Consentius,³ Probus,⁴ Sergius,⁵ Virgilius Maro Grammaticus,⁶ Isidorus,⁷ Maximianus (i.e. Maximus Victorinus), Paperinus or Papirianus, Hieronymus, and Augustinus.⁸ The origin of the passages quoted under the names of Plinius Secundus and Terrentius Grammaticus is doubtful. A number of examples are cited from Vergil the poet, Lucan, Horace, Cicero, Sallust, Suetonius, and Iuvenus, but these are taken from the foregoing grammarians. A considerable portion of the *Ars*, fol. 16 r^o-31 v^o of the Bern ms., was transcribed by me in full, but I have not thought it worth while to publish it until an opportunity of seeing the Bamberg ms. should present itself. In the meantime as a specimen of the work and of the manner in which grammar was taught in the court-school at that period, I give as an Appendix to this paper that section of the treatise which deals with conjunctions, on fol. 28 v^o-30 r^o of the ms.

I cannot terminate without recording my thanks to the authorities of the City-Libraries at Zürich and Bern for the readiness with which they gave me access to their mss., and also to Dom Louis Gougoud of the Benedictine Abbey, Farnborough, Hampshire, for assistance rendered during the compilation of this paper.

¹ Cf. Hagen (*Anecdota Helvetica*, pp. clxxxv-cxc).

² Cominianus is always quoted from the *Ars Grammatica* of Charisius, and the extracts in Clemens are of no little value for the emendation of the text of the latter, cf. Hagen, pp. clv-clxiii.

³ Cf. Hagen, pp. cxc-cxcii.

⁴ Cf. Hagen, pp. cli-clii.

⁵ Some of the passages quoted by Clemens under the name of Sergius do not occur elsewhere, cf. Hagen, pp. cxcii-cxcv.

⁶ The forty-three passages quoted by Clemens from Virgilius are printed by Hagen on pp. 189-201.

⁷ Cf. Hagen, pp. cclv-cclvi.

⁸ On the last four cf. Hagen, pp. ccli-ccliv.

APPENDIX.

Codex Bernensis 123, fol. 28 v^o-30 r^o.

INCIPIT DE CONIUNCTIONE.

Sergius:¹ Coniunctio dicta est quod coniungat elocutiones. Quid est hoc? Vt si dicas, 'ego et tu eamus ad forum'; ecce coniunctum est; quod si coniunctionem non posueris, erit soluta oratio, 'ego tu eamus ad² forum.' Sed etiam, si naturam habeat disiungendi, sensus tamen coniungit sermonis,³ ut si dicas, 'ego aut tu [eamus]⁴ coniunctum est uerbis, licet disiunctum est sensu.⁵

Donatus: Coniunctio est pars orationis adnectens ordinansque sententiam. Coniunctioni tria accidunt, potestas, figura, ordo. Potestas coniunctionum in quinque species dividitur. Sunt enim copulative, expletive, distinctivae, causales, rationales.⁶

Sergius: Copulativa est que sensum copulat, et coniungit uerba. Expletiva que aliquem sensum expleat et plerumque ornat tantummodo quomodo dico, 'si illud non facis saltem hoc fac.' Expletive dicuntur eo quod prepositam rem expleant. Sunt coniunctiones causales et rationales, sed inter causales et rationales plurimum defert; sed prius dicendum est quid sit causa quid ratio. Nam causa est qua quod compellimur facere, ratio qua qui deficiatur [et]⁷ reliqua.⁸

Sergius: Coniunctiones pro⁹ significatione sua poni debent, ut puta¹⁰ causales in causa, rationales in ratione. Nam aut ante causa precedit et sic sequitur¹¹ ratio, ut puta,¹² 'occidi illum quia habet tunicam,'¹³ causa est; 'itaque¹⁴ ueneno illum, non ferro [occidi],¹⁵ ne cognosci possit,' ratio est. Causalis,¹⁶ 'si illum occidero, habebō tunicam,'¹⁷ rationalis,¹⁸ 'itaque ueneno illum¹⁹ [non ferro]²⁰ occidi, ne agnoscī possit.'²¹

Priscianus item: Sunt etiam causales quasi proprio²² nomine, 'quoniam prodest tibi, lege.'²³

¹ Ser. cod. ² sed cod. ³ sermones cod. ⁴ eamus additi. ⁵ Cf. Hagen, *Anecdota Helvetica*, p. cxv.

⁶ Donatus, *Ars Grammatica*, ii, 14, p. 388 (ed. Keil, *Grammatici Latini*, t. 4, 1864). ⁷ et additi.

⁸ This passage was neglected by Hagen, loc. cit., p. cxv. It is somewhat different from the original in Sergius, *Explanations in Artem Donati*, ed. Keil, loc. cit., 4, p. 516. Cf. also Sergius ap. Hagen, loc. cit., p. 156. ⁹ per cod. ¹⁰ pute cod. ¹¹ sequente cod. ¹² pute cod. ¹³ tunicam cod.

¹⁴ ita cod. ¹⁵ occidi additi. ¹⁶ causales cod. ¹⁷ tunicam cod. ¹⁸ rationales cod.

¹⁹ uenenum illo cod. ²⁰ non ferro additi. ²¹ Cf. Hagen, p. cxv. ²² proprie cod.

²³ Priscianus, *Instit. Gramm.*, xvi, 4, p. 95 (ed. Hertz, ap. Keil, *Gramm. Lat.*, t. 3, 1859).

Donatus: Copulatiue hae sunt, et, que, at, atque, ac. Sunt distinctatiue,¹ aut, ue, uel, ne, nec, neque. Expletiue, quidem, equidem, saltem, uidelicet, quanquam, quamuis, quoque, autem, porro, porro autem, licet, tamen, uero, enim, nam, namque.²

Priscianus: Causales, si, etsi, etiamsi, siquidem, quando, quandoquidem, quin, quinetiam, quatenus, sin, seu, siue, nam, namque, ni, nisi, nisi si, enim, etenim, ne, sed, interea, quamobrem, praesertim, item, itemque, caeterum, alioquin, praeterea. Rationales, ita, itaque, quoniam, enim, enimvero, quia, quare, quapropter, quoniam, quidem, quippe, ergo, ideo, igitur, scilicet, preterea, quando, quin, alioquin, utique, atqui.³

Priscianus item: Species sunt, copulatiua, continuatiua, subcontinuatiua, adiunctatiua,⁴ causalis,⁵ effectatiua,⁶ adprobatua, disiunctatiua,⁷ subdisiunctatiua,⁸ dissertatiua,⁹ ablatiua, presumptiua, aduersatiua, abnegatiua, collectiua uel rationalis,¹⁰ completiua.¹¹

Donatus: Figure coniunctionum duae sunt, simplex et composita. Simplex, ut nam; composita, ut namque.¹²

Cominianus: ¹³ Figura est qua appellatur aut simplex, ut quidem, aut composita, ut equidem ¹⁴

Priscianus iterum: Sciendum quod quidam 'equidem' coniunctionem compositam esse existimant ab 'ego' ¹⁵ et 'quidem'; sed errant, simplex enim est, et hoc maxime ex ipsa quoque constructione orationis possumus intellegere. Nam 'equidem facio, equidem facis, equidem facit,' dicimus, et potest 'equidem' et ad primam et ad secundam et ad tertiam transferri personam, quod minime fieret, si esset compositum ex 'ego' et 'quidem.' Nemo enim dicit, 'ego quidem facis,' 'ego quidem facit,' sed 'ego quidem facio.'¹⁶

Priscianus item: Ordo accidere dicitur coniunctionibus, qui communis est pene omnibus dictionibus. Sunt tamen quaedam que semper preponuntur, ut 'at, ast, ac, uel, nec, neque, si, quin, quatenus, sin, seu, siue, ni'; alie que semper subponuntur, ut 'que, ne, ue,' et reliqua. Alie pene omnes¹⁷ indifferenter et preponi et subponi possunt.¹⁸

Cominianus: Superest ut dicamus que coniunctio cui qualitati iungatur. Cum iungitur modo finitiuis modo subiunctatiuis,¹⁹ ueluti cum dico, cum dicebam; item ceteris finitiuis modo temporibus; subiunctatiuis quoque sic, cum dicam, cum dicerem; item ceteris subiunctatiuis temporibus. Sed interest

¹ disiunctiuae Donatus. ² Donatus, ii, 14, pp. 388-389. The end of the passage is somewhat different in Donatus. ³ This passage is not a direct quotation from Priscian. ⁴ adiunctiua Priscianus. ⁵ causalis cod. ⁶ effectiua Priscianus. ⁷ disiunctiua Priscianus. ⁸ subdisiunctiua Priscianus. ⁹ disertiuua Priscianus. ¹⁰ rationales cod. ¹¹ Priscianus, xvi, i, p. 93. ¹² Donatus, ii, 14, p. 389. ¹³ Com. cod. ¹⁴ Cf. Charisius, *Ars Grammatica*, ii, 14, p. 224 (ed. Keil, *Gramm. Lat.*, t. 1, 1857). ¹⁵ eo cod. ¹⁶ Priscianus, xvi, 14, p. 103. ¹⁷ omnis cod.

¹⁸ Priscianus, xvi, 15, 16, p. 104.

¹⁹ subiunctatiuis Charisius.

utrum finitiuis an subiunctatiuis iungatur. Finitiuis iungitur, quoties ad id tempus quo agebat refertur: 'Cum declamo uenit,' id est ipso tempore quo declamo, cum declamabam, ut apud Virgilium:

'Cum uenit, auleis iam se regina superbis
Aurea composuit sponda,'¹

id [est]² tempore ipso quo ueniebat.³

Subiunctatiuis⁴ uero, cum post factum aliquid⁵ significat, ut 'cum uenisset, declamauit.' Significat enim prius uenisse et sic [se]⁶ cepisse clamare.⁷

Cominianus: Sic si modo finitiuis uel si facias, si faceret. Dum iungitur finitiuis, uelut dum uenio. Quoties uero pro eo quod est dummodo ponitur, subiunctatiua recipit, ut apud Virgilium:

'dum contenderet urbem,'⁸

id est dummodo contenderet.⁹

Cominianus; Num cur, quare, quid, postquam, ni et nisi, etsi, antequam, modo finitiuis, modo subiunctatiuis iunguntur. Contra autem superius: iunctum [subiunctiuis]¹⁰ ueluti antequam uenisset; disiunctum finitiuis, ut apud Virgilium:

'Ante, pudor, quam te uiolo.'¹¹

Cominianus iterum: Quamuis, quanquam, donec, dummodo, licet subiunctatiuis iunguntur.¹²

Iterum: Vt recepit finitiua acuto accentum relatum.¹³ Effertur autem, quocies pro eo accipitur quod est quo modo, ut apud Ciceronem:

'ut sustinuit, immo uero ut contempsit,'¹⁴

id sit quo modo.¹⁵ Sit ut pro continuo fit pro quoniam fit pro utinam.

Cominianus iterum: Utinam recipit optatiuum, 'utinam uenias.' Item ne acuto accentu imperatiua recipit, ueluti uti ne fac. Quocies uero graui accentu effertur optatiuo recipit, ut apud Oratium:

'ne facias utinam.'¹⁶

Donatus: Coniunctiones pro aliis coniunctionibus posite inueniuntur potestate motata.¹⁷

¹ Aen., i, 697.

² est addidi.

³ Charisius, ii, 14, p. 226.

⁴ subiunctiuis Charisius.

⁵ alia quid cod.

⁶ se addidi.

⁷ Charisius, ii, 14, p. 226.

⁸ Aen., i, 5; conderet

Virgilius et Charisius.

⁹ Charisius, ii, 14, pp. 226-227.

¹⁰ subiunctiuis addidi.

¹¹ Aen., iv, 27; Charisius, ii, 14, pp. 227-229 passim.

¹² Charisius, ii, 14, p. 227.

¹³ relatum relatum cod.

¹⁴ Cicero, Pro Milone, 24, 64.

¹⁵ Charisius, ii, 14, pp. 227-228.

¹⁶ Cf. Horace, Sat., i, 1, 94; Charisius, ii, 14, p. 228.

¹⁷ Donatus, ii, 14, p. 389.

Virgilius: Quanquam in quinque species coniunctio diuisa sit, tamen in sese commiscuntur, ut unaquaqueque alterius ratione pro dictionum qualitate utatur; frequenter enim causales pro rationabilibus et copulatiue pro causalibus poni solent, ut pro 'enim' 'et' ponatur, sicut Cicero:

'uicistis uos et Dii uos iuuerunt,'²

tamquam hoc diceret, 'uicistis, quia Dii uos iuuerunt.'³

Virgilius: 'Quoniam' 'et' 'enim' pro 'tametsi'⁴ ponuntur, sicut Donatus sic ratus est: 'Quanquam me accusent, quoniam ego auctoritate certa fidens omnium probra tempno,'⁵ hoc est, 'tametsi' omnia tempno.' Lucanus etiam de imbecillitate Tuscorum scribens: 'Enim' inquit, 'multos uiuant annos, non se unquam uindicabunt,'⁶ hoc est, 'si uiuant.'⁷

Cominianus: 'At' pro 'autem' sit, et 'atque' pro 'et,' et 'an' pro 'cum,' ut Virgilius:

'An mi cantando uictus non redderet ille,
Quem mea carminibus meruisset fistula caprum?'⁸

Fit an⁹ pro ergo. Ast apud antiquos uariam uim contulit uocibus, pro atque, pro ac, pro ergo, pro sed, pro tamen, pro tum, pro cum, ut in glosis antiquitatum legimus scriptum.¹⁰

Cominianus: Optatiue, ut ne uellim. Infinitiue, dum, quanquam, postquam, antequam, quatenus et cum.¹¹

Inter 'autem' et 'enim' hoc distat, qua 'autem' dictionum sensum commotat ac discernit, 'enim' conglutinat.¹²

Virgilius: Inter 'uerum' et 'uero' due sunt distantie; una, quia 'uerum' prepositiui ordinis est, 'uero' subiunctiui; alia, quia 'uerum' causaliter pro 'tamen' habetur, 'uero' ob expletionem tantum sue stationis accipitur.¹³

Priscianus iterum: Loco causalium coniunctionum accipiuntur pronomina, ut 'ideo, eo'; nomina 'qua causa, gratia, quapropter, quamobrem, quas ob res.'¹⁴ Sit quando pro quomodo.

Virgilius: 'Quoniam' si duo uerba circa se¹⁵ habeat, subiunctum se priori faciet et sequens antecedit, Sulpitio scribente: 'Iurabant, quoniam debellabant'; hic est ordo: 'ideo debellabant,'¹⁶ quoniam iurabant.¹⁷

Finit de coniunctione.

¹ unaquaque cod.

² I have not identified this quotation.

³ Cf. Hagen, p. 200.

⁴ tamen si cod.

⁵ factus cod.

⁶ Donatus praetorius? Cf. Hagen p. 201n.

⁷ tamen cod.

⁸ Vicanus, Vuleianus? Cf. Hagen, p. 201n.

⁹ uindicabant cod.

¹⁰ Cf. Hagen, pp. 200-201.

¹¹ Virgil, Ecl., iii, 21-22.

¹² en cod.

¹³ Charisius, ii, 14, p. 229.

¹⁴ Charisius, ii, 14, p. 226.

¹⁵ I have not succeeded in identifying this passage.

¹⁶ Cf. Hagen, p. 200.

¹⁷ Priscianus, xvi, 5, p. 95.

¹⁸ eum cod.

¹⁹ hoc est ordo ideo bellabant cod.

²⁰ Cf. Hagen, p. 201.

II.

THE SIERRA LEONE CANNIBALS, WITH NOTES ON THEIR
HISTORY, RELIGION, AND CUSTOMS.

By MAJOR R. G. BERRY, Army Service Corps.

PLATES I-III.

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IN this paper no pretensions are made to first-hand knowledge of all the customs dealt with; but the description of every custom is obtained from recorded instances, supplemented by the accounts of natives and the actual experiences of Europeans long resident in various parts of West Africa. At the same time, accounts which I have failed to verify from observation or from two or more sources are omitted.

These notes intentionally deal only with some of the more obscure and difficult aspects of African society, and there are many points that have only just been touched upon. There is much we would like to know regarding the lives and fast-disappearing customs of the West African natives; but so little has been done that I am compelled by necessity to leave my descriptions vague, and this I have done with intention to show all I could learn relating to that phase of life, in the hope that some other worker would carry on the task and complete what I have begun.

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Assistant District Commissioners Rainey and Vergette ; District Commissioner Sangster, of the Gambia Colony ; and Captain Foulkes, Political Resident, Northern Nigeria.

HISTORY.

The Sahara is one of the most ancient known habitations of the human species. In the northern Sahara, especially in the calcareous deposits of dried springs, the traces of a formerly richer flora, and, above all, the remains of human settlements in regions now completely uninhabited, speak only too clear a language, and assure us that even the deficiency of water in the Algeria of to-day as compared with that of Roman times is not to be referred merely to the decay of artificial irrigation, but must have definite causes. Everywhere the soil yields flint arrow-heads—an undeniable proof of the existence of a large population which found a climate favourable to life in a region which to-day seems devoted to eternal sterility.

Looking back through the mists that precede the dawn of history, we see faintly a people that lived by hunting, and worked immense quantities of flints, which we now find in the drifting sands which form the soil of the Sahara. These flints, sometimes brought by caravans to the south, are found in quite isolated and now uninhabited parts of the desert, and are much worn by the action of the sand ; but still their character indicates a people in the Palaeolithic stage. Here in this great vastness of what to-day is sterile, drifting aridity, the white sands shimmering with heat under a merciless sun, Palaeolithic man found a climate moist and cool, and a country fertile enough to support an immense population.¹ These were a pre-Libyan people who, as the stock grew and increased in their primitive home, became the Mediterranean race of Sergi, and sent forth waves of migration which, although acted upon by opposing races and differing environments, still retain traces of their original unity. From this stock have sprung such widely different peoples as the primitive Cretans, Semites, and Egyptians, the Gala, Somali, Nubians, Ethiopians ; and on the other side the Fullas and the earliest Iberian waves. The Egyptians in the hot valley of the Nile became a deeper brown, or red as they call themselves, than their ancestors ; but still there is a marked contrast between all these races and the Nilotic or Negroid races, both in physical characteristics and in the language. The Hamitic Gala and Somali languages are distinctly related to the Libyan, ancient Egyptian, and Semitic, and have no connexion with the Nilotic or the Negro languages. The physical type of all is distinctly Caucasian, with features of an Egyptian cast,

¹ For similar conditions in Central Asia see "Sand-buried Ruins of Khotan," by Dr. M. A. Stein, and the records of the Pumpelly Expedition.

approximating to the higher types of ancient Egypt and the modern Arab. The most southern extension of these people is marked by the Hima or Red Men of Uganda, who bear a striking resemblance to the Fulla. The Hima reached Equatorial Africa through Abyssinia; and when first they arrived amongst the blacks they were regarded as superior and supernatural beings, the spirits of the dead returned to life, and one of their names means "Spirits of the Departed," for the black man thinks that after death his soul is not black, but paler, nearly white. The Hima are not Mahomedans, and are great believers in sorcery and witchcraft; they were nomadic, brought with them cattle and dogs, and are the great cattle-keeping aristocracy of East Africa.

A migration of these Saharan people took place to the coast lands of the Mediterranean, where they seem to have come in contact with a fairer race, and mixed. In time this people became modified by environment, and divided into a fair and a brown race, the former occupying the highlands of North-west Africa, where they are still represented in their old home by the Berbers, or African blonds. The brown race took the lowlands and coast region, and became known as the Libyans; as a race they are nearest in relation to the Egyptian, and constitute an intermediate form between the Semitic and the African of the south. In the Egyptian records both races are known as Libyans.

These races occupied their present country before the beginning of historical tradition, and must have become distinct and numerous at an early period. At a very early time these dolichocephalic people crossed to Europe; they appear to have come in successive waves, and there divided, in accordance with climatic and geographical conditions, into a brunette and a fair race. This stock preserved its primitive burial customs of inhumation. Wherever it settled we find traces of its characteristic architecture in the chambered tomb which has its highest development in the pyramid.

The megalithic monuments which characterize this race are found not only all over northern Africa, but in the islands of the Mediterranean, Malta, Sicily, Sardinia, and Corsica; and all over western Europe—the Iberian peninsula, and especially the west of France and Ireland; also in Great Britain, Denmark, and the Scandinavian peninsula. Those of western Africa are earlier in point of time, as is shown by their structure and artistic inferiority; and they vary in architectural type from the dolmen and kistvaen of Morocco and the tumuli of the Niger and the chambered tombs still found among some of the lower races as far south as the Guinea Coast, all of which probably had their origin in a primitive litholatry practised in the common home.

The Palaeolithic inhabitants of Egypt were a hunting people of the

steatopygous yellow Bushman type. These were pushed back and conquered by an invasion of Libyans from the west. The arrival of the Libyans was probably very gradual, and commenced by an infiltration along the coast of a Libyan people who entered Egypt on the western side of the Delta perhaps about 8000 B.C. (Petrie). The Libyans appear to have sacrificed and made gods of the former inhabitants, as female figures of this type are found in the early graves, but disappear about B.C. 7600, by which time the type had retired south. In these figures we probably see the first beginnings of the worship of Isis. No remains of Pygmies have yet been found in Egypt; but the ancient Egyptians were from early times well acquainted with a Pigmy race, which occupied the Sahara and stretched eastwards to the Land of Punt, as we hear of a representative of the race being brought from there in the time of King Assa; and about 2500 B.C. one of the expeditions from Elephantine brought back a dwarf from the land of Ghosts, which at that time extended north nearly as far as the Second Cataract. Upon hearing of the capture, the boy Pharaoh, Pepy II, wrote to the Prince of Elephantine, saying: "My Majesty desires to see this Pigmy more than the gifts of Sinai and of Punt."

This western invasion does not appear to have spread much further south than the Delta; but there was no stop to the influx of populations, which passed eastwards along the coast of the Mediterranean¹ and down both shores of the Red Sea, and established themselves in central and southern Arabia and the mountainous regions of the African coast, which were afterwards known by the general name of the Land of Punt. At this time the country around the Red Sea must have been less arid than we now find it. The fertility of Punt is frequently mentioned in Egyptian inscriptions; and it seems probable that the high table-lands in central Arabia, Yemen, the African coast, and Abyssinia were in Neolithic times one fertile region, due perhaps to the central African and Asian seas having not completely dried up. This country was inhabited by the primitive yellow Palaeolithic people, with whom the immigrants mixed, as, in the descriptions of Punt, we read of men with beards and very fat women seated at bee-hive huts.

The people on both sides of the Red Sea, to which they gave its name, were known as Himyarites, or Red Men; they developed shipping, and kept in touch with each other and with Egypt, and claimed to be of older and purer stock than other Semites (from whom they differ slightly), and to have had an African origin. Their name indicates their position as well as their

¹ Herodotus, Book II, chap. ii.

complexion, which was fair, with ruddy cheeks—a mountain race. Hima, according to Schrader,¹ is one of the early root-words, and in all Semitic languages means “Red.” Amongst primitive peoples red is the colour of spirits, and denotes things sacred and holy; thus the sacred tracts of fertile lands, which were common grazing-ground and the abode of the gods, where no strife might take place, in the highlands of central and northern Arabia, and possibly also in Africa, were known as Hima,² and the dwellers in them as Himyarites. The Himyarites had a growing and considerable civilization in the Neolithic age; they worshipped a deity embodied in stones, and commemorated their ancestors by annual games. As the population increased, the early Semitic hordes were thrown off, and divided into kingdoms which have come down to us under the classical names of the Minaeans, Nabataeans, and Sabaeans.

In the interior of Arabia, sites of ruined cities and inscriptions have been found, from which we learn that long before the days of Mahommed Arabia was a land of literature and culture, the seat of powerful kingdoms and wealthy commerce. Of these kingdoms, the Sabaeen empire marched with Egypt and Nineveh, and was the greatest in extent. It was variously known as Sabaea, Saba, Sheba, and the Spice Country, and its centre was in the populous south on both banks of the Red Sea, and its inhabitants were, according to Herodotus, great astrologers. It was a great and ancient kingdom in the eighth century, and can be traced to 1000 B.C., but was much older and had arisen to power on the remains of a still older kingdom known as Main, whose people have come down to us under the classical name of Minaeans.³

The Minaean empire extended all over Arabia, to the borders of Egypt and Syria, as far as Palestine, and embraced Ethiopia from Axum to Meroe. Its inhabitants were considerably advanced in the arts of civilization; they were a commercial and sea-going people, literary, and possessed their own alphabet and system of writing. They worshipped large stones, and the Great Mother under the name of Athtar, from which were derived the names Hathor and Ishtar. The inscriptions mention thirty-three Minaean kings; the kingdom was probably as old as Menes, and there are traditions that would point to its being much older. In the earliest inscriptions the Egyptians treat Punt with considerable respect, and they regard it as the land of their gods. The Egyptian god Min was the god of the eastern desert. Punt is represented as a prosperous and fertile land, from which spice and

¹ “Prehistoric Antiquities of the Aryan Peoples,” by Schrader & Jevons. London, 1890, p. 43.

² “Religion of Semites,” by W. Robertson Smith. Edinburgh, 1880, pp. 135, *et seq.*

³ “Human Origins,” by S. Laing. London, 1892, pp. 87 *et seq.*

other articles of commerce were obtained, whose inhabitants sent forth migrations of Red Men to the Nile and beyond to the Atlantic, and through Nubia to the south.

About a thousand years after the western immigration to Egypt, some commotion seems to have taken place amongst the Red Sea people; probably the growing population and the onset of one of those cycles of aridity causing migration, for, about the year 7000 B.C., we see the influx into Egypt of a people who brought products with eastern characteristics, and came by the Red Sea road,¹ bringing new gods, Set and Min. These people differed very little physically from the previous population that arrived from the west, and their vases indicate that they must have been in touch with Egypt long before their migration there is traceable. According to Mosso there was in the Neolithic age a uniform culture which extended over the whole basin of the Mediterranean and lasted several thousand years.²

This Eastern immigration was followed by a distinctly Turanian type which came from the north and had pigtailed like those shown on the Hittite monuments, and both these types with their god Set were conquered by the Horus or hawk-worshippers, who also came by the Red Sea road and drove the worshippers of Set out of Egypt about 5800 B.C., towards the north-east, where they became the Amorites of Palestine.

During these two thousand years there had been a steady influx to Egypt of people from the west, who gradually came in at first along the coast, then to the unoccupied lands of the Fayum, then by the desert paths further south, until by 2500 B.C. the western desert was everywhere occupied by Libyans, and they entered Nubia, where they founded a kingdom. In the fifteenth century B.C. there was a great invasion of nomads with blue eyes and fair hair coming from the west towards Egypt, and the monuments of Egypt describe this people, and record that of this race was the mother of Amenhotep, for she was a blonde with blue eyes and fair skin.

The early gods of Egypt are gods of a period of migration, and some are obviously derived from totem emblems. From totemism the western nomad tribes seem to have developed the Great Mother, and the eastern the divinity of the leader. We know that the ancient Egyptians deified the chieftains who had marched into Egypt at the head of the conquering tribes, probably with totem names, and that when one people conquered another, the god of the conquerors was adopted, and their chieftain was identified with the god whom their tribe had served. This war of the gods is reflected in the legends of

¹ See Mr. A. E. P. Weigall on the "Red Sea Highroad" in "Travels in the Upper Egyptian Deserts."

² "The Dawn of Mediterranean Civilization," by Angelo Mosso.

Osiris and Horus, and in the alliance of the Osiris, Isis, and Horus worshippers, who drove out the people of Set and conquered Lower Egypt from the south. But these changes were very gradual, and there was no sudden break between the Neolithic and early dynastic cultures, as there would be had the country been overrun by an entirely different people. Such migrations would account for the primitive cultural and linguistic connexions between the early Sumerians, Semites, and Egyptians; and the systematic measurement and comparison of skulls have shown that, although there are slight differences, there is no trace of a foreign strain, and that the early dynastic people are lineally descended from the pre-dynastic.¹

“All northern Africa, as far as the country of the blacks, has been inhabited by Berber races,” says Ibn Chaldoun, their great historian, “since an epoch of which we know neither its anterior events nor its commencements.” These races, as we have seen, lived on the coasts of Africa, and cultivated the beautiful valleys of Tell long before the arrival of the Phœnician and Roman colonists. Carthage and Rome set the Berbers in motion once again—this time towards the west, and by continually crowding and pressing them back towards the interior, transformed them into a nomadic people.

The Roman and Phœnician colonization was most intense in Tunis and Algeria, pushing the Libyan inhabitants back on Morocco, part of whose population, giving way, followed the coast-line of the Atlantic towards the south, till they came to the country of the blacks.

In those days the black races held all the Sahara, which was not as barren as we find it now.

From Greek writers we learn that a people in the Iron Age whom they name the Nigretes, using bows and arrows and chariots armed with scythes, lived between the black dwarfs and the Libyans, thus showing the existence of different races and prevalence of a superior civilization in this part of Africa at a very early date. Herodotus, writing some five hundred years before Christ, records a story of the King of Ammon in the Oasis of Siwah, how some Nasamonians, attempting to penetrate the Libyan desert from east to west, were captured by dwarfish men and conducted through extensive marshes, and finally came to a town where all the men were of the same size as their conductors, and black in colour; a great river flowed by the town, running from west to east, and crocodiles were seen in it.² These people are now probably represented by the dwarfs and the Babil of the Congo; and if they

¹ “History of Sumer and Akkad,” by King. “Anthropological Work in Egypt,” by Professor G. Elliot Smith, British Association, 1908.

² Herodotus, Book II, Chap. 32.

had a city on the Niger, and their influence extended across the Sahara, they must have been more civilized in the sixth century B.C. than their present representatives, whom we must look on as the remnant of a decadent race rather than the beginnings of a new. The traditions and customs, the symbology and beliefs of the people of the twin kingdoms of Kongo and Kakongo, the relation of the two kingdoms to each other, their many titles and customs on making and burying kings, and the spiritual headship of the king of Kongo, as shown by Mr. R. E. Dennett in his book, "At the Back of the Black Man's Mind," all seem to point towards a northern origin or influence. These people, from the earliest we know of them, have been much given to cannibalism, and have suffered perhaps more than any others from slave raids.

The Libyans, then strangers to the desert, found it habitable and fertile; and their numerous herds and extensive clearings decreased the already none too liberal supply of moisture, so that in their progress they left behind vast uninhabitable sand plains, which, on account of their flocks, forced them ever onwards, transforming them from a settled people into groups of nomadic tribes.

The other portion of the Libyans maintained themselves side by side with their kinsmen, who had been driven from farther east, until they in their turn were pushed back from the coasts of Morocco by the invading Vandals towards the end of the fifth century. Deserting the sea, some took to the Atlas Mountains, where we find their descendants in the valleys of Kabyle to this day; while others followed their brethren by the desert and sea-coast routes to the south. At the time of the Arabian invasion, Libyan and Arab joined in their attacks on Europe; and when, after three centuries, they were finally driven out of Spain, the Moors (as the mixed people, partly Libyan, with an infusion of Arab, Iberian, and Teutonic bloods, were now called), returned to Morocco to find the country of their fathers in the hands of the Arabs; and being forced to prolong their exodus, they too followed the Atlantic border and became nomads in their turn.

These Libyan people represent the autochthonous populations of Mediterranean Africa, of Morocco, Tunis, and Tripoli, and include all those white people whom we know under the names of Touaregs in the Sahara, Kabyles in Algeria, Moors in Morocco and Senegal, and Fullas in their wanderings across the Soudan and into Nigeria and the coast regions. In the neighbourhood of Oulata (anciently known as Ghana, Gana, and Ganta, in the Arabic texts, and Birou by the Songhois) and Timbuctoo, they bear with them a name which leaves no doubt as to their origin. "They are," says M. Dubois, "called Andalusians to this day."¹

¹ "Timbuctoo the Mysterious."

The Moors who were left behind adopted the religion of their Arabian conquerors; and it was by way of the Moorish tribes settled along the Atlantic coast that Islamism penetrated to the country of the blacks in the ninth century, making its headquarters first at Oualata, and afterwards emigrating to Timbuctoo, which became the metropolis of the language of the Koran and the Arabian sciences, in its progress breeding a race of sectarian fanatics in whose veins runs the mixed blood of the white and negro races. Of such origins spring the Fulla people, who are now bigoted and devoted adherents to their religion, as are all people sprung from north African stock.

Owing probably to its proximity to the salt-mines of Tregazza, the first home of the people migrating along the Atlantic coast was in the Adrar—the land extending to the north of Senegal, which takes its name from a Fulla tribe called Senhadja. The Tarik says “the Fullas are nations of the land of Tischit.” The Moors of the later migrations pushed the Fullas further south before them into the country of the blacks, where they intermarried with the negroes, throwing off tribes of mixed origin such as the Joloff, the Mandigoe, and Susu, who are black, but with Caucasian features. The Fullas, however, did not all get mixed; there is to the present day a pure race, preserving their yellow, or brown, complexions; these are the nomad cattle-rearers, and in addition to their purity of blood they have kept one thing more—a secret language which is used amongst themselves, and is passed down only in the pure Fulla blood. If a Fulla man or woman marries into the mixed people, or anybody not of pure Fulla blood, he may not teach his children the Fulla tribal speech. This secret speech is probably a remnant of the old Libyan language, or perhaps the primitive Mediterranean language, which was the speech of pre-Aryan Europe. This is not the speech the Fulla uses as an every-day language, or in the presence of strangers; it is only used among their own people; and it is not understood by Mandingoes or Susu, who speak dialects of what is ordinarily known as the Fulla language—a speech full of strange remnants and the puzzle of philologists.

In the present day, from the Atlantic north of Senegal and Lake Chad to Abyssinia, there exists a Caucasian race—Hamites and Semites; south of this stretches a great mixed zone right across Africa, which may be racially and linguistically divided into three groups. From the Senegal east to about 25° the land is inhabited by the Soudanese and Guinea negroes; further east to 35° of longitude, there are the Red Men or Nilotic negroes; beyond these to the coast, the Abyssinian and Ethiopian group; and south of this great zone come the Bantu.

Still pressed in the rear, these Libyan-speaking people penetrated the negro zone, which then extended further north, and moved nearly across

Africa, joining hands, or nearly so, with their kinsmen moving south on the eastern side of the continent. Besides the Libyans, this region has been invaded by powerful Hamitic and Semitic peoples, who have been pressed forward by Iberian invasions in the north—all peoples sprung from the same Mediterranean stock, once speaking a common language, the ancestral speech from which the Semitic, Hamitic, the Berber dialects and ancient Iberian are descended. Older languages were displaced, and the movements of this people impressed on the Somali and Gala their present Hamitic speech. Nubian was driven south from Egypt and its place taken by the old Egyptian language, which had both Hamitic and Semitic affinities, and this in its turn had to give place to the present Semitic. In the west the speech of the Berbers drove southwards the older tongues of the Tibu, the Kanuri, the Songhoi, and the Fulla; but one branch of these negro languages, the Haussa, was captured by Libyan invaders, probably the Fullas, and given a Libyan twist and complexion.

In historic times the movement of the Fulla people has, without doubt, been from west to east. The Arab records of the black kingdoms of the Soudan are unanimous in describing a kingdom of a white people which lay to the west, between the sources of the Senegal and the Niger, in the high lands of the Fota Jalon, which they call the Mali empire. But before the Mali empire extended to the proportions we get glimpses of in the fourteenth century through the historians of the Songhay empire, lying further east in the valley of the Niger, there appears to have been a pagan kingdom in the Fota Jalon known as the kingdom of Ghana, where twenty-two white kings ruled over the country before the year of the Hegira.

“In the Mali army it was the custom,” says Ibn Batuta, a fourteenth-century traveller, “for a captain, on being given a command, to be placed upon a shield and raised above the heads of the soldiers,” in exactly the same manner as a chief amongst the Scandinavians and other Teutons was elevated above the heads of his subjects. The court ceremonial was elaborate and servile, and there was an ancient practice of dressing in masks like birds or animals. Poets commented freely on the actions of the Mali monarch, like the mummers at the court of the Aztec emperor.

Amongst the pagans who ruled in Ghana maternal succession prevailed, and the throne went to the son of the king's sister. They buried in tumuli, many of which are to be found on the banks of the upper waters of the Niger; and they placed with the dead the things the deceased used and treasured in this life. Of this practice an Arab writer has left us a graphic description.

“The royal town of Ghana,” says El Bekri, the Arab historian, “was surrounded by sacred groves in which the priests dwelt and the idols of the

nation were placed, and within the groves were the royal tombs. A new grove was planted for each tomb. Upon the king's death the body was laid upon a bed covered with hangings and cushions and placed on the spot chosen for his tomb. Beside the dead king were laid his ornaments, his arms, and the dishes and cups from which he was in the habit of eating and drinking, together with food and intoxicating drink. Around the body of the king were laid the bodies of his cooks, the makers of royal drinks, and attendants, who were sacrificed to attend on him in the next world. The whole was then covered with cloth and mats, and a great dome of wood was constructed, and the assembled people threw earth upon the tomb until a great hillock was formed, and a ditch which left only one passage of approach surrounded the mound." (These and other translations from Arabic texts were made for me by a Mullah from mss. in his possession.)

Every town of Ghana had near to it a sacred grove, just as the towns of the Congo have to the present day, to which people resorted to make their offerings to the dead.¹

The Mali kingdom lasted till 1513, when it was destroyed by the Songhois.

The ancient civilization of Egypt spread from south to north; and the earliest seat of civilization in Africa was the country watered by the Upper Nile known by the name of Ethiopia, and which lay between latitude 10° N. and 17° N., and extended from the Red Sea west beyond the Nile. On the western side of Lake Chad the limits of habitation of the higher races of the Soudan are fixed by the same bounds. The Songhois themselves say that they did not originate on the banks of the Niger; and when questioned concerning the home of their fathers, they always point towards the purple dawn.

"It is to the south of the island of Philae," says M. Dubois, "that we find a similar race, and there also has ancient Egypt left indelible traces."²

Monuments, of which a more or less consecutive chain can be traced from Nubia to the Straits of Bab-el-mandeb, but especially at Meroe and Axum, point to the existence in this territory, at a period of great antiquity, of a people possessing the arts of a relatively high civilization.

The principal state of this Ethiopian country bore the well-known name of Meroe, whose capital was a city of the same name. The people were a mixed race composed of Libyans, Egyptians, Negroes, and Troglodytes, a primitive nomad race inhabiting the western deserts, and probably of north African origin, with some admixture of the early Palaeolithic people. On the site of the city of Meroe there exist remains of temples and pyramids, more primitive than the Egyptian, which appears to indicate that the pyramid was a form of

¹ Compare Dennet's "At the Back of the Black Man's Mind," pp. 63, 97.

² "Timbuctoo the Mysterious," p. 91.

architecture native to Meroe, and only afterwards brought to perfection in Egypt. It is evident from the decoration of the temples which have been uncovered that they were dedicated to the worship of Ammon, and that human sacrifice was common, as the immolation of boys and young men is depicted on the walls of a temple, and jars containing burnt bones were found in a chamber underneath. On the base of one of the monuments a zodiac has been found; and portraits of priests, frequently repeated upon the monuments, show them as tall and slender, with handsome profiles, red-brown in colour, and with hair indifferently straight or curled. The remains of the temple of the most famous oracle of Jupiter Ammon are, it is believed, to be found in the ruins situated about eight hours' journey to the north-east of Shendy, a little below the site of Meroe. This temple of the oracle was known to exist within a few hours' journey of Meroe, and the priestly traditions of Ethiopia and Egypt assert that the worship of Ammon and Osiris was first settled at the Metropolis of Meroe.

Meroe possessed tributary states to the north and east. The Empire of Meroe was composed of many little states with settled constitutions and laws; and the whole was governed by a line of princes who followed matriarchal succession, and were dominated by a priestly caste.

Deeply buried in the sands of the Great Sahara, to the west of the Bahr-el-Ghazal, there is said to be a wonderful city of temples.

During the troubles in the Soudan the troops were subject to constant annoyance from a mysterious enemy who appeared from nowhere and as mysteriously disappeared, and in consequence were viewed by the native troops as wizards or spirits. On their being pursued by some British officers, it was found that they disappeared down holes. Examination showed that the sand around was honeycombed with holes like a rabbit-warren; and it was from these that the enemy issued forth to fight, and, re-entering, left no trace. On being entered it was found that the holes led into passages, and these into galleries and chambers until quite a city was revealed.

M. Dubois, describing the tombs around the old mosque at Jenne, in the Soudan, the commercial capital of the Songhai empire, which was noted for its massive Egyptian form and pylonic decoration, noticed terra-cotta pipes planted vertically in the soil like the chimneys of Troglodyte dwellings. The pipes were filled with soil and connected with subterranean dwellings which are the abode of the dead. "In some places," he continues, "the earth has fallen through; and I could distinguish piles of skeletons that were only separated from one another by thin layers of earth. One seldom sees the living in this spot, but there is life here: eagles and crows, dogs and rats, legions of red and yellow lizards, but the kings of the place are the enormous iguanas—green, and as large as crocodiles." The negroes hunt the iguana

and devour its flesh, but here in Jenne it is regarded as sacred, and to kill it to commit sacrilege. They venerate the iguanas because their forefathers did so; and this carries our memories back to the banks of the Nile, where the crocodile was dear to the priests of Thebes and Crocodilopolis. In Sierra Leone the cry of the iguana is said to be that of a devil or spirit.

Of other Egyptian customs there are many traces amongst the Songhoi and other African peoples. Some of the Songhoi kings married their own sisters, and Ali the Conqueror was embalmed.

In the valley of the Nile we find the magical bird with outspread wings raised on a pedestal for protective purposes above towns or groves; and towards the end of the seventeenth century Barbot, a slave-trader, mentions copper birds as spreading their wings above all the best houses in Benin; and Ibn Batuta, in describing the ceremonies of the court of Malli in the fourteenth century, mentions a golden bird as perched on the king's umbrella.

Doves, everywhere the symbol of the Great Mother, were the oracular birds of the temple of Ammon, and are known in West Africa as "birds of Jenne," where to this day nests and food are arranged for them in the houses, and they are never by any chance put upon the spit.

To this day Jenne is a city of the Pharaohs; its houses, built of bricks, long, flat, and rounded at the ends like those of ancient Egypt, display the pyramidal form and flat roof, plastered within and without, similar to those of the valley of the Nile, and the pylon gives a motive for the decoration of the doors and fronts of the houses; and the large dwellings and great buildings are supported by single buttresses or groups of buttresses of pylonic form.

It is to Egypt, by way of the valley of the Nile, that we would naturally look for the earliest information concerning the land of the blacks; and it is to Egypt, and through Egypt and Arabia, that the Songhois themselves trace their oldest traditions. According to the Tarik-e-Sudan the ancestors of the Songhois came from Yemen to a town in Misr named Kokia. Deserting Kokia to escape the Arab invaders, they marched up the Nile to Meroe.

Speech points the route taken by the emigrants after leaving Meroe. Keeping along the south of the Libyan Desert, "a language similar to that of the Songhois is spoken at Agades," says M. Dubois; "and the people bordering the desert between Lake Chad and the Niger are also Songhoi." Turning round the north of Lake Chad, the migration headed for the Niger, which it struck south of Gao, where a town was founded after that which had been left behind. The Tarik mentions a town named Kokia still existing in the sixteenth century, south of Gao, the capital. These migrations, M. Dubois thinks, must have begun towards the middle of the seventh century, for Jenne,

their most western territory, was founded one hundred and fifty years after the Hegira, or about 765 A.D.

The Songhois empire lasted nearly a thousand years, during which time it was ruled over by three dynasties, the Dia, the Sumi, and the Askia.

There are other West African people who claim descent from the east. The Haussas, a negro people, have a tradition of having come from the shores of the Red Sea; and their historian, the Sultan Bello, says they were descended from the Egyptians. Another people who claim Asiatic descent are the Yoruba, lower down the Niger, who claim to be descended from the Canaanites.

By the valley of the Nile the civilization of Egypt, Ethiopia, Arabia, and the east has for countless ages conveyed an influence which, together with the frequent immigration of people from these countries, has powerfully modified the negro races. The Hima, Songhois, and possibly others, have invaded from the east; while, along the west coast, hordes of Libyans, the Fulla, and the Moors flowed into the territories of the blacks, intermingling with and pushing them back. The civilization of Crete, Carthage, Rome, and the west, as well as influencing the Libyan emigrants, has reached the south by the more indirect method of filtering through the wandering nomad tribes of the desert, and by the caravan routes, which, in the course of ages, have carried many strange people across the desert. All these have brought something of culture with them, so that in West Africa of to-day we find strange remnants of religions, and habits, symbols, and customs, for an explanation of which we must look elsewhere. The meeting-place of the eastern and western influences has, as we have already seen, in historic times, been upon the bend of the Niger, where civilizations have risen and decayed, sending tribes of mixed blood down towards the coast.

South of the healthy uplands, the seat of the African civilizations, a range of hills, backed by a swampy belt of densely wooded malarial jungle, stretches to the coast, which from immemorial antiquity was inhabited by a pagan race who eat men—idolaters, magicians, and barbarians, who have always been looked upon as only fit for slavery.

The Arab historians record that in this region there was a cannibal belt, the inhabitants of which they named the Lem-Lems, Dem-Dems, and Gem-Gems, and say they eat men.

Barbot, in the seventeenth century, describes the natives of the coast as gross pagans, worshipping snakes, consecrated trees, the sea, and much given to human sacrifices on a vast scale. This was the fetish which was driven southwards from Ghana in the eleventh century, and at an early period from Gao, Daura, Kano, and other towns in the northern territories.

In another place Barbot describes the coast people as sorcerers, idolaters, robbers, and drunkards, very savage, cruel, and treacherous, no better than their country. They were gross pagans, said to worship demons more than any other blacks, very low-class naked natives, barbarous, wild, bloody, and treacherous, very savage cannibals who file their teeth, and married indifferently any female member of their family, including their mothers.

To this day there is in Africa a broad cannibal zone which stretches from the Gulf of Guinea eastwards to the Welle region, and from the Soudan far into the Congo basin. This region is inhabited by more or less degraded races which have been pushed back by the Berbers and Arabs, who have made room for themselves at the expense of the blacks, capturing and making slaves of them, thus causing a great intermixture of races. Looking to the west we see Jolloff, Mandigo, and Susu, derived from a cross of Fulla and negro stock, perhaps with a strain of Songhoi blood; and to this latter race the Temne of Sierra Leone may be related. The Temne displaced the Mendi, and squeezed out and partly absorbed the Lokkos and Bulloms. The Bulloms are the same people as the Sherbros, who have been pushed south, and partly absorbed by the Mendi. The Sherbros and the Bulloms belong to the now scattered but once powerful people called Mampas. The Mampas, who now inhabit all the coast districts of Sierra Leone, with their kindred on either side of them, once lived north of Port Lokko, which is a translation of *Bacca Lokko*, sixty miles up the Sierra Leone River to the northward. Between two and three hundred years ago the Susus, a numerous, powerful, and civilized Mohammedan tribe, attracted by the slave trade, pushed their way to the head of the Sierra Leone River, where they established a port and sold slaves, mostly Lokkos (from whom it takes its name), to the traders of Bunce Island. During those slave-hunting wars the Mampas got split up and driven south. There is a tradition that the Bulloms migrated from the south of the Roquelle River, and occupying the district between the Rivers Skarsies and Roquelle they settled and divided it into five districts: the Samu Bullom, lying north of the Great Skarsies; the Mambolo Bullom; the Medina Bullom; the north Bullom or Lokko Massama; and the Kafu Bullom along the coast, which still retains its independence as a separate Bullom organization; but the other divisions have been gradually absorbed—politically at least—by the Temnes who intermarried with them.

Next to the Mendi towards the east come the Eru, Ewe, Tshi, and Yoruba people. The Yoruba, Beni, and Ashanti people have all been modified from the north; and higher up the Niger are many remnants of races, the most curious of whom are the Angass, which show intermixture and influence from the north and south. South of this region comes the decadent civilization of

the Kongo and Kakongo people much given to anthropophagy, who eat human flesh as food in the strictest sense of the word—on the Congo herds of human cattle are preserved and fattened for the table. The worst offenders are the Fans, below Fernando Po, and the natives of the Welle basin. The Fans do not eat their own dead, but barter them for those of their neighbours. Captain H. D. Foulkes, a political resident in Bauchi province, Nigeria, tells me that among the Tangales of northern Nigeria the dead of two families, as a mark of esteem and friendship, are exchanged to be eaten—but, as a rule, they are buried; also that a section of the Lingudas, a neighbouring tribe, do not bury at all; amongst them everyone is eaten, even victims of disease such as small-pox. The Angass eat enemies slain in battle and criminals. The latter are chopped into small pieces, which are sent round to the various householders and put in the family pot. The Angass cannibal feasts are carried on in a secluded spot in the “by-Gwon” thicket, and what flesh is available is finished at one meal; and if any is left over, it is taken home and cooked.

Gwon is one of those shapeless, hazy gods one finds in West Africa, who is worshipped among the Angass, Tangales, and Chip people at the leaf ceremony, which seems to be a ceremony to keep their women in order. The men gather in the Gwon thicket and clothe one of their members from head to foot in leaves. There does not seem to be any ritual, but much dancing and shouting are engaged in; and Gwon is led through the town to punish people for stealing and other offences. No woman may look on the leaf man; as he approaches she kneels down and hides her face; if she disobeys, the penalty is death. In the Gwon thicket, an ordinary mud hut with domed roof is erected, and called Gwon’s house. In Chip, a neighbouring territory, when the captured dead are very numerous they are all cooked in one day, and the people return day after day to Gwon’s temple until all have been devoured. Women are not allowed to partake of these feasts, and, among these people, women have, as far as is known, never been eaten, except by a king for whose table they are fattened.

In addition to other tribal peculiarities, all these people have tribal marks on their faces, except the Susu and Limba, who do not mark themselves. The tribal marks of the Kru people consist of a perpendicular blue band on the forehead, about half an inch wide, extending from the root of the hair to the top of the nose. On the Kru coast the band is broken by two uncoloured bands, and the blue stripe becomes three blue dice. Kru men of Grand Bassan, in addition to the three dice, have a horizontal band above each eyebrow. On the temple a blue triangle in outline is drawn with the apex towards the outside corner of the eye and base towards the ear. The marks are made in infancy by a specially skilled woman, who uses a small knife, making incisions into which a vegetable dye is inserted. There is no keloid; the marking looks

like tattooing. The older men have the perpendicular blue band from the hair down to the tip of the nose, and the triangle is filled in with blue, and assumes a shape somewhat like a barbed-stone arrowhead. These marks have been discontinued for about two generations.

The Mandingoes, the Washulan mostly inhabiting Senegal, and the Munderi, who are known as the "pure Mandingoes," have two, three, or four cuts down the cheek from the eyebrow to the cheek-bone. The Temne have two or three small perpendicular blue lines rather nearer the eye than the ear. The Mendi sometimes have a mark like the Temne, sometimes the perpendicular marks below the temple are crossed by horizontal lines, occasionally there are two perpendicular lines and a cross. The Sherbro, as a rule, have the same marks as the Mendi, but sometimes they show two perpendicular marks; there is often a cross accompanying them. Occasionally the Sherbro have no marks, and the Bulloms have none.

Of all these people, from the point of view of this paper, the Sherbros, who are the lowest, are the most interesting, and next in order the Mendi and the Temne, all of whom file their teeth. Sherbro lies south of Freetown, and consists of an archipelago, of which the largest island is named Sherbro, and the smaller are nothing but mangrove swamps. Across the Sherbro River, on the mainland, lie the Imperri and Temdale countries, part of Mendi-land. All of these countries are covered with bush, the roads are bush-pathways, more or less wide; and the waterways are the main highways. Before the present Protectorate was taken over by the British Government in 1896, and until after the 1898 rising, it was the scene of constant inter-tribal war; and as a result the native slave trade was in full force. The bodies of the dead, and sometimes the living prisoners, were eaten, and all runaway slaves were, on recapture, killed and eaten. But the Sherbros were not the only cannibal people; the Beri tribe, on the Liberian border, openly professed cannibalism, and Mendi, Temne, Limbas, Mandingoes, Creoles, and other tribes have participated in it from time to time. In fact, cannibalism extends all along the coast from the Senegal to Old Calabar, and beyond it southwards. From time to time it has been especially rife in one or other of the districts along the coast. It is still common in Liberia, and from time to time recurs in French and British territory.

Cannibalism and human sacrifice appear to be innate with the Sherbro, the Bullom, and other branches of the Mampas. The Sherbros have the Human Leopard society; and the Bulloms generally practise their cannibalism through the Alligator society; but both societies are common to all branches of the Mampas. All accounts say the Alligator society is exactly the same as the Human Leopard society, except that the human alligator covers

himself with a crocodile skin, and takes to the water, lurking amongst the mangrove roots to obtain his victim. The members of this society are supposed to have a double canoe called a konkobai, formed by two canoes, one much smaller than the other, having their bottoms fastened together. This is put in the water with the small canoe downwards, and so evenly that the latter contains a good deal of air. The lower canoe acts as a sort of diving-bell, which is entered by a man diving underneath it from up stream. Another man, seated above, paddles the canoe along, and when he comes to a watering- or washing-place the alligator man below dives, and, seizing a child, drags it under the water, and returns to the boat. In the Bullom country is a secret creek called the Mosimp creek, which few are allowed to enter, or if they do, they do not come back. In the old days the chiefs and queens of the country used to go there and make ceremony once a year, and, my informant said, still do so. There is much reason to believe that these two peoples are the remnants of a race known to the Arab historians of the Soudan as the Lem-Lem, or Gem-Gem, a degraded cannibal people who were always pushed south to the unhealthy bush districts along the coast.

The Sherbros would not seem to have reached Sherbro before 1607, as in a manuscript letter giving an account of a visit of Captain Hawkins to Sierra Leone in that year, mention is made of "the island which we fell in with some ten leagues south from the Bay of Sierra Leone, in lat. 8° N., has no inhabitants, neither did I learn its name." In the same letter, which is preserved in the Registrar-General's Office at Freetown, it is stated that to the south of this bay, some thirty or forty leagues into the interior country, there are very fierce people who are cannibals, and sometimes infest the natives of Sierra Leone, who, in the same manuscript, are thus described:— "The men of this country are large and well made, strong and courageous, and of civilized manners for heathens; as they keep most faithful to their wives, of whom they are not a little jealous. . . . All the children are circumcised. . . . The king and a few of his principal attendants are decently clothed in jackets and breeches; but the common people have only a short cotton cloth round their waists; while the women have a kind of short petticoat or apron down to their knees, all the rest of their bodies having no dress whatever. All the people, both men and women, have all parts of their bodies very curiously and ingeniously traced and pinked (tattooed), and have their teeth filed very sharp. They pull off all the hair from their eyelids. The men have their beards short, black, and cropped, and the hair of their heads strangely cut into crisped paths or cross-alleys; while others wear theirs in strange, jagged tufts, or other foolish forms, the

women's heads being all closely shaved. . . . When a negro man goes from home he has always his knapsack on his back, in which he has his provisions and tobacco, his pipe being seldom from his mouth; besides which he has always his little sword by his side, made by themselves of such iron as they get from the Europeans; his bow also, and quiver full of poisoned arrows, pointed with iron like a snake's tongue, or else a case of javelins or darts, having iron heads of good breadth, and made sharp, sometimes both."

Succession.—The African social and political unit is the village. A village consists of a headman and a number of group-families, the members of which are each and severally responsible for the actions and debts of the others. If theft is committed, it is only necessary to fix it on the village; the headman traces the responsibility to the group-family, and it is then for the head of the family to bring it home to the individual. If the individual cannot make good the theft by returning the articles or paying in kind, the responsibility falls on the family; if the family fail, restitution must be made to the owners by the village. As a consequence, there is little or no theft, and storehouses require no locks, for the headman and the village collectively are responsible for seeing that each family gets its normal needs. Should the family fail to support itself, its immediate needs are supplied by others; but the rice it receives is not a gift, only a loan, which has to be repaid in kind or in labour the following year. Similarly, in war, the village is the unit, and each headman must produce his quota. The headman thus becomes the political, military, and social head of the village community. This position is hereditary.

The lands of the village surround it; and when the population of a village increases to such an extent that it has outgrown the available lands within easy distance, there is a palaver, and an able man is chosen. At the head of the youths and maidens who have passed the initiation school, are fit to marry and are not otherwise appropriated, he sets out one day, each of his followers carrying whatever of food and property has been spared from the family needs. Travelling onwards, sometimes for hours, sometimes for days, rising ground suitable for a village is eventually reached. If there is nearness to water, and a good supply of it, lands suitable for rice and casada, and plenty of palms, the site is decided to be good. First, they clear a site for the village; then as the clearing progresses, the framework of the huts is made and the compounds outlined, and while the men clear the more distant parts and prepare the ground for cultivation, the women plaster the mud walls and prepare the town. For purposes of defence the town is always laid out in the form of a maze. This formation confuses an enemy should he gain possession of it, and facilitates retreat of the defenders. The leader of this migration is called the Kumra-Bai; and he is responsible on behalf of the new community that they,

as a whole, discharge their debt to the parent village, and that each one of the community repays to the families left behind the value of the goods he brings away with him and of the wife he marries.

The standard of African coinage is a "head"—the price of a good male slave. The head is constant in value; but in lean years it buys less, owing to the scarcity, and in fat years more; besides the "head" of any product measured to the buyer is less in quantity than the measure at which it can be bought—the difference between the two measures being the profit of the retailer, which is thus a fixed amount in Africa.

By this measure the new community has to discharge its debt to the old, either by labour or in kind, which sometimes takes years; then it can cut the tie which binds it to the parent village. But it is not free; its separation has provided a new tie, and the obligation is felt when the tribal chief puts out his demand for help or tribute; and he looks to the Kumrai-Bai to see that his demand is instantly complied with.

The Kumra-Bais are all sub-chiefs; but as they do not belong to the reigning family, they are not themselves eligible for election to the chieftaincy. Like the office of Kumra-Bai, the chieftaincy descends in one family along the maternal side, so that the heir to a chief is his sister's son; but if he is unsuitable, there is no obligation to elect him. Any member of the reigning family that the Kumra-Bais consider most suitable may succeed if he be elected. The Kumra-Bais are the king-makers, in whose hands lies the privilege of selecting and electing the paramount chief.

Having selected the chieftain, the Kumra-Bais accompany him into the bush, where he remains two or three months learning the duties pertaining to his exalted calling. Sometimes he is shut up in a kunk for thirty days before going into the bush. When he comes out of the bush, he is known by a new name; and it is an offence to utter his old name, the old name with its body being dead—gone to Futa, gone to Congo.

Initiation.—All the Sierra Leone races have the Bundu institution, which amongst them is of remote antiquity, thus pointing to some common origin or association. The Temne have their puberty institutions for males; and although they practise circumcision, their institution differs in essentials from the Poro, which does not exist amongst the Temne: it is a purely Mendi institution. The Poro exists amongst the Sherbro, but not amongst the inhabitants of the Bullom shore, thus showing that, whereas cannibalism is a custom common to both branches of the Mampas, the Poro has been imposed upon the Sherbro by their Mendi conquerors and neighbours. Amongst the Sherbros and the Bulloms may be found the degraded beliefs and practices of their more civilized neighbours, who have from time to time conquered them, taken their country,

and pushed them further towards the coast. The daily life is haunted by superstition and governed by fetish, and they are banded into numerous societies which, by fear and intimidation, regulate the daily life of man and woman alike.

Like all other primitive people, the tribes of West Africa have their ceremonies on initiation, and, as Mr. Andrew Lang, in his "Origins of Religion" (page 17), says:—"Looking widely at human history, we find mystic rites and initiations, numerous, stringent, severe, and magical in character, in proportion to the lack of civilization in those who practise them. The less the civilization the more mysterious and the more cruel are the rites."

Of these initiatory rites, the more important happen at the age of puberty, with the object of removing the youth, who up to that time had been under the care of his mother, from the association of the women and children, and introducing him into the society of the men, and to his duties as a warrior and a man of the tribe. Initiation ceremonies go back to an antiquity that is unknown, and their origin appears untraceable. The mysteries are always jealously guarded from the uninitiated, contain the code of morality developed by the people, and the religious ideas to which they have attained. We find puberty rites associated with animism, naturalism, and ancestor-worship. In West Africa they are associated also with fetishism and with Islamism. As a people becomes more civilized the initiation rites assume a more spiritual form, such as those of Egypt, the worship of Mythra, and the Eleusinian mysteries, and the mysteries of Demeter and Bacchus; at the same time the language by which the ritual is expressed becomes either hidden or is veiled in symbols and allegory.¹

Almost universally initiation rites include a mimic representation of the death and resurrection of the novice. The Susus say that the boys are killed, and that they remain dead for some days; on the Congo, they are believed to die and come to life again. The new life to which the youth awakes after initiation is one utterly forgetful of the child-life, which is dead, and falls off from the initiate with his hair, or as his flesh wastes, or is washed away with the white clay with which the novice has been bedaubed as a sign of mourning, and to hide him from the malignant ghosts around at the critical time the soul is entering his body. In the Dionysiac mysteries the performers were painted all over with white clay or gypsum, so that they might not be recognized. The object of the initiation ceremony seems to be to bring the initiates as closely as possible to the state of the wandering spirits, and in touch with the great amorphous powers. To

¹ For classical parallels see Mr. Andrew Lang's essay on "The Bull-Roader" in "The Origins of Religion," and the "Metamorphoses of Apuleius," Book xi, pp. 192 *et seq.*

attain this, the novice is separated in seclusion, deprived of food and sleep, and subjected to long-continued ordeals and torments, and the sight of the new, the horrible, and the unexpected, until the nervous strain and reaction produce a state of extreme sensitiveness, or partial hypnosis, which is often increased to a death-like trance—a state the primitive mind is unable to distinguish from actual death. In this condition, which is essentially favourable to the reception of indelible impressions, the novice is supposed to receive his soul.

The sign and token of the new life and the resurrection into it is the giving of a new name; but as the name is the expression of the soul in words, and as this soul or new life can be injured by magical practices, an outward and visible sign is given as the seal of entry into tribal life; and, as the attainment of this new life and the awakening to manhood and womanhood is the sign of sexual maturity, so the seal of fitness is made by some mutilation of the sexual organs, usually circumcision in the male, and clitoricision in the female.

Thus, initiation, instead of being a getting rid of life, a finding of a receptacle where it can be safely stored, is a taking on of life, and an admission into the co-operation of man, which is the corporate life of the tribe. But as this co-operative life can be injured by war, so the individual life may be injured by malice; hence the name that is given with this new life is hidden. Sometimes the primitive mind confuses the life that is dead with the re-birth into the life of the tribe; and we find amongst some peoples that after initiation the birth-name becomes secret, while with others the new or initiation name is the secret one. The fact is that primitive man is unable to comprehend the power of co-operation and the function of reproduction; but he dimly realizes that by subjecting the youth to the strains and ceremonies of initiation he becomes incorporated into a life that goes back into the eternal past, and can be reproduced into an eternal future.

Poro.—The puberty initiation amongst the Sierra Leone natives is known as the Poro society. The word "Poro," according to Major Fairthlough, is a corruption of a Spanish word, or perhaps a Spanish form of the Mendi name of the society. A native never calls the society by the name of Poro except when speaking to a Creole or to a European; the Mendi call it "Poi," and the Temne word is "Soku," both meaning a society which agrees (sets "one word," i.e., unity) to do a certain thing or to pass a certain law.

The Poro society is threefold in its functions—namely, religious, political, and social. In its political capacity it frames the unwritten law of the country, to which all must bow, and decides on the making of peace or war. So powerful are its workings that in the old days of inter-tribal war the interference of

the Poro meant the immediate cessation of hostilities and the compulsory submission of the matter at issue to the arbitration of the heads of the Poro society. Its workings are secret; and so well are its secrets preserved that the rising of 1898 was not even thought of until it broke out.

Like every other secret society, the Poro has its ritual for entrance and exit, its signs and passwords. A candidate has to be accompanied by one who is already initiated, who acts as sponsor for him. They approach the entrance to the Poro bush, which is covered by a mat hung between two poles, which are generally decorated. Behind the mat stands an official, who is called Yandiboo, or fine-neck. The candidate having been prepared and the entrance reached, the sponsor hammers the mat with one strong blow, followed after a short lapse by three other blows in quick succession. Yandiboo, hearing the signal, lifts the mat and looks out, when he is given the password "Ndoinge," meaning "mother of children." The mat is then allowed to fall; and when he looks out again, the candidates are bowed to the ground, and as a sign they touch the earth four times with the bent hand. The Yandiboo then speaks the word "Shote," and the sponsor answers "Namore," after which they are admitted.

The following description of the ceremony of initiation into the adult Poro was given to me by the Rev. A. E. Greensmith, who is one of the few white men who have been admitted to the Poro. During the first three days the candidates are at liberty to go throughout the "Kamila," that is, the whole bush. On the third day they are marked with an inverted Y-shaped sign; starting on the spine between the shoulders marks are cut across the spine one below the other, until well below the shoulder-blades, when they splay out across the back and round the sides. The candidates kneel on the ground; the flesh is picked up with a fish-hook and cut with a knife or hot iron spike, wrapped in medicine, and palm oil is applied to the wounds. Immediately after receiving the Poro mark, the Poro devil is revealed to the candidates. The devil was brought to the midst of the space where the candidates were assembled in the following manner. Two men came running towards the candidates with a country cloth spread out between them, from behind which squeaky reed music was heard. As soon as they arrived in the midst of the space where the candidates were, the cloth was dropped and a man was revealed. This man is the Poro devil or "Poi Yaffi," also called "Ungöi" by the Mendi and "Banika" by the Temne. No dress was worn by the devil, and apparently no special dress is worn by him at any time. The sectional devils have very elaborate dresses.

The devilship descends from father to son. The candidates are circumcised by the Poro devil with an ordinary knife, but amongst the Angass of Nigeria

a stone knife is used, and the operation is performed at a particular stone on the top of a hill.

The day after the revealing of the devil the candidates have medicine water and some bush-leaves brought to them, in which they wash, and on that day their Poro names are given. On the fifth day the "Poi-Kamila" is beaten. The Poi-Kamila is a tortoise-shell, which is beaten once quickly: then follows a slight pause, which is followed by three quick beats. The "Poi-Kamila" and the flute played by the Poro devil have all the properties of the bull-roarer:¹ They are the instruments which warn the female and uninitiated to keep clear of the male ceremonies, any prying on which is fraught with punishment. The first founder of the Poro had, so tradition says, a squeaky voice; hence the squeaky sounds of the reed-flute through which the Poro devil speaks. No woman may look on this flute or on the tortoise-shell used as a "Poi-Kamila"; and on hearing the sounds made by them, they must immediately depart to their houses or into the bush, and kneel down with their faces covered and towards the ground.

Near the Poro bush is the sacred bush where the old men—the tribal ancestors—are buried. When the "Poi-Kamila" is beaten, and all is clear and no one but Poro people in sight, the Poro devil passes through the town. The candidates are then taken through the town; and they have to run all the way from the Poro bush to the sacred bush. Here the older Poro men are assembled to receive the initiates, who are given food; and rice is placed on the graves of the dead, gin is given to the older Poro men, and some is poured on the graves as an offering to the dead. At a rude altar a prayer is offered to Ngewo (God the Creator) and to the dead, commending the new initiates to their protection, and asking for material blessings to be given to them. A man answers at intervals, like a clerk putting in an Amen.

On the last day, all the hair is cut off the heads of the initiates. Now they are regarded as being sick; and their families send them each a new handkerchief to cover their heads with. This they must use until their hair has grown again. Coming back from the graves in the sacred bush, a procession is formed, with the old men leading, followed by other Poro members escorting the initiates, who are assembled under a country cloth which is held over their heads, forming a sort of canopy to protect them from the sun's rays, which are able to exert an extraordinary and injurious influence on the youth at this time. The procession proceeds through the town until it reaches the barre, or palaver-house, where the boys sit down for four days before leaving for home.

¹ See "The Origins of Religion," by Andrew Lang, pp. 15 *et seq.*

The Poro devil when approaching a town does not wear a distinctive costume; he is merely accompanied by a large concourse of Poro men and boys, who run about and make a great noise. Upon this alarm reaching the town, all men not of the Poro order, together with all women and children, must conceal themselves inside their huts, and drop down the mats before the doors and window-spaces. The women have to kneel down indoors and clap their hands. The devil then enters the town, when all noise must cease. The devil speaks in a discordant way through a piece of hollow stick, having holes cut in its side like a flute; these holes are covered with spider's webs. Before the boys are brought out from the Poro bush the devil makes a prolonged stay in the town, usually remaining from about seven o'clock in the evening until two or three o'clock in the following morning. At intervals during this time he perambulates the town, blowing this reed-flute in a very doleful way, the meaning of it being that he is presumed to be in the pains of childbirth, for, when the boys go first into the Poro bush, the devil is supposed to be pregnant, and when they come out, the devil is said to have given birth.

A boy has no real name until he goes to the Poro bush, when it is given at his circumcision, as among the Jews. He also receives the Poro markings on both sides of the spine. He is then taught the medicinal use of leaves and herbs, not merely as fetish, but as medicine in our sense of the word. Dancing is an important part of his education.

When the boys have completed their training and gone through the ceremonies in the juvenile Poro, they are eligible to join in the general or special Poro, in which is formulated the unwritten law of the country.

Bundu.—The rites of baptism and confirmation are with us common to both sexes; but, as in other times and countries, so in Africa at the present day, the less civilized the people the more cruel and hidden are the secret mysteries and initiations that are the preliminaries to puberty and the entrance into manhood and womanhood. Amongst all the Mendi tribes, the Sherbros, and the Temnes, the Bundu is practised. The Bundu is a secret society, the violation of whose privacy—by the black man at least—is punishable by death. The Bundu bush, where its meetings are held, is hidden away in the thick shrubbery; and here the girls of all classes are trained and prepared for their entrance into womanhood. The course of training is held in the dry season, and lasts three months or more; if something goes wrong in the country, it is extended to secure the safety of the girls; or if the pupil intends to enter the higher ranks of the institution, the instruction is continued for three or more years, and includes dancing to the sound of the *segura* (or gourd covered with a netting of hard seeds, which is the special musical instrument of the women), or to the tom-tom.

"In the society for girls," says Dr. Blyden, a native,¹ "which goes by various names in different parts of Africa—called Bundu in our neighbourhood (Sierra Leone) and Suna further north among the Jolloffs—the teachers are women only: usually the older women in the neighbourhood are selected for this office, but always women of experience. Instruction is given in everything which prepares a woman to act her part in the existing social order—everything necessary to enable the young mother to perform the function which her position involves. The women who impart these lessons are either married or aged widows, and unpaid. It is a labour which is part of the communal work.

"Africa has had these institutions from time immemorial. In the Bundu society or school instruction is given in all the normal and abnormal complaints and diseases to which women are liable, especially as wives and mothers; and all the known remedies for the prevention and cure or alleviation of such diseases are taught; so that when a girl has passed through the prescribed course of training, she is prepared, without extraneous aid, everywhere and at all times, in the bush or in the town, to take care of herself in emergencies."

The Bundu society is described by Mr. J. C. Smith² as "the real school for women, handing on from generation to generation the tribal folklore, traditions, proverbs, songs, dances, instrumental music, domestic economy, together with all the historic knowledge appertaining exclusively to woman as the mother of the human race, and relating specially to the functions of generation, the preservation, the perfection, and the continuation of the human species."

The Bundu society is intimately associated with the African marriage customs. During her course in the Bundu every African girl makes a number of friends, who are spoken of as mates. One of the obligations of these friendships is mutual aid in marriage. Should one of the coterie happen to become the first or head wife of a chief, and have therefore the power of selecting the subsequent wives for her husband, the unmarried mates have prior claims upon her for preferment. Each wife has her own house and compound; but the first or head wife has supreme authority, which is enforced; and the household duties are divided so as to relieve each woman of the simultaneous burden of housekeeping and child-bearing. An African woman nurses her child for two years; and from the period of pregnancy to that of weaning all marital relations are suspended. This custom lies at the

¹ "African Life and Customs." By Edward Blyden, London, 1908, pp. 13, 14.

² Mr. J. C. Smith is the author of "Legal Tender Essays," "Money and Profit Sharing," and other books, and has given considerable attention to the economic side of African life.

base of the African group-marriage, which aims at the regular protection and provision for the normal sexual and maternal instincts of all women, so that there are no spinsters past girlhood.

From babyhood both sexes go naked until they reach the age of puberty. While in the Bundu bush the girls wear round their loins several rows of black beads, to which is attached a tail of cotton; and besides the usual charms, chiefs' daughters are distinguished by wearing a leopard's tooth round their necks. Before leaving the Bundu bush each girl undergoes a rite similar to circumcision by the excision of the clitoris and labia minor, with the object of assisting continence during the long period from the beginning of pregnancy to the termination of lactation; at the same time they are marked with cicatrices on the front and back of their bodies (vide Plate II.). When they complete the course, they are bedaubed from head to foot with white mud (on the Congo the girls are painted red),¹ dressed in a barbarous dress of network and brass, loaded with silver ornaments; and, headed by the Bundu devil, they go in procession through the town (vide Plate I.). As in the Poro, the processional devil is not the head of the society, the society being ruled over by a head woman or priestess, who has the right of entry to the Poro.

The daubing of the Bundu girls with white clay would seem to indicate that in the past, if not at the present time, the ceremony of initiation as carried out in the Bundu bush must have included a mimic representation of the death and revival of the novice. Amongst many primitive people whitening the body is a sign of mourning: and the negro believes that after death his body becomes white, and some tribes paint their dead white or red so as to resemble spirits, which they believe are of a pale white or reddish hue. So probably the whitening of the Bundu girls is symbolical of the death of the child-life which they have left behind buried in the bush; and as the white clay falls off so fall away childish things as the flesh from the bones in the grave.

The Poro bush is cut out on a plan which much resembles a genealogical tree. From the entrance a straight broad path leads into the bush from which spring by-paths like the branches of a tree, each of which ends in a circular cleared space. Going straight ahead from the entrance, one enters the chief's Poro; on the left of that lies the section of the Sami women, while further to the left lie the sections for the Toma bush and the ordinary and Mahommedan Poro. To the right of the chief's Poro lie the sections belonging to the sectional devils and some unknown sections.

The Bundu bush is similarly shaped, except that around the outline of the

¹ Vide Bennett, *op. cit.*, p. 69.

tree, and enclosing it as if in an egg, is a path fenced with grass-mats in the shape of an oval. This oval or egg is the shape in outline of the emblem of the Bundu bush, and is also the Bundu sign. It sometimes happens that natural curiosity will induce a woman to secrete herself, and thereby, in disobedience to the Poro law, to become acquainted with some of the mysteries of the Poro. The superstitious belief in such cases is that sickness follows, and during her illness the woman confesses to a *Toto-gbe-moi*, who reports it to the *Soko* or *Sowa*, one of the headmen of the Poro. *Toto* means "medicine," *gbe* is "to look," and *moi* is the word for a man. The *Toto gbe moi* is the country fashion-man, the man who can observe or find out things by means of medicine, in other words, "a diviner, a magician." After consultation, one of the sectional Poro devils is sent to seize her; and she is taken to the Poro bush: fines are imposed upon the woman's family or husband, if she has any, before anything can be done in the matter. When they are paid, she receives Poro treatment, and after she has got well she is initiated into the Poro order in the same way as a man, and receives the Mendi name of "Maboi." She is then considered to be both man and woman, is exempt from "woman palaver," and is amongst the Sherbro called *Deli-Boi*, meaning Poro woman.

All the people, men and women, born in *Samie* town, which is a portion of *Baoma* town, 24 miles beyond *Bo*, must enter the Poro.

There are two kinds of Poro: *Tasso* when there is a *Tinga-Tanga*, and *Lakka* when no *Tinga-Tanga* is present. *Tasso* medicine is stronger than *Lakka* medicine, and according to some accounts a *Murri* man, although he can be a Poro man, cannot belong to the *Tasso* section. No woman may look upon a dead *Tasso*. *Lakka* is also the name given to the young men's Poro where they are initiated and circumcised.

The dancing man of the Poro is a *Sokko* man. The office of the *Sokko* man is usually hereditary. When a new *Sokko* man is to be made, if the son of the last *Sokko* man is not selected, at least one of his family must be. When a new *Sokko* man has been selected, he is put in the *kunk*, which is near the Poro bush, where he sleeps for nine nights, and learns his duties; for it must be remembered that to be able to dance a ceremony means to be intimately acquainted with its ritual. When he comes out of the *kunk*, he is brought before the chief by an old *Sokko* man. The chief owns the *Tinga-Tanga*; and when the new *Sokko* man is brought before him, he causes the *Tinga-Tanga* to be placed on the ground, and addressing the new *Sokko* man says, "This is your load." After that the *Tinga-Tanga* is handed over to the *Sokko* man, who henceforth is known as a *Sokko-Tasso*, or *Tilli-Tangi*, from his headdress, which, when not in use, is in the custody of a high official in the Poro bush.

There are two kinds of Sokko men—the Sokko-Lakkas and the Sokko-Tassos. When it is intended to put people into the Poro bush, the Sokko-Lakka's business is to walk round the country and summon people, saying where and when to assemble. After the Sooko-Lakka has called all the people, the Sokko-Tasso comes out and dances.

The head-dress known as Tinga-Tanga is shaped somewhat like an hour- or sand-glass, and is a sort of circular basket about three feet high, formed of two cones, the apices of which join in the middle. The bases of the cones are joined by four wooden hoops; a similar number are worked in or near the junction of the two cones; and the inner and outer hoops are surmounted by circles of wood which look like two equators to a pair of globes one inside the other. The top edge of the basket is surrounded by a huge bunch of feathers; and the dancer carries a fire stick wrapped in tow concealed in the head-dress, so that smoke issues from it during the dance. The Tinga-Tanga is a powerful medicine made by the Poro society and kept in a Poro bush. It is sought to protect people from arrest or punishment. When the Tinga-Tanga is covered with feathers and one cannot see inside it, it is a good medicine; but when the feathers are only on top or are absent and the sides bare, and the Tinga-Tanga contains a skull and bones or bottles of fat, it is a bad medicine. A Tinga-Tanga examined was found to contain two femora, two tibiae, and the skull and lower jaw of a youth seventeen to twenty years of age; these were said to be the bones of a human-leopard victim offered some three months before. The whole of the bones were charred and rolled up in a fishing-net. The parcel thus made was carried on the top of the Tinga-Tanga. Natives have again and again declared that bones in a Tinga-Tanga are "persons' bones who were pulled in saraka" (sacrifice), and it is a very bad medicine because of the skull and bones.

A chief having looked country-fashion—that is, consulted a diviner and found that the devils (spirits) are vexed with him—proceeds to make saraka by feeding the Tinga-Tanga.

When the Tinga-Tanga is to be fed, the Poro people are put in the Poro bush which is known as "killed Poro." In order that no further trouble may befall the person performing the ceremony, rice is cooked; and the Tinga-Tanga and Pora bush are fed by placing some of the cooked rice in the Tinga-Tanga and on the graves near the Poro bush. A stronger medicine can be made by killing a fowl or a goat and feeding the Tinga-Tanga with it. The ordinary Poro of the Mendis is the Lakka Poro; and the ceremony of feeding a Tinga-Tanga would not have anything to do with the Lakka Poro. The Tinga-Tanga is apparently the abode of a devil, a fetish. When covered with feathers the feeding of a Tinga-Tanga is considered an ordinary saraka; but when the

Tinga-Tanga contains a skull and bones, it is looked upon as a bad medicine; and no member of a society, not a bad society, would feed a bad medicine.

Inside the Poro bush is a part known as the Toma bush, where the members of the Toma society express their ritual in a dance, and make a medicine called Toma. All members of the Toma bush are members of the Poro; and children are sometimes put into the Toma bush. Anyone who is able to feed the Tinga-Tanga or the Toma bush would be a member of the societies to which those medicines belong; and members of the Leopard society should be able to feed both the Poro and Tinga-Tanga and the Toma. The natives say that Toma medicine is a bad and powerful medicine; and although it sometimes cures people, it more often harms them by making their noses drop off, and it has been known to kill people. It is made from tobacco and a part of the elephant, and is administered as a snuff called Telei, or cut-nose medicine, when used in trial by ordeal. It is recognized as a bad and dangerous medicine, and is only resorted to in important cases when both parties have to partake of it.

When the Poro is about to be killed, the Tinga-Tanga is brought out of the Poro bush, and a small house of sticks and palm-leaves is built over it. Every Poro bush is not in possession of a Tinga-Tanga, but sometimes the Poro bush belonging to an important town may have two or more Tinga-Tangas; and when the Poro society dances, the Sokko men carry the Tinga-Tangas on their heads. When a chief's town is to be doctored, the people assemble from surrounding parts, sometimes the Tinga-Tanga, the Poro, and Toma bush are fed, and the Sokko men, with the Tinga-Tanga on their heads, are brought to town and dance for four days. As they dance smoke sometimes issues from the Tinga-Tanga; and at the end of the four days' dancing the Sokko men cook rice and put some of it on the Tinga-Tanga and some on the graves near the Poro bush.

Whenever it is intended to hold any palaver or any ceremony for sacrifice, word is sent round and generally there is a meeting. This meeting is of importance in proportion to the power of the chief who summons it. If by a paramount chief, the sub-chiefs and their officials all attend, so that every section of the country is represented. Smaller chiefs or sub-chiefs only have their own immediate friends and followers or townsmen.

Those bidden having arrived, the chief receives them at the barri, in the Poro bush or under a cotton-tree, where they sit down. The chief's speaker then gets up, and announces that the chief is in trouble, or that his health (in a political sense) is bad, that he looked country-fashion and has found out that his dead parents are vexed with him, and he must make a sacrifice, and they are there to determine what the nature of the sacrifice should be.

Human Leopard Society.—A person desirous of joining the Human Leopard society has first to find out who the king or priest is—a difficult matter. Then he goes out and asks the king for Borfimor, who answers that he would give it, but he is not the only owner, and he must consult others. According to Major Fairthlough the word 'Borfimor' is a contraction of two Sherbro words, 'Boroh,' meaning 'a little bag,' and 'Fimah,' 'black'—the medicine being kept in a little black bag. Occasionally, when it was desired to force a more or less prominent individual into the society, he was invited to a friendly meal. Having partaken of the food, he was told that it contained human flesh, and that it was necessary for him to join the society, which it would appear he always did.

Some days after, the aspirant was directed to meet the Borfimor on the road. Proceeding along the road, he was met by some friends who introduced him to others, who asked him if he had come for the medicine. Having answered in the affirmative, he was asked what he wanted it for, and he answered "to play jagay" (or knucklebones, a game played with cowries). Next he was asked if he would swear, and having signified his assent, the party proceeded into the bush.

The Borfimor was placed in a red box, a leopard-knife was put into the right hand of the aspirant, who held it without putting his hand through the handle. Knocking on the box with a leopard-knife, an oath was administered to the effect that as "I come now to get this medicine, from these people, and that afterwards if I revealed them, if I walk on the road big snake must bite me, if I walk on the sea I must drown, if I walk on the road again lightning must kill me."

The aspirant then swore the three who swore him on the same medicine and box. He was then asked to pay for the medicine, and gave four pieces of cloth to one of the three, who passed the cloths to another, who in his turn handed them to the "king" or headman to make medicine. The party then separated. Three days later they went to seek a victim. There is reason to believe that originally the victim had to be a girl, free-born, and over fourteen years of age, so that the soul might be settled in the body. A first-born picin was desirable. Each initiate to the Leopard society had to produce as a sacrifice a person of his own or his wife's blood. Now it appears that the sacrifice may consist of a woman or a girl, a boy or a man. In earlier times the victim was commonly a tribal enemy, the society being used to get rid of an enemy who could not be killed otherwise. Before a victim is killed the Borfimor can be started by using portions of the remains of a first-born female picin (child) who has died a natural death, together with other ingredients to form the medicine; but medicine made in this way, or from an enemy, would not be powerful medicine,

A candidate for initiation into the Leopard society must be a man, and must be a member of the Poro. Women have sometimes taken part in the ceremony, but there is reason to believe that they are women who have been initiated to the Poro or are Sami women, i.e. belonging to the nobility of the country, who have the right of entry.

The Leopard-men usually endeavour to have a Christian or a Moslem as a member, but only very debased specimens of either sect join them. Creoles sometimes join for trade purposes, as by means of the society they can push a trade or get payment of a bill which would otherwise be hopeless.

The candidate has to procure a victim for division amongst the members, and each member who receives a share is bound, in his turn, to produce another victim.

When the nature of the saraka, or sacrifice, for the purpose of cannibalism is announced, two of the messengers of the cannibal society accompany the person who has to provide the sacrifice to "beg" a victim. No one not a member of the society could beg a child for sacrifice. As a rule, five men meet the mother or guardian of the victim on a lonely road, and they ask the mother for her child for the good of the country offering perhaps a sovereign for it. Generally the men are related to the woman. Similarly, a man is asked for his son, brother, or sister, an offering of money being made for the victim; but a victim cannot be bought. At first he refuses or says nothing, but generally through fear he lends himself as a tool for the capture. Before sacrifice is made, the sanction is obtained of the father, mother, and all the male relatives of the victim; this serves the double purpose of increasing the membership of the society and of secrecy. If the sacrifice is being made for or on behalf of a powerful chief, he himself does not beg or ask for the victim, but sends his brother or his messengers to obtain it.

While this is going on, the country-side is being sworn not to reveal what is about to happen; the leopard-men take to the bush where they wandered about all night making noises like real leopards. These wanderings and noises are often kept up till daybreak; and the natives say that this noise is only made when the leopard-men want to catch someone, and that it is always heard when and before people are caught; and they are sure it does not come from real leopards, as there would be too many of them, and they would be seen.

The Tinga-Tanga is brought out, the Sokko man dances in all the surrounding villages for four days, and the people kill Poro; Poro and Toma bush are fed.

It is usually night when the leopard ceremony is held; but it need not be so—it may be day, in the morning, or any time when people are gathered

together ; but the "dark-break" or twilight is the proper time for the sacrifice to be offered.

When the victim has been selected, a man is chosen for his strength and agility, and often because he has done it before, to catch the victim. He is called Yongolado, the man who has the teeth or claws, "the warrior." To him is delivered a leopard-skin and two knives. The leopard-clothes and knives are kept by the chief ; and no common man is allowed to go in where they are kept. When wanted they are sent out. The skin, with the knives rolled up in it, comes, passed on by many hands, from no one knows where, and when the ceremony is over, as mysteriously disappears. The bundle is received from a man, often unknown, who instructs the receiver to carry it to such and such a place, where he will hand it over to another, who carries it forward as before.

The knives are variously described by those who have seen them as pronged knives with two points, and two knives each with two blades. The knives are attached to the forepaws of the leopard-skin like claws, and are held in the hand like knuckle-dusters. One of these leopard-knives was described as double-edged, with a hole in the handle through which one could pass part of the hand. Between the handle and the blade it was bound with hide. There were two blades at right-angles to the handle. The whole knife was of iron, except the hide. Another knife is described as being of iron with two prongs a little shorter than the length of a hand. The handle is a piece of wood with a hole in it, through which the holder puts his hand. There are also small knives consisting of two points attached to a ring which is worn on the finger (vide fig. 1, p. 69).

The Yongolado dons the leopard-skin, and is often accompanied by other men similarly clad. The skins cover their faces as well as their bodies, and their hands are thrust into the forepaws of the leopard-skins, which have for claws the pronged knives. The knives are attached to the shoulders by strings or ropes. Usually there is only one pair of knives ; but cases where more were present have been known. Sometimes the leopard-skin is more elaborately arranged. It has been formed into a shirt, descending below the knees and to the elbows. There was another skin for the head which came down on the forehead like a judge's wig, leaving the face bare ; it covered the head and neck, and fastened under the chin. The face was covered with a bimbi or net, and masks have been used.

The bush comes up close to the villages, often to within 30 to 40 yards of the backs of the nearest houses. The leopard-men, having assembled in the bush behind the town, make the cannibal sign to the headman of the village. The whistle, a piece of cane about $1\frac{1}{2}$ inches in diameter and about 6 inches

long, with a hole at each end, is used to make the signal; and if there are any cannibal men in the town, they know the sign and come out to the others. If there are no cannibal men in the town to aid them, the leopard-men lie concealed until a favourable opportunity presents itself, when one or more of them spring up, seize the victim, and, stifling the cries, carry him or her off to the bush. If there are confederates in the town, it is generally arranged that the capture takes place in the bush. Those in the town arrange that the victim passes along a certain path—a long, straggling, crooked footpath, with high bush rising like a wall on either side; the creepers cover even the smallest openings, and give concealment. The leopard-man, dressed in a leopard-skin, a knife in each hand, his hands through the handles, and the blades turned in, crouches in the bush. Quite unconscious of his fate, the victim passes along, happily enough, to cut palm-cabbage. The leopard-men turn and follow. The boy stops, and prepares to trim the palm-tree. As he stops a sound of “burr,” “burr,” like the purr of a leopard approaching a goat, is heard. The human leopard springs. Once on the back of the victim he puts the knives into his throat; only one cry is heard, as the victim falls on his face, the whole throat being cut out, and the human leopard kneeling on his back. The body is then carried off into the bush by the Yongolado; and a man, who is shod with shoes having a carved portion of wood representing a leopard’s paw, leaves as many tracks as possible, and a trail into the bush different from the direction taken by the others.

Having reached a secure place, indicated by a certain stick or tree, the body is deposited on the ground. In a clearing near the Poro bush is a certain stone covered by a country-pot which used to rise and walk when the leopard-men wanted to catch anybody. Here the body is opened, the lower part of the belly cut across, and the cut carried up each side as high as the collar-bones; the flesh is raised, and the intestines examined. The intestines, liver, heart, and head are removed, the body is divided at the waist, and again longitudinally from the neck down the centre, making four quarters. The body is then divided and distributed. The observations of Dr. Burrows show that occasionally only a small portion of the flesh is taken and cut into small pieces and distributed, with extraordinary rapidity, among the members. The pieces are wrapped in banana leaves, and then in a cloth. The mask is almost invariably removed, probably to destroy the identity of the victim.

The belly is always opened, the liver being a guide to the suitability of the victim for “medicine purposes.” Among the Mendi and Sherbro it is an invariable practice to open the belly of all corpses, and the state of the liver and gall-bladder is said to be indicative of any witchcraft practised by

the deceased, or of his potentialities for "bad medicine." If found to be a "witch man," the body is not accorded honourable burial, but just buried in the bush to hide it away naked and unsung.

The victim is sometimes slaughtered by the throat being cut, and without further ceremony; but this is exceptional, and in many instances elaborate ritual is indulged in. On one occasion the victim was brought to a gba-gba tree and made sit down, with the chain by which he had been fettered still round his neck. The chief for whom the sacrifice was made was called by the officiating Murri-man, and at his request came and sat on the victim's shoulders. All present came forward, and those near by placed their hands on the chief or on the victim; the others put their hands on those who were touching the chief and on each other. Thus placed they remained while the Murri-men were saying Murri words (talking in Arabic), and as the Murri men counted their beads, they called on the chief's dead ancestors to assist him. The officiating priest then prayed in the Mendi language that the saraka should take effect, and bring good in the chiefdom. The chief Murri-man having recited his prayers and invocations, told the chief to stand up, which he did, and all present then stood back against the fence. The head Murri-man then told the chief to call the sacrificer. The office of sacrificer is the occupation of a single man who makes his living by the exercise of it. The sacrificer came forward dressed in a leopard-skin, and with the leopard-knife cut open the victim's stomach from the centre towards the right side; an assistant placed a pan under the wound, and a third, inserting his hand into the wound, pulled out the liver and intestines, which he placed in the pan. Now came forward five others. The first placed his hand in the wound and drew forth some fat, and the four others did the same. The pan with the intestines, liver, and blood was taken away to a house. The body of the victim was then carried to the piazza of the late chief's house. It being now midnight, they separated. No one was left with the victim, who was still alive and chained, and remained alive for some hours.

Next morning the body was removed to a secret place in the bush near the kunk and was butchered. First, the breast and ribs were removed; then the basin was brought, and the rest of the liver and the heart were put in the pan and taken away. The chest and ribs were put aside as the chief's portion, and one of his wives came and put it in a kettle and took it away to the chief's house. Then the legs were removed and the bones taken out, and the head was cut off and skinned, and the flesh removed. Asked what these bones were required for, the reply was given that they were required for the Tinga-Tanga which would be used next time the chief was put in the kunk and the Poro pulled. When the flesh was removed, the leg- and thigh-bones and the

skull were taken and buried under a palm-tree. The remainder of the body was cut up; and a messenger was sent to the town for the chief. When he came, he ordered the meat to be shared out. In addition to the chest and ribs the hands and feet were allowed to the chief; these he presented to some of the minor chiefs; the remainder of the meat was distributed to representatives of the sections.

The chief then ordered some men to cut banana-stalks and dry leaves. These were taken to the back of a house, where they were made into an effigy of the victim. The effigy, together with a pole, was fastened up in a country mat; and it was then sent to the village from which the victim came, where it was buried in the presence of the victim's relations as the actual body of the victim.

The man who provided the victim got the entrails; the heart and liver were usually divided. Special portions of the body were reserved for the chief, the king of the Leopard society, and the father of the victim, who was usually present, and commonly was a leopard-man. Special portions of the sacrifice were also given to any of the Kumra-Bais who happened to be present. The king of the human leopards always got the skin of the victim's forehead to cover the Borfimor and the kidney fat to rub on it; he also got the liver and trachea.

At another cannibal feast in the Imperre country part of the ceremony consisted of a dance. The victim, a little girl whose step-father was being initiated, was carried to the Poro bush, where a fire was lighted, and to the beat of drum seven men, clad in leopard-skins, which covered their heads, faces, and bodies, and with tails trailing behind them, came into the clearing, with a quick, jerky run. Their arms were thrust into the forelegs of the leopard skins, the paws of which were armed with pronged knives, from which glittered and shot back the yellow glare of the fire and the silvery rays of the moon. As they ran they broke into a kind of dance, each man dancing for himself, as is the native custom, except two men who appeared to carry a pole with a box slung to it. After dancing for a time they formed one behind the other and moved across the space to a bush, where they stopped, and broke into a low, sad chant. From the box they took something, which was afterwards found to be a wooden image of a leopard and a Borfimor bag, and offered it to the bush. Retiring from the bush, they recrossed the space and danced again. Returning to the bush, the box was opened to receive the spirit of the fetish. This they did several times; finally they danced right across the space to the fire and sat down. They then took fat from the child's stomach, and having anointed the image with it, they put it back into the box. The company then cooked and ate the flesh, buried the bones in the soil

near the fire, the ashes of which being scattered over the grave, they returned to the village.

Sometimes there was no ritual; and the ceremony, except for the presence of the Murri-men, could not be called a sacrifice.

About a month after the human sacrifice the remainder of the sacrifice was made, and a black cow, or white sheep and white fowl, whichever had been determined on, were offered up. At this ceremony the Murri-men officiated as before and told their beads, talking Murri-talk; and all the people laid their hands on the black cow, after which it was slaughtered and eaten.

Some people say that the person is only killed for the purpose of being eaten, but the natives say "that they wanted to catch woman to make medicine in order to get riches."

The objects of the ceremony are always material. To get "one word" for the chief in the country, "to get some blood to make the country cold," so that "bad luck would be taken away from the country, and they would all get plenty of money." A great point was made of supremacy over the white man, in the white man not being able to find out what was being done, and that the eating of human flesh would give power over the white man. For, say they, "the white men have more power than the black men; but in this cannibalism you get some power so that when you do wrong you will not be found out by the white man."

Medicine and Fetish.—The leopard-sacrifice or medicine is known as "Kori-hari." Before Kori-hari can be made the following have first to be produced and brought:—Durwe or Doro bark, a dead cat, a snake with two heads which walks in two ways (that is a snake-like animal which has its tail flattened out like a head, probably the *Amphisbaena*). To these are added Gpa (farm-house) or Kpa dust, which is also called Qua and Kpwah, genital products, eggs, and many insects.

Kpa is a fetish which consists of a few large stones, to which are brought the heads of bush-deer, bush-hog, shevretain, boa-constrictor, and leopard. Men, women, and children are taken to these stones, and the stones are prayed to. Neglect this medicine, and it will rebound on you; you will meet accident or get sick unless you get the Kpa priest "to pour cold water," that is to make an offering to the Kpa altar and offer a prayer. The old members sometimes assist to make the leopard-medicine. By mixing some of the medicine at this stage with certain leaves, a charm will be created to make a man strong and successful.

After the sacrifice, when the flesh has been distributed and taken home, it is put in a pot for a short time and cooked with a little salt and water. During the cooking the grease is skimmed off and put in a bottle, and the

flesh is eaten with the fingers. The bones are broken and the marrow taken out; if not eaten, the cannibal rubs himself and his medicine with the marrow-fat. Before being eaten a portion of the flesh is sometimes dried and part of the dried flesh is put into the medicine. The grease in the bottle is carefully preserved, for, if a man rubs human fat on himself, he will get money and become strong, and it can make his body invisible and his deeds unknown; the possession and use of human fat will make a man powerful to govern the whole country.

Some days after the sacrifice has been made three Murri-men go into the kunk for seven days, during which time the Nessi medicine is made. Nessi medicine is made by writing the Mussulman confession of faith, or texts from the Koran, on paper or on board. These are then washed, with many incantations, until the writing is removed. When the charm is clean, the washings are put into a bottle and the paper on which the charm is written is rolled up, and either used as a cork or tied to the bottle.

The Nessi having been made, it, together with the bottles containing human fat, were divided into lots and placed in the ground. The Nessi was only given to the big men—it was distributed among the headmen of sections. If the Nessi was rubbed on their bodies, the Murri-men told them it would prevent the white men from knowing of the matter if they did anything wrong, and so no harm could come to them.

The heart and the liver of the victim are dried; the internal organs are used, and, by aid of charms and incantations, the human fat, the Kpa medicine, and the other ingredients of the "Kori-hari" are welded into one composite and powerful medicine by mixing them together, moistening the mixture with nessi, and kneading the whole into a paste which is placed in a small horn. This medicine is the Borfimor, the attainment of which is the great object of the Human Leopard society. The Leopard medicine is put away in a box in a man's house. At certain times the grease gained from the fat of the flesh is rubbed on the medicine. The owner does not carry the medicine about with him. Before going to a meeting of the people, before meeting the chiefs or a commissioner, the man rubs the medicine on himself. The grease he rubs over his face and body. Thus armed he will gain power and deceive the white man.

A Borfimor bag in my possession (vide Plate III.) figured prominently in a trial which led to the hanging of thirty-two men. The natives all say it is a bad juju, and was used by Leopard-men; and this particular bag was known to be used to swear men on. The juju are contained in a leather bag to which are attached buttons and carrying cord. Opened, the bag contains four smaller bags.

One of the bags contains a package enveloped in numerous wrappings of dirty black cloth tied round with a piece of string, and inserted in a blue cotton bag. This bag is thrust into an old red sock, and this again into another that apparently was its fellow, and all these are enclosed in a white bag spotted with red. The inside package is wound about with fine thread, underneath which is hair, which encloses a roll of paper with Arabic writing on it; this paper contains a quantity of leaves like broken tobacco-leaves. The second white cotton bag contains a lasimois or charm composed of unending windings of some black cloth. The third bag contains two tau-shaped iron crosses, a piece of bamboo, and a boat. The stems of the crosses are lapped with cotton, and to the top of each is tied a cowrie shell. There are three sections, each about 6 inches long, of a split bamboo enfolded in many strands of bark string. The model, in wood, of a dug-out canoe is 4½ inches long; into it has been packed a paper with Arabic writing; the stern of the boat and a corner of the paper had been passed through fire and scorched, and then rolled in two wrappings of black cloth. The third package is a coarse cotton bag containing a goat's horn, which is filled with the leopard medicine or actual Borfimor. The horn has holes in the base and point, through which a string is passed for hanging. There is also a pebble made of some earthy matter and lime, in one side of which is incorporated a cowrie shell. The pebble is wrapped in what appears to be a blood-stained bag. In this bag were three pieces of string—a red, a blue, and a white string.

The Borfimor bag containing the leopard and other powerful medicine is worshipped as a fetish. Sacrifices are made to it, and the "king" or priest rubs the Borfimor with blood. During the ceremony the people wear no clothes; they tie the Borfimor up, and anoint it, and pray to it, asking that they may get power, money, and slaves: that no trouble may come to them, and that the English may not know what they do. "For," said a black man, "I fear the white man more than God."

Many years ago Sir Philip Smyly, now Chief Justice of Sierra Leone, when he first came to the colony, was making some inquiries in connexion with a Human Leopard case he was conducting, and, in course of his investigations, was told, as nearly as he can remember it, the following story as to the origin of Borfimor:—Long ago, in the hinterland of Sierra Leone, north of Sherbro, there lived three tribes who had what might be described as a fighting connexion with each other. One tribe lived at Taiama in the Imperri country, and the other two lived a day's march either side of it, one in Mendiland and the other in the Sherbro country. The Mendi and the Sherbro had a quarrel, and Mendi war-boys were sent to settle it. On their way to try conclusions the Mendi war-boys stopped for the night with their friends at Taiama:

During the night the Taiama people sent a message to their Sherbro friends to say that the Mendi war-boys were there. The Sherbro acted immediately on the information, and coming down to Taiama slew all the Mendi war-boys in their sleep. The Mendi people blamed the Taiama people for the slaughter, but, not having any war-boys left, could not take revenge. In their strait they besought the assistance of a big Murri-man named Maiwa. Maiwa gave them a medicine called Borfirmor, which, when in full force and efficacy, brought plenty of trade, plenty of copper, and plenty of wives, but unless its properties were renewed from time to time by rubbing it with the fatty parts of a goat, lost its effect. In making this particular concoction, Maiwa substituted the internal fatty parts of a human being for those of a goat. The women of the Mendi tribe made friends with the people of Taiama, and, under guise of seeking their protection, presented the Taiama people with the Borfirmor, explaining how it would, if kept in full vigour, bring prosperity, power, and much riches. But to keep it in full force it must be renewed periodically by anointing it with the internal fat of a human being, who must not be a slave, but must be some blood-connexion of the person seeking help of the Borfirmor.

The Taiama people were grasping, selfish, and avaricious; and the Mendi people gained their revenge, for the cult of the Borfirmor took great hold on the Taiama people. In order to keep the Borfirmor alive and benefit by its powers, the Taiama killed off the greater part of their tribe, and eventually started to seek victims from amongst their neighbours. To do this without attracting too much suspicion, they sought their victims in the bush, and seized them by imitating the habits of the leopard.

In time the worship of the Borfirmor spread all over the country, and some years ago a powerful chief in the Imperri country made up his mind to stamp it out. For this purpose he summoned from the far north some powerful magicians known as Tongo-players, who did their work so thoroughly that for years there were no Leopard murders. According to Chief Bunting Williams of Mattru, Paramount Chief of Jong, the word "Tongo" means to find out and reprove secret deeds, such as cannibalism, alligator and human leopard murders, and witchcraft. When a person has suffered trouble by any of these means, or been killed by a Fangay charm, or been robbed, the relatives apply to the paramount chief for permission to find out by means of the Tongo players who caused the injury to their relative. In former days the ordeals imposed by Tongo-playing were recognized by both Mendi and Sherbro laws.

The gang that came from the upper country in answer to the chief's summons were headed by a noted magician named Kpawamonopo and his assistants Kakewa and Fuecheh. The three principal Tongo-players sent

emissaries to every town and village, and they proceeded through the country in state. They wore barbarous costumes composed of leopard-skin with a bell attached to the tail; they danced, and the principal carried a pole covered with leopard-skin, from which protruded huge metal spikes, and called a Tongora. Each village was taken in turn. On their arrival at a town a space was cleared in the bush for their encampment. With the cut bush they erected two poles, to which they tied a cross-piece and piled all the small bush underneath. They then retired to their camp and made medicine.

When the village was to be judged, drums were beaten and the people assembled. The head Tongo-player drove his Tongora into the ground, placed medicine on and around it, and then retired into the bush with his two assistants. The people were formed into a line and their names called out, and the three in the bush cast lots. When all the names had been called out, the three Tongo-players came out of the bush and danced, the principal whirling his pole about. While dancing the three would rush up to a suspected person, and if the chief pointed his stick at him, he was instantly seized by the assistants, who passed a circular wooden hoop called a Gagba over his shoulders and led him away; if he was able to compound for his life, he was allowed to go beggared to the world. The players danced on, frightening some by approaching them; others were pointed at, but to others the chief player dealt blows with his Tongora, and lucky it was for the man who met a spike and was killed outright.

Those that were killed or wounded, or could not pay enough to buy their lives from the Gagba, were tied hands and feet, and, if the players were merciful or the man had been able to purchase that form of death, large stones were tied to him and he was drowned. Others were trussed to the horizontal pole and had palm oil poured over them, and then the bush was fired, and, as Chief Bunting Williams put it, "such native prisoner will be put in fire and well burned to ashes." Before the departure of the players the village was burned.

A Sergeant-Major of the Sierra Leone Police, who was a boy in Sherbro when the Tongo-players last visited it, told us that at some of the villages, when the people saw the Tongora set up and the medicine placed on it, many who were guilty of witchcraft or of leopard murders came forward and confessed. At one village eighty persons were taken and burnt, and at another he remembers seeing a pile of human bones and ashes four feet high.

"Tongo is," says Chief Bunting Williams, "a kind of society intended for good and evil purposes in olden times; hence a good chief does not permit them to play in his chiefdom, because the issue of it is bad; the playing and dancing is no offence whatever, but the powers that the master of the players

exercises with the influence of the chief in any paramount chieftdom is a bad one, and should not be allowed by any Court of Justice, because its movement is all like violent robbery, because after apprehending people they first extort every farthing from their pockets and plunder them. It is a most wicked society. So far as my experience goes there is no one they cast a lot upon which cannot be well tried and beaten with sticks, dragged, wounded. These few native explanations will, I expect, assist the Crown a bit."

West African Religions contain Remnants of older Religions.—Fetish worship, now confined to the southern coast, at one time extended far to the north of the Niger. At the present day, all over Guinea can be seen a succession of religions; on the coast the cannibal animistic, and fetish worshippers; further north in the hinterland there are survivals of an Astarte-like goddess-worship and the worship of ancestors, stocks, and stones, such as appear to have formed part of the worship of the Mali people, are to this day the representatives of the god of the Angass; and behind this pagan worship again is Mahommedanism. Thus the higher human type has always driven further south before it the lower, weaker, and more degraded negro races.

The natural religion of all the African tribes is naturalistic and animistic; that is, it rests not only on a firm belief in spirits and powers which, because they are capricious, must be wheedled, and because they are often hostile must be appeased, but also on a belief that the things around are living, not because they are the abode of spirits but because of their own inherent or self-powers. The animist does not think, and has little conception either of his own spirit, except that it is that in him which does things in his dreams, or of the relation of these unknown powers and spirits to his own spirit. He only knows they exist; but what he fears—and fear becomes his normal religious condition—is the physical harm they may bring upon his body or his property.

Animists generally are found to have a belief of varying intensity and effectiveness in a supreme being, creator and father of all, hardly yet clothed with individual attributes, and a belief in a future existence for the soul. They may hold these at present to very little purpose; by believing that the soul is immortal they live in perpetual fear of the existent spirits of an older generation.

Islamism has shown powers of adaptation, and has grafted itself on the animism of Africa. Throughout the Sierra Leone Protectorate Mahommedanism has made, and is steadily making, progress, acting distinctly for good, by putting down human sacrifice and replacing a fetish worship by a lofty monotheism. The faith of Islam with its polygamy and patriarchal form of government suits the people, and presents its truths in a form they understand;

but amongst the African peoples who have turned to Islam there is a curious mixture of Moslem and animistic belief.

Animism.—The Mendis have words for god (Ngewo), a devil or sprite; but they also use it in a higher sense, and as a name for the Creator. All the Mandi-speaking people—so Dr. O’Gorman, the Roman Catholic Bishop of Sierra Leone, informs me—have individualized the Creator; it is he who has made the world, themselves, and everything in it. They consider him good and beneficent, and give to him an attribute of aloofness; he does not now trouble much with the earth and its inhabitants, but he is an all-powerful individual. If his favour can be gained, he can do more than other devils, but he does not act direct; he tells some other devil to do it. He is abjured by an offering; at the same time the supplicant calls out: “Great God, come down; I give you a fowl.” He is also called upon in swearing by the formula, “Help of God,” which is a most solemn declaration, and only resorted to when all else fails; and a person is never sworn to death without calling on Ngewo.

The word for “the spirit” is Ngafa, Ngafei, whether abstract or materialized, for dream and visual reality are all the same to this people; indeed, to them this world is the dream, and the one beyond the reality. Ngafa means a spirit, which may be disembodied or, like Ngewo, was never joined to a body. The word for “shadow” (Ndendeli) is also used to signify “spirit.” Heaven they call Ngelegohu, and the land of the living is Ngelemahu; but the two words have peculiar meanings, which Dr. O’Gorman has explained to me as follows:—Ngelemahu is the sky which we see; the moon and the stars are in it. Beyond the stars, in the belly of the sky, are Ngewo and his associates in Ngelegohu. When Ngelegohu (in the belly, inside the clouds) was found, Ngelemahu (above the clouds) was lowered, and from the earth up is sometimes called Ngelemahu. The lower world is Ndou, and the shades, whose home it is, are the Ndou-bela. There are also words for the sun, moon, star, Orion, Southern Cross, Pleiades, and Venus, whom they call the jealous woman. The language contains few foreign words, and there is no gender. They count in scores, with a basis of ten. They have no abstract idea of property; “to have” with them is rendered “to be in the hand.”

The Mendi fables show that the ideas of God and the sky are both equally indefinite and indeterminate. He speaks of the father sky who rains down, fructifying the mother-earth, and of man, the animals, and plants as the products. The bush around him swarms with amorphous powers, of whose functions he has no idea, around which no myths have gathered. These incorporeal beings he classes comprehensively as “Hawa,” or “devils.” But some of these devils have more power than others, and if he gains the right side of them they may be induced to share it with him; some even have the

power of assuming human shape temporarily. All are malignant, and more or less evil, and if not appeased may do him bodily harm, or interfere with his wives or his chop (food); if he can gain their favour, he will acquire copper (money), and their aid will preserve him in immunity from the consequences of his evil actions. Freedom from bodily harm, wives, copper, and chop define the limits of the Mendi's perception. The devils can be destroyed by burning them and their abodes. If not fed by sacrifice, the devil eats man; he catches and kills him; and he also steals children. By living with devils man can turn into a devil.

A boy was once stolen by a devil. "The boy and the devil returned to the devil's town. The devil caught the boy, and put him in a house. He shut him in the house and night came, and the boy turned into a devil. They went into the bush and got medicine. Devil gave him medicine. He took it. They went to the road; people came. The devil caught a man; he killed him, he carried him. He gave him to his son; they arose; they came to their town; they cooked him. He gave to him, and he said, 'I will not eat.'" (Migeod's Mendi Grammar.)

An ever-increasing number of Temne are Mahomedans, but still the real objects of worship are the "Krifis" or spirits, upon whose good- or ill-will their happiness in this world depends. For these they care much more than for the supreme being, hence the many sacrifices they make to them. Any evil which may befall a person is attributed to the ill-will of the Krifi who have been offended or neglected, and must be appeased by sacrifice; while every good is attributed to the good-will of the Krifi, for which a sacrifice in thanksgiving must be rendered. The same belief is prevalent among the Angass of Nigeria, the Krifi being known as "Gigwel."

The Krifi or devils are good or evil, male or female, and their business is not only to take care of men, but of towns, farms, and houses. At the entrance to towns a small hut containing stones, bones, and skulls may be seen, which is dedicated to the Krifi, or tutelary spirit of the town, before whom they set food at certain times. The sacrifices consist of food, cooked rice, or of cakes.

The Temne has advanced from the belief in incorporeal beings with neither name nor shape, for he tells us that the Krifi can be seen by those possessed of second sight, but not by the ordinary individual, who represents them by stones taken from the graves of relatives which he keeps in his house, and calls "the dead ones." For them he cooks, and offers the product in sacrifice.

The immortal part of man is his shadow, but it is not a Krifi. The Krifis may be the deified spirits of their departed ancestors; if so, he rather fears than reveres them.

The Krifis are made by God, and are invisible, except to the gifted. They are lighter in complexion than the negroes, being like white men or brown men. They reside in the bush, and are called bush devils, and sometimes, before the sunrise, make a noise like striking a tin can. Sometimes they appear like a shine or reddish light, and they incarnate in a snake called "yaro," variously known as the magic, devil, or diamond snake, and they also visit people in the form of another person. They beat drums and dance in the daytime, but no man can see them.

Thus we see that the Temne is a higher type of being than either the Mendi or the Sherbro, who are still in that state which not only attributes a spirit or soul to animals and plants, but also to inanimate things such as stones, the rushing stream, the moving sea, from which, in his dreams, he brings forth deities or powers malevolent and jealous of disposition, ever ready to catch him or his property to work their mischievous will upon. The primitive mind associates life with motion, and looks on flowing water as an object of worship, and reverences it not merely as a living thing, but as the dwelling-place of spirits.

Besides the prevailing cults of animism and Islamism, we find in West Africa the various forms of ancestor-worship, to which is added fetishism, while magic, witchcraft, and ordeals reach their highest development. Ancestor-worship prevails as much in Africa as in China.

Ancestor-worship.—On the west coast the underlying idea seems to be that a man retains the same status in the after-life that he had held in the present. The kind of homage, therefore, paid to the ancestral spirits differs greatly according to circumstances. A deceased chief would still have great power in the land of the dead, but an ordinary person would receive only very ordinary treatment.

The African does not believe in death being the end of all things. He is a firm believer in continuity of existence, and to him the next world is much the same as this, only he wears a whiter shape and can do more—has more power. He will remember who he was and what he did in this world, and will not forget his friends and wives, relatives and children, on whom he will be dependent for food.

At death the spirit is expelled from the body forcibly, and wakes up in a dazed sort of way, and has a feeling of being "bushed," that is, having lost his way in the bush and being unable to find a way out. Gradually the perception becomes clearer, and in about three or four days the spirit finds the grave where the body has been deposited. To this it attaches itself, and expects to find offerings of food placed there by its surviving kin, with which it can appease its hunger after its long fast. It may wander afar, but it always

returns to the grave of its body to be refreshed by the offerings, and if it does not find them there it will exert its new power to injure those it left behind, and who, as pious men, should have ministered to the spirits of their ancestors.¹

The African fears the ghost or disembodied spirit of the recently dead, and appeases it with offerings and sacrifice. He does not fear much the bush spirits, but at the mention of the recently dead a strong man will tremble. The dead are never mentioned, and one of the original objects of mourning was to hide the living from the spirit of the dead, which is apt to be vindictive on its awakening to the realization of separation from earthly things. The living do not desire to be remembered by the dead: on the contrary, they pray that the disembodied spirit will speedily forget them; as a consequence the negro knows his parents and near relations who have passed beyond, and duly honours them, as they may still be attracted by earthly things; his grandfather he may or he may not know and give homage to, but all beyond lose their individuality, and are merged into the general body of spirits to whom he renders offerings as a whole. The dead man is still animated by the same passions, feelings, and fancies as in life; besides, their status and position have to be maintained in the next world. Consequently, if he was a man of power and revelled in blood in life, he would in shadeland clamour for blood and the ministry of others to maintain his social position. Hence the feasts of the dead, accompanied by the sacrifices of multitudes of human beings, as in Ashanti, Dahomey, and Benin, which were only surpassed by the same rites held by the Aztec monarch before the conquest of Mexico by the Spanish.

Human sacrifices have been practised by all the different sections of the Yoruba nation and other West African tribes, especially at periodical festivals and other great occasions; they were very common and abundant in Dahomey and Ashanti with their ancestor-worship. "The King of Dahomey is reported, as far back as 1664, to have built a royal dead-house, the mortar of which had been mixed with human blood. In Yoruba," says Bishop Johnston, a native, "the human victim, chosen for sacrifice, and who may be either a free-born or a slave, or a person of noble or wealthy parentage, or one of humble birth, is, after he has been chosen and marked fit for the purpose, called an Oluwo.

"He is always well fed and nourished and supplied with whatever he should desire during the period of his confinement. When the occasion arrives for him to be sacrificed and offered up, he is commonly led about and paraded through the streets of the town or city of the sovereign who would sacrifice him for the well-being of his government, and of every family and individual

¹ For the distinction between shadow, breath, ghosts, soul, and spirit see Dennett, *opus cit.*, pp. 79, *et seq.* The same ideas are to some extent shared by the Sierra Leone natives.

under it, in order that he might carry off the sin, guilt, misfortune, and death of all without exception. Ashes and chalk were employed to hide his identity by being freely thrown over his head, and his face painted with the latter, whilst individuals would often rush out of their houses to lay their hands upon him that they might thus transfer to him their sin, guilt, trouble, and death. This parading done, he is taken through a temporary sacred shed of palm and other tree-branches, especially of the former, the Igbody, and to its first division, where many persons may follow him, and through a second, where only the chiefs and other very important persons may escort and accompany him to, and to a third, where only the Babalawo and his official assistant, Ajigbona, are permitted to enter with him. Here, after he himself has given out or started his last song, which is taken up by the large assembly of people, who have been waiting to hear his last word or his last groan, his head is taken off, and his blood offered to the gods. The announcement of his last word or his last groan, heard and taken up by the people, is a signal for joy and thanksgiving, and for drum-beating and dancing as an expression of gratification that their sacrifice has been accepted, the divine wrath appeased, and the prospect of prosperity or increased prosperity assured.

“Human sacrifices are generally offered in Yoruba and in many other parts of Africa by sovereigns, especially when an expiation that is to be made is of a general character, and in the interests of their respective governments and peoples; and this is always in Yoruba, according to the specific prescription and after the instigation of priests, who, to reconcile them to the fearful and revolting deed, and prevent in them qualms of conscience over it, usually seek by their language to magnify before them their great power and the importance of their office, and impress them with the idea that no one would or could call them to account for this use which they would make of a fellow-man’s life.”¹

We have seen that amongst the Sherbros and other natives of Sierra Leone the object of the Leopard sacrifice is to obtain “one word.” Now, “one word” in the country means agreement, so the aspiration is towards unity. This they obtain through their secret societies, the Poro and the Bundu, which to them represent authority, organization, and obedience, three functions of state. We have seen that these societies have a social function, a teaching function, a religious function, and a political function. At the head of the Poro is the king, who has also the office of priest, and at the head of the Bundu is a priestess who is also a power in the land.

¹ “Yoruba Heathenism,” by Bishop James Johnston, quoted by Dennett, “At the Back of the Black Man’s Mind,” pp. 263 *et seq.*

Black Phylis's plea.—The black mind works on the principle of resemblances, and the black man regards everything as male or female. He says, as a woman's body is different from a man's, so a woman's morals must be different from his. Her intellectual and spiritual outlook he also regards as different, which he expresses by saying that is "woman palaver, and man no fit to understand that." It is the cleavage of the sex idea that Dennett¹ sets forth in his sixfold formula of genetic relations in the mind of the Bavili. The Bavili make a clear distinction between the superior and the inferior, the positive and negative, powers, the husband and wife ideas of opposites, so that any displacement of the social equilibrium is to the black man productive of causes, male and female, which, interacting on each other, produce a disturbance throwing male and female effects on opposite sides, as in a woman's palaver and man's palaver, the result of which is a product—namely, an agreement which is regarded as also male and female, from which is produced concord or unity.

To attain this unity the black mind casts about for something more or less desirable, of which it makes an immediate surrender, so that some greater good may be attained. This is the essence of sacrifice.

The sharing of a common substance as food, as illustrated by the cannibal feasts, unites those who partake of it in a common life, as all those taking part in the ceremony have in the most literal way absorbed part of the victim's life into themselves. Through this community of life is discovered an influence—namely, medicine—which will produce a revelation of those unmanifested amorphous powers, male and female, symbolized by the Borfimor, the sharing of the sacrifice with which will produce atonement, and therefore harmony. This notion of atonement and communion are in all primitive faiths bound up together, and the word "atonement" bears its original meaning on its face—at-one-ment, restitution, the bringing again into harmony. Such a ceremony expresses the establishment of a bond of common life between the worshippers and their god, whereby the worshippers can bring to themselves some of the power inherent in the god, which to the West African mind is manifested in the Borfimor. In other words, the Borfimor has become a fetish.

Fetish.—We have seen the process of making the fetish; but the human elements differ in various places in accordance with the object to be produced. The liver is the seat of valour; the ears the seat of wisdom; the eye the seat of power, influence; the heart and brain seats of cunning and other great qualities, notably courage, wisdom; the genitals, seat of production and fertility; the blood, the seat of life. Human fat has wonderful properties,

¹ *Opus cit.*, pp. 104 and 112.

sharpening the perception and the sight of the wearer, and proportionately diminishing the perceptions of those to whom it is opposed, until he who is wholly anointed with it may become invisible and carry out his will without fear of detection.

To the human constituents, which are often mixed with earth and ashes, the material part of fire, are added other magical elements obtained under peculiar circumstances and having peculiar properties. Some portion of a leopard, besides having the qualities pertaining to that particular part, give bravery by stealth, quickness; and strength is obtained from the elephant. Buck, especially the ears and eyes, give the power to see and hear without being seen, and to understand the cries of birds and animals; and similar ideas, including the power to see and strike in the dark, are associated with the snake—that most mystical of animals.

The elements are prepared in seclusion by persons who have been isolated for a greater or less length of time. During the preparations a definite ritual is observed and magical formulae are pronounced, often in a secret language. All this in the midst of a population who know the object to be attained, but have but the haziest and most superstitious regard for and belief in the means of obtaining it. The result is the engendering of a psychological atmosphere, one of the effects of which is the great reverence shown to and fear produced by the product, notwithstanding its contemptible exterior.

The medicine when made, be it *Nessi* or *Borfimor*, is, for convenience of carriage, packed into the horn of some animal—antelope, goat, or sheep generally, but it may be contained in a box, shell, nut, or piece of bamboo. In this form it becomes a symbol or “symbolic charm with sympathetic properties,” and its contents being pleasing to the powers, spirits, or devils, lures one which is satisfied to take up its residence there, so that when the *Borfimor* is worshipped the worship is paid to an intangible, nebulous, amorphous power or spirit resident therein, and the horn and its contents form a tangible link between the object of worship and the worshippers.

One of the essential things about a fetish is the necessity for its renewal. Fresh victims were sacrificed to renew the power of the *Borfimor*; and the skin of the forehead of each new victim was given to the leopard king with which to cover the *Borfimor*. Similarly, the ancient Aztec did not make his horrible sacrifices so much to placate his gods as rather to rejuvenate and keep them alive; and in both Mexico and West Africa, after the sacrifice, the victim was eaten in communion.

There would appear to be some connexion between the full moon and the Leopard murders, as the sacrifices are usually made about that time; and if this is so, the offer of the yellow woman has a peculiar significance, as *Albinos*

were by the ancient Mexicans offered to the moon. Women have great reverence for the moon, which affects their daily life, and once a month they say the moon is upon them.

Fangay or Shape-changing.—In one or other form the Human Leopard society exists in Liberia, the Gold Coast, and in the French Congo; and it may be taken that with slight modification all these customs extend from the Gambia to Calabar.

A belief in were-wolves and vampires seems to have stretched right across Africa. On the Nile, at Senaar in Nubia, wizards can transform themselves at night into hyaenas and hippopotami, which roam about seeking to destroy their enemies. Human hyaenas, called marafils, hold cannibal feasts in the bush, indicating their presence by fearful howlings, and at daylight assume again their human form. Similarly, in Aztec days in Mexico, benighted wayfarers were stricken with awe by the midnight roar of the transformed human jaguars.

There was a similarity in power and in the ritual of the Mexican priesthood to that of ancient Egypt; and one cannot help remarking the resemblance there is between the West African ritual and that of the ancient Egyptians and Aztecs. In Egypt as well as in West Africa "the fundamental idea was," as Professor Flinders Petrie has put it, "that the king was the priest of the land, and that all offerings (especially those for the dead) were made by him." In the entrance to the Poro there is a resemblance to the oldest form of Egyptian shrine, while the dancing of the Leopard men with the ark or shrine reminds one somewhat of the procession of the Egyptian priests with the ark of the god. And again, the worship of animals as implied in the shape-changing and the animal societies is hardly totemism, in which is implied a brotherhood between the tribe and the animal. In West Africa, as in Egypt, we find that the venerated animals are revered on account of special qualities which the worshippers believe transferable to themselves.

By witchcraft a person in West Africa may turn himself into a leopard, or into an alligator, in order to hunt others in a secret manner. The natives say such persons come by night to the house of another, rub against the door, imitate the voice of some person, pretending to have something to say to the person in the house, but when the person opens the door it is a leopard which kills him. Men have been burnt for doing such things. They tie the hands and feet of such a man together, thrust a stick through them, and, suspending him over a fire, burn him to death.

The term "Fangay" is used for this and other similar institutions. Dr. Burrows tells me that the members professing this power to turn themselves into snakes, birds, monkeys, or any other state of lower life, form themselves

into a club to terrorize a community into secrecy regarding their particular villainy. The members are generally the bad characters of the neighbourhood. They announce that they have power to enter a person's body and devour his entrails or else suck his blood and make him dry up. An unhealthy season, when fever and dysentery are prevalent, gives these vampires an excellent opportunity of putting their supposed powers into force. They search for an adult or child suffering from fever or dysentery and by underhand means make it known that one of their members has entered the victim's body as a worm or a bat and is thus sapping the blood or "melting the bowels." The natives, already superstitious to a degree, only too readily believe the story. A confederate comes in and for a handsome "dash" (present) "pulls the medicine" and professes to cure the sufferer and sometimes does so probably by means of quinine or chlorodyne. This is a common practice in Freetown.

Totemism.—There is another relic of totemism among the Mendi, some of the people claiming to belong to the bird family, and these will not eat eggs or fowls; others are of the monkey family, and will not eat or kill monkeys; there are also fish and leopard families. There are family and individual tabus which are mostly animal, but some are vegetable; thus the family of a chieftain at Bo may not eat yams, and at Moyamba a woman may not look at a leopard till its claws and head have been taken off.

Litholatry.—It is common to swear people on stones, which, although sacred, are not removed but left embedded in the ground. The most powerful fetish in the Mendi country is the far-famed Bandahau stone. Situated in a small chieftaincy at Bo, it is visited from far and wide, and its power is considered so great and potent that when a chief finds it impossible otherwise to settle a palaver he announces that he will swear the people on the Bandahau stone. As a rule, nothing more is heard of the matter. This stone came by its reputation through a woman, whose crops had suffered much from the browsing of deer, noticing one day that it appeared hotter than the rest; so she swore the deer on it, and next day they were found lying dead in the field. Its fame at once spread, and offerings were made to it, and it is still fed by people it kills; for amongst these people, so powerful is the influence of suggestion and of the mind over the body, that it brings about its own weird.

Amongst the Sherbro great faith is placed in ancient steatite images, called nomaloes or numori, which are dug up from time to time. Most families have one, and they place it under a palm-leaf hut in the field to watch over the crop. If the crop is good, the women make offerings to it; if it is bad, they abuse, revile, and beat the image. A family will not part with one of these images; but they do not mind its being stolen if one has the pluck to do so.

In Northern Nigeria, the Angass, according to Captain Foulke, have a household god which they name Kum, who is symbolized by an upright slab of stone called "hukh," which is erected before the door of each hut. Kum lives in this stone; and he gets a portion of everything the man himself gets. If the man goes to live elsewhere, he makes a mixture of flour, puts it inside a pot, and attracts the spirit from the stone into it, and thus he carries Kum with him. Every man has a Kum by which he swears. The king's Kum is called Tau; and this is also the Kum of the town. The Angass make sacrifices of fowls, food, and the first of the new corn ground to meal to their Kums.

Symbolism.—The egg is also a common symbol; and we have already seen that the bundu bush is planned in the form of an egg. Fowls' eggs are tabu to certain families. The egg as a symbol is as old as the human race, and signifies birth and nutrition, the mysterious beginning of life, the womb of man, the Abode, the Place, the House, the Kingdom of Life, and hence the symbol of Life and Life Eternal. As the emblem of the Universal Mother, it was the sign of Isis, Istar, Astarte, Venus and Aphrodite, the Beginning and the End. Owing to the mysterious development of the life-germ within the egg and its form, it became a symbol typifying regeneration and re-incarnation.

The idea of re-incarnation is curiously illustrated by a custom amongst the Jollah. When a man dies, his brother's wives are called together; squatting, one takes the head of the corpse in her lap, and another the feet; if there are any more wives, they squat behind, with their arms round the waists of the women holding the corpse, and, if possible, they should each touch it. The deceased's brother then rolls an egg along the ground round his squatting wives; and it is believed that one of the women conceives of the spirit of the deceased, which is re-incarnated in her child.

The egg is the vehicle of life, and as such is associated with the ark and the crescent moon; the boat of the heavens, which is the sign of the Virgin Mother goddess, Isis sometimes being represented with the horned moon at her feet. Amongst the natives a common ornament, sometimes used to contain powder or medicine, is two horns, mostly those of cattle or goats, joined together at the base with leather in the shape of the crescent moon, like the Cretan "Horns of Consecration."

It is a far cry from Scandinavia to West Africa. Still there seems to be a connecting link in the double-headed snake used in West African medicine being found sculptured on pottery of the latter Bronze Age in the Museum at Copenhagen, and apparently intended as a sun-symbol. But this is not the only sign of serpent-worship; signs are numerous everywhere, but hard

to follow. The bush native conceives a connexion between the lungs and an ant-hill, which, when broken or cut in sections, shows a number of holes and passages. In old ant-hills certain snakes come to live, and their presence is discoverable by a hole. In and around this hole the native pours rice-flour, of which snakes are said to be very fond, as an offering; and in the native's mind the snake in the ant-hill is associated with the breath of life in the lungs. Tame snakes can be found in many villages; and the natives believe that no snake will bite a man who lives up to the requirements of his Poro, and pays due reverence to the shades of his ancestors.

The association of the serpent with the tree is almost universal; and there appears to be some remote connexion here, as the serpent is associated with the Poro. In the whole range of symbolism no emblem occurs more frequently than the Branch or Tree, and in the 'Tree of Life' it is associated with the Cross as a symbol of regeneration and of Life active.

Among the things found in the Borfimor bag before mentioned were two tau-shaped crosses, with a cowrie, or sign of life, bound to the top. The tau cross, or *crux ansata*, was the emblem of Osiris, and is called the Sign of Life, the symbol of resuscitation and new birth, expressive of the idea entertained by the Egyptians and other philosophers, that nothing created was annihilated, and that to cease to be was only to assume another form, dissolution being merely the passage to reproduction. In its association with the Borfimor we seem to have the reflection of some such ideas, the fetish being animated by the indwelling life of the victim and the spirit attracted to it.

Amongst the Ashantis the swastika is in use, but whether as a sun-symbol or not does not appear clear; another form of the swastika is found further along the coast.

The sign of the Poro is the inverted Y formed in keloids down the spine between the shoulders and branching off towards the ribs: a similar sign may be seen on the backs of girls, and a St. Andrew's cross-shaped star, probably a form of the swastika, is another of the Bundu marks (vide Plate II.). The Y is the symbol of the branch or tree representing resurrection, new birth, new life as typified by the ceremony of initiation into the life of the tribe performed in the Poro. It is also a form of the cross; and as a modification of the swastika it is found in Denmark as a sun and fire symbol. The stars cicatrized on the stomach in the outline of a human figure are supposed to represent the vital spots of the human body (vide Plate II.). Inverted as we find it in the Poro, the Y is an emblem of Trinity, and may have some relation to the threefold function of the Poro as the place where laws are made and the power behind them, the educational and religious function as typified by the teaching of the young, and their preparation for the ritual of initiation; and

lastly, the social bond which regulates the intercourse of life. In this connexion the three pieces of split cane tied with the three cords of different colours, also found in the Borfirnor bag, may have some significance, and there seems to be an idea that it is symbolical of generation, life-growing and inherent.

The trident is a sign of the Trinity; it is also one of the signs of Siva; and on the West Coast of Africa a trident-shaped spear is the badge of office of a chief's prime minister or chief man, his treasurer and man of business, and by him carried before the chief as a symbol of his power, and forms part of the chief's regalia.

The outline of the Poro bush is said to represent a tree somewhat in the form of a genealogical tree; and the Bundu bush takes this shape enclosed in an oval. The shape may be accidental or intentional; but it is curious that the various lodges are not approached direct from the entrance or placed on either side of it, but that from the entrance one broad path penetrates the bush, and from it, as it proceeds, are cut the paths to the lodges, thus forming the outline of a tree, and one is tempted to see in this shape a fragment of a forgotten knowledge. The tree is a sacred emblem all the world over, and is regarded as the residence of a beneficent goddess. In Egypt it was associated with Hathor, a tree-goddess who dwelt in the sycamore tree and represented abundance, and hence the female principle, the Divine Mother who gave life, and presided over life, and is identified with Isis. In Babylon the tree was connected with Ea, the god of the deep; and it is significant that one of the meanings of the Y is water. This symbol is often tattooed on the foreheads of Albanian women; and it is one of the Hindu caste-marks. The holding of meetings under a tree is world-wide, and has a religious significance. On the Congo all important and legislative meetings are held under the shade of a tree; and in West Africa the Poro meetings and those connected with the sacrifices were often held under a tree.

On the Gambia, amongst the Bassari and the Jollah, or Feloops, who are also called the Ajamati, a tree is identified with the life of each individual. The Jollah worships his tree and makes a smooth place round its roots; on it and into its crevices he puts and hides things. A similar idea exists all along the coast to Nigeria, where the pagans call the big tree their life, and say that when any of them die, even in a far country, their spirit returns to the big tree.

The Great Mother.—The Niger Company's MSS. say that in early times a pagan goddess who had many names—amongst them Gonkie and Shemsusu—lived on the walled hill of Dalla, now Kano Town. The chief of the people

inherited the customs of Dalla, and this mystic inheritance made him the high priest as well as chief. To this goddess were sacrificed twice a year black animals, which sacrifice is still carried on. During the rites the people divested themselves of clothing. Astarte was worshipped so within the walls of Mecca; and the customs of Dalla reveal great similarity to the worship of the Great Mother in Crete, Asia Minor, Sinai, Egypt, and North Africa.



Fig. 1

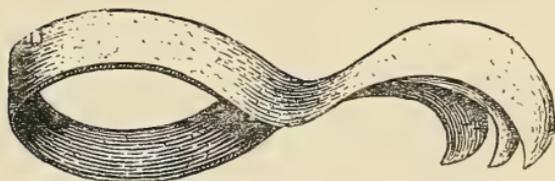


Fig. 2

LEOPARD-KNIVES.—From a sketch by Dr. Burrows

DESCRIPTION OF PLATES.

PLATE I.

Bundu girls with whitened faces, and dressed in the ceremonial dress of bell-caps, nets, grass, and other ornaments, ready for the usual parade about the town after leaving the Bundu bush on completion of the course (vide p. 41).

PLATE II.

Figs. 1-2.—Woman showing Bundu marks (vide p. 41).

Fig. 3.—A Tinga-Tanga, with bones of the leopard-victim, whose sacrifice is described at p. 49.

PLATE III.

Borfinor bag (vide pp. 52-3, 62-3, 67) and lasimois, or charm, of hoof and hide of cow, looked upon as a very powerful medicine.



BERRY.—THE SIERRA LEONE CANNIBALS.



Fig. 1.



Fig. 2.

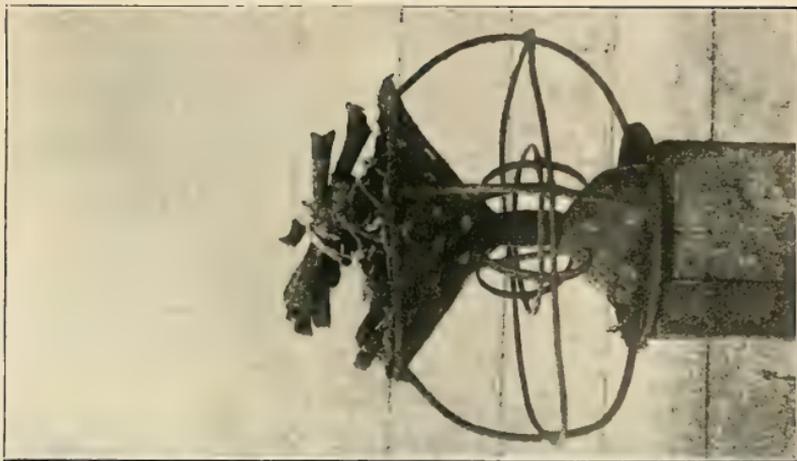
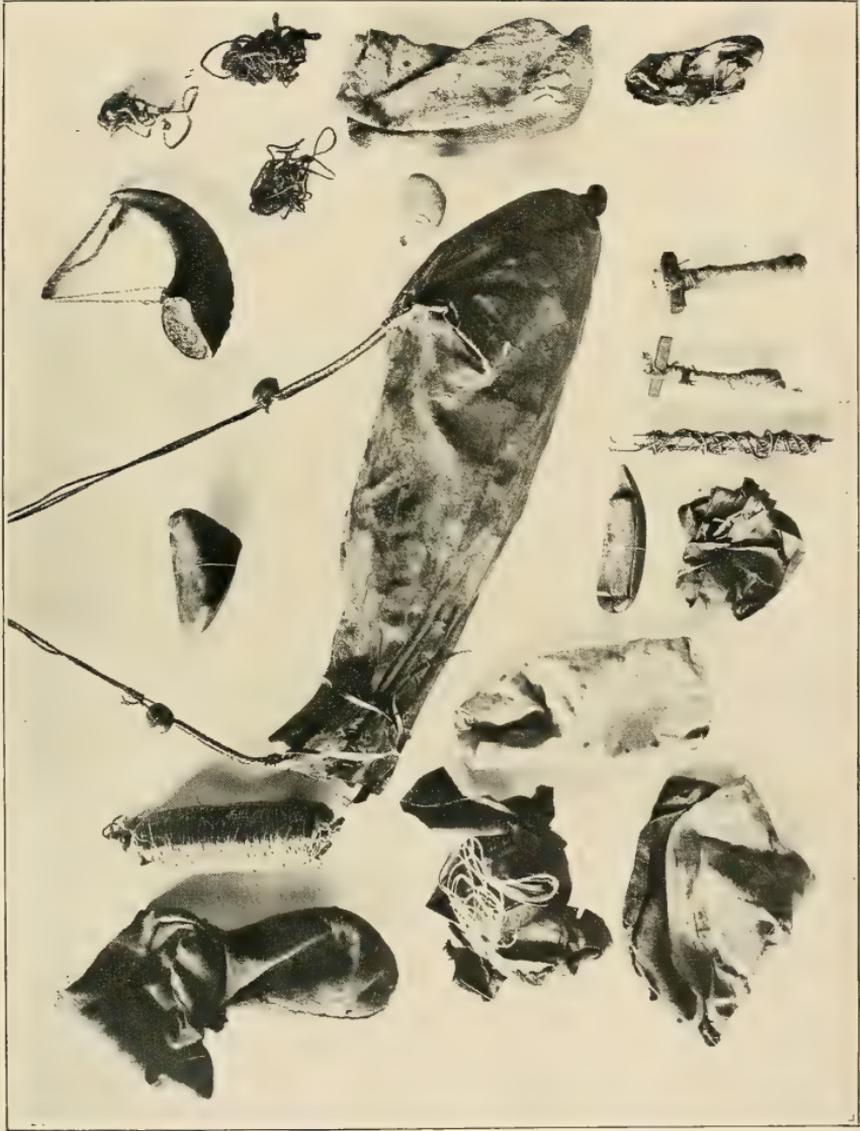


Fig. 3.

BERRY.—THE SIERRA LEONE CANNIBALS.



BERRY.—THE SIERRA LEONE CANNIBALS.

III.

LIST OF ALL PAMPHLETS, BOOKS, &c., PRINTED IN CORK
DURING THE SEVENTEENTH CENTURY.

By E. R. McCLINTOCK DIX.

[Read APRIL 22. Published JUNE 3, 1912.]

IN submitting to the Academy the following list of Cork printing in the seventeenth century, I desire to preface it with some observations.

The list contains a brief collation of every item of printing extant, or known to have existed from reprints, or stated to have been printed in Cork by such authorities as Ware and Cotton, or other authorities equally good.

Outside Dublin there was little printing in the seventeenth century in Ireland. There was printing in Belfast during the last few years of the century. All that is known on that subject appears in the list of "Belfast-printed" books and the two or three supplements to it published by the late Mr. John Anderson.

In Waterford and in Kilkenny there was a good deal of printing for a short period in the seventeenth century—namely, during the time of the Catholic Confederation and the two or three years immediately succeeding it.

In Cork, however, printing during this century was small and, as appears by the following list, consisted, so far as is at present known, of forty items, spread over fifty-six years of the century. There was, no doubt, much more printing than that, which has perished, but more may yet come to light.

The object of the following list is to put on record in chronological order all that is at present known of the output of the Cork presses of that period. It will be seen at a glance that the chief activity of those presses was in the years 1648-50, with occasional items after that, until the end of the century.

Nearly all the items in the list are rare, and some copies are unique. No copy of the first item exists, nor is it known who the printer of it was.

Items 2 to 14 represent printing done in Cork by the Royalist party. With the exception of item 9, no printer's name appears in any of these items.

The Cromwellian party obtained possession of Cork about the month of October, 1649. Items 15 to 29 represent the output of the Cork presses under their rule. The earlier items of this period are also without a printer's name. In fact, the only one in this group of items that has a name at all is No. 29, the printer being "William Smith." Undoubtedly items 27 and 28 would appear to have been printed at the same press when one compares the type, etc., of the three items.

Smith also is given as the printer of items 30, 31, and 34, and items 32 and 39 bear a strong resemblance to his printing, and his name appears on the imprint of item 36.

It is unnecessary perhaps to deal further with the list, which explains itself and is published merely with the view that the information contained therein may be on record.

Apart from the political and religious items, there are none of special interest, except No. 36.

LIST OF BOOKS, &c.

1644.

1. "A Sermon preached at the Funeral of Richard Boyle, Archbishop of Tuam." The Revd. Edward Worth, D.D., Dean of Cork. 4to.

[*Vide* Cotton's "Fasti," I., 240; and Harris's "Ware's Writers" (1764), etc., p. 159.]

1648,

2. "The Declaration of the Protestant Army in the Province of Mounster *Vnder the Command of the Right Honourable the Lord Baron of Inchiquine Lord President of Mounster, with two severall precedent addresses to the Parliament for our speedy reliefe or transportations.*"

"Printed at Cork, in the yeare of Our Lord God, 1648."

Dated *April*, 1648.

Royal Arms on t. p. 4to. t. p. × 14 pp. × 3 pp. (blank, unnumbered). Sigs. A—A 4; B—B 2; and B—B 4.

[E. R. McC. Dix.]

1648.

3. "The Answer of the Committee Of Estates of Parliament of Scotland To the desires sent to them from the Lord Inchiquin."

Dated 28 *June*, 1648.

"Printed at Corck, in the yeare 1648, and are to be sold at Roches building."

Royal Arms on t. p. 4to; 2 leaves, unnumbered.

[E. R. McC. Dix.]

THE ANSWER
OF THE COMMITTEE
Of Estates of Parliament
OF SCOTLAND
To the desires sent to them from the
LORD INCHQUIN.



Printed at Corck, in the yeare 1648. and are
to be sold at Roches building.

FIG. 1.—Title-page of item 3, p. 72.

1648.

4. "A Declaration of the Lord Lieutenant Generall of Ireland" [Ormonde].
Dated *October 6, 1648.*

"Printed at Corck, in the year 1648, and are to be sold at Roches building."

4to. 8 pp.

[University Library, Cambridge, / Hib. 5. 648. 1, &c.,—3 copies; British Museum (Ireland), 1325. F. 9.]

1648.

5. "A Declaration of the Lord Lieutenant Generall of Ireland for settling the Protestant Religion, maintaining his Majesties Iust Rights, and the Privileges of Parliament."

[Novr. 23rd or 27th?]

[*Vide* London reprints in British Museum, E. 473 (25); and Christ Church College (Oxford).]

1648.

6. "A Message from His Highness the Prince of Wales, delivered to the Rt. Honble. the Lord Baron of Inchiquin, in a Councell of War at Corecke, Nov. 28th, 1648. By Richard Fanshaw, Esq."

"Printed at Corck, in the year 1648, and are to be sold at Roches building."

4to. 12 pp.

[University Library, Cambridge, / Hib. 7. 648. 14, &c.—2 copies.]

1648.

7. "A Speech made by the Lord Lieutenant Generall of the Kingdom of Ireland, to the General Assembly of the Confederate Catholiques at the City of Kilkenny, at the conclusion of the Peace."

"Printed at Corcke, and are to be sold at Roche's building, without South Gate."

Broadside, plain type, in two columns.

[Bodleian (MS. Carte 151, appendix, fol. 19.); Cashel Diocesan Library.]

1648.

8. "Some Observations upon the Late Articles of Cessation with the Irish, or, *A briefe and plaine Survey of the grounds and reasons thereof; By a Well-wisher to Truth and unity.*"

"Printed in Cork, in the yeare of our Lord God, 1648. And are to be sold at the Printhouse at Roche's building."

Royal Arms on t. p. 4to.; T. 1. + 9 pp. + 1 p. (blank) T. 1.—Sig. A—A
2, B—B 2.

[E. R. McC. Dix.]

NOTE:—Extract from above; “It is the modesty of our ingenious Printer that he hath not (in this little interval) been scattering some loose sheets, to amuse the greedy Inquisitors of the times with, since his ready Engine, the Presse, began its motion in this Sphere. Wee expected ere this a *Mercurious Hibernicus*, or some bellowing noyse of a defeat given *Owen-roes Creaghts*, should have been ushered in a weekely tribute of two pences, towards the support and encouragement of our honest Artist; but time having not yet afforded seed or maturity for such a birth; it will conduce equally to our purpose, if we make the subject of most men’s (and too many women’s) discourse the Argument of raising a little advantage to the Printer, with a designe of no disprofit to the Reader.”

There are two other allusions in the same Tract to the Press. The author of the Tract invites his opponent to reply to him through the Press. He also refers to “two letters” that he had heard were in the Press.

1649.

9. “Eikon Basilike. The Portraicture of His Sacred Majesty in His Solitudes and Sufferings.”

(*Peter de Piennes.*)

12mo. 320 pp.

[Robert Day; and University Library, Cambridge.]

1649.

10. “Articles of Peace made, concluded, accorded and agreed upon, by and between His Excellency James Lord Marques of Ormonde, Lord Lieutenant Generall, and General Governor of His Majesties Kingdome of Ireland; for and on behalfe of His most Excellent Majesty, by virtue of the authority wherewith the said Lord Lieutenant is entrusted on the one part, and the Generall Assembly of the Roman Catholiques of the said Kingdome for and on behalfe of His Majesties Roman Catholique Subjects of the same on the other part.”

Dated 17th *January*, 1648 (9).

“Printed at Corcke, and are to be sold at Roches building, 1648.”

4to. 33 pp. + 1 p. (blank).

[Royal Irish Academy, “Halliday Tracts,” box 56, 1; British Museum, C, 38, c. 4.]

1649.

11. “A Continuation of the Narrative of the last and final dayes proceeding of the High Court of injustice sitting in Westminster Hall, on Saturday, Jan. 27, concerning the triall of the King; with severall speeches of the King, Lord President, and Solicitor Generall; together with a copy of the sentence of Death upon Charles Stuart, King of England; also the King’s last Speech made upon the Scaffold at Whitehall gate, immediately before

his execution, on Tuesday the 30th. of Jan. 1648 [49]; with a relation of the manner of his going to execution."

"Printed at London by Peter Cole, and reprinted at Corck, and are to be sold at Roches building, 1648."

4to. 20 pp. 7½ inches.

[Bibliotheca Lindesiana, Catalogue, Col. 1643.]

1649.

12. "The Declaration of His Excellency the Lord Marquis of Ormond Lord Deputy of Ireland and General of all the Forces in that Kingdome for the King. Together with the Lord Inchiqueen and all the rest of the Kingdome; concerning the Death of His Sacred Majestie who was Murdered at Whitehall, the 30. of January; By an Usurped Power of the Commons of England, as they call themselves.

Dated 20. *Febry*.

[Tide London reprint in British Museum, Thomason Tracts, E. 543/13: and in University Library, Cambridge, /Hib. 7. 648. 20.]

1649.

13 & 14. "The Propositions of Owen Roe O'NEILE sent to Col. Monck And a Cessation for three months concluded between them: together with a letter thereupon sent by a gentleman at Dundalk to his friend at Corck."

[May 20th.]

"Printed at Corck in the year of our Lord God, 1649. Are to be sold at Roche's building."

4to. 4 leaves unpagéd.

[British Museum, 2 copies, /E. 531 (15), and E. 562 (15).]

Two different issues or editions; see note below.

N.B.—The copies differ in arrangement and style of type of their title-pages, and in the ornamental designs occurring in the same pages. The texts are verbally similar, but the word "Monck" in one is printed "Moncke" in the other; and "Ormond" as "Ormonde." The type is not set alike in both. In other words, one is a copy but not a facsimile of the other.

1649.

15. "The Remonstrance and Resolutions of the Protestant Army of Munster now in Corke."

Dated *Oct. 23*, 1649.

"Printed at Corecke, in the yeare of our Lord God, 1649."

4to 8 pp.

[University Library, Cambridge, Hib. 7, 649, 26.]

1649.

16. "Proclamation by Oliver Cromwell, Lord Lieutenant General of Ireland, against wasting Wheate or Barley, or behaving outrageously towards the Inhabitants by killing their Sheepe and Cattle, &c."

Dated 8. *Dec.*, 1649.

"Printed at Corcke."

A broadside. 7 + 7.

[John Elliott Hodkin, vide his "Rariora" p. 35.]

1649.

17. "The Irish Monthly Mercury."

(No. 1, 21 *Decr.*, 1649.)

[*Vide* London reprints in British Museum (2 copies), E. 592 (6), etc.]

[1650 ?]

18. "A brief Character of Ireland."

[*Vide* London Edition (1692) in British Museum/T. 1835 (3).]

N.B.—At end of 'London' Edition it says: "Ended the 21st December, 1649. Printed at Corke."

1650.

19. "The Irish Mercury Monthly, communicating all true Intelligence within the Dominion of Ireland." 2nd No.

(*Jan.* 25—*Febry.* 25.)

[*Vide* London reprints in British Museum, Burney 34; and Worcester College Library (Oxford).]

1650.

20. "Certaine Acts and Declarations made by the Ecclesiasticall Congregation of Archbishops, Bishops, and other Prelates met at Clonmacnoise, the 4 day of December, 1649. Together with a Declaration of the Lord Lieutenant of Ireland, for the undeceiving of deluded and seduced people, which may be satisfactory to all that do not wilfully shut their eyes against the light. In Answer to Certaine Declarations and Acts framed by the Irish Popish Prelates and Clergy in a late Conventicle, etc."

"Printed at Cork the 25 of *February*, 1649" [1650].

[*Vide* Dublin reprint in King's Inns Library N. 10, 7a.]

1650.

21. "Declaration of the Lord Lieutenant of Ireland For the undeceiving of deluded and seduced People which may be satisfactory to all that doe not wilfully shut their eyes against the light. In Answer to certaine late

Declarations and Acts framed by the Irish Popish Prelates and Clergy in a Conventicle at Clonmac-Noise. Licensed by the Secretary of the Army."

N.B.—There is no date to the Declaration, but it was after 4 Decr., 1649. The London reprint has "21 March, 1650" in the imprint. Is this 1651?

[*See* London reprints in Royal Irish Academy "*Halliday Tracts*" 64, 5; Corpus Christi and Worcester Colleges (Oxford); and British Museum, E. 596 (6).]

N.B.—This Declaration commences: "Having lately perused a Book printed at Kilkenny In the year 1649, containing divers Declarations and Acts of the Popish Prelates and Clergy framed in a late Conventicle at Clonmacnoise, the 4th day of December, in the year aforesaid, I thought fit to give a brief Answer to the same." This Kilkenny book is the same as last item, and of which there is also a London reprint in the British Museum, E. 534 (5).

1650.

22. "A True Relation of Mr. John Cook's Passage by sea from Wexford to Kinsale, in that great Storm, January 5. Wherein is Related the Strangeness of the Storm, and the Frame of his Spirit in it. Also the Vision that he saw in his sleep, and how it was Revealed that he should be preserved, which came to pass very miraculously. Likewise a Relation of a Dream of a Protestant Lady in Poland, which is in part come to pass, the Remainder being to begin this year, 1650. All written by Himself."

"Printed at Cork."

[*See* London reprints in British Museum, E. 588, 1; Bodleian and Worcester College (Oxford).]

1650.

23. "Mrs. Frances Cooke's Meditations; being an humble thanksgiving to her Heavenly Father for granting her a new life, having concluded herself dead . . . on that great storm, Jan. 5, 1649." (With a hymn on the same occasion.)

[*See* London reprint in the British Museum, E. 600 (9).]

1650.

24. "A Declaration and Proclamation of the Deputy General of Ireland concerning The present hand of God in the Visitation of the Plague: And for the Exercise of Fasting and Prayer in relation thereunto."

Dated 30 July.

[*See* London reprints in Royal Irish Academy "*Halliday Tracts*," 64, 1; British Museum, E. 612 (3); Merton College (Oxford); and Dublin Municipal Library.]

1650.

25. "A Letter from the Lord General Cromwell To the Parliament of England, concerning his proceedings with their Army in Scotland, and the late victory God hath given them over the Scottish Army there: Together

with An Act of Parliament for publique Thanksgiving in England thereupon : and a Proclamation of the Deputy General of Ireland for a further day of Publique Thanksgiving in relation to the same throughout Ireland. On Thursday [? Tuesday], the *seventh* of *November* in the present year, 1650."

"Printed at Corcke."

4to. 12 leaves, unpag'd, Sigs. A-C—in fours.

[St. John's College (Oxford) ; British Museum, / 9512 aa. ; and Advocates' Library, Edinburgh.]

[1653 or 4?]

26. "Scripture Evidence for baptizing the Children of Covenanters. In 2 Sermons." The Revd. Edward Worth, D.D., Dean of Cork.

"Printed for T. Taylor, Widow, and are to be sold at her Shop in Cork."

4to. 148 pp.

[Worth Library at Madame Steevens' Hospital, Dublin ; and Marsh's Library, Dublin, / Cashel Loan Collection.

Also vide :—Irish Librarian, Vol. IV., p. 271 (in National Library) ; Cotton's "Fasti," i. 240 ; Harris's "Ware's Writers," p. 159 (1746) ; and Lowndes, p. 2996.]

NOTE :—The Sermons were preached in April and June, 1653. No other date appears.

QUERY :—Printed in *Waterford* ?

[1656?]

27. A Ballad "Complaint of South Suburbs of Corcke." (*W. Smith* ?)

4to.

[Marsh's Library, Dublin, / Cashel Loan Collection.]

[1656?]

28. A Ballad "Preparation for Pacification" of Suburbs, &c. (*W. Smith* ?)

4to.

[Marsh's Library, Dublin, / Cashel Loan Collection.]

1656/7.

March 10th. "Understand there is a Presse in that City [Cork]. The Mayor to give an account of it."

[*Vide* Correspondence of Council of State, No. 28, in 15th Report, p. 248.]

1657.

29. "The Agreement and Resolution of Severall Associated Ministers in the County of Corke For the Ordaining of Ministers."

"Printed by *William Smith* for Richard Plummer, and are to be sold at his house in Corcke, 1657."

4to. Sigs. A to E in twos and one leaf. T. 1 + 2 - 22 pp. + 1 leaf.

[British Museum (Co. Cork), T. 759 (5) ; Queen's College (Oxford) ; M. Darcy, Dublin ; E. R. McC. Dix ; Assembly's College, Belfast ; University Library, Cambridge ; Bradshaw.]

R.I.A. PROC., VOL. XXX., SECT. C.

[11]

1660.

30. "History of Charles II. James Davies." (*Wm. Smith.*)
[Authority:—H. R. Plomer.]

1662.

31. "A Sermon preached on the Sunday before Easter, 1661, being the day on which among severall others I received the Holy Orders of Priest-hood from the hands of the Right Reverend Father in God, Michael Lord Bishop of Cork, Cloyne, Rosse; one of his Majesties most Honourable Privy Councill, In the Church of St. Finbarry, the Cathedrall of the Dioces of Corke: By John Butler, Preacher of God's Word at Inishonane in the Diocese of Corke."

(Printed at Corke by *William Smith.*)

4to. Two leaves (Title and Dedication) + 14 pp. (Much cropped at top.)

$5\frac{3}{8} \times 6\frac{7}{8}$.

[R. R. Belsaw (of Dublin).]

1664.

32. "Inquisitio in Fidem Christianorum Hujus Seculi." Roger Boyle, Dean of Cork.

"Corcagiae, 1664."

12mo. 2 leaves + 60 pp. + 1 leaf (blank) + paper cover ($5\frac{1}{2} \times 3\frac{1}{4}$).

[Marsh's Library, Dublin, Cashel Loan Collection,—XI. 69; Ames Collection (463. h. 4. 3184).

Also vide Madden, i., p. 158, and ii. 165; and Cotton's "Typographical Gazetteer," First Series, p. 71.]

1675.

33. "The Moderate Cavalier Or The Soldier's Description of Ireland And of the Country Disease, with Receipts for the same . . . A Book fit for all Protestant Houses in Ireland."

4to. 36 pp.

[British Museum, / 11631 bb. 44.

See also Prendergast's "Cromwellian Settlement." Second Edition (1875), p. 196 (foot-note).]

N.B.:—The place of printing or the name of the printer is not stated. The type is not very good: it closely resembles that of William Smith. The top of the second page contains this dedication: "To the Protestant Nobility, Gentry, and Soldiery of Ireland, but more especially to the worshipfull the Major, Aldermen, Sheriffs, Citizens, and Inhabitants of Corke." And towards the bottom of the same page the following incoherent sentence occurs: "The Author upon his intent to have presented three dozen of these books to the Major of Corke and his guests and his feast when he first comes into his office." The copy in the British Museum is bound and endorsed: "Soldier's description of Ireland, Corke, 1675." Captain Mercer was likely the author of this peculiar work.—(J. B.)

1679.

34. "Strange and Remarkable *Prophecies and Predictions* of the Holy Learned and Excellent Iames Usher, *Late Arch-Bishop of Armagh* and Lord

Primate of *Ireland*, Giving an Account of his foretelling I. The Rebellion in *Ireland* Forty Years before it came to pass. &c., &c."

(Printed by *William Smith*.)

4to. 8 pp. (folds in twos or folio-wise).

[National Library, / Thorpe Collection, Vol. VI.]

N.B. :—Much cropped.

QUERY :—A Folio ?

1681.

35. "Poems for Church Festivals." Roger Boyle, Earl of Orrery.
Folio.

[T.C.D. / D.e. 15 (imperfect, wants pp. 6-9); British Museum, / 11626, g. 3; University Library, Cambridge.]

NOTE.—The body of this work (pp. 2 to 80) was printed in Cork (by *W. Smith*), judging from the type and ornaments; the title-page and preface (3 leaves) are London-printed.

Authority : W. C. Hazlitt.

[1690 ?]

36. "A Chronological Table of the Pedigree and lineall Descent from Adam of the Right Honourable Justin¹ Lord Viscount Mountcashell, Ld. Barron of Castle Hinchy, Lievt. Generall of his Majesties Army, Lord Lievt. of the County of Corke, Governour of the Province of Munster, Master Generall of the Ordinance, and one of his Majesties Most Honoble Privy Councill." Dermot McCarthy.

(*William Smith*).

16mo. 5 pp. (unnumbered) + 49 pp. + 2 leaves (unnumbered).

Folds in fours.

[The Dublin Municipal Library, late Sir John Gilbert's.]

1691.

37. "Pastoral Admonishment directed by the Bishop of Cork [Wetenhall] to all under his charge. Whereunto is added a Sermon (on Psalm lxxvi. 19) reflecting on the late Sufferings and Deliverance of the Protestants in the said County and City. Preached at White-Hall on the Fourth Sunday in Lent, March 22, 1690."

("Printed by *John Brent* for David Jones, Bookseller, and are to be sold in his Shop in Cork, 1691.")

8vo. Title leaf + 16 pp.

[British Museum, 689 h, 26 (2).]

1691.

38. "A Sermon Preached at Whitehall. Before the Queen, on the Fourth Sunday in Lent, March 22, 1690. Reflecting on the late Sufferings and

¹ McCarthy.

Deliverance of the Protestants in the City and County of Corke. Published for the sake of those concerned in it, who could not hear, yet may edify by it. By Edward, Lord Bishop of Corke and Ross" [Wetenhall].

("Cork, Printed by *John Brent*, for David Jones, Bookseller; and are to be sold at his Shop in Cork, 1691.")

8vo. Title leaf + 34 pp.

[British Museum—bound with foregoing item; and University Library, Cambridge, / Hib. 7. 691, 16.]

1698.

39. Testimony as to Paper entitled Gospel Truths. The Rt. Revd. Edward [Wetenhall] Bishop of Cork, &c.

8vo.

[*Vide* Dictionary of National Biography.]

1699.

40. Reply to Mr. Penns . . . Defence. E. [Wetenhall] Bishop of Cork.

8vo.

[Dictionary of National Biography.]

IV.

RECENT PREHISTORIC FINDS ACQUIRED BY THE ACADEMY.

By GEORGE COFFEY.

PLATES IV-IX.

Read APRIL 22. Published JULY 2, 1912.

1. AN IMPORTANT FIND OF MOULDS IN CO. ANTRIM.

AN important find of moulds for the casting of bronze weapons was made in December, 1910, by a farmer when ploughing in the townland of Killymeddy, parish of Dinvory, about five miles from Ballymoney, Co. Antrim. The portion of the townland where the find was made is on a ridge that overlooks the valley of the Bann. A little stream, tributary to the Bann, runs along the foot of the field, and to within a few yards of where the moulds were found. The plough struck against what proved to be the moulds, and a mark made by the plough coulter can be seen on the sandstone mould (Plate V, fig. 3). The moulds were obtained by the Academy through the good offices of Mr. S. F. Milligan, M.R.I.A. The find consisted of (1) two complete moulds for looped socketed spear-heads, one measuring $8\frac{3}{4}$ inches in length, the other $5\frac{1}{8}$ inches, both made of chlorite schist; and half of a mould for a looped socketed spear-head made of sandstone, measuring $5\frac{2}{16}$ inches. On the back of the mould for the larger spear-head there is a mould for a dagger or short sword and also for a smaller knife-like implement, while the sides of both have also a mould for a round-pointed object; the other half of this mould is broken above the centre, and there is a piece missing (Plate V, fig. 2). The smaller mould has on each side a mould for a leaf-shaped knife. (2) A mould for one side of a long dagger-blade, or short sword, $14\frac{3}{4}$ inches long, broken into six pieces, made of sandstone. (3) A large mould of sandstone $7\frac{1}{4}$ inches long for casting one side of a leaf-shaped knife with a midrib; part of the face of this mould has been broken away by the plough coulter. (4) Two halves of a mould for casting a sickle, made of sandstone; the larger half, which is broken into

Fig. 1 ($\frac{1}{2}$).

three pieces, measures $9\frac{3}{4}$ inches following the curve of the blade, the other half $8\frac{3}{4}$ inches. (5) Four fragments of moulds of sandstone measuring from $2\frac{1}{2}$ to $4\frac{1}{4}$ inches in length, four other smaller fragments, two sharpening stones, the first $8\frac{1}{4}$ inches in length (fig. 1, p. 83), the other broken, $3\frac{1}{4}$ inches in length, and a stone for hammering or smoothing objects $2\frac{1}{2}$ inches long, showing traces of use. The cutting on these broken fragments of moulds is not deep, but they show traces of some blackening caused by use, so perhaps it would not be safe to consider them as unfinished. The sharpening stones and the stone for hammering or polishing complete what was probably the outfit of the founder.

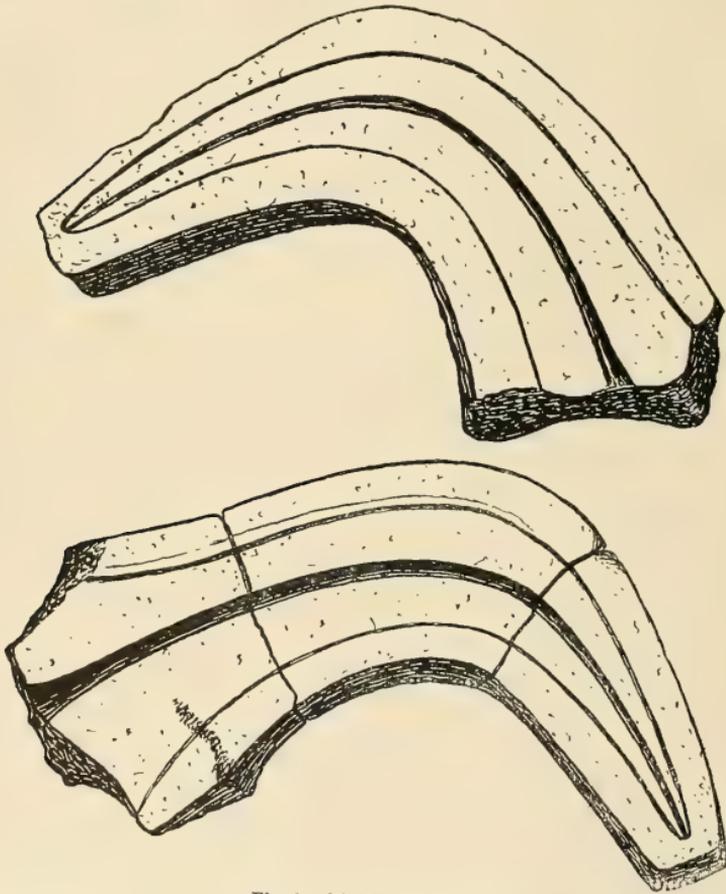


Fig. 2. Mould for sickle ($\frac{1}{2}$).

The most interesting portion of the find is perhaps the mould for the sickle (fig. 2). Up to the time of its discovery the only sickles known in Ireland

were those furnished with a socket. No moulds of any description had been found. In Britain, though the type without the socket has been found, it is rare, and mostly confined to the western counties. On the Continent, the sickles without the socket are the prevailing type, though a few socketed examples have been found in the north-west of France. The Continental sickles divide themselves into three types. The first has a raised button or method of attachment, the second a tang generally furnished with rivets, and the third a curved end. In the Swiss lake-dwellings the flat type of bronze sickle and moulds for casting it have been frequently found, as also the iron type derived from it. The date of this mould has a very important bearing upon the growing of corn in Ireland. Its date is fixed by that of the moulds found with it, as the whole find may be assumed to be of the same period. Looped socketed spear-heads of the type shown by the moulds may be assigned to the fourth period of the Bronze Age as divided by Montelius,¹ and this may be placed at from 1500 to 1000 B.C., or taking it in round numbers at about 1200 B.C.

Spears of the type for the casting of which the moulds were used I have placed before the leaf-shaped type with rivet-holes on each side of the socket. The leaf-shaped spear is associated by form with the leaf-shaped sword; the looped spear with the older types of weapons—the dagger and rapier forms. The record of "finds" is incomplete, but the association of leaf-shaped spears and swords to the exclusion of the looped form is in several instances sufficiently marked to be noted. The evidence of the spear-head moulds further enforces the separation of the two types. Of the known moulds for spear-heads nearly all are of the looped type, and the few for the leaf-shaped type are small and of an indeterminate character. The evidence indicates that with the introduction of the leaf-shaped spear a new method of casting was introduced. These moulds may perhaps be placed towards the end of the period when stone moulds were still in use, and assigned to about 1500 to 1200 B.C.

2. AMBER BEADS FOUND AT COACHFORD, CO. CORK.

The Academy's collection contains a great number of amber beads, many of which appear to be old. Unfortunately the early registers of the Academy's purchases and acquisitions were somewhat loosely kept, and details as to how the objects were found were in many cases not entered. A few years ago I went into the evidence of the finding of amber in Ireland, with a view to determining the age of some of the specimens—whether they belonged to the Bronze Age or were earlier—or whether some might have come from the Mediterranean.

¹ "Archæologia," vol. lxi, p. 97.

I found it very hard to get any cases in which the evidence was at all clear. The most important case was that of a necklace of fourteen beads which were found with gold beads at Cruttenclough, near Castlecomer, Co. Kilkenny. Seven amber beads were found by Conwell in Cairn H., Lougherew, Co. Meath; these, from associated objects, decorated with late Celtic patterns, can be ascribed to the La Tène period. An amber bead was also found in the Dowth tumulus, but the date of this is uncertain.¹ I have since heard of a number of amber beads having been found in association with a bronze sickle and other Bronze-Age objects in a cave at Whitechurch, Co. Waterford; this find is not yet published.

I was therefore very glad to get a really good case of amber found with associated objects.

The find was made in May, 1907, by two men named Michael Sullivan and William Connell, when making a fence on the land of Mrs. Kate O'Connell, at Mountrivers, Rylane, Coachford, Co. Cork. The objects were buried about a foot from the surface of the ground, and consisted of two bronze celts, two gold fibulae, a bronze fibula, and a number of amber beads; nine beads were stated in the reports of the find to have been obtained, but eleven were recovered. It is alleged that one or two were put in the fire by the finders and that they "blazed up." The objects were handed to Mrs. O'Connell, who kept them until the end of June; she then gave them to her brother, R. Hinchey, who sold one of the gold fibulae and one celt to Mr. Robert Day, M.R.I.A. Mr. Day forwarded these objects to the Academy, and is to be congratulated on his prompt action in the matter. The remainder of the find came into the possession of the Rev. Patrick M'Auliffe, of Clonmoyle, Coachford, and were by him forwarded to the Academy; all the objects of this important find being thus recovered. They are figured one-half the true size. (Plate VI.)

The gold fibulae weighed 3 oz. 4 dwt. 4 grs., and 2 oz. 17 dwt. 20 grs., respectively. The bronze fibula belongs to a type somewhat rare in Ireland, though a few of the same form have been found. The beads appear to be made from Baltic amber, not Italian; though of a rich brown colour, they have not the dark shade of the southern continental variety. They resemble two large beads in the Academy's collection, one of which measures $2\frac{3}{4}$ inches in diameter, and has a thickness of $1\frac{7}{8}$ inches. It was found at Cashel, near Armagh; the other, of about the same size, was deposited by Trinity College, Dublin.

All these objects may be placed in the Bronze Age. According to

¹ G. Coffey: "Origin of Prehistoric Ornament in Ireland." *Journal Royal Society of Antiquaries of Ireland*, vol. xxvi., p. 38.

Professor Montelius' recently published "Chronology of the Bronze Age in Great Britain and Ireland,"¹ they belong to the fifth or latest period, and can be dated from the middle of the twelfth to the end of the ninth century B.C. The Coachford celts are well-formed specimens, and this type is placed in the "British Museum Guide to the Bronze Age" at the end of the period of the development of the celt. They may be somewhat later than the date given by Professor Montelius; we may say, however, that they cannot in any event be later than about 500 B.C. The find is therefore of much importance, as it places beyond dispute the fact that many of the amber beads found in Ireland can be placed in the Bronze Age. That this was so had frequently been asserted in the past, but the matter can now be taken as definitely settled.

Amber is very commonly found in Scandinavia in graves belonging to the earlier Stone Age, but in the last portion of this period and during the Bronze Age it is very seldom found, the reason of this being, no doubt, that it was exported to other countries, where it was much prized. The two principal places where amber is found in the north are the west coast of Jutland and the coast of west Prussia. Amber was exported early from both places, and as there is no difference in appearance or chemical composition, it is impossible to determine from which place amber found in another country may have come. As, however, the amber was no doubt exchanged for metals such as gold, bronze, and copper, and as Jutland is far richer in finds of these materials than west Prussia, it is probable that the greatest amount of amber comes from Jutland.² This northern amber, or succinit, as it is called, is known from the chemical examination of Herr O. Helm, of Danzig,³ to contain a large proportion of succinit acid (3 per cent. to 8 per cent.). This is not present, or present only in very small traces, in the amber obtained at the foot of Mount Etna in Sicily. Herr Helm examined several beads from different Italian graves of the Bronze Age, all of which contained succinit acid, and were therefore presumably made from northern amber. The examination of a bead from the shaft graves at Mycenae gave the same result. None of the amber in the Academy's collection has been chemically examined, this being a troublesome process; but from its appearance, and judging by analogy, I think it would be fairly safe to conclude that it is derived from the Baltic.

¹ *Archæologia*, vol. lxi, p. 97.

² Montelius, "Die Chronologie der Ältesten Bronzezeit," pp. 71 and 72.

³ *Zeitschrift für Ethnologie*, vol. xxxiii, 1901, p. 400.

3. AN ACCOUNT OF RAPIERS AND EARLY SWORDS OF THE BRONZE AGE.

Bronze rapiers have often been found in Ireland; there are about forty in the Royal Irish Academy's collection. Some of these are very long. The lower portion of one specimen, which measures at present $13\frac{7}{8}$ inches, is stated by Wilde to appear to have belonged to a rapier nearly 40 inches in length. It has two thick rivets at the base of the blade, and the mark of the handle can be clearly discerned. (Plate VII, fig. 1.) The well-known rapier from Lissane, Co. Derry, measures $30\frac{1}{2}$ inches long, and is the longest complete example which has been found in the British Islands. The average length of the rapiers is much shorter; many of them approach in their outline the Mycenaean thrusting-swords, from which they are derived.

The rapier which I am about to describe is probably the most perfect and best preserved example that has yet been found. It surpasses in the fineness of its ornamentation any I have seen, and approaches in the excellence of its casting to the work of the most skilful founders. It measures $16\frac{3}{4}$ inches in length, $1\frac{7}{8}$ inches across at the base and $1\frac{1}{4}$ inches at the centre. The mid-rib commences nearly an inch from the base of the blade and is carried right up to the point; somewhat flatter at the base, it rises on each side to the height of $\frac{1}{8}$ inch. The photograph (Plate VII, fig. 6) and the drawing (Plate VIII, fig. 4) will show its ornamentation and the beauty of the raised lines better than a detailed description. The point and edges of the blade are as perfect and sharp as when they left the hands of the founder. By means of the intersection of the mid-rib, the point on both sides has been fashioned to a marvellous degree of fineness and sharpness. The two bronze rivets at the base of the blade measure about $\frac{3}{4}$ inch in length, and are over $\frac{1}{4}$ inch in thickness.

This splendid weapon is a fine example of the excellence and skill attained to by the craftsmen of the Bronze Age, and gives a high idea of the civilization in Ireland at that period. It was obtained by Mr. Thomas Plunkett, M.R.I.A., from the finder, and was discovered in Upper Lough Erne at a depth of 17 feet under water, close to the old castle at Crom. We can therefore say it was found near Enniskillen.

I mentioned above that the longest rapier ever discovered in the British Islands was the celebrated specimen found before 1867 at Lissane, Co. Derry. It has been the good fortune of the Academy to acquire recently this splendid object. (Plate IX, fig. 5.) The history of the rapier is shortly as follows:—It was discovered in a bog at Lissane, Co. Derry, on the property of Sir Thomas Staples, Bart. At his death it passed into the possession of his

widow, Lady Staples, who bequeathed it to the Hon. Mrs. Burrell, who left it to her daughter, the Hon. Mrs. Henniker Heaton, from whom it was purchased by the Academy in 1912. It is figured by Sir William Wilde in the Catalogue of the R. I. A. Collection, p. 442, fig. 314, as the finest bronze rapier ever discovered in Ireland, and he presented, by Lady Staples' permission, a cast of the rapier to the collection.

Wilde's opinion of this rapier is confirmed by Sir John Evans,¹ who reproduced the illustration from the R. I. A. Catalogue. I would, however, go further than this, and describe it as the finest specimen of a rapier I have seen in any museum.

In the illustration of the rapier given by Wilde, and copied by others, two rivets are shown at the base of the blade. The rapier has now only one rivet, and on its purchase I was informed by the owner that, to the best of her knowledge, there never had been more than one. The great length of the rapier must have required much skill and care in the casting. It shows no imperfections or running of the metal in any place. To produce such a weapon in bronze would put a modern founder on his mettle.

The manner of hafting these early swords and daggers is fortunately quite certain, as a few hafted examples have been found. Some were hafted with handles of cast bronze, and a few had handles of horn of the same type as those of bronze, but the hilts for the most part would seem to have been made of horn or some other perishable substance, as they have not been recovered. The curious scolloped mark of the hilt is in many cases quite clear.

Figure 4 of Plate VII represents a bronze dagger which has often been illustrated. All the illustrations show the sides of the hilt as decorated with an ornament of cross-hatched triangles. This ornament on the sides, if it ever existed, which is doubtful, cannot now be traced. Montelius assigns this dagger to his third period, dated from the seventeenth to the end of the fifteenth century B.C.² Figure 5, Plate VIII, is a bronze-hilted rapier found in Co. Tipperary, and formerly in the Petrie collection. The hilt and lower portion of the blade are figured after Wilde, by Montelius, who places it in his fourth period, dated at the end of the fifteenth, to the middle of the twelfth century B.C. It is now drawn completely for the first time. It had originally four rivets, of which two remain. We may place it towards the end of the fourth period.

Figure 5, Plate VII, shows a broken weapon of rapier form, found in a bog near Ballymoney, Co. Antrim, in 1901, with a very remarkable hilt made

¹ "Bronze Implements," p. 252, fig. 318.

² *Archæologia*, vol. lxi, p. 97.

of horn. This has never been published before, and is the only example I know of a hilt of this material. It is very notable, and the Royal Irish Academy is to be congratulated on having this specimen, which up to the present is unique, in its collection. The form of the hilt is the same as those of cast bronze, and has the same scolloped shape; it is attached to the blade by three bronze rivets. The pommel of the handle, also of horn, is made in a separate piece, and fixed in with a dowel and two pins made of horn.

I figure a number of daggers and rapiers in the Academy's collection. Some of these are decorated with incised or raised lines. Several of the figures on Plate VII show a striking similarity to the rapier I am describing. They display the same flattening of the mid-rib at the base; the arrangement of the ornamental lines is very similar, and the workmanship of all is very good. The connexion between the types of dagger-blade and the early Italian daggers is confirmed by the series of small hatched triangles which have been found at the base of two Irish examples, and which are a common feature on the Italian daggers. I have noticed this point in my recent book.¹ These daggers belong to an early phase of the Bronze Age, the long rapiers being assigned to a somewhat later period, but it is hard to go further, as the Irish finds are few, and there was probably some overlapping of the different types. The whole subject of the direct early connexion of Ireland with the continent is very important from an historical point of view, and we see that the civilization of Ireland in the Bronze Age was much higher than has commonly been assumed, and was spread generally over the country.

The rapiers belong to the middle and later portion of the Bronze Age. In France, where this type is common, it is classed by M. Déchelette in his Series B., type 2, as "sword with trapezoidile base," and he describes the type as follows:—

This form is widely spread in the British Islands and the north of France, whence it was introduced into South Germany and the region of the middle Rhine. The blade, which narrows considerably from the handle, is sometimes exceedingly slender and very thin. An exceptionally long example found in Ireland measures 30¼ inches in length, and only ⅝ inch in breadth at the centre. The first swords of type 1, Series B (swords with a round base), which surpass in length the triangular daggers, appear at the end of the Age of Bronze II (1900-1600 B.C.). Those of type II belong to the Age of Bronze III (1600-1300 B.C.). They have been found in the depot of Anzy-le-Duc, Saone et Loire, and in burials of the same period, for example, in the tumulus of Staadorf, Haut Palatinat, a burial of the Age of Bronze III (1600-1300 B.C.).²

Dr. Montelius, in his "Chronology of the British Bronze Age," places the

¹ "New Grange and other Incised Tumuli in Ireland," p. 115.

² Manuel d'Archéologie, vol. ii, p. 208.

rapiers in his Period IV, which he dates at from the end of the fifteenth to the middle of the twelfth century B.C., so that his dating of these objects almost agrees with that of M. Déchelette, and this period practically coincides with the date I have chosen for the erection of the principal tumuli at New Grange and Loughcrew, i.e., some time before 1200 B.C., as given in my recent book, "New Grange and other Incised Tumuli in Ireland."

It is now well recognized that the development of the Aegean-Mycenaean swords went on lines parallel to those of western Europe. We find first that long rapiers or thrusting weapons, which go back to the Cypriote dagger with the curved or hook-shaped tang appear, and later come the swords with cutting edges. We cannot doubt that some of the western rapiers or daggers were derived from the Mycenaean types, which were then lengthening into swords. See on this point M. Déchelette, "Manuel d'Archéologie," vol. ii, p. 214. A direct bond is otherwise established between the Mycenaean types and those of the West by the bronze swords found in Sicily with pottery dated as Minœan Recent III. These Sicilian rapiers, which appear to be local imitations of Mycenaean types, are found in tombs belonging to the period immediately following that of the Mycenaean rapiers.

It is interesting to note that the rapier was the parent of a rare type of spear-head that is almost confined to Ireland. There are six examples in the Academy's collection, and one in that of the Royal Society of Antiquaries of Ireland. In England only two have been found, one at York, and one in the Thames at Taplow. This type was evolved by adding a socket to the rapier-blade, and attaching a pair of loops a short way down the socket. One example found at Taplow on the Thames has a pair of gold studs at the base of the blade, which are no doubt derived from the rivets at the base of the rapier.

4. RECENT FIND FROM THE NEIGHBOURHOOD OF LOUGH ERNE.

Recently the Academy was fortunate enough to obtain a very fine bronze spear-head and two bronze leaf-shaped swords found at Tempo, Co. Fermanagh, through the agency of Mr. Thomas Plunkett, M.R.I.A. The spear-head, which measures $15\frac{1}{2}$ inches, is in a very fine state of preservation, and belongs to a rare form (fig. 3, p. 92). The loops are formed by the extension of the small ribs on each side of the mid-rib, which are turned at right angles to the socket; there are also rivet-holes. It is almost identical with the spear-head figured by Evans,² which was found at Knockans,

¹ "Archaeologia," vol. lxi, p. 97.

² "Bronze Implements," p. 331, fig. 41.

Co. Antrim, and is now in Canon Greenwell's collection. The present spear-head is the first complete specimen of this type that has been obtained for the collection, and, as far as I am aware, this, with the one in the Greenwell collection mentioned above, another slightly longer in the Belfast Museum, and an imperfect specimen at present, measuring 12 inches long in the Academy's collection, are the only examples of this type known.

The two leaf-shaped swords are both in an excellent state. (Plate IX, figs. 3 & 4.) They belong to the same type, with notches below the hilt, and are both of the same period. The casting of the handle of one of them appears to have been imperfect, and to have been afterwards repaired. It has six rivet-holes on the handle-plate, but had formerly eight, of which two are now stopped up. It measures $24\frac{1}{4}$ inches in length, and the blade at its widest part measures $1\frac{3}{4}$ inches. The other sword is the same length, but heavier, and is slightly wider at the broadest portion of the blade. It has four rivet-holes but had originally seven, three of which are now stopped up. The handle-plates end in the usual fish-tail shape. Swords of this type, with notches below the hilt, are placed by Montelius in his fifth period of the Bronze Age, dated from the middle of the twelfth to the end of the ninth century B.C. This date is perhaps somewhat too early, and their use may have lasted on into the Heroic period.

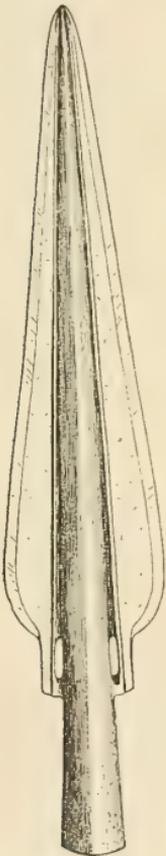


Fig. 8.

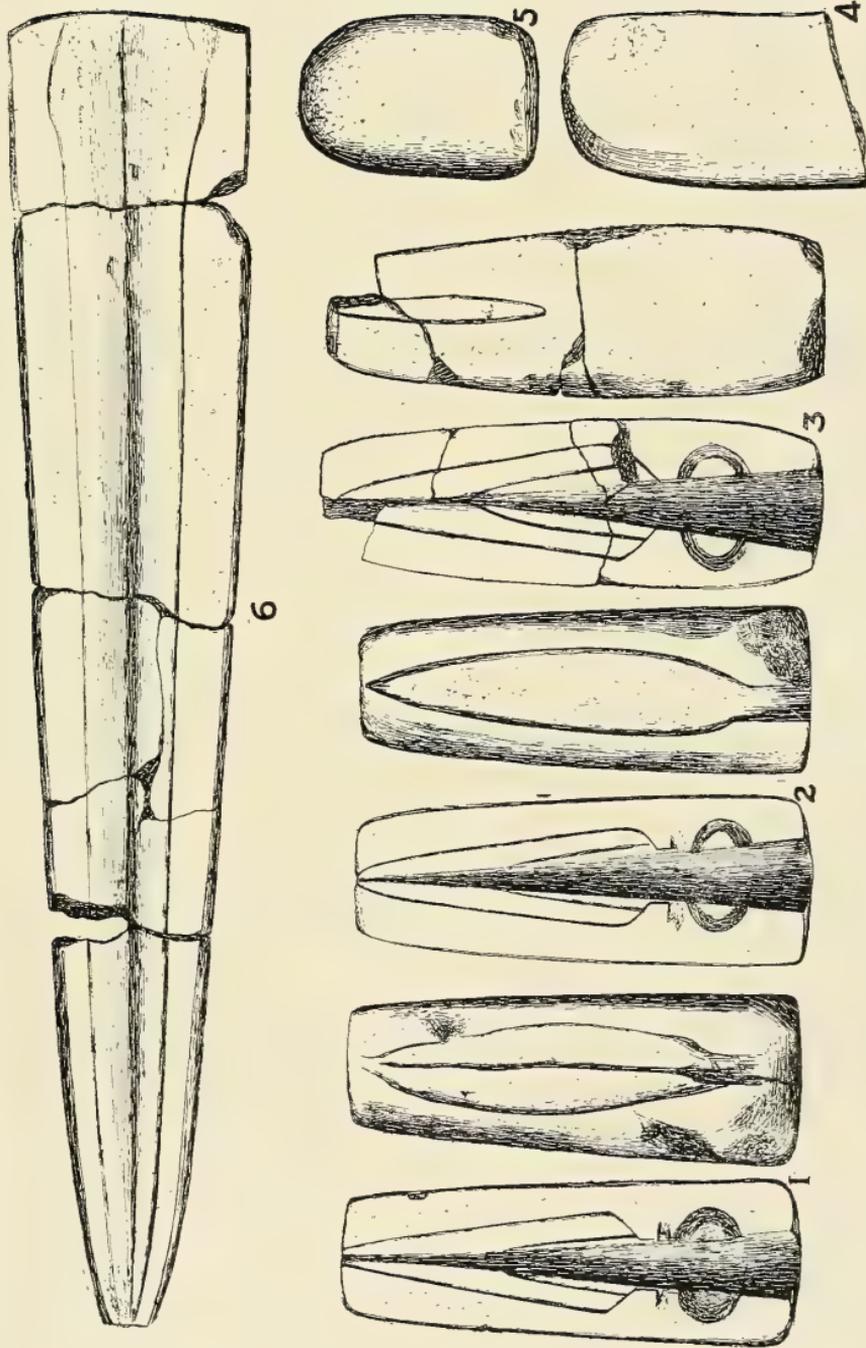
5. FIND FROM BELTURBET, CO. CAVAN.

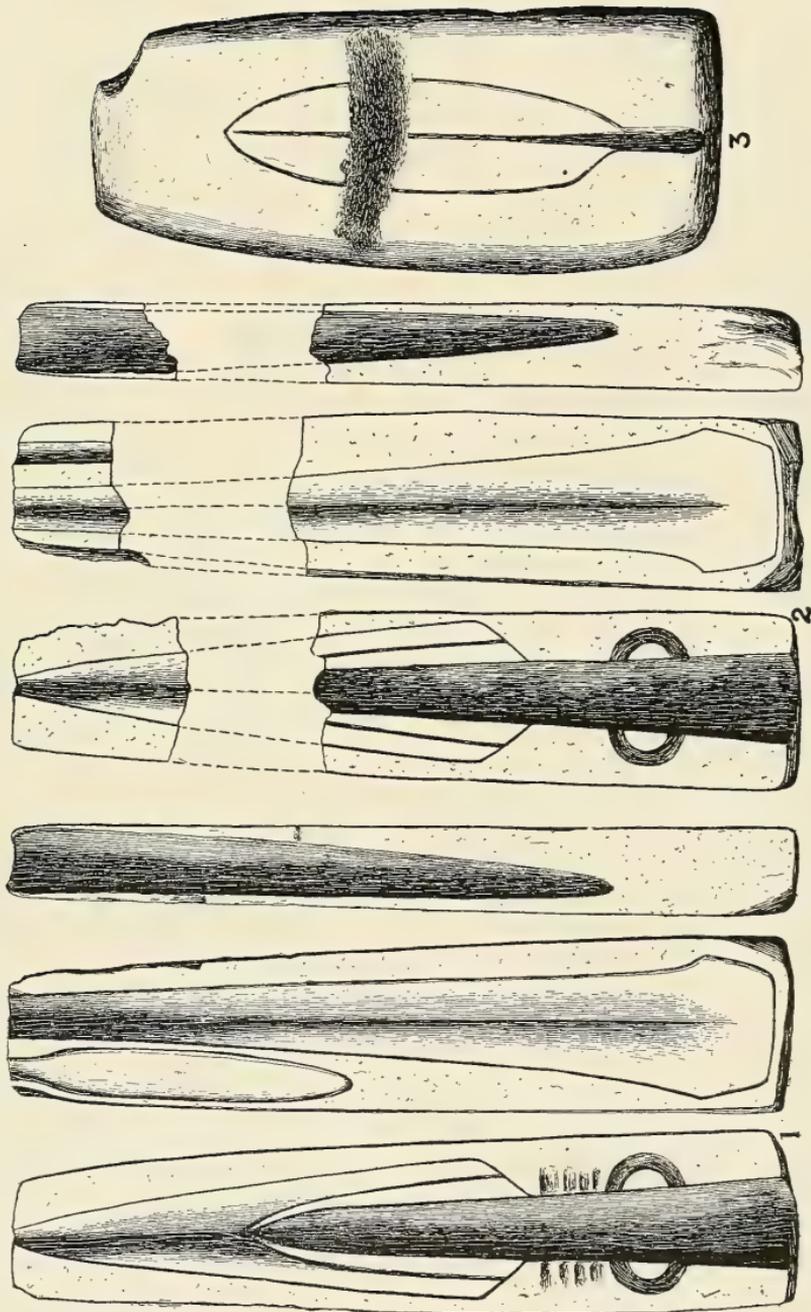
Another important find of two leaf-shaped bronze spear-heads was made by Miss Rose McConnell at a place called the Ford near Belturbet, Co. Cavan. These spear-heads were found together, and were probably the arms of a single chief or warrior.

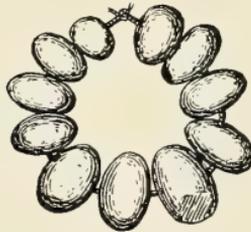
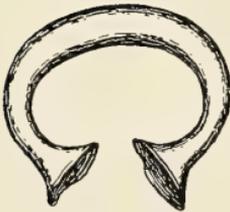
Both spear-heads are in a good state of preservation, but were unfortunately much cleaned by the finder before being sent to the Museum. The longest is 21 inches in length, and the blade is $2\frac{1}{2}$ inches at its broadest part. (Plate IX, fig. 2.) It has a rivet-hole on each side $1\frac{1}{4}$ inches from the base of the socket, and is the longest spear-head of this type in the collection. The smaller is $12\frac{5}{8}$ inches long, and the blade is $2\frac{1}{2}$ inches broad at its widest part. (Plate IX, fig. 1.) The rivet-holes are $\frac{7}{8}$ inch from the base of the socket. They belong to the same type as the spear-head from

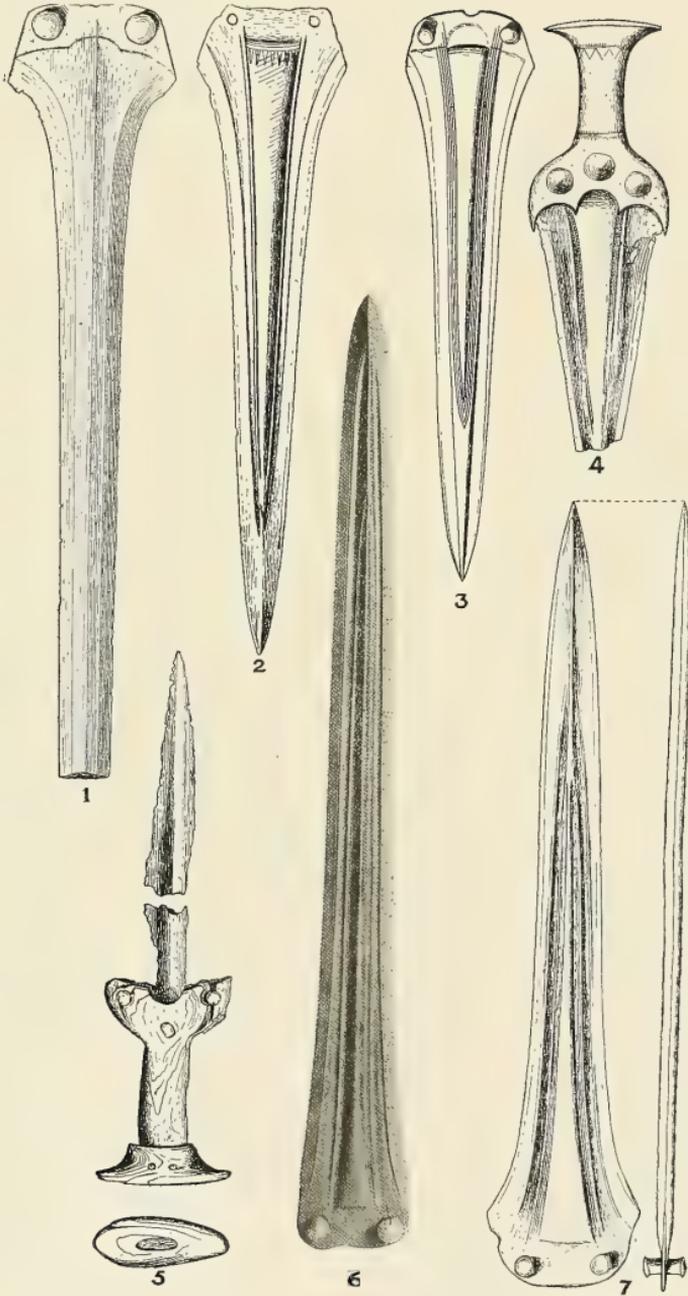
the North of Ireland figured in Evans's "Bronze Implements," fig. 384, p. 316, also the one from Lough Gur, figured in my paper on "The Classification of Spear-heads of the Bronze Age found in Ireland," Proc. R. I. A., vol. iii., T.S., fig. 19, p. 496. In this paper I dealt fully with this type of spear-head, and in summing up the evidence as regards its age, showed that in finds the association of the leaf-shaped spear with objects of the Bronze Age, such as cauldrons, leaf-shaped swords, horns, crotals, &c., was well marked.

Professor Montelius, in his chronology of the British Bronze Age, places this type of spear-head in his fifth period, dated at from the middle of the twelfth to the end of the ninth century B.C., but this is perhaps somewhat too early, and I should prefer to leave it at somewhere before 700 B.C.

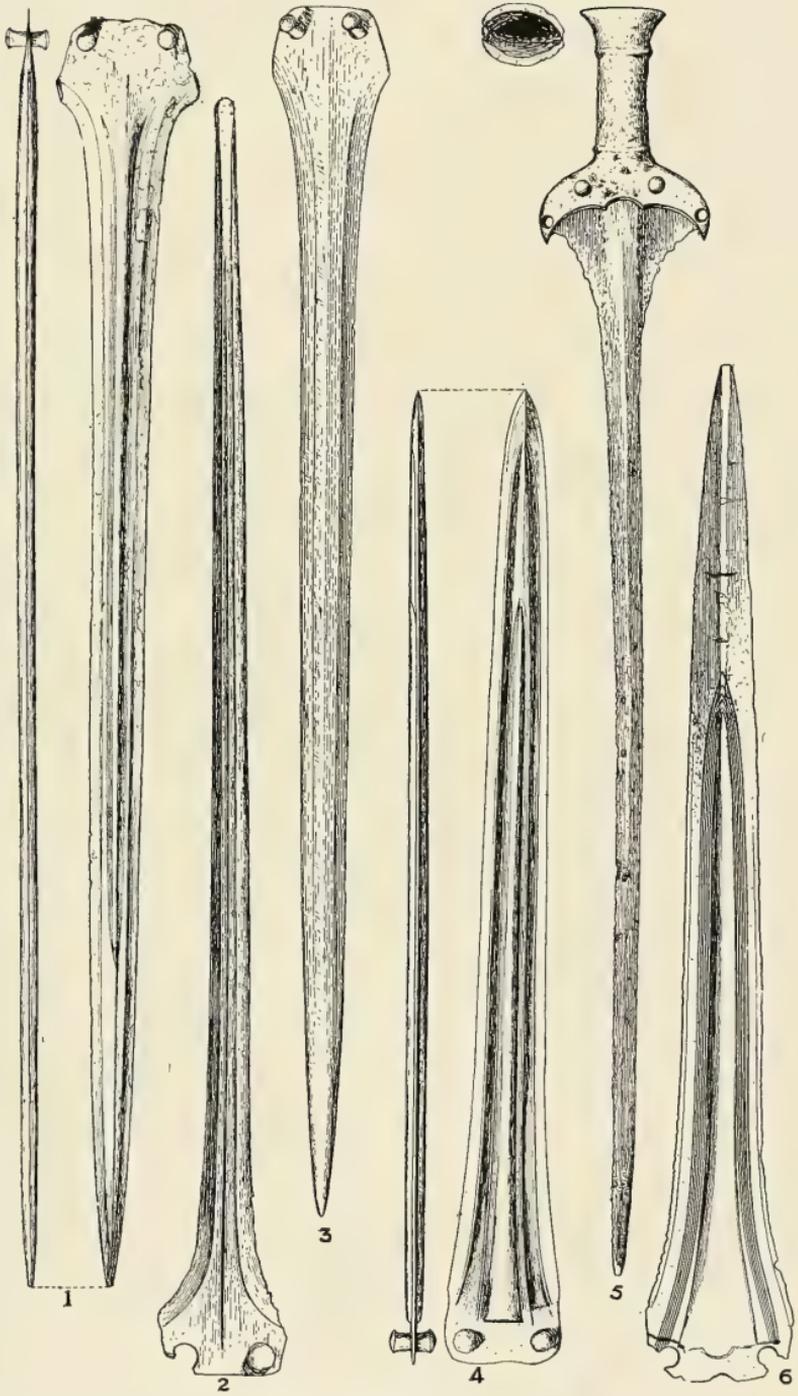




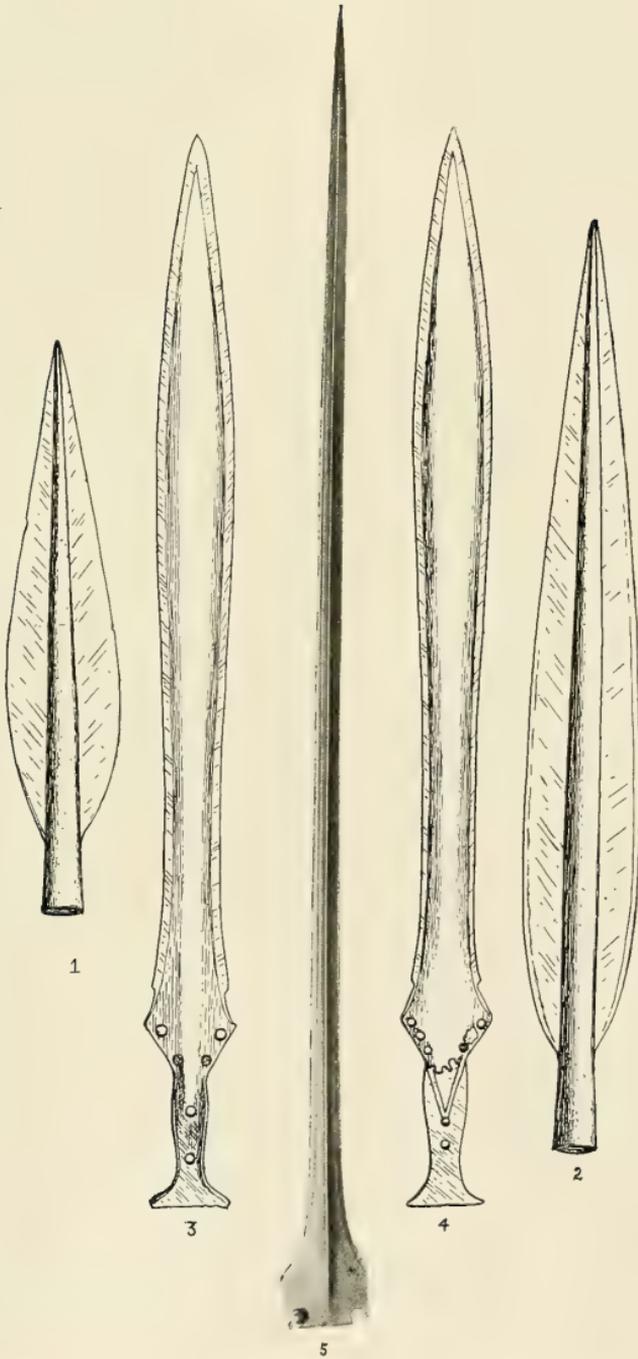




COFFEY.—BRONZE RAPIERS. (13)



COFFEY.- BRONZE RAPIERS. (1/3)



V.

A CALENDAR OF THE REGISTER OF ARCHBISHOP FLEMING.

BY REV. H. J. LAWLOR, D.D.

Read FEBRUARY 26. Published AUGUST 3, 1912.

INTRODUCTION.

THE Register of Archbishop Nicholas Fleming is the second part of the volume of which the Register of Archbishop Sweteman forms the first part; but the former is in a much better state of preservation than the latter. This is probably due to the ingenious construction of the volume in which it was originally bound. In it the outer sheet of each gathering was of vellum. By this outer sheet the inner sheets of paper were protected from injury.

In attempting to ascertain how far the Register remains in its original state, how much of it has been lost, and to what extent leaves have been transferred from their places, we must fix our attention mainly on two features of the manuscript. It happens that in a good many cases a document begins on one leaf and ends on another. Such leaves must have been consecutive from the first. And again, most of the leaves are still attached to their conjugates. Where two leaves were successive it may be assumed that their conjugates were likewise successive. We shall also receive assistance from the fact that, in addition to the numbering of the leaves which corresponds with the present state of the Register, and which was added in the seventeenth century, there are considerable remains of an older numeration which apparently belongs to the sixteenth century.

When we take account of these data we easily reach the conclusion that the first and second gatherings (ff. 1-20), each consisting of ten leaves, of which the outer two are of vellum and the rest of paper, are perfect, and that the second originally followed immediately upon the first. Moreover, it seems that what is now the first gathering had the same place in the original Register, for the third document contained in it intimates that up to the day on which it was written Fleming had performed no official acts in his diocese.¹

It is also clear that an unnumbered leaf which now stands between ff. 65, 66, originally had its place between ff. 27, 28. Transferring it to that

¹ See no. 4.

position we find that the third gathering (ff. 21–28) was originally a gathering of the same size and structure as the first two, which has lost a leaf—the conjugate of the one which we have restored to it—between ff. 21, 22. That it followed the second in the sixteenth century is proved by the older foliation.¹ That it did so originally is highly probable. For the dated documents in the first two gatherings, with the exception of some which appear to have been added later in spaces originally left blank,² and one or two of earlier date which were obviously not copied into the Register till long after they were issued,³ are arranged in almost exact chronological sequence. A similar arrangement, not, however, so rigorously chronological, is found in the third gathering. And the last dated document in the second gathering is of 4 January, 1409,⁴ the second in the third gathering of 11 March, 1409.⁵

At least one gathering has disappeared between ff. 28, 29. Not only is a document left incomplete at the end of f. 28; we have also what seems to be an allusion to the lost portion in the present fourth gathering. On f. 31 reference is made to a letter against O'Hanlon, which is said to have been copied on the sixth leaf⁶—i.e., doubtless the sixth leaf reckoned backwards from f. 31. No such letter now appears in the Register. And this conclusion is confirmed by the chronology. For the penultimate document of the third gathering⁷ is dated 18 April, 1409, the first of the fourth⁸ more than a year later—9 May, 1410. The loss of this portion of the Register must have taken place at an early period, since the older numerator regarded the gatherings which are now the third and fourth as consecutive.⁹

The fourth gathering (ff. 29–40) is now of twelve leaves, and is almost certainly in its original state. The fifth (ff. 41–50) has lost at least two leaves in the centre, but is otherwise perfect. It may therefore be assumed to have been also of twelve leaves. Each of the three gatherings just mentioned has an outer sheet of vellum, the inner sheets being of paper.

After the fifth gathering there is another lacuna, of which an incomplete document at the end of f. 50¹⁰ is decisive evidence. That it is of considerable extent, and that the loss occurred between the dates of the earlier and later foliation, is proved by the fact that f. 49 is numbered 51 in the older hand, and f. 51 is numbered 70. Allowing for errors in the ancient numeration¹¹ we may suspect the loss of two gatherings of ten leaves each.

¹ Ff. 17, 18 (second gathering) are marked with the same numbers in the older hand; f. 28 (third gathering) with the number 30.

² Nos. 16, 18, 19, 90.

³ Nos. 29, 30, and probably nos. 54, 83.

⁴ No. 96.

⁵ No. 100.

⁶ See no. 131.

⁷ No. 121.

⁸ No. 123.

⁹ He numbered ff. 28, 29 as 30 and 31 respectively.

¹⁰ No. 214.

¹¹ That the sixteenth-century numerator made mistakes is certain. Ff. 54, 55 are both numbered 73; ff. 61, 63 are numbered 80 (corrected from 79) and 83 respectively, f. 62 having been numbered 81, which is corrected to 82.

From f. 51 onwards the manuscript is in confusion. We may at once exclude from consideration the leaves numbered 65, 67, which evidently do not belong to Fleming's Register. Of the remaining leaves we observe that ff. 51, 64 (both of vellum) are conjugate, and that ff. 51-54, 66 were originally consecutive. The latter were therefore the first five leaves of a gathering of which f. 64 was the final leaf. Again ff. 56, 60 (vellum) are conjugate, and the intervening leaves (ff. 57-59) have had their conjugates, which came between ff. 59, 60, cut out. The same fate has apparently befallen two conjugate leaves, the remains of one of which now stand between ff. 56, 57, and of the other before f. 60. These facts suggest that ff. 56-60 are a fragment of a gathering which the binder placed within another gathering, represented by ff. 51-54, 64. There remain ff. 55, 61, 62, 63, 68. Of these the first two are of vellum, and are conjugate. We might therefore be inclined to suppose that they form the outer sheet of a gathering. But this hypothesis seems to be excluded by the date of the instrument on f. 55,¹ which lies within the period covered by ff. 56-60. And for a similar reason ff. 62, 63 appear to belong to the gathering represented by ff. 51-54, 60. In short, if we put the leaves in the order 51, 52, 53, 54, 66, 62, 63, 64, and 56, 55, 57, 58, 59, 61, 60, we obtain two chronological sequences, the first from 30 August, 1412, to 30 January, 1414, and the second from 22 June, 1415, to June, 1416. These, then, we take to be the remnants of two gatherings of the original Register. Let us examine them more closely.

In the former there are two gaps. The first is indicated by the fact that in passing from f. 62 to f. 63 we leap forward from 24 May to 21 November, 1413.² The second is revealed by the loss of the first part of the document, the latter part of which is on f. 64.³ On the other hand, ff. 66, 62 are almost certainly consecutive, since the date of the last document on f. 66 (as given in the ms.) is the same as that of the first on f. 62.⁴ Hence, if each of the gaps is accounted for by the loss of a single leaf, it may be inferred that this gathering had ten leaves, of which the seventh and ninth have disappeared. But it is possible that f. 68, which contains a portion of an instrument dated 27 July, 1413, the concluding part of which was on a leaf now lost, originally stood between ff. 62, 63. In that case the gathering was of twelve leaves, of which the seventh (?), ninth (?), and eleventh have perished. It must be noted, however, that the document copied on f. 68 cannot have reached Armagh for several—perhaps many—months after it was written. It is safer, therefore, to regard it as not belonging to this gathering, though it may have had a place elsewhere in Fleming's Register.

¹ No. 243.² See nos. 229, 231.³ No. 236.⁴ Nos. 224, 225.

In the latter of our two gatherings, as we have seen, the leaf which once followed f. 55, and four leaves (including the conjugate of the one just mentioned) before f. 61 have been cut out. And at least one leaf between ff. 58, 59, and its conjugate have disappeared.¹ These, with the existing seven leaves, would make a gathering of fourteen. As this is without parallel elsewhere, it may be assumed that the leaf which originally separated ff. 58, 59 was misplaced, and is now represented by the fragment between ff. 56, 57. Thus the gathering was probably one of twelve leaves, of which the fifth, seventh, eighth, ninth, and tenth have been lost.

The interval between our two gatherings—31 January, 1414 (f. 64), to 22 June, 1415 (f. 56)²—is accounted for by the supposition of a lost gathering. The gathering represented by ff. 55-60 must have been the last in the Register if the date given by Ware for Fleming's death is correct.³ It not only contains a document penned a few days before he died: on the other side of the same leaf is a draft of the commission of a proctor of the chapter during a vacancy of the see.⁴

Our reconstruction of the Register of Archbishop Fleming may be represented thus, each gathering being indicated by a letter, and the lost gatherings by letters enclosed in square brackets:

A₁₀ B₁₀ C₁₀ (C 2 lost, C 9 misplaced) [D] E₁₂ F₁₂ (F 6, 7 lost) [G₁₀ H₁₀] I,^{*} (I 5 misplaced, I 7, 9 lost) [J] K₁₂ (K 5, 7-10 lost).

From this it appears that four out of eleven gatherings, and a number of leaves amounting to about one more gathering, have disappeared. In other words, rather more than half the Register is in our hands. It should be added that in the last gathering our loss is probably more apparent than real. The Register was plainly brought to an end by the death of the archbishop, and it is thus quite likely that the leaves which once stood between ff. 59, 60 were all left vacant.

This reconstruction seems to me in its main parts so certain that I venture to express the hope that if the volume containing the Registers of Sweteman and Fleming is rebound—a work which must be done if it is to be preserved for future generations of students—the leaves of its second part will be arranged in their correct order and numbered afresh. In the following Calendar the numbers of the leaves are given in the order suggested by my examination of the manuscript, the seventeenth-century numbers, where they differ, being in every case added in brackets.

It remains to be said that the leaves numbered in the seventeenth century 66-68 were probably found by Ussher, and introduced by him into the volume;

¹ See no. 253.

² See nos. 239, 242.

³ Ware i. 85 puts his death in June, 1416. No. 256 is dated 22 June, 1416.

⁴ No. 254.

for on each of them is written in his hand 'Nicolaus Flemming.' This gives ground for the belief that the volume was bound under his supervision, and therefore that we owe the preservation of the remains of the Registers of Sweteman and Fleming to the care of their famous successor.

The principles which guided me in constructing the Calendar of Archbishop Sweteman's Register¹ have been followed here, and there is no need to explain them again. By the facts recorded in his Register, the date of Fleming's consecration may be fixed within a day. Nos. 118 and 126 imply that 2 May, 1404, and 30 April, 1405, were both in his first year. It follows that he was consecrated on 1 or 2 May, 1404. From this, or possibly on the ground of independent evidence, Ware² inferred that the date was 1 May. This is probably correct, since 1 May is the festival of St. Philip and St. James, and 2 May is not a saint's day. With one exception (see no. 160) all the indications in the Register are in agreement with this conclusion.

When editing the Calendar of Sweteman's Register I expressed the hope that a study of the other Registers of the Archbishops of Armagh would throw light on obscure place-names. To some extent this expectation has been realized. Following a suggestion of Mr. E. J. Gwynn, I conjectured that 'Hewynnae near Armagh, which is the archbishop's land,'³ was a phonetic spelling of the Irish name of Navan Ring, an ancient fort rather less than two miles to the west of Armagh. This is confirmed by Fleming's Register, from which we learn that in 1278 Loughnashade, near Navan Ring, and the land about it, belonged to the archbishop.⁴ This somewhat diminishes my confidence in the correctness of the identification, in which I followed Reeves,⁵ of the 'manor of the lake near Armagh' with Bishop's Court in the townland of Mullynure, a short distance from Armagh to the north. There is at present no lake at Bishop's Court, though there is a local tradition that a lake which was once there was drained in modern times.

The manor of Kyllroe or Kyllareo in the Diocese of Derry,⁶ the position of which I could not determine, I am now inclined to place at Drumachose, which was also known as Ro.⁷

The name *Castrum Viride* no doubt indicates the same place in Sweteman's Register as in Fleming's. But in the latter⁸ it is clearly Greencastle in the parish of Bright. In the index to the Calendar of Sweteman's Register I wrongly identified it with the better known Greencastle in the Mourne.

Two remarks may be added, which are not directly suggested by my study of Fleming's Register.

¹ *Proceedings*, vol. xxix. Sec. C, no. 8, p. 213 ff.

² Sweteman, no. 8.

⁶ Sweteman, nos. 135, 208.

⁴ See below, no. 30.

⁷ Below, no. 56.

² Ware i. 85.

⁵ Reeves, *Armagh*, p. 17.

⁸ Below, no. 62.

In Sweteman's rent-roll of Nobber¹ a place is mentioned by the name of Brakschise: it is elsewhere called Braktys.² The first syllable of this name is evidently βραεα. Can it be Brittas in the parish of Nobber, the name of which is formed from the synonym βριτ?

An interesting pair of documents appears in Sweteman's Register without dates—the inventory of the goods of one Peter, an ecclesiastic, and his testament.³ Among the debtors of Sir Peter was Master William Somerville, and his executor was Master Henry Paton, Vicar of St. Peter's, Drogheda. Now William Somerville resigned the archdeaconry of Armagh in 1427,⁴ and is last mentioned, as a canon, in 1455;⁵ and the only Henry Paton who is known, apart from these documents, to have been vicar of St. Peter's was presented to the vicarage in 1454.⁶ Hence the date of the inventory and the testament seems to have been not earlier than 1454, and probably not much later. In agreement with this conclusion is the fact that the hand in which these two documents are written has the appearance of being considerably later than that which occupies the verso of the same leaf, and which belongs to 1367.⁷ The recto of the leaf was, in fact, originally left blank, and was afterwards utilized by a scribe of the time of Primate Mey, or Primate Bole.

My best thanks are once more due to the friends who assisted me in my work on the Register of Archbishop Sweteman. To them must be added the Rev. Hamlet McClenaghan, who has expended time and trouble in fixing the position of places in the neighbourhood of Dunboyne, Co. Meath.

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⁵ Leslie, p. 47.

⁶ *Ibid.*, p. 236.

⁷ Sweteman, no. 179. See note there.

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CALENDAR.

1. Table of Contents.

c. 1600. Headed "Liber Nicholai Flemingie, Archiepiscopi [Ardmachani], Anno Domini, 1404."

Inserted leaves.

2. Letter appointing Philip Walsch and David Mollaghlyn special proctors **16 September, 1405.** of the archbishop and the church of Armagh for the purpose of collecting alms and the firstlings of all cattle (animalium) for the fabric of the said church, lately (nuper) destroyed by accidental fire. f. 1.

The letter is valid for one year. Letters of procuration granted by the archbishop's predecessor are recalled.

Dated at Athirde.

3. Letter of indulgence to the clergy regular and secular of the **20 September, 1405.** province. f. 1.

The archbishop states that his church of Armagh had been burnt long before (diu ante) he came to it. He exhorts them to give (erogare) alms

and aids (subsidia), and to cause the same to be done by their subjects and "parochiani." All those who have made confession and are contrite, and have contributed or have left by testament alms or other gifts (largitiones) for the restoration of the church, or have procured the doing of this by others, are granted relaxation of forty days of penance. The letter to be valid for a year.

Dated at Athirde.

4. Letter to Pope-Innocent (VII).

f. 1^v.

20 September, 1405. The bearer of the letter, W. Mowner, formed bachelor¹ in decrees, the archbishop's proctor, will declare the misery of his life for lack of bulls. Before his provision and consecration to the church of Armagh he had benefices which enabled him to live honourably. But now for lack of his bulls the temporalities must remain in the hands of the king, and he cannot lawfully deal with the spiritualities (nec de spiritualibus obstante constitucione iniuncte audeo intronittere); he will, therefore, be obliged to beg unless the Pope grants some delay of payment (of his dues). The Church of Armagh is afflicted with wars and other adversities.

Written in the Hospital (hospitali) of St. John of Athirde, where the archbishop is living on account of the want of his bulls.

The year is not given in the dates of nos. 4, 5; but it is probably the same as that of no 3.

5. Letter to the same.

f. 1^v.

20 September, 1405. Differs from the foregoing only in the opening sentence, and a few words in other places.

Written in the Hospice (hospicio) of St. John of Athirde.

See note on no. 4.

6. Letter.

f. 2.

15 May, 1406. When the messenger or proctor of Sir Eustagius (*also written* Eustachius) Roch, chaplain, an anchorite enclosed in the chapel of St. Mary and St. Peter and St. Paul in Boghomyr,² commonly called Seynt Dulagh (*in title* Doulagh), in the diocese of Dublin, comes seeking alms for the maintenance of the anchorite or the adornment of his church, the recipients of this letter are to receive him and to further his work. All confessed and contrite persons, whose diocesans confirm this letter, and who contribute as above, are conceded forty days of indulgence, and the archbishop permits his own "parochiani" to confess their sins and to receive penance from the anchorite.

¹ That is, a bachelor who has completed his course of study. See *Oxf. Eng. Dict.* s. v. Formed.

² Reeves (*loc. cit.*) prints Roehomyr, but conjectures that the name survives in the townland of Bohammer. The capital letters B and R are very similar in this part of the Register (see, e.g., the names Burton and Russell in no. 7), and I think the name may be read as it is printed above.

Dated at Athirde.

Printed in Reeves, *St. Duilech*, p. 7.

7. Letters granted to the quaestors of the Hospital of St. Thomas the Martyr at Rome. f. 2.

May × November, 1406. If the proctors or messengers of this hospital—founded long ago (dudum) for the entertainment of poor pilgrims from England and Ireland—viz., William Burton and Thomas Russell, or either of them, come asking for alms, the clergy and faithful of the province are to explain, or permit them to explain, the letter of indulgence granted to the hospital by the archbishop, on Sundays [and festivals] at mass, and to promote their work; and all the faithful who contribute by testament or otherwise are to have forty days of indulgence.

The only clue to the date is the position of the document in the Register. The argument founded thereon is strengthened by the fact that nos. 2-19, with the exception of nos. 15, 16, are all in the same hand.

8. Collation by the archbishop, guardian of the spirituality and spiritual **2 November, 1406.** jurisdiction of the diocese of Dromore, *sede vacante*, of the vicarage of Teachgowo,¹ in that diocese, vacant by the death of Sir Patrick Oduberayn, to John M^eogogayn, clerk.² f. 2^v.

Dated at Atrium Dei.

9. Mandate to Master Thomas Omostead, Archdeacon of Dromore, to **2 November, 1406.** induct the same to the vicarage of Teachgowo.³ f. 2^v.

10. Citation for an ordinary visitation. f. 2^r.

November, 1406. Thomas Olucheran, Dean of Armagh, is to appear, and to cite the persons (personae) of the chapter, and the clergy of the deanery of Erthir to appear at the church of Armagh on 29 November.

Dated at Atrium Dei.

The citation was obviously issued in November. The year is inferred from the dates of the preceding and following documents.

11. Licence to Alicia, widow of John Keppok, lately deceased, to hear **15 November, 1406.** mass in an oratory. f. 3.

¹ Perhaps Teachgolbo.

² The form, which includes the institution and investiture, in this and other similar documents, is as follows:—"N. &c. filio in Christo dilecto A. salutem gratiam et benedictionem. *Vicariam perpetuam* ecclesie de B. per mortem C. ultimi vicarii eiusdem vacantem et ad nostram collationem spectantem tibi conferimus intuitu caritatis teque instituimus auctorizabiliter in eandem et per anuli nostri traditionem investimus de eadem decernentes te fore realiter (*in nos. 54, 239 this word is omitted: in no. 8 personaliter is substituted*) inducendum in corporalem (realem et corporalem in no. 8, corporalem et realem in no. 54), possessionem vicarie predictae cum omnibus suis iuribus et pertinentiis universis vel quasi et defendi inductum. In cuius rei testimonium," &c. The italicized words vary according to circumstances. Sometimes for the words "per . . . eiusdem" we have simply "certo modo."

³ Possibly Teachgolbo.

She is to have divine offices (divina) celebrated before her in a suitable (honesto atque decenti) place in her dwelling house (mansum habitationis) by a fitting chaplain, provided she hears the same, if she conveniently can, in her parish church on Sundays and festivals, and saving the right of the mother (matricis) church.

Dated at Atrium Dei.

12. Letter of excommunication.

f. 3.

November, 1406. The secular clergy of the diocese of Armagh are informed that certain persons unknown detain goods bequeathed to the archbishop and the church of Armagh by his immediate predecessor, John (Colton), viz., the sacerdotal vestments and other ornaments of the archbishop's chapel, cloths (mappae), towels (manutergia), goblets (siphos) of murra¹ (de murino) and silver, brazen and wooden vessels, skius (utres) or great bottles (bodellos) "an^e gubbis," and other household utensils; they are commanded to warn these persons, and all who know where these goods are, that they restore or reveal them within six days; and, if this is not done (alioquin), to excommunicate them at mass on Sundays and festivals until further order be given.

The date is inferred from the position of the letter in the Register. Its contents imply an early period of the episcopate of Fleming. Cp. note on no. 7.

13. Letter dimissory, granting licence to John Cardyff, clerk, though a **20 November, 1406.** native of the diocese of Armagh, to be ordained to holy orders, major or minor, by any catholic bishop, if found fit. f. 3.

Dated at Athirde.

14. Collation of the rectory or comarbia of St. Kynnicus, Drumgossa, **26 October, 1406.** *alias* Ro, diocese of Derry, vacant by the death of Master John M^cthaig, and in the archbishop's gift for this turn by devolved right, to Master Odo M^cthaig, canon of Derry. f. 3^v.

He is invested, and by the giving of the ring instituted. Otherwise the form is as in no. 8.

Dated at Dundalk.

Printed in Spelman, 152; Reeves, *Collt.* 39. Translated in Ware ii. i, 233; King, 37.

15. Citation of Nicholas, Prior of St. Mary's, Louth, to an ordinary **November (?), 1406.** visitation. f. 3^v.

Only a portion of the letter is copied.

The preceding and following documents (nos. 11, 13, 14, 17, 20) point to a date September or November 1406, most probably November. November is supported by nos. 10, 42. This document and no. 17 are in the same hand as nos. 20-22.

16. Letter to the treasurer and barons of the Exchequer, praying them to

¹ See *Oxf. Eng. Dict.* s.v. Murra; Du Cange s.v. Mazer.

accept Geoffrey Devvenisch and Patrick, clerk of William de Preston, chancellor of the green wax, as the archbishop's attorneys in all causes. f. 3^v.

The position of this document in the Register would indicate about November, 1406. But the inference is uncertain, since it seems to be a later insertion written in the space left for the conclusion of no. 15.

17. Resignation of the parish church of St. Columba, Clounmore (*also* **4 September, 1406.** *written* Clonmor) by John Plunket, proctor of the rector, Richard Kynmoure (*also written* Kymmoure), presbyter. f. 3^v.

The resignation was made in the chamber of the Prior of St. John's, Athirde, before the archbishop, in the presence of Master William Mowner, Brother John Broun, and others.

18. Letter of Henry (IV) to the archbishop or his official or their **1 June, 1407.** commissaries. f. 4.

On the ground that pleas concerning agreements (conventionibus) belong to the crown, they are prohibited from hearing the suit instituted by Isabella Drumgolle against John Ruyn in the court of Christianity.

Ends: "Teste Stephano le Scrope milite deputato carissimi filii nostri Thome de Lancastre senescalli Anglie locum nostrum tenentis terre nostre Hybernie apud le Naas," &c.

The dates of nos. 18, 19 being later than those of 17, 20, though they are written in the same hand as most of the earlier documents, it would seem that they are later insertions, and that f. 4^r was originally left blank. Cp. no. 16.

19. Letter of excommunication and interdict. f. 4.
1 May, 1407 × 24 March, 1408.

The archbishop intimates to the clergy of his diocese that he has excommunicated and interdicted Argallus Ohanlan, captain of his nation, Malachy Ohanlan and Odo M'loy, together with their familiars, aiders and abettors, for various injuries inflicted on him and his tenants, and especially for slaying Maurice Odowgenan, his tenant and falconer (*qui nobis accipitres portavit*); and commands them to publish the excommunication and interdict (quoted in full) on Sundays and festivals in their churches and market places, clad in albs and stoles, with cross erect, bells and candles, until further order. He further admonishes all, English and Irish, within his diocese, that they are not to converse, eat or drink with the above-named, their familiars or tenants, nor to sell them bread, beer (*serviciam*), salt or any other things, nor to hold any communication with them.

The date is given as 1407 A.D. and the fourth year of the archbishop's consecration.

20. Collation of the vicarage of Kylsleby to Sir Tuinus M'ynnyb. f. 4.
4 December, 1406.

Form as in no. 8.

Dated at the city of Armagh.

A note states that the mandate for induction was issued to the Dean of Armagh the same day.

21. Collation of the vicarage of Dyrebruchisse, vacant by the resignation
7 December, 1406. of Master Benedict Oculcan, to Sir Dermot M^cneyll
 Ohanloyn. f. 4r.

Dated at Armagh. Form as in no. 8.

Note, as in no. 20.

22. Grant to the brothers Philip and Simon M^cnukean. f. 4r.
5 December, 1406. With the unanimous consent of the dean and chapter, the archbishop grants them the lands of Dary craynd, Dary M^carban, Dary saran, Dary regleach, Gartarglays, Cluaynard, Ceryunnacallechy (?), Leathadary, viz. Rathnacrossy, Lysachadary and Arlyssy in the lordship of the church of Armagh at Balydary, for their life, at a rent of 10s. a year payable 1 November and 1 May, provided they are obedient, pleasing (*grati*) and faithful to the archbishop and his successors, cultivate the lands without handing it over for this purpose to any outside (*extrinseco*) layman, and pay the accustomed rents and services. They are not to mortgage (*cum nullo impignoraverint*) the lands. The survivor of them is to pay for re-entry (*novum introitum . . . solvat*).

Sealed by the archbishop and the chapter.

Dated at Armagh.

23. Grant to John M^clugyn. f. 5.

5 December, 1406. With consent as in no. 22 the archbishop grants him the lands commonly called Olathgura in his tenement at Armagh for life at a rent of 3s. 4d. a year, on the conditions mentioned in no. 22, the mortgage clause being omitted.

Dated in the monastery of St. Peter and St. Paul, Armagh.

24. Collation of the rectory of the plebs of Clandcharuaych inferior, *alias*
8 December, 1406. Gartywyeh, vacant by the death of Sir Rory M^cgyllamura, to Sir Maurice M^cralagean. f. 5.

Dated at Armagh. Form as no. 8.

Note as in no. 20.

25. Collation of the rectory of Diriluran (*in heading* Direluran), vacant
10 December, 1406. by resignation of William Olathgan to Master William M^ckamull. f. 5.

Dated at Armagh. Form as no. 8.

Note as in no. 20.

26. Collation of the vicarage of Ardtrea, vacant by the resignation of
10 December, 1406. Cornelius Ohinergi, to William Olathgan, clerk. f. 5.

Dated at Armagh. Form as no. 8.

Note as in no. 20.

27. Collation of the rectory of Ardrea, vacant by the death of
12 December, 1406. Cornelius, son of John Oneyll, to Eugenius Oneyll,
 clerk. f. 5v.

Dated at Armagh. Form as no. 8.

28. Note. f. 5v.

12 December, 1406. States that Master Peter Omolchallynd, canon of
 Armagh, had collation of the rectory of Dysertlynd, vacant by the resignation
 of Master William M^ckamuyll, of the same form and date as no. 27.

29. Grant by Brother Patrick (O'Scannell), archbishop, to Rory M^cgillamuru,
5 February, 1264. clerk, and his heirs male in the direct line. f. 5v.

He is granted, with unanimous assent of the dean and chapter, the land
 of Tolach clochran, and the land of Oulltan, extending in length from (o)¹
 Ath [*space in MS.*] mugí to Lom lena churrin and to Osta Thiri birn, and in
 breadth, from (o)¹ Ath murnaid fakolyeh to Ath kamogi and from (ab) Ath
 kamogi "sicut puteus ascendit" to Tolach clochran and Kylle Oulltan,
 together with their (suis) areas in the city of Armagh, viz.: the area of
 Oulltan, and all the areas which lie between the areas of Mecmoelfedyr
 and Mecbrigdiu, and the areas which lie between the areas of Okonnwel
 (? Okomnoel) and Meekonsciach, at a rent of 3s. a year payable at
 1 November and 1 May.

Sealed by the archbishop and the chapter.

Ends: "Hiis testibus Mauricio Macgillamuru, Gillachomded et Karmac
 Macomgan, Dompnallo Macinabbad, Patricio Macumyn et aliis. Datum apud
 Cloinfekna," &c.

30. Grant of Archbishop Nicholas (Mac Mael Isa) to Rory Makillamuru.
28 May, 1278. (*in title* M^cgyllamura) and his heirs male. f. 5v.

With unanimous assent of the dean and chapter 28*d.* of rent for a certain
 meadow (prato) and pasture lying under the archbishop's lake of Loch-
 chachsseth near Makillamuru's land of Tulachowyr (? Tulacholbyr) is remitted
 until out of land valued at that rent meadow and pasture are provided for
 him.

Sealed by the archbishop and the chapter. Dated at Armagh.

The year is probably "mccclxxoc[tauo]," but possibly "mccclxxvi[i] or "mccclxxvi[ii]." If the second reading be correct, the date is 8 May, 1277.

31. Letter to J(ohn MacMenamin), Bishop of Raphoe (Raboten., Rathboten.;
15 December, 1406. *in title* Rabothen.). f. 6.

Master Eneas M^cgyllenr[.]de (?), Archdeacon of Raphoe, has complained

¹ Apparently the Irish preposition *o*.

that the bishop molests him about the possession of certain churches and prebends which he has for some time peacefully held. The bishop is ordered to cease from molesting the archdeacon until the provincial council, which will soon be held, and at which the archbishop will do justice between them.

Dated at Armagh.

32. Grant to Flan Ocoffaych and his son John Ocoffaych. f. 6.

18 December, 1406. With consent and on conditions as in no. 22 the archbishop grants them the lands in his tenement at Armagh, formerly called the lands of Odechán, but now the lands of M'keltan, lately occupied by Geoffrey M'keltan, who was deprived of them by Archbishop John (Colton) for the murder of his bailiff in Armagh, at an annual rent of 6s. 8d. payable 1 November and 1 May.

Sealed by the archbishop and the chapter. Dated at Armagh.

33. Collation of the vicarage of Dineluran, vacant by the death of Sir **20 December, 1406.** Henry Oconelan, to Donald Oconelan, clerk. f. 6.

He is to be inducted by the Dean of Armagh.

Dated at Armagh.

34. Letter of excommunication and interdict. f. 6r.

2 January, 1407. The archbishop, guardian of the spirituality and temporality of the bishopric of Dromore, *solo coeunte*, informs Masters T. Omestead, Archdeacon, and Patrick Okellaid, canon of Dromore, and Sir Milo, vicar of Drumgore in the diocese of Dromore, that Odo Magynassa (*in titlo* M^ogenessa), captain of his nation, had made hostile entry into the archbishop's lands and the city of Armagh, and among other crimes had taken Philip M^o [*spici in MS.*], citizen and native of Armagh, prisoner, and detained him till he paid ransom; and commands them (1) to warn Magynassa that within 10 days he is to make due amends to the archbishop and Philip, or come to reasonable agreement with the former in the matter; (2) if this warning is unheeded, to denounce him as excommunicate in the principal places of the diocese of Dromore, and warn him that he must give satisfaction for his crimes to the archbishop and Philip, within the 40 days following the said 10 days; (3) if this warning is ineffective, at the end of the 40 days to place all his lands under an interdict.

Dated at Atrium Dei.

35. Letter to Odo (Magynassa). f. 6r.

18 December, 1406. Recounts the capture of Philip M^oenabid (*in titlo* M^onab), as in no. 34, on the occasion of a recent war between Magynassa and Catholicus Oneyll, the ransom extorted from Philip being stated to have been 40 marks in money and in kind (in argento et in precio). Magynassa is

exhorted to make due amends to the archbishop and Philip, to the end that the archbishop may not be compelled to proceed against him with ecclesiastical censures.

Dated at Armagh.

The year is not given in the date, but it is fixed by no. 34.

36. Grant to the citizens of Armagh. f. 7.

19 December, 1406. They are granted three parts of the vault (*volte* [*above line seu*] *ecclesie* [*above line seu*] *inferioris domus terrestris* [i.e. "under-ground house" ?] *nuncupate*) under the chancel (*cancellò*) of St. Patrick's Church, Armagh, for the archbishop's life, for keeping goods, on condition of their being obedient, pleasing and faithful to him and his church, the fourth part being reserved to the archbishop for keeping the jewels (*ioalibus*) of the church and other things.

Dated at Armagh.

37. Grant to Master J(ohn) Ocorre, Prior of the Colidei of the church of

19 December, 1406. Armagh. f. 7.

He is granted in farm the church of Dyrebruchisse *alias* Okaregan, appropriate to the archbishop's mensa. He is to pay a rent of 2 marks a year, payable 1 November and 1 May, and to bear all the burdens of the church which pertain to the archbishop.

Dated at Armagh.

38. Note. f. 7v.

20 December, 1406. Sir Cornelius Ohynneri had collation of the rectory of Thomlachthilistyr, vacant by the resignation of Master Pèter Omolchallynd.

39. Memorandum. f. 7v.

December, 1406 (?) States that Philip M^enabbid and Donald, his son and heir, have a charter of the archbishop for the lands of Okynnechann, at a rent of 5s.

The place in the Register of this document (which is in the same hand as nos. 36-38, 40-42) suggests a date about 20 December, 1406. This appears to receive some support from nos. 34, 35, from which we learn that on 18 December Philip M^eNab held land from the archbishop.

40. Grant to Master Lucas Ocassaly (*in title* *Ocassali*), canon of Armagh,

19 December, 1406. of a pension of 10s. a year. f. 7v.

The pension is given for services rendered and to be rendered. It is to be paid out of the archbishop's lands of Tyrry in his lordship of Cloyndawyll, and is to continue till Ocassaly is promoted to an ecclesiastical benefice, if he be obedient, pleasing, and faithful to the archbishop.

Dated at Armagh.

41. Memorandum. f. 7v.

29 December, 1406. States that at Atrium Dei Laurence Ofergalich, clerk, had collation of the rectory of Areguldakerog, vacant by the death of Master

Dionysius M^ckamuyll, and a mandate for induction, of same date, addressed to the Dean of Armagh.

42. Citation for an ordinary visitation. f. 7v.

31 December, 1406. The visitation, begun in the metropolitan church, will be continued in St. Peter's church, Droghda, 13 January. The apparitors of the deanery of Droghda are to cite the clergy, and the usual number of laymen from each parish.

Dated at Atrium Dei.

A note states that similar letters were sent (1) to the apparitors of the deanery of Atrium Dei for 17 January, and (2) to those of the deanery of Dundalk for 20 January. The letters were addressed to the apparitors because there were then (*pro tunc*) no deans in the diocese among the English.

43. Appointment of Master William Mowner, LL.B., as official principal of **22 February, 1407.** the archbishop's court. f. 8.

Dated at Atrium (*sic*).

44. Letter of excommunication and interdict. f. 8.

February × March, 1407 (?). Since in the presence of A(rthur MacCawell), Bishop of Clogher (Clocheren.), Thomas (O'Loughran), Dean of Armagh, John (O'Corry), Prior of the Colidei, and others of the chapter, the colidei of Armagh, and many others, in the monastery of St. Peter and St. Paul, Arthur, son of Catholicus Oneyll, swore on the Gospels, the crosses of St. Patrick, and many other relics that he would restore to the archbishop, the citizens of Armagh, and the archbishop's herenaghs the lands of Omartenan Ocophi, the lands of the sons of M^cgillamur, and other portions of lands belonging to the church of Armagh; and since the archbishop has been informed that Arthur and his men, viz.: Cornelius M^cpersone (? M^cpersore), Catholicus M^cgyllachony, Neyr Oconnaghy, Niallan M^cgyllagchony, and others still detain the lands; therefore the dean, the prior, the rest of the chapter, and the colidei are directed, during mass on three occasions to warn the persons named and their accomplices that they are to restore the lands within eight days on pain of excommunication and interdict. If they do not obey, the excommunication and interdict are to be published.

The end of the document, including the date, is lost.

The only clue to the date is the position of the document in the Register.

45. Names of persons ordained by the archbishop. f. 8v.

1407. In St. John's Church, Atrium Dei, on 19 February¹—?

Subdeacons—John Paker, Milo Ker, each on title of [*space*] marks. These were ordained deacons 12 March.

¹ This date is also given as the Saturday after "Festum Cinerum." This must mean the Saturday after the first Sunday in Lent, the regular day for Ordinations, which in 1407 fell on 19 February.

On 26 March—

Acolytes—Hugh Odonowhy, Carmelite, Nicholas Bege.

Subdeacons—John Cardyf, on a title of 5 marks, Thomas Gorman, on a title [*space*].

Deacons—Nicholas Lyon, Carmelite [*space for another name*].

Priests—John Paker, on “above” title, Milo Ker, on “above” title, Thomas Clintoun, Cistercian.

46. Letter of citation to J(ohn Dongan), Bishop of Down. f. 8^r.

April, 1407. Recites that St. Colman’s Church, Kylkeyll, in the diocese of Down, having been lately vacant by the death of the rector, Sir J(ohn) Chyne, and being in the presentation of King H(enry IV), the latter had presented thereto Patrick Oweyn, chaplain of the diocese of Meath, whose demand for admission and collation the bishop refused and gave collation and induction to Adam M^cburne. Oweyn appealed to the metropolitanical court of Armagh and demanded apostles. On the day fixed for the reception of the apostles the bishop neglected to deliver them to him. The bishop is therefore cited to appear on the Friday before 1 May, i.e. 29 April, and to show cause why the archbishop should not, of metropolitanical right, and according to the form of the royal mandate addressed to him, admit and grant collation and induction to Oweyn.

The date clause is omitted. But in the body of the document April is said to be “instant,” and 29 April to be Friday. The latter fact suits 1407 and 1412. The former year is obviously to be preferred. Oweyn was presented to Killeel 17 June, 1406. *C.P.R.I.*, 183, no. 95.

47. Letter of citation to Sir Adam M^cburne. f. 9.

April, 1407. Recites the facts recorded in no. 46, and requires M^cburne on the day fixed to show cause why the archbishop should not remove him from the church of Kylkeyll and grant admission, &c., to Oweyn.

The date is fixed in the same way as that of no. 46.

48. Collation of the rectory of St. Patrick’s church, of the diocese of **2 June, 1407.** Armagh, situated in Dyvelek [*in title, Divelek*] within the borders of the diocese of Meath, vacant by the death of Sir John Fox, to Sir Adam de Sancta Brigida. f. 9^r.

Dated at Athirde. Form as no. 8.

49. Mandate to Master Richard More, Archdeacon of Armagh, to induct **2 June, 1407.** the same into the said church. f. 9^r.

Dated at Athirde.

50. Commission to Sir William Smyth, vicar of St. Mary’s, Athirde, and **June (?) , 1407.** Sir John Dermot, rector of St. Mary’s, Dunbeyng, empowering them to receive clerks convicted of crime by secular courts within the diocese of Armagh, and to imprison them in the archbishop’s prisons according to the laws and customs of Ireland. f. 9^r.

Ends: "Datum etc. m^{mo} ecce^{mo} septimo et nostre consecrationis iiii."

The date as given above lies between 1 May, 1407, and 24 March, 1408; but the preceding and following documents point to June, 1407.

51. Petition of the archbishop, chaplain of Henry (IV), to the
11 July, 1407. king. f. 9^v.

Sets out that, though by divine right and the law and immemorial custom of the realm the cognizance (cognitio) and punishment of the crime of perjury and all mortal sins belong to the ecclesiastical court (forum), the king, on the false representation (suggestionem) of John Ruyn, by royal brief had prohibited the archbishop and his official from holding a plea of agreement (ne placitum conventionis . . . teneamus) against Ruyn (as appears in the brief, now sent by the archbishop to the king's court), because at the instance of Isabella Drumgoyl the archbishop has proceeded and intends to proceed to inflict the canonical penalty for perjury on Ruyn (as appears from the conclusion of the libel presented in the cause, a copy of which the archbishop sends to the king's court). The archbishop prays that the prohibition be revoked.

Dated at Athirde.

52. Letters patent certifying (*title says*, to the king's court) the excom-
19 June, 1407. munication of John Gret of Athirde. f. 10.

Dated at Athirde.

53. Letter certifying the absolution of the same. f. 10.
11 July, 1407. Dated at Athirde.

54. Institution of Sir Thomas Keyft, presbyter of the diocese of
20 October, 1406. Dublin, to the rectory of St. Columba's, Clonmore, vacant by the resignation of Sir Richard Kymmowr, chaplain, through his proctor John Plunket, and in the gift of King Henry (IV), the temporalities of the church of Armagh being in his hand.¹ f. 10.

55. Letter to Sir Richard Waspall, vicar of St. Mary's, Carlyngforde. f. 10^v.
c. 1 May, 1407. Recites the facts as given in the earlier part of no. 46, adding that Sir Patrick Owyn established his case, and was accordingly admitted and instituted, &c., as in no. 8. Waspall is to induct him.

The document is undated, but that its date is 29 April, 1407, or a few days later, may be inferred from no. 46.

56. Letter to certain persons of the diocese of Derry, whose names
1407. are omitted. f. 10^v.

Relates that, the church of St. Kennycus at Dromgossa, or Ro, having

¹ The form of institution runs thus: "N. &c. filio in Deo dilecto A. salutem &c. Ecclesiam de B. per &c. (as in no. 8) vacantem et ad presentationem D. spectantem, teque per eundem . . . presentatum ad eandem ecclesiam admittimus ac auctorizabiliter instituimus in eandem et per &c. (as in no. 8) eadem omnibus et singulis que de jure et consuetudine ecclesie nostre Ardmachane requiruntur primitus et legitime peractis et observatis decernentes &c. (as in no. 8)."

been collated by the archbishop to Master Odo M^ctaig, canon of Derry, Dermot Okaan disturbed him in his possession of it, and deprived him of the fruits. The recipients of the letter are ordered, if after due warning thrice repeated, Okaan does not desist from this action and make restitution within twenty days, to excommunicate him and his aiders and abettors in their churches and other chief places of the diocese, and to continue doing so until he receives absolution.

The date is determined by no. 14, and the position of the letter in the Register.

57. Letter of inhibition.

f. 10^v.

15 April, 1407. States that in a cause relating to the rectory of Regles, the parish church of Cluain, diocese of Ardagh, Sir Gelasius, rector thereof, had appealed from a decision of Edmund, Prior of Insula Magna, in the diocese of Ardagh (Ardakaden.), Sir Charles, Dean, and Sir Maurice, Archdeacon of Ardagh, executors specially deputed by the Apostolic See, the appeal being directed to the Apostolic See, and to the church of Armagh "tutorie interpositam." The appeal alleged that Andrew M^cquican had obtained the rectory from the Apostolic See by false suggestion, and that, the foregoing having been deputed as executors, Maurice proceeding alone, without citing Gelasius, deprived him and intruded M^cquican. The executors and all clerks and laymen of the diocese of Ardagh are therefore inhibited from disturbing Gelasius in the possession of the rectory, and John M^ccanybrewyll, Sir Trenotus, chaplain of Cluain, and the other parishioners of Regles, are admonished under pain of excommunication to be obedient to him, while the appeal remains undecided.

Dated at Adthyrd.

58. Letter of excommunication.

f. 11.

8 August, 1407. John (O'Flannery), Bishop of Derry, having complained that Bernard, son of Bernard, son of Henry Oneyll, and others, together with their accomplices, had laid violent hands upon him, despoiled him of clothing, horses, and other goods, bound his hands behind his back and taken his rings off his fingers, and had ordered his clerks who were in his company to be ill-treated and slain, the archbishop excommunicates Bernard, his followers, and their accomplices, and commands Masters Thomas Oluheran, Dean of Armagh, and William M^ckamayll, official of the deanery of Tyllaghog, and the secular clergy of that deanery to denounce them as excommunicate on Sundays and festivals in their churches and other solemn places, with cross erect, bells and candles, until they receive absolution or other order is issued by the archbishop.

Dated at Athyrde.

59. Letter in favour of quaestors.

f. 11.

10 August, 1407. The priors, abbots, and secular clergy of the diocese are exhorted to receive and assist proctors of the sick in the Hospital of St. John outside the new park of Dublin, who come seeking for alms. "Parochiani" of the archbishop, and others whose diocesans ratify the indulgence, visiting the aforesaid sick, or giving or procuring contributions for their sustenance, are to have a relaxation of forty days of penance.

Dated at Athyrde.

60. Letter to the rectors, vicars, chaplains, and farmers, or their deputies.
August (?), 1407. of the deanery of Erthir. f. 11^v.

Since from information given by the dean and chapter it appears that the apparitor of Armagh was entitled to have from each of them yearly a sheaf (gelimam) and two fleeces (vellera), a penny out of every oblation, and a pall (pallium) from every newly beneficed person inducted by him, they are commanded to pay these fees and accustomed dues to Laurence Olathagan, now apparitor. Those not paying within a month after the date at which they are due shall incur sentence of greater excommunication.

The date is an inference from the position of the document in the Register (see nos. 59, 63, 64). Nos. 60-63, and apparently also no. 59, are in the same hand.

61. Letter "for the Dean of Derry Okerrolan" (*so contemporary title: the August (?), 1407. name does not appear in the text.*) f. 11^v.

Gives counsel to all laymen in the diocese of Derry that they should not meddle with (intromittere de) the rents or fruits of the deanery, that Odoghirty should adhere to the dean to whom the Chapter of Derry adheres, and that they should permit those who are litigating about the deanery to divide the fruits between them until the cause is decided, because both the litigants, as the archbishop is informed, are 'apostolici' [i.e. have obtained letters of provision] and have processes containing severe censures.

The date is inferred on the same ground as that of no. 60. One of several rival deans had been provided 7 November, 1406 (*Papal Letters*, v. 114).

62. Letter to Master Thomas Omustead, Archdeacon, and Master J. August (?), 1407. M^egylboy, canon of Dromore, and Sir William, chaplain of St. Finian's, Viridecastrum. f. 12.

Recites that Sir Patrick Owen, chaplain, had been presented to St. Colman's Church, Kylkeyll, in the diocese of Down, by King Henry (IV); that one Adam M^ebrune had been intruded into the said church; that Owen had appealed from J(ohn Dongan), Bishop of Down, to the court of the archbishop, who had given sentence in his favour, and had also admitted him and invested him as in no. 8. The above are therefore commanded to admonish

all chaplains in St. Colman's church, and in chapels dependent thereon, and all parishioners thereof, that within eight days they give obedience to Owen as lawful rector, and pay to him or his proctors tithes great and small, oblations, and other obventions; and if this admonition is disregarded, they are to excommunicate offenders and their aiders and abettors, with cross, candles, and bells, at mass on Sundays and festivals, until they receive absolution.

Dated in the fourth year of the archbishop's consecration.

The date places this document between 1 May, 1407, and 1 May, 1408; and its contents prove that it is later than 29 April, 1407 (see no. 46). Its position in the Register points to August in that year.

63. Letter of the archbishop, guardian of the spirituality and spiritual c. 1 **September, 1407.** jurisdiction of the Bishopric of Dromore, *sede vacante*, to Master J. M^ogyllaboy, canon of Dromore, and Peter M^ogwyrin, clerk. f. 12.

States that Patrick Oweyn, chaplain, rector of St. Colman's, Kylkeyll, in the diocese of Down, has complained that Columba M^okartan, chaplain of the diocese of Dromore, received and receives the fruits of the chapel of Kylkeyll beye, which is dependent on St. Colman's, although while the case between Owen and Adam M^obrune was pending they were sequestered, and M^okartan therefore incurs sentence of greater excommunication. Therefore the above are to cite M^okartan to appear before the archbishop or his commissaries in St. John's Church, Atrium Dei, on the Monday after the Nativity of B.V.M., to answer the petition of Oweyn.

No. 62, and the position of the letter in the Register, indicate 1407 as the year. In that year the Monday after the Nativity of B.V.M. was 12 September; and it may be assumed that the citation was issued about a fortnight before that date. Hence the date is fixed.

64. Letter of the same, guardian of the spirituality and spiritual juris- **28 October, 1407.** diction and the temporality of the Bishopric of Dromore, *sede vacante*, to Master Patrick M^ogynd, canon of Dromore. f. 12^v.

M^ogynd is appointed the Archbishop's commissary and sub-guardian, with full powers, except only collations and deprivations of beneficed persons apart from (preter) the collation of three benefices now vacant or shortly to be vacant.

Dated at Armagh.

65. Letter of dispensation of the same, guardian, &c. (as in no. 63). **November, 1407.** f. 12^v.

States that the archbishop has received letters from Francis (Carbonus), cardinal presbyter of St. Susanna, penitentiary of Pope Boniface IX, written by the Pope's command, addressed to the Bishop of Dromore or his vicars in spirituals, and dated at St. Peter's, Rome, 1 November, 1403 (the opening words and the date quoted), and that by authority thereof, and having

satisfied himself of the fitness of Adam and Gilbert Magynd, brothers' scholars of the diocese of Dromore, he dispenses them so that, though sons of a priest and an unmarried woman, they may be promoted to holy orders major and minor, and that they may hold one ecclesiastical benefice each, even with cure of souls, provided that if either of them obtains such benefice he must get himself promoted to holy orders within the canonical time, and personally reside in the same.

Dated in the fourth year of the archbishop's consecration.

This letter is referred to in *Papal Letters*, vi. 476.

The date indicates the period between 1 May, 1407, and 1 May, 1408, and the place of the document in the Register suggests 28 October × 20 November, 1407. Of the genuineness of the letter of Carbonus referred to in it there seems to be no room for doubt. But it is curious that, according to Eubel (i. 37, 46), Carbonus ceased to be cardinal presbyter of St. Susanna in 1392 on his appointment as bishop of Sabina.

66. Letter of excommunication addressed to (Bishop) J. and others.
20 November, 1407. f. 13.

John (O'Flannery), Bishop of Derry, having complained that Cornelius Odoghirdy, captain of his nation, and his brothers, with their familiars, accomplices, and followers, have invaded and destroyed churches, lands, and possessions belonging to the bishop's mensa, and seized the rents and profits thereof, thereby incurring sentence of greater excommunication both by canon and by the constitutions of the Church of Armagh, the persons addressed are commanded (1) to admonish them to give satisfaction to the Bishop of Derry and to cease from such depredations within 15 days; (2) if this admonition fail, to denounce them as excommunicate in public and noted places, and to continue doing so till satisfaction has been made; (3) if the sentence of excommunication has been unheeded for 40 days, to place under ecclesiastical interdict all the lands and subjects of Cornelius and all places whither he or his brothers or accomplices may go.

Dated at Armagh.

67. Letter of excommunication of the archbishop, guardian of the **November × December, 1407.** spirituality and temporality (and) spiritual jurisdiction of the Bishopric of Dromore, *sede vacante*, to Masters P. M^cgynd, subcustodian in the same diocese, and J. M^cgyllaboy, canons of Dromore. f. 13^v.

Sir Patrick Oweyn, rector of St. Colman's, Kylkeyll, diocese of Down, having complained that Donald Oronaga (*in title* Oronoga) and Columba M^ckartan, chaplains of the diocese of Dromore, celebrate divine offices against his will in the chapel of Kylkeyll beic and elsewhere in the parish, and minister the sacraments to his parishioners, and usurp fruits, obventions, oblations, issues (proventus), altarages, and other profits belonging to the rectory; the above are commanded (1) to admonish Oronaga and M^ckartan to cease from such

acts and give satisfaction to Oweyn or his proctor or farmer for the fruits received by them, within 15 days; and if this admonition is ineffective, to denounce them as excommunicate in the noted places of the diocese; (2) to admonish Walter M'kartan and all other parishioners that they be answerable to Owen or his deputy or farmer, and to no other, for the fruits of the rectory; and if they disobey the monition, to excommunicate them, and to continue doing so till they obtain absolution.

The position of the document in the Register indicates 20 November × 30 December, 1407, as the date. It is certainly later than 28 October, the day on which M-gynd was appointed sub-custodian (no. 64).

68. Collation of the rectory of Killysill, vacant by the death of Sir **30 December, 1407.** Maurice Olucheran, to Maurice Olucheran, clerk. f. 14.

Dated at Athirde. Form as in no. 8.

69. Collation of the rectory of Dompnacfyre (*in title Dompnacfynire*), **December, 1407 × January, 1408.** vacant by the resignation of Master Magnellus Oneyll, to John Olucheran, clerk. f. 14.

Form as in no. 8. He is to be inducted by the Dean of Armagh.

The date is inferred from the place of the document in the Register.

70. Licence for non-residence to Laurence Ofergalaich, clerk, rector of **December, 1407 × January, 1408.** Aregul. f. 14.

The dispensation is for one year, a chaplain being appointed to serve the church.

The date is inferred from the place of the document in the Register.

71. Commission to John Logan, Abbot of St. Mary's, Mellifonte, **Early in January (?), 1408.** Master John Whythet 'sacre pagine professor,' William Mowner, LL.B., and Adam Elmeley, Prior of Colpe, as auditors of accounts. f. 14.

They are appointed in conformity with the decision of a convocation of the archbishop's clergy, held before him at Atrium Dei, that auditors should be deputed to audit the accounts (ad audiendum comptum seu ratiocinium) of collectors of subsidies granted by the said clergy to certain persons ecclesiastical or secular from the death of Primate John (Colton). They or any two of them are to audit the accounts and have power to coerce the collectors to render the same.

The date is inferred from the position of the document in the Register; it is clearly not a later insertion.

72. Citation addressed to the vicars of Kylsi, Cloinbroney, and Tagsenys, **c. 12 January, 1408.** and the parochial chaplains of Granard and Kyll, diocese of Ardagh. f. 14.

States that the archbishop had excommunicated Sir Donat (O'Farrell),

vicar of Kyll, for manifold contumacies of which he was guilty (when cited) before him at the instance of the Prior of Tristernagh, in the diocese of Meath, on account of the negligence of Adam (Leyns), Bishop of Ardagh (Ardakaden.),¹ and that the above had fulfilled his command, contained in letters patent, to denounce him as excommunicate in their churches on Sundays and festivals; and that Donat remains obdurate. The above are to cite him peremptorily to appear before the archbishop and show cause why he and every place to which he goes should not be placed under ecclesiastical interdict and himself pronounced incompetent to hold any ecclesiastical benefice.

For date see note on no. 73.

73. Interdict, addressed to the Dean of Ardagh (Ardakaden.) and **26 (?) January, 1408.** Master Florence M^mmurrerty, official of the court of Ardagh. f. 14^v.

States that the archbishop had excommunicated Sir Donat (O'Farrell), bearing himself as vicar of Kyll, for manifold contumacies, &c. (as in no. 72); that in noted places in the diocese of Ardagh he was denounced as excommunicate in accordance with the archbishop's letters patent; that the archbishop caused him to be cited to appear before him or his commissaries on the Thursday before 2 February at St. Peter's Church, Droghda, to show cause why sentence of interdict should not be passed upon him; and that, Donat not appearing, Master William Mowner, special commissary of the archbishop, at that time and place pronounced him contumacious, and placed under interdict all places and parishes to which he should come, as long as he should be in them. The archbishop confirms Mowner's decree, and commands the above to denounce Donat as under interdict in the principal places of the diocese of Ardagh, and to admonish all to have no dealings with him.

Their position in the Register suggests for nos. 72, 73 dates between January and May, 1408 (see nos. 68, 75). In that year the Thursday before 2 February was on 26 January. This document must, therefore, have been issued on that day or soon after it. No. 72, which appears to be the citation here referred to, may be placed earlier in the same month. These dates are in harmony with no. 129, from which it appears that the excommunication was issued in or before August, 1407.

74. Letter of excommunication and interdict addressed to the Dean, Prior **January × May, 1408.** of Colidei, canons and colidei of Armagh and the abbots, priors, and secular clergy of the diocese and province. f. 15.

States that Maurice, son of Catholicus Oneyll, and his brothers Rory and

¹ "Quia cum alias nos dominum Donatum . . . propter suas multiplicatas et manifestas contumacias coram nobis ad instanciam prioris de Tristernagh . . . ex negligentia . . . Ade episcopi Ardakadensis . . . contractas excommunicaverimus." The corresponding words in no. 73 are: "Quia nos alias dominum Donatum . . . propter defectum et negligentiam . . . A . . . episcopi Ardakadensis . . . ad certos diem et locum coram nobis peremptorie citatum ad instanciam prioris et conventus de Tristernagh . . . propter suas manifestas et multiplicatas contumacias ad instanciam dictorum prioris et conventus contractas . . . excommunicaverimus." Cp. no. 129. For the meaning of cp. no. 132.

Arthur Oneyll, took oath on the Gospels, the chalices, the "crux dominica," and other relics, that within a term long since past they would restore to the archbishop and his tenants, true natives of the same, the lands of the church of Armagh usurped by them, and pay each his own portion of the rents for the time during which they had kept possession thereof, and that they would desist from violence towards the tenants; and that this oath has not been fulfilled. Therefore the above are commanded (1) to admonish Maurice, Rory, and Arthur, by name and expressly, that within twelve days they act in accordance with it, and give satisfaction to the tenants for injuries inflicted on them, and do public penance for their perjuries; (2) if this monition prove ineffectual, to denounce them at mass as perjurers and excommunicate, and to place their lands and all lands in which they shall tarry under ecclesiastical interdict, and to admonish the faithful to have no dealings with them.

The date is inferred from the position of the letter in the Register.

75. Letter of the archbishop, guardian of the spirituality of the Bishopric **12 May, 1408.** of Dromore, *sede vacante*, confirming [*space in MS.*] in the vicarage of Dromard (*in title*, Dremard; *elsewhere* Drumard), diocese of Dromore. f. 15^v.

Dated at the manor of Dromeskyn.

76. Letter of inhibition and citation to R(obert Montayne), Bishop of c. **25 June (?)**, 1408. Meath. f. 16.

States that William Mollys (*also written Molys*), clerk of the diocese of Meath, proctor of (Richard: *named as one of the litigants lower down, but omitted in the list at the beginning of the letter*), Philip Rede, Peter Sower, Donald Red, and Sir Matthew M^ocu, parochial chaplain of Lercor, diocese of Meath, exhibited to the archbishop, in the chapel of his manor at Dromeskyn, an appeal in his own name and theirs, from the hearing of the bishop to the court of Armagh, in regard to injuries inflicted by the bishop on him and them. The appeal having been admitted the archbishop inhibits the bishop from taking further action while the case is pending, and cites him to appear at St. Peter's Church, Droghda, on the Monday "after the feast," etc.

The day for which the bishop was cited must have been shortly before Thursday, 12 July, 1408 (see no. 77). And since it was Monday, it cannot have been later than 9 July. The citation was probably issued about a fortnight before it (cp. nos. 78, 79). Hence the date is determined.

77. Apostles granted to Robert (Montayne), Bishop of Meath. f. 16^v. **12 July, 1408.** The archbishop informs Pope Gregory (XII) that he had received the appeal of Philip Rede, William Molys, clerk, Peter Sower, and Donald Rede, of the diocese of Meath, and had inhibited and cited the bishop as in no. 76. The bishop having thereupon frivolously appealed to the Apostolic See, the archbishop grants him this writing in place of apostles

(hanc scripturam loco apostolorum refutatoriorum), though the appeal being frivolous the case still proceeds in his own court.

Dated at Droghda.

78. Letter of citation of the archbishop, delegated as one of the principal conservators of the Order of St. Mary of Mount Carmel in Ireland, to Sir Thomas, parochial chaplain of St. James', Athboy, diocese of Meath, and Sir William Byng. f. 16.

They are commanded to cite the persons commonly called Sir Richard Cristofore and Sir Gregory Lameragh to appear before him or his sub-delegate in St. Peter's Church, Droghda, on 1 October, to answer the petition of the prior and brethren of the above order at Athboy with reference to injuries inflicted by them upon the petitioners.

Dated in the manor of Dromeskyn.

79. Letter of inhibition to N(icholas MacBrady), Bishop of Kilmore 15 September, 1408. (Triburnen.). f. 17.

States that Augustine (*also written* Augustus) M^cbrady, vicar of Dronge and Learath in the diocese of Kilmore, presented to the archbishop, sitting in St. John's Church, Athirde, an appeal from the hearing of the bishop to the court of Armagh. The appeal having been admitted, the archbishop inhibits the bishop from taking further action while the case is pending, and cites him to appear at St. Peter's Church, Droghda, on 1 October. He desires the bishop to cite N. M^cbrady, Andrew M^cbrady, Patrick M^cgramragran, and all others who have an interest in the case, for the same place and time.

80. Commission to John Flemyng of Mortoun and Richard Whyt of November (?), 1408. Kylmon as supervisors of the tenants of the archbishopric. f. 17.

They are to supervise as well free tenants and farmers as gavellers throughout the diocese among the English. They have power *inter alia* to receive rents from tenants and receivers and to audit the accounts of seneschals, bailiffs, provosts (prepositorum), receivers, sergeants, and other servants, to arraign (arreneandi) the archbishop's lands, to demand the ameracements of his courts, to seek the "cu^r"¹ of his tenants from the courts or hundreds of other lords, &c.

The position of this document in the Register points to a date between September and November, 1408. It is in the same hand as nos. 79, 81. The latter month is suggested by the fact that Flemyng was with the archbishop, and about to set out for the diocese of Meath, on the 26th (see no. 85).

81. Grant, with the consent of the dean and chapter, to Philip M^cenabbid

¹ This word seems to have been written in error. It is an abbreviation of "curias," which occurs in the immediate context, but does not give good sense here.

2 December, 1408. (*in title*, M^cnabbud) and his son Donald of the lands which Osochaid held in the archbishop's tenement at Armagh. f. 17^v.

It is to be held for their life, on the conditions set out in no. 22 (omitting clauses concerning mortgage and re-entry), at a rent of 9*d.* a year English, payable 1 November and 1 May.

Sealed by the archbishop and the chapter. Dated at Termefeghyn.

82. Institution of Sir John Trimnet, priest of the diocese of Meath, to the **19 October, 1408.** vicarage of St. Feghin's at Termefeghyn, vacant by the death of Master Richard More, and in the gift of the Prior and Convent of St. Mary's Loueth, O.S.A. f. 17^r.

He is instituted, and invested as in no. 8.

Dated at Termefeghyn.

83. Certificate of the ordination of John Paker (*also written* Pakker), **26 March, 1407.** acolyte, a native of the diocese of Armagh, as recorded in no. 45. f. 18.

Dated at Athirde.

Wrongly dated 2 February. The date given above is that of his ordination to the priesthood, which occurs in the body of the instrument and in no. 45.

84. Letter to Master William Mowner, LL.B., the archbishop's official, **3 December, 1408.** directing him to make inquiry about the rectory of St. Columba's, Carrek, to which Richard Bagot had presented Sir Bartholomew, priest. f. 18.

He is to inquire, (1) into the qualifications of Bartholomew, (2) whether the rectory is vacant, (3) how and when it became vacant, (4) who is the true patron, and to whom the presentation belongs for this turn, (5) who made the last presentation, (6) whether the rectory is "pensionary" or "portionary."

Dated at Dromeskyn.

Incorrectly headed "Mandatum de inquirendo super vicaria predicta."

85. Citation of Robert (Montayne), Bishop of Meath, for a metropolitanical **19 November, 1408.** visitation of his diocese. f. 18^r.

The bishop is to appear in St. Patrick's Church, Trym, on 11 March, 1409, if that be a juridic day; if not, on the juridic day next following; and to cause the Archdeacons of Meath and Kenlis and the clergy, with laymen from each parish of the deanery of Trym, to be cited for the same day. The clergy of the other deaneries are to be warned to be ready for visitation. The bishop and his clergy are to pay 60 marks by way of procurations at the beginning of the visitation, according to the form of composition between the archbishop and the bishop and clergy of Meath on this matter.

Dated in the manor of Dromeskyn.

Prefixed is a memorandum that on 26 (19 is written but crossed out) November this letter was handed to John Flemyng of Mortoun for delivery to the bishop.

86. Note.

f. 19.

1416. John (MacCormack) Bishop of Raphoe (Rathpoten.) took oath of fealty to the archbishop in the chapel of the manor of Dromeskyn, 2 March, 1416, in the presence of Masters Henry Logan and Philip M^cgowyn and Sir Nicholas Alisaundyr.

This is a side-note, written between nos. 85 and 87, and is obviously a later insertion.

87. Form of oath of fealty to the same taken by Richard (Messing), Bishop

11 November, 1408. of Dromore.

f. 19.

88. Memoranda.

f. 19.

11 November, 1408. The foregoing oath was taken by Richard (Messing), Bishop of Dromore, in the archbishop's manor, 11 November, 1408; and by his immediate successor, John (Curlw), 4 January, 1411.

The last words are a later addition.

89. Letter to Richard (Messing), Bishop of Dromore, presenting Sir John **November, 1408.** Om^ccrela, priest, to the rectory of St. Archanus, Domnachmore, diocese of Dromore, vacant by the death of [*space in MS.*].

f. 19.

Dated in the manor of Dromeskyn.

A space is left for the day of the month in the date.

90. Memorandum.

f. 19.

3 February, 1419. Cornelius (O'Farrell), Bishop of Ardagh (Ardakaden.), took oath of fealty to Archbishop John (Swayne) in his manor (?) at Athboy in the presence of Richard Whyt, seneschal, Master William Gylton, and William [. . . .], etc.

This is written in the lower margin, and in a different hand from that of no. 89.

91. Letter of the archbishop, general delegate of the Apostolic See in **November × December, 1408.** regard of an appeal.

f. 19^{*}.

The appeal arose out of the fact that Robert Meygyr, priest, of the diocese of Meath, despoiled Sir Nicholas Gornow, vicar of St. John Baptist, Clonmalwey (?) in the same diocese, of his vicarage. The archbishop's letter is addressed to the abbots, priors, secular clergy, tabellions, notaries public, and clerks of the dioceses of Armagh and Meath, and Thomas Chambyr, the archbishop's apparitor.

The body of the letter has not been copied, though space was left for it.

The date is inferred from the place of the letter in the Register (see nos. 89, 94).

92. Letter of the same to the Lord (domino) Laurence Ratholdi of **c. August, 1411.** Pastoch in the Kingdom of Hungary (Ungarie).

f. 19^{*}.

Permits the latter to have a chaplain for hearing his confessions.

Written in the space left for the completion of no. 91. The letter is obviously a good deal later than no. 178, and was most probably issued at the time when that document was copied into the Register, i.e., apparently, the third quarter of 1411.

93. Letter of Thomas (Cranley) Archbishop of Dublin. f. 19r.

20 December, 1408. States that Sir Richard Ragg, Archdeacon of Armagh, and Master William Pyrroun, Precentor of St. Patrick's, Dublin, desire to exchange benefices, and requests the archbishop to act for Cranley in the proceedings connected with the proposed exchange.

Dated at the Palace of St. Sepulchre, Dublin. The year is also described as the twelfth of the consecration of Cranley.

94. Collation of the archdeaconry of Armagh, vacant by the resignation, **4 January, 1409.** with a view to exchange as in no. 93, of Sir Richard Rag, to Master William Pyrroun, Bachelor of Decrees. f. 20.

He is instituted, and invested as in no. 8, but there is no reference to induction.

Dated at Dromeskyn.

95. Collation, under authority of Thomas (Cranley), Archbishop of Dublin, **(4) January, 1409.** of the Precentorship of St. Patrick's, Dublin, vacant by the resignation, with a view to exchange as in no. 93, of Master William Pyrroun, to Sir William Rag. f. 20.

He is instituted, and invested as in no. 8, the reception of his profession of canonical obedience and his induction being reserved to the Lord Dean of Dublin.

Dated at Drummeskyn.

96. Certificate of the induction of Master William Pyrroun to the **4 January, 1409.** archdeaconry of Armagh by the archbishop. f. 20r.

97. Commission to Sir Thomas Kyft, rector of Clonmore and John Jordane, **March × April, 1409.** clerk, for collecting a subsidy in the deanery of Droghda. f. 20r.

States that the clergy of the diocese of Armagh, at a parliament held at Kylkenny on the Monday after 13 January, had granted a subsidy of £10 in aid of the Irish war to Sir Thomas of Lancastre, seneschal of England, and lieutenant of the king in Ireland, and that by certain assessors, elected by the clergy for the purpose, this subsidy had been assessed at 2s. 6d. in the mark according to the ancient taxation, now current, of spirituals and temporals, and 12d. out of every carucate of land of free tenants (tenentes; l. tenentium) of the clergy.

The date cannot be inferred from the place in the Register, since the document has the appearance of being a later addition. But the mention of Kyft as rector of Clonmore proves that it is earlier than 18 March, 1411 (see no. 155). It is therefore unlikely that the parliament referred to was held

so late as the middle of January in that year, though this is just possible (compare the dates in no. 108). The parliament cannot have been held in 1410, since a similar subsidy was granted on 21 May of that year at Dublin (no. 108). Hence, 1409 is the most probable year. The position in the Register actually suggests a date between January and June of that year (see no. 99). Assuming the year to have been correctly determined, the date of the parliament would be 14 January, 1409; and judging from the analogy of no. 108, the present commission may have been issued about ten weeks later (25 March).

98. Note.

f. 20^v.

1410 (?). Simon M^cgrayn held the church of Cranstheyl for three years without being promoted to holy orders, and was admonished.

This note is written at the foot of the verso of the last leaf of a gathering in a hand which differs from those of nos. 96, 97. Hence no inference can be drawn as to the date from those of the preceding and following documents, except that it is probably not earlier than no. 97. It is not improbably of about the same date as no. 135.

99. Indulgence.

f. 21.

29 June, 1409. Grants forty days of indulgence from enjoined penances to all the faithful, being in a state of grace, whether the archbishop's own "parochiani" or others whose diocesans have confirmed this indulgence, who shall contribute or procure contributions towards the rebuilding of the bridge of Novan (*in title Navan*) lately broken down by a flood.

Dated at Droghda.

100. Letter of the archbishop in his metropolitical visitation of the **11 March, 1409**. diocese of Meath. f. 21.

States that during the visitation he caused Sir Thomas de Evertoun, (*also written* Everdoun), priest, rector of St. Mary's, Kyldalk, diocese of Meath, to be cited to appear before him and exhibit his letters of holy orders, and his title to the said rectory. Evertoun appeared accordingly, and exhibited the instruments, and produced witnesses in support of them. The archbishop therefore pronounces sentence (quoted) that he received all holy orders at proper intervals of time, and is rightful rector.

Dated at Trym.

101. Letter of King Henry (IV).

f. 21^v.

23 April, 1409. Reginald Gutter, having been found guilty of felony in the king's court by twelve lawful men, pleaded privilege of clergy. The archbishop is commanded to proceed to his purgation.

Ends: "Teste fratre Thoma le Botiller Priore Hospitalis sancti Johannis Jerusalem in Hibernia deputato carissimi filii nostri Thome de Lancastre senescalli Anglie locum nostrum tenentis terre nostre Hibernie apud Dublin," &c.

102. Letter of Henry IV to Pope (Gregory XII).

f. 22.

12 November, 1408. The king announces his intention of taking part, as other princes also intend to do, in the efforts that are being made by the

College (of Cardinals) to restore peace to the Church. Having taken counsel with his son (Henry, Prince of Wales), and the prelates and nobles of the kingdom, (Francis Uguccioni), Cardinal of Bordeaux, being also present, and with their unanimous assent, he demands of the Pope, whose cause he had hitherto embraced, that for the avoidance of scandals—not so much of the Church as of the Apostolic See—he will appear in the spirit of humility at the place (Pisa) and time (25 March, 1409, when the General Council had been appointed to meet), in order to fulfil his vow and oath (taken both before and after his election as Pope, that he would resign the papacy). He states that since the cardinals of both colleges have come to an agreement, and almost (quasi) all Christian princes show themselves ready to help them, union will certainly be attained; and that it is inexpedient for him to stand aloof from the other orthodox princes by not sending ambassadors and prelates to the council. He reminds the Pope of the danger to souls caused by a continuance of the schism, and of the slaughter of Christians—estimated at not less than 200,000 persons—which it has occasioned; in particular of the death of 30,000 persons in a contest for the bishopric of Liège between adherents of the Pope and the anti-pope. He calls on the Pope to suffer the loss of the honour of the Apostolic See rather than the repetition of such horrors in the future. And he mentions the creation of nine new cardinals, which, “using the words of others,” he calls a violation of the Pope’s vow and oath.

Dated at the Palace of Westminster.

The earlier part of this letter was written on a leaf now lost. But a short summary of it is given in a letter of Henry IV to the clergy of Aquitaine, giving instructions for the sending of representatives to the council, dated 24 December (Rymer viii, 567), and in almost identical terms in a letter to the Emperor Rupert, urging him to attend the council, of date 9 November, 1408 (Martène and Durand vii, 887). A copy of the present letter is stated to have been enclosed with the latter. From these summaries some particulars have been supplied which must have appeared in the portion now lost. The latter shows that the letter must have been drafted some days before the date which appears in the text. In the date the year is omitted; but it was obviously 1408.

103. Letter to A(rthur MacCawell), Bishop of Clogher (Clochoren.; *in* 6 January, 1409. *title* Clogheren.). f. 22^v.

States that the archbishop has received from the cardinals of the sacred Apostolic College letters addressed to him and his suffragans and to the abbots, priors, and other prelates of his province, exempt and non-exempt, to the effect that the cardinals, together with the cardinals of Peter de Luna, called Benedict XII [*sic*], desiring peace in the Church, have decreed that there shall be a General Council as a means thereto, to be held at Pisa at the feast of the Annunciation (25 March). The archbishop therefore cites the bishop, and commands him to cite his dean and chapter and clergy to appear before the archbishop in St. Peter’s Church, Droghda, on 29 January, to elect

proctors and messengers (nuncios) to be sent to the council, and to make provision for their expenses.

Dated at the manor of Dromeskyn.

A note states that similar letters, bearing the same date, were sent to the bishops of Connor (Cuneren.), Down (Dunen.), Raphoe (Rapoten.), Ardagh (Ardakaden.), Kilmore (Triburnen.), and Clonmacnoise (Cluanen.), and to the chapter and clergy of Derry (Deren.).

104. Letters appointing Robert (Montayne), Bishop of Meath, and Master c. **29 January, 1409.** John Whythed, S.T.P., as proctors at the Council of Pisa. f. 22^v.

The archbishop writes in his own name and that of the clergy of the diocese of Armagh, and of the dean and chapter¹ of Armagh, and in the name and place of Arthur (MacCawell), Bishop of Clogher (Clochoren.), Nicholas (MacBrady), Bishop of Kilmore (Triburnen.), and Adam (Leyns), Bishop of Ardagh (Ardakaden.).

For the date see no. 103.

105. Appointment of Sir Thomas Haddesors, vicar of Stabanan, and c. **September, 1409.** Richard Whyt, clerk, proctors of the archbishop in a parliament to be held at Dublin, 14 October. f. 23.

The date given above is based on the supposition that the parliament referred to was that which was held at Dublin, 11 Henry IV (Berry, i. 516 ff.). But it is possible that it relates to a parliament in 1408. It must in any case belong to the later part of the year, and therefore, in whatever year it is placed, it interrupts the chronological sequence.

106. Citation for a metropolitical visitation of the deanery of Seryn in the **12 March, 1409.** diocese of Meath. f. 23.

The archbishop, having begun his visitation on 11 March in St. Patrick's church, Trym, commands the dean of Seryn to cite the rectors, vicars, and chaplains of his deanery, together with laymen from each parish, to appear at St. Columba's church, Seryn, on 20 March.

Dated at Trym.

The heading states that the citation was directed to the apparitors of the diocese.

A note adds that similar citations were issued to the dean of Rathtouth for 21 March, to the dean of Dyuelek for 22 March, and for 23 March at Pontana.

107. Citation of Nicholas (MacBrady), Bishop of Kilmore (Triburnen.), for **9 July, 1409.** a metropolitical visitation of his diocese. f. 23^v.

The bishop is to cite his clergy and to appear with them at St. Patrick's church, Moybolg, on 18 July, or the juridic day next following. He is also to

¹ "Decanus et capitulum"; no doubt an error for "decani et capituli."

cite David, claiming to be Bishop, and Master Thomas, Archdeacon of Kilmore.

Dated at Droghda.

108. Commission to Andrew Keppok, rector of Baronnistoun, to collect
31 July, 1410. a royal subsidy in the deanery of Dundalk. f. 23^v.

The subsidy had been granted by the archbishop's clergy to Thomas le Botiller, prior of the Hospital of St. John of Jerusalem in Ireland, at a parliament in Dublin on 21 May, and amounted to 17 (decem et ceptem) marks in the name of reward (regardi) for his labours for the commons of Ireland. To this exempt and non-exempt and free tenants, gavellers, and owners of personal or real property (catallarii) of the clergy shall contribute. It has been assessed by assessors elected by the clergy at 2s. in the mark, according to the ancient taxation, and 12*d.* out of every carucate of land as well of temporal persons as of free tenants of the clergy.

This document, if it is correctly dated, is not in its proper place according to the chronological arrangement; and it is certainly not a later insertion. The year is, as usual, given in two forms— as 1410 A.D. and the seventh of the archbishop's consecration—which are in agreement.

109. Letter of the archbishop in his metropolitanical visitation of the
11 March, 1409. diocese of Meath. f. 24.

States that during the visitation he caused Sir Thomas Bache, Archdeacon of Meath and rector of St. Columba's, Kenlyns, in the diocese of Meath, to be cited to appear before him and exhibit his title to the said lawfully united benefices. He appeared accordingly, stated that he was 60 years of age, exhibited the instruments, and produced witnesses in support of them. The archbishop therefore pronounces sentence (quoted) that he is rightful archdeacon and rector.

110. Letter of Robert (Montayne), Bishop of Meath, regarding the Priory
15 October, 1405. of Nova Villa, near Trym, O.S.A. f. 24^v.

States that the priory being vacant by the resignation of Leonard Goldyng to him, he granted to the convent licence to elect a prior; whereupon the convent elected Thomas Scurlag, a canon of the priory. But Master Richard Rath, clerk, LL.B., rector of Rathfagh, in the diocese of Meath, having been appointed by the bishop his commissary to inquire into the lawfulness of the election, found that it was uncanonical and quashed it, and declared that the appointment for that turn devolved upon the bishop. Subsequently Rath, by the authority of the bishop, provided Scurlag to the priory, instituted him and invested him by giving him his gloves, and decreed that he should be installed by the archdeacon.

111. Bull of Pope Innocent (VI) on behalf of the Prior house of St. Peter at
30 April, 1353. Novimidia, near Trym, the cathedral church of Meath. f. 24^v.

Since the prior and convent have not the means of completing the work begun by Simon (Rochfort), Bishop of Meath, the Pope exhorts the Irish bishops and clergy to receive and assist their proctors or messengers, and to forbear from receiving similar emissaries from other houses. Further, following the example of Popes Alexander (III), Lucius (III), Urban (III), Clement (III), Celestine (III), Innocent (III), Gregory (IX), Honorius (III or IV), Martin (IV), and Nicholas (IV), he grants to all penitent and confessed persons relaxation of a year and forty days of enjoined penance, and the stations of the Roman Church, and to annual contributors to the above church dispensation for various classes of offences. In all places to which the proctors thereof may come, if they are under interdict, the offices shall be celebrated. All indulgences of his predecessors to that house are confirmed.

Dated at Lyons.

Since Pope Nicholas IV (1288-1292) is mentioned in the bull, it must, if genuine, have emanated from Innocent VI (1352-1362) or Innocent VII (1404-1406). Innocent V died in 1276, and Innocent VIII (1484-1492) is manifestly too late. Innocent VI is more probable than Innocent VII, since the letter of Boniface IX in favour of the monastery at Newtown in 1402 (*Papal Letters*, v. 490) is not mentioned, and since the document is dated in France. The year being described as the first of the Pope by whom the indulgence was granted, it would therefore be of the date 30 April, 1353. But the bull is almost certainly a forgery. Innocent VI was not at Lyons on the day just named, but at Avignon (see *Papal Letters*, iii. 458, 497). Moreover the Priory of Augustinian canons at Newtown was not founded till after the see of Meath had been transferred from Clonard to that place in 1202, according to a petition of the prior and convent, made about 1397 (*Papal Letters*, v. 75). The statement of the present document, that indulgences were granted in its favour by five popes earlier than Innocent III (1198-1216), is therefore manifestly false: and indeed it seems that the earliest document of the kind of which we have good evidence, is that of Boniface IX, already mentioned, half a century after the supposed date of the present letter. It may also be remarked that the Pope Honorius named in the bull, whether he be Honorius III (1216-1227) or Honorius IV (1285-1287), is out of place. The former was the immediate predecessor of Gregory IX, the latter the immediate successor of Martin IV. And lastly, royal, papal, and episcopal letters in favour of particular monasteries frequently rest under the suspicion of forgery (cp. Frere, i. 59 ff.)

112. Letter of the archbishop in his metropolitical visitation of the
15 May, 1409. diocese of Meath. ff. 25, 26.

States that during the visitation he caused Sir Thomas Fournays, priest, claiming to be rector of Rathmore, diocese of Meath, to be cited to appear before him and exhibit his title to the rectory and letters of holy orders. Fournays appeared accordingly, and exhibited the instruments, and produced witnesses in support of them. The archbishop therefore pronounces sentence (quoted) that he received all holy orders at proper intervals of time, and is rightful rector.

Nos. 111, 113, 114 extending over the latter part of f. 24^r, the early part of 25^r, and the whole of f. 25^r are in the same hand. Another hand has written nos. 115, 116 (occupying the latter part of f. 26^r): and a third, nos. 112, 117 (the end of f. 25^r, the beginning of f. 26, and f. 26^r). Hence it appears probable that originally the latter part of f. 25^r was left blank, nos. 110, 111, 113, 114 having been written on ff. 24^r, 25^r, and 25^v. Then another scribe inserted no. 112 on the blank portion of f. 25^r and the upper part of f. 26^r and no. 117 on ff. 26^r, 27. The portion of f. 26 which

he left blank was afterwards used by the scribe who wrote nos. 115, 116. These documents did not, however, fill the space, and consequently the lower margin of f. 26^r is abnormally large.

113. Presentation of Bartholomew Heyn, clerk, by Walter Plunket, (Lord) **11 April, 1409.** of Beaulieu, to the rectory of St. Brigid's, Beaulieu, vacant by the death of Sir Richard Frensch.¹ f. 25^v.

Dated at Beaulieu.

114. Letter of William Pyroun (*also written* Pyrroun), Archdeacon of **12 April, 1409.** Armagh, touching the presentation (no. 113). f. 25^v.

States that, the presentation having been made, he had held an inquiry, in accordance with a mandate from the archbishop, at St. Peter's Church, Droghda, on 12 April, 1409. Jurors: Sirs William Herdman, parochial chaplain, Richard Durant, rector of Felda, John Darcy, vicar of Dunlere, Bartholomew, rector of Carryk, Thomas Rosell, vicar of St. Peter's, Droghda, William Herdman, parochial chaplain of Kylsaran, Peter Tanner, chaplain of St. Mary's Chapel, Droghda, Nicholas Terovour (?), parochial chaplain of Balmakenni, and Richard Milward, parochial chaplain of Genonestoun, Henry Clyntoun of Dunlere, Henry Habirge of Beaulieu, Richard Whyt of Boly, John Syward, burgess of Droghda, Robert Loweyes of Serlestoun, Richard Fote and Henry Chambre. It was found that the church had been vacant by the death of Sir Richard Frenshe since 20 March, that Walter Plunket, lord of Beaulieu, had the right of presentation, and that he had made the last presentation, namely of Frenshe, that the church is neither pensionary, portionary, nor a subject of litigation, and that Heyn is duly qualified.

The instrument is sealed with the official seal (*sigillum officii officialitatis*) of the Archdeaconry of Armagh and dated at St. Peter's, Droghda.

115. Letter certifying that Patrick Cruys, subdeacon of the diocese of **10 May, 1410.** Meath, was promoted by the archbishop to the order of deacon, on letters dimissory from his diocesan, on Saturday of the week of Pentecost, 10 May, in the chapel of the archbishop's manor of Termefeghyn. f. 26.

• Dated at Dromeskyn.

The date of the ordination is wrongly described as Ember Saturday: it was the Vigil of Pentecost. Cp. no. 125. See also note on no. 112.

116. Letter appointing Sir Patrick Ocoyn coadjutor or tutor of Sir William **2 March, 1410.** Prout, vicar of Kylmodymok, who was blind and decrepit,

¹ The form of presentation is as follows:—“*Venerabili in Christo patri ac domino suo N. Vester humilis et devotus filius M. seipsum cum omni reverentia obedientia et honore tanto patri debitus ac devotus. Ad rectoriam ecclesie de B. per, &c., (as in no. 8) et ad meam praesentationem spectantem dilectum mihi in Christo A. vobis presento caritatis intuitu paternitatem vestram humiliter rogans quatenus dictum A. ad eandem ecclesiam admittere eundemque in et de eadem instituere et investire velit cum omnibus iuribus suis et pertinentiis universis ceteraque omnia et singula facere et exercere que vestro incumbunt officio pastoralis in hac parte cum gratia et favore. In cuius,*” &c.

and giving him the administration of the oblations, fruits, and issues (proventuum) of the vicarage. f. 26.

See note on 112.

117. Letter.

f. 26^v.

17 April, 1409. States that in his metropolitanical visitation of the diocese of Meath the archbishop caused the prior and convent of Lanthonia Prima, in Wallia, O.S.A., in the diocese of St. David's (Meneven.), to be cited as rectors of the churches of Colpe, Marinerestoun, Kylkervan, Nany, Clonalwey, Stamolyn, Ardkath, Rathbegan, Kylmessan, Kyleoly, Kyllowath, Delvyn, and half the church of Drumrath, in the diocese of Meath, to show title to these churches. They accordingly appeared by their proctor, Adam Elmeley, priest, canon of the same priory, who said they had obtained possession lawfully and had held it peacefully for forty years and more, and indeed from time immemorial, and at present hold it—as is notorious in the diocese of Meath. Documents having been put in and witnesses examined in support of them, the archbishop pronounced sentence (quoted) that they are the true rectors.

Dated "in ecclesia b(eate Marie de Droghda)", the clause being left incomplete.

Nos. 115, 116 being later additions, and this letter having been written immediately after no. 112 (see note there), the year (which is omitted in the date) is almost certainly 1409 (cf. nos. 114, 118). On the following day the visitation was proceeding in St. Mary's, Drogheda (no. 121).

118. Commission to [. . .] rector of Vastina, in the diocese of Meath, **30 April, 1409.** to act as the archbishop's proctor for punishing delinquents convicted in the metropolitanical visitation of Meath, now proceeding, in the deaneries of Molynger, Clonard, and Ardnurchyr. f. 28.¹

Dated at Molynger. The year is also described as the fifth of the archbishop's consecration.

119. Reply (roturum) to a royal letter for a council or parliament to **c. 19 April, 1409.** be held at Dublin on the Monday before St. George's Day. f. 28.

The archbishop, not being able to appear personally, as required, on account of the rebellion of the archbishop and clergy of Dublin against him with regard to the carrying of his cross and the right of primacy in the province of Dublin, appears by his proctors, Richard With and William Sottoun. He states that, since execution of the royal letter cannot conveniently be made to the Dean and Chapter of Armagh, and execution of similar letters has not been made in the past, inasmuch as they are mere Irish, the clergy of Armagh among the English appear by their proctor, Sir John Darci, vicar of Dunler.

¹ This leaf is without a number. It follows f. 65.

The place of this document in the Register suggests a date in April or May, 1409. In that year the Monday before St. George's day was 22 April. The letter must therefore have been written earlier in the same month. Darcy was then vicar of Dunleer (no. 114), and his successor in that living resigned 29 September, 1415 (no. 247). But if the parliament took place in 1409, there were apparently two parliaments in that year (see no. 105). The year 1410 is excluded (see no. 108).

120. Letter on behalf of the leper house (domu[s] seu casella) of St. Brigid, April (?), 1409. Kylbyxy, in the diocese of Meath. f. 28.

Exhorts the faithful in the deaneries of Fauoria, Molynger, Loñ, and Arnurchyr to give to the proctor of the house when he comes to them, and grants an indulgence of 40 days to contributors throughout the whole diocese.

The date is inferred from the position of the letter in the Register.

121. Dimission. f. 28^v.

18 April, 1409. States that the archbishop, in his metropolitanical visitation of Meath, supposing the house of Dyuelek to be a priory of which Thomas Spenser, canon O.S.A., was prior, cited the latter to submit to visitation or show cause why he and the house and also the chapel or oratory set apart for the celebration of divine offices should not be visited. Spenser appeared and alleged that he was not prior, but a canon of the priory of Lanthonia near Glowcestria, diocese of Worcester (Wigornien.), O.S.A., and merely proctor during pleasure of the prior and canons thereof, to whom the parish church of St. Kenan, Dyuelek, belonged; that the house of Dyuelek, commonly called a priory, was neither a priory nor a cell of a priory, but a storehouse (receptaculum), or house or grange; and that the canons residing there as proctors had been for over 40 years, indeed from time immemorial, exempt from the metropolitanical visitation of the archbishops. Having examined instruments of his predecessors, and heard witnesses, the archbishop pronounced sentence (quoted) in favour of Spenser.

Dated in St. Mary's Church, Droghda, on the Meath side.

A note adds that the instruments mentioned above were copied in the registers of the church of Armagh.

122. Certificate that in his metropolitanical visitation of the diocese of April (?), 1409. Meath, the archbishop caused Sir John Nouan, priest, to be cited to show his letters of orders, and that he appeared. f. 29 (28)^v.

The title seems to show that he gave proof of his orders and received a certificate thereof.

Breaks off at the end of the page.

Both the character of this document and its place in the Register suggest a date not far from that of no. 121. It is written by the same hand.

123. Letter of excommunication to the Bishop of Raphoe (Raboten.). 9 May, 1410. f. 30 (29).

In continuation of a former letter the archbishop commands the bishop in

his chapel or the church which he usually attends, and the regular and secular clergy of his diocese in their respective churches, to pronounce his sentence of excommunication and interdict on Sundays and festivals with cross erect, bells and candles, on certain persons not named, sprinkling blessed water to put to flight the demons by which they are held, and praying that the Lord Jesus Christ will bring them back to the Catholic faith, saying and singing (dicendo et decantando) the Response (responsorium) *Congregati sunt inimici nostri* with the Psalm *Quid gloriaris*, and the Response *Revelabunt celi iniquitatem* with the Psalm *Deus laudem*. Then they are to approach the doors of the churches, with clerks and parishioners, to terrify them (ad eorum terrorem) casting three stones towards their dwellings, as a sign of the eternal malediction of God upon Danan and Abiron, such publication to be continued on Sundays and festivals until they receive absolution.

124. Letter of title of Walter Plunket, Lord of Bewleue, for Peter **16 May, 1410**. Chambre, a deacon desirous of promotion to the priesthood. f. 30 (29).

He grants him 5 marks yearly rent out of his lands in Kerestoun, until he receives a competent benefice.

125. Names of persons ordained by the archbishop in the chapel of his **May, 1410**. manor at Termefeghyn on Ember Saturday in Pentecost week, 10 (corrected by another hand to 17) May. f. 30 (29)^v.

Acolytes—Philip Nanny, Brothers Nicholas Stantoun, John Yog', Richard Feypow, Nicholas Fyzlenys, and John Brond. *Sub-deacons*—John Fyzrychard, Peter Chaumr', Nicholas Begge, William Hanell, monk, William Heruy, monk. *Deacons*—Patrick Cruys, Nicholas Down (?), monk.

For the error in the date see note to no. 115.

126. Letter of the archbishop, the king's chaplain, to Henry (IV). **2 May, 1410**. f. 30 (29)^v.

Announces that the monastery of St. Peter and St. Paul, Cnok, being vacant by the death of abbot Henry, the canons, after obtaining licence from the king, elected Geoffrey Broun, a canon thereof, the bearer of this letter, as appears by the decree of election sent to the archbishop, and that the archbishop has confirmed the election. He prays the king to receive the elect favourably, and to order his business to be set forward with speed.

Dated at Dromeskyn.

The year is also described as the seventh of the archbishop's consecration.

127. Commission to Master Thomas Olucheran, Dean of Armagh, and **26 June, 1410**. Sir John Dermot, rector of Dunbeyng, to hold a metropolitanical visitation of the diocese of Derry. f. 30 (29)^v.

128. Confirmation, during the metropolitanical visitation of Dromore, of

16 or 23 March, 1411. Master Donald Oronoga, canon of Dromore, as rector of Kylmylcon. f. 31 (30).

The date is given as “die lune proxime Sancti Patricii,” the words “post (or ante) festum” being omitted, -i.e. the “Monday after (or before) St. Patrick’s Day.”

129. Citation addressed to the Dean, Archdeacon, and official of Ardagh **10 August, 1410.** (Ardakaden.), and Florence, rector of Kylmor. f. 31 (30).

States that, compelled by the negligence of A(dam Leyns), Bishop of Ardagh, the archbishop had excommunicated Sir Donat Offergyll, chaplain of the diocese of Ardagh, for many contumacies contracted at the instance of the Prior and Convent of Tristernagh, diocese of Meath,¹ and, on his obduracy, had interdicted him, under which sentences he had remained obdurate over three years. The above are to cite him to appear in St. Peter’s Church, Droghda, on 6 October, to show cause why he should not be deprived of his benefice as a heretic.

130. Notarial certificate. f. 31 (30)ᵛ.

22 August, 1410. Certifies that on the day of writing the archbishop, in the chapel of his manor at Termefeghyn, read a document (quoted) by which he appointed as his proctors at the Roman Curia Master John Swayne, LL.D., abbreviator of apostolic letters, Master Nicholas Symond, Bachelor of Decrees, collector of papal dues (denariorum camere apostolice . . . debitorum) in Ireland, Master William Purcell, notary public, and Patrick Oweyn, chaplain, of the dioceses of Kildare, Meath, and Ossory.

Ends: “Acta sunt hec . . . presentibus reverendis et discretis viris magistro Willielmo Mowner bachallario decretorum rectore de Mawndevylestoun et officiali curie Ardmachane Johanne Penbrok et Thoma Penbrok literatis Ardmachane et Midensis diocesis testibus ad premissa vocatis specialiter et rogatis.”

131. Excommunication and interdict addressed to Masters T. Omestead, **August × November, 1410.** Archdeacon, and Patrick Okellaid, Patrick M^egynd, and John M^egyllaboy, canons, of Dromore. f. 31 (30)ᵛ.

The preamble is said to have been identical with that of a letter against Ohanlon “in the beginning of the sixth leaf of this book.” It proceeds: Donald M^egynnessa (*in title* M^egynnessa) of the diocese of Dromore and his accomplices despoiled Margaret Taaff, Lady of Rathmolyu. diocese of Down, who was in the protection (patrocinio) of the Church, of many cows and other animals in (de) a certain holy island in the diocese of Down and slew two men, keepers of the same, incurring *ipso facto* sentence of greater excommuni-

¹ “Cum nos alias dominum Donatum . . . exigente negligencia . . . A . . . episcopi Ardakadensis . . . propter suas multiplicatas contumacias ad instantiam prioris et conventus de Tristernagh . . . contractas . . . excommunicavimus.” Cp. nos. 72, 73.

cation. The above are, therefore, to warn M^gygnessa and his accomplices that within ten days he is to restore her property, or make due amends for it and the death of the men. If the warning is ineffectual, they are to denounce them as excommunicated, in the more noted places of the diocese of Dromore, as they were excommunicated by the Bishop of Down, and to warn M^gygnessa that if satisfaction is not made within a further period of twenty-four days they and the places where they sojourn will be placed under interdict.

This document, if we may judge from its place in the Register, is to be dated August × November, 1410. It seems to have been written during a vacancy to the see of Dromore. This would fix it some time after 30 May, when Messing was provided to the see of Sodor (*Papal Letters*, vi. 197) and before 4 January, 1411, when his successor took the oath of obedience to the archbishop (no. 88).

132. Letter to N(icholas MacBrady), Bishop of Kilmore (Triburnen.).
August × November, 1410. ff. 32 (31), 33 (32)^v.

The Prior and Convent of Fauoria in the diocese of Meath complain that certain clerks and laymen of the diocese of Kilmore detain the tithes, oblations, and obventions of churches appropriated and united to the priory, and therefore, by the provincial constitutions of the church of Armagh, have incurred sentence of greater excommunication. The bishop is therefore to admonish all who have done so to restore such tithes, &c., within twelve days or to make a reasonable composition for them, and if this is not done to excommunicate them. If he is negligent or remiss in the matter, the archbishop will do justice to the prior and convent.

The date is inferred from the position of the letter in the Register.

133. Letter in favour of quaestors. f. 32 (31)^v.
August × November, 1410. States that the Master and Brethren of the Convent and Hospital of St. John at Jerusalem, by reason of the schism, mortalities, storms, their wars with the Turks and their capture of the Castle of St. Peter—which is a refuge for the poor flying from the enemy—have not sufficient means to build and fortify that castle. The clergy and faithful of the province are therefore exhorted to receive and assist William Cormok, chaplain, their proctor or messenger, and to have the indulgence granted to them by the late Pope Alexander V explained to the people at mass on Sundays and festivals. Those who contribute to the building and defence of the castle, being confessed and contrite, are to have an indulgence of forty days.

The date is after intelligence of the death of Alexander V (3 May, 1410) had reached Ireland, i.e., probably after June, 1410. The place in the Register suggests August × November, 1410.

134. Letter to the parochial chaplain and other chaplains serving in
1410 (?). St. Peter's Church, Droghda. f. 33 (32).

Since the archbishop is informed that Thomas Scynner, burgess of Droghda, lately deceased, bequeathed money for purchasing ornaments for the high altar of St. Peter's, that this money was placed in charge of the mayor, bailiffs and commons of Droghda, and that they converted part of it to their own uses; he therefore, in accordance with a special custom of the church of Arnagh enabling him so to act in such cases within his diocese, commands the above to warn the mayor and bailiffs individually (in specie) and the commons in general (in genere) to restore the money within eight days; and, if this warning be ineffectual, to cease from the public celebration of divine service and the ringing of bells till they receive further order from him.

Nos. 134-136 are in hands different from that of nos. 132, 133, 137. Hence it is possible that f. 33^r was originally left blank, and that these three documents are later insertions. But no. 134 is probably earlier than no. 135.

135. Letter of safe conduct for E(u)genius Olorkan and Simon M^cgranach, 1410 (?). clerks, going to the Roman curia. f. 33 (32).

This letter is certainly much earlier than November, 1411, when sentence was passed on M^cgranach at the Roman curia for holding a benefice without promotion to holy orders (*A.H.* 16). No inference can be drawn from its position in the Register. See note on no. 134.

136. Letter to John FitzAdam and his fellow-justices of the Common Bench 1410 (?). Bench in Ireland, at Cathirlagh, concerning the appointment of an attorney. f. 33 (32).

Since Thomas Flemyng, knight, baron of Slaun, Christopher Holywod and others have taken out (tulerunt) a brief of *Quare impedit* against him and others regarding the church of Rathdromnew before the above, the archbishop asks them to record in the brief John Herdman, or any other person accepted in their name, as attorney (seu alium quemcumque uideritis accept^o nomine vestro attornat^o seu attornat^o).

The date is before 28 April, 1414, when FitzAdam is described as late justice of the Common Bench (*C. P. E. I.* 204, no. 41), and probably not much later than 14 June, 1409, when the latest mention of him as justice seems to occur (*ib.* 191, no. 104). He is named without title 4 June, 1410 (*ib.* 196, no. 89). See note on no. 134.

137. Letter to the Bishop of Raphoe (Rapoten). f. 33 (32)^r.
August × November, 1410. The Bishop of Derry complains that Turgellus Odomnaill, Lord of Conallia, diocese of Raphoe, detains the tithes, oblations, and obventions of a certain church, appropriate to the church of Derry, the rents, issues (proventus), and possessions appropriate to the church of Derry and to the episcopal mensa, as well as the episcopal thirds due to the bishop, and therefore, by the provincial constitutions of the Church of Armagh, has incurred sentence of greater excommunication. The Bishop of Raphoe is to warn Odomnaill to restore the same to the Bishop of Derry within twenty-four

days, on pain of excommunication. If this warning is ineffectual, he is to proclaim him excommunicate on Sundays and festivals; and if he is still obdurate after a further period of twenty-four days, he is to lay the places in which he may sojourn under ecclesiastical interdict, which is not to be relaxed till he has made restitution, or reasonable composition with the bishop, and received absolution.

The date is inferred from the place of the document in the Register.

138. Letters patent certifying (*title says* to the court of the king) the **August × November, 1410.** excommunication of Stephen Goddferey (*in title* Godfrey). f. 33 (32)^v.

States that, at the instance of John Awell, the above has received sentence of greater excommunication from the late Master Richard More, Archdeacon of Armagh, and has been obdurate under the same for over a year; and requires that he shall therefore be avoided by all.

This is obviously to be dated in or after January, 1409 (see no. 140). Its place in the Register suggests the date given above. It is apparently in the same hand as no. 137.

139. Letter of citation of Richard More, Archdeacon of Armagh, addressed **9 January, 1408.** to Henry Miltoun, Nicholas Haburgey, Laurence Ohage, and William Horny. f. 33*.

The above are commanded, at the instance of John Awell, to cite Stephen Godfrey to appear before the archdeacon in St. Peter's Church, Droghda, on 10 January, in a case of defamation and perjury moved between Awell and Godfrey, according to the form of previous citations in the same matter (*juxta formam retroactorum in eadem*).

Sealed with the official seal of the archdeacon.

Nos. 139-141 are on inserted slips of vellum, evidently placed here because of the connexion of nos. 139, 140 with no. 138.

140. Notarial instrument. f. 33**.
9 January, 1408. Certifies that in St. Peter's Church, Droghda, Master Richard More, Archdeacon of Armagh, pronounced Stephen Godfrey, who had been cited to appear before him at the instance of John Awell, contumacious and ordered him to be denounced as excommunicate.

Ends: "Presentibus tunc ibidem Thoma Chambyr et diversis aliis."

The certificate of William Mey, priest of the diocese of Meath and notary, with his device (signum), follows.

141. Letter of Archbishop John to the parochial chaplain of St. Nicholas, Dundalk. f. 33***.

States that in his first ordinary visitation (*in nostra visitatione ordinaria nostri primi ingressus*) he had ordered all priests of the deanery of Dundalk to

exhibit their letters of orders, and that Patrick M^enab, claiming to be parochial chaplain of Casteltoun, near Dundalk, had failed to produce such letters; that he was warned to produce them within a given time on pain of suspension; that he had received similar warning from the archbishop's commissaries in visitations on pain of excommunication; and that the letters have not yet been exhibited. The above is to cite M^enab to appear in the chapel (?) of the archbishop's manor of Drummeskyn on the Wednesday after Low Sunday (Dominica in Albis) to show cause why he should not be suspended and excommunicated.

A note states that, notwithstanding these proceedings, M^enab continued to minister at the altar.

142. Commission of Thomas Hadesor, vicar of Stabanan, Sir Andrew August × November, 1410. Keppok, rector of Baroneston, and Sir William Herryoth, vicar of Keppok, to levy a subsidy. f. 34 (33).

States that the clergy of the diocese of Armagh, assembled in St. Peter's Church, Droghda, had granted to Hadesor, deputed as their proctor at a council held before Thomas de Botiller, Prior of the Hospital of St. John of Jerusalem, lieutenant of Ireland, at Dublin, a subsidy of 13s. 4d., which had been assessed by assessors deputed therefor at 3d. a mark according to the ancient taxation. The above are commanded to levy the same.

Nos. 142-145 are in the same hand, apparently that of nos. 132, 133, 137, 138, the last of which they immediately follow. The dates are inferred from their position in the Register. No. 142 seems to refer to the parliament mentioned in no. 108.

143. Letter to Marcus, a bishop sojourning in the diocese of Dromore. August × November, 1410. f. 34 (33).

Since Richard (Messing), Bishop of Dromore, and his vicar general, the bishop being absent, are negligent in correcting laymen who detain lands and possessions and fruits ecclesiastical against the will of the occupying prelates, the archbishop by his metropolitanical authority gives Marcus power to do so in the diocese of Dromore.

See note on no. 142.

144. Collation of the vicarage of Kylltibrud, diocese of Ardagh (Ardakaden.), August × November, 1410. vacant by the deprivation of Sir Bernard Ocolla, and in the archbishop's gift for this turn, to Dermot M^eincelruoyd, clerk of the same diocese. f. 34 (33)ᵛ.

Form as in no. 8. He is to be inducted by the Archdeacon of Ardagh.

See note on no. 142.

145. Letter to the clergy of the diocese of Armagh in favour of James Hall, August × November, 1410. a layman of the diocese of Meath, who intends to visit the Holy Land and the Sepulchre of Christ. f. 34 (33)ᵛ.

When Hall comes to them they are to induce their parishioners to give him alms. A relaxation of forty days' enjoined penance is granted to all confessed and contrite persons who contribute. The letter is valid till Easter.

See note on no. 142.

146. Presentation by Nicholas Habyrgey *in no.* 148 Habyrgey, *in no.* 157 **November, 1410.** Ahyrgey) and Elias Mei (*in nos.* 148, 157 Mey) of John Logan, clerk, to the rectory of St. Michael, Derwer (*in nos.* 148, 157 Derver), vacant by the death of Sir John Byset. f. 35 (34).

Form as no. 113.

Only the year is given in the date; but see no. 157.

147. Letter of John (O'Flannery), Bishop of Derry, Thomas (O'Loughran), **1 December, 1410 × 18 March, 1411.** Dean of Armagh, and John Dermot, rector of Dunbyng (*elsewhere* Dunbeyg), commissaries of the archbishop, engaged in a metropolitical visitation of the diocese of Derry. f. 35 (34).

States that during the visitation they caused Master Donat Okevolan, Dean of Derry, to be cited before them and to exhibit his title to the deanery. He duly appeared and exhibited a bull of Pope Boniface IX for the deanery, and letters testimonial of his induction by the Pope's executors, and other documents both of his diocesan bishop and the Chapter of Derry, and of the late Archbishop John (Colton). The commissaries therefore pronounce sentence (quoted) that he is rightful dean.

Sealed by the bishop with his own seal and by the dean and Dermot with the archbishop's seal.

Wrongly headed, in a late hand, "Commission for visiting the Bishopric of Derry."

Dermot being here styled vicar of Dublin, the date is before 18 March, 1411 (see no. 154). But it does not seem to be in the same hand as no. 146, and the scribe has found it difficult to make it fit into the page. Hence it was probably written after no. 148.

148. Identical with no. 157, except that the last few lines, including the **28 November, 1410.** date, are omitted. f. 35 (34)ʳ.

149. Letter dimissory to N., clerk (*in title* Patrick Okemman). Form **December, 1410.** nearly as no. 13. f. 35 (34)ʳ.

The date is inferred from the place of the document in the Register.

150. Letters patent of Arthur, son of Catholicus Oneyll, deceased. **14 December, 1410.** f. 35 (34)ʳ.

He states that he has taken oath to the archbishop to observe the following agreements:—1. To deliver up free possession to the archbishop of all lands of the church of Armagh which he or his subjects occupy, when required. 2. That he will not hinder feofees (incartatos) of the church of

Armagh from cultivating their lands or pasturing their flocks thereon. 3. That as long as the archbishop allows him and his subjects to reside on those lands he will cause the tenants to pay their rent regularly to the archbishop, who may, if any are in arrear, distrain therefor. 4. That he will hinder Donald of Armagh, otherwise Oneyll, called (nuncupatum) his brother, from taking exactions or tribute from the citizens or other tenants of the church of Armagh.

Dated at Armagh.

151. Inhibition.

f. 36 (35).

21 February, 1411. States that Gibert Oscheyg, clerk of the diocese of Clogher, disturbs the Priors of St. Mary's, Louth, and St. John's, Athirde, in their possession as rectors of the parish churches of Dounaghmayn and Rosse, diocese of Clogher, and disputes their title to them, though these churches were lawfully appropriated to the priories, and they had been in peaceful possession of them from time immemorial; and that the priors had appealed to the Apostolic See, and "tutorie" to the court of Armagh. The clergy of the diocese of Clogher (Clochoren.) are commanded to inhibit Oscheyg from disturbing the priors in their possession while the appeal is pending.

Dated at the archbishop's manor of Dromeskyn.

152. Note.

f. 36 (35).

21 July, 1411. Letters were issued similar to no. 151, in favour of the Prior of Fowir, about the church of Disertyncill, diocese of Kilmore (Triburnen.), against Sir Donat Ogown, of the same diocese.

Obviously a later insertion.

153. Letter to Sir Richard Waspayn, vicar of Carlingford (*also written*

11 March, 1411. Karlingford).

f. 36 (35).

The archbishop having in the course of his ordinary visitation sequestered (the fruits) of the church of Karlingford, pertaining to the prior and brethren (confratres) of the Hospital of St. John of Jerusalem in Ireland, rectors of the second (alterius) portion thereof, on account of their failure to repair part of the chancel, and appointed Sir Richard FitzJohn, chaplain, and John Seyn, clerk, sequestrators; Waspayn is commanded to warn all the faithful not on any pretext to meddle with dues pertaining to the said prior and brethren, without special licence from the archbishop, on pain of greater excommunication.

Dated at Carlingford.

154. Resignation by Sir John Dermot of the rectory of Dunbeyng with a **18 March, 1411.** view to an exchange with Sir Thomas Kyft, rector of Clonmore.

f. 36 (35)*.

Undated; but see no. 156.

155. Resignation by Sir Thomas Kyfte (*in titlo* Kyft) of the rectory of **18 March, 1411.** *Clonmor* (*in titlo* Clonmore) for the purpose mentioned in no. 154. f. 36 (35)^r.

Undated; but see no. 156.

156. Certificate. f. 36 (35)^r.

18 March, 1411. States that the resignations, nos. 154, 155, were made by Sir John Dermot and Sir Thomas Kyft before the archbishop in the chapel of his manor of Dromeskyn.

Ends: "Presentibus . . . magistro Willielmo Mowner utriusque iuris bacallario rectore de Maundeuylllestoun officiali curie Ardmachane fratre Johanne Broun Nicholao Alisandir clerico testibus Ardmachane et Midensis diocesium."

157. Admission of John Logan, presented as in no. 146, to the rectory of **28 November, 1410.** St. Michael, Derver. f. 35 (34).

He is instituted, and invested as in no. 8.

Dated at Dromeskyn.

158. Letter to Adam Leyns, Bishop, and the Dean, Archdeacon. Official **March - June, 1411.** and the other clergy of Ardagh (Ardakaden. . f. 37-36).

States that certain persons unknown captured and imprisoned Thomas Scurlagh, prior of St. Peter's near Tym, diocese of Meath, and his men, and spoiled him of his goods, and *ipso facto* according to the provincial constitutions of Armagh, incurred sentence of greater excommunication. The above are to denounce them as excommunicate, and, if they remain obdurate after eight days, to lay all places where they shall sojourn under interdict.

The place of this letter in the Register suggests the date given above. It is confirmed by no. 162, which shows that the offenders had been discovered and made their submission before 4 October, 1411.

159. Mandate of induction to Master William Pyroun, Archdeacon of **13 June, 1411.** Armagh, or his commissary. f. 37 (36).

The priory of the hospital of St. Laurence, Drogheda, being vacant by the death of Walter Tanner, and being in the gift of the archbishop for that turn, he has collated it to Thomas Kyfte (*in titlo* Schyft), brother of the same house, priest, instituted him by giving of his ring, and invested him. The archdeacon is to induct him.

160. Letter to Arthur Oneyll. f. 37 (36)^r.

26 September, 1411. States that Oneyll's rent having been remitted, with the exception of (ad) a very small sum, he had sworn to pay it on a day long past, and had not done so; and that he had for many years cohabited with a woman related to him within the prohibited degrees. He is required to pay his rent and put away the woman within ten days on pain of being denounced

as excommunicate and under interdict in the churches throughout the province.

Dated at Termonfeaghyn.

The date is given as the Saturday before Michaelmas, 1409, and the eighth year of the archbishop's consecration. This is clearly incorrect, since the eighth year was 1411-12. Hence the true year is either 1409 = sixth year, or 1411 = eighth year. The latter is more probable, since *meccoix* is more likely to be confused by a scribe with *meccoxi* than *vi* with *viii*. And the place of the letter in the Register points to 1411 (or later: it is possible that this document was copied after no. 161.)

161. Letter to Master Thomas Olocheran, Dean, and the colidei of June (?) 1411. Armagh. f. 37 (36)^v.

They are to admonish Thomas and Adam Olocheran, sons of the Abbot of St. Peter and St. Paul, Armagh, not to disturb Nicholas Ohelman, the archbishop's tenant, in the possession of his native lands, of which he has a charter from the archbishop (a nobis veraciter incartatus), and, if he does not obey, to denounce him and his accomplices as excommunicate in the church of Armagh at mass on Sundays and festivals, not ceasing therefrom till they have received absolution.

The place of the document in the Register suggests June, 1411. It seems to be in the same hand as nos. 159, 160.

162. Charter of G. de Angulo. f. 37 (36)^v.

Grants to William Carpentarius "a carucate of land as I and my men have perambulated [*space in MS.*] Argel, and a third part of my mill, 'hereditarie' for his service 'magistraſ carpentarie.'"

This document seems to be in a later hand than no. 161.

163. Letter to Master W. Pirroun, Archdeacon of Armagh, directing 22 June, 1411. him to make inquiry, as in no. 84, about the vicarage of St. Catherine's, Kylmadimok, to which Thomas le Botiller, Prior of the Hospital of St. John of Jerusalem in Ireland, had presented Sir Patrick Okoyn, priest, and the vicarage of Cloynkey, to which John Serll, Lord of Gylbertestoun and Sturmynestoun, had presented Sir John Prout, presbyter.

Dated at Termefeghyn. f. 38 (37).

164. Confirmation, by metropolitcal authority (*title adds* during a 23 June, 1411. visitation), of Master Patrick M^cgwyrin, canon of Dromore, in his rectory of Kylmilcoun (*in title* Kylmylkon), called prebend.

Dated at the manor of Termefeghyn. f. 38 (37).

The fact that the document is dated at Termonfeekin conflicts with the statement that it was issued during a visitation of Dromore.

165. Letter to John Logan, rector of St. Michael's, Derver. f. 38 (37). June (?), 1411. He is dispensed to spend three years "in universitate seu

studio generali," his church being meanwhile served by a chaplain, and its burdens, ordinary and extraordinary, being paid.

The place in the Register suggests June, 1411 (see nos. 163, 164, 169). This letter is in the same hand as nos. 163, 164: and the date agrees with no. 157, which records Logan's institution to Derver, 28 November, 1410. But we should not expect that after receiving this dispensation he would be ordained deacon on 24 September, 1412 (no. 218).

166. Letters of Orders.

f. 38 (37)^v.

1409 (?). Certify that the archbishop on Ember Saturday, 1 June, 1409, in the chapel of his manor at Termefeghyn, promoted Richard Fitzjohn, subdeacon, to the order of deacon, and on Ember Saturday, 21 September, in the chapel of his manor at Dromeskyn, ordained him priest.

Wrongly headed, "Litere Dimissorie."

167. Letter to Master W. Pirroun, Archdeacon of Armagh. f. 38 (37)^v.

June (?), 1411. Informs him that the Abbacy of St. Peter and St. Paul at Knoc, near Loueth, having been vacant by the resignation of Geoffrey Broun, the canons regular thereof had elected Simou [*space in MS.*], canon of Holy Trinity, Dublin, and that the archbishop had confirmed the election, instituted Simon, invested him as in no. 8, and decreed his induction.

The end of the document is omitted.

The position of the letter in the Register indicates June, 1411, as the date. This is in some degree confirmed by no. 126.

168. Collation of the rectory of St. Columba's, Clonmore, vacant as in

18 March, 1411. no. 155, to Sir John Dermot.

f. 38 (37)^v.

Form as in no. 8.

Dated at the manor at Dromeskyn.

A note states that a mandate for induction was issued to the archdeacon.

169. Collation of the rectory of St. Mary's, Dunbeyng, vacant by the
1 July, 1411. resignation of Sir Thomas Kyft, to Sir Stephen Bodnam, chaplain.

f. 39 (38).

Form as in no. 8.

Dated at the manor of Termefeghyn.

Note as in no. 168.

170. Letters patent of Donald Oneyll, King of the Irish of Ultonia,
20 November, 1307. Gormlith daughter of Odopuill, Queen, and John Oneyll, their first-born son.

f. 39 (38).

They promise for themselves and their successors to the Archbishop, Dean and Chapter of Armagh, and the tenants of them and of the churches subject to them, that: 1. they will make no imposts (nullas servitutes, onera, gravamina, collectas, tallias, subsidia aut auxilia . . . imponemus) upon them for themselves or their Scottish allies (satellitum) or any other troops

(turbarum); 2. that they will without delay restore all lands of which the church of Armagh or the prelates thereof can show that they have been despoiled, especially the lands of Clondawyll; 3. that for all transgressions committed against them by them or their people they will deliver sufficient pledges (pignora); 4. upon all the things which the archbishop seeks from them they will hold to the ordinance or testimony of the dean and chapter, without any disturbance or litigation (stabinus ordinacioni seu testimonio . . . absque aliquo alio tumultu vel strepitu judiciali). For their oath to observe these things they have found Edward (II), King of Ireland, a guarantor (fidemjussorem), as is contained in his letters patent.

Dated at Armagh.

The date is given as the first year of King Edward. That this was Edward II appears from entries in the Four Masters relating to two of the persons mentioned in the document. They record that Donald, son of Brian O'Neill, died in 1325; and that Gormlaith, "daughter of O'Donnell, wife of O'Neill," died in 1353.

171. Collation of the rectory of St. Mary's, Dunbe yng, vacant by the **7 October, 1414.** resignation of Sir S(tephen) Bodnam, to Nicholas Alexander, clerk of the diocese of Meath. f. 39 (38).

Form as in no. 8.

172. Letter of the archbishop, sole executor of the Apostolic See in the **7 August, 1411.** matter mentioned below. f. 39 (38)*.

States that a letter from Cardinal Peter (Gerardi), Bishop of Tusculum, having charge of the papal penitentiary together with Cardinal Antony (de Cajetanis), Bishop of Porto, dated at Bologna, 1 March, 1410, and sealed with his oblong seal in the manner of the Roman court (opening and closing sentences quoted), had been presented to the archbishop by Niallan Occorr, scholar of the diocese of Armagh, who prayed that it should be put into execution. Witnesses as to the character of Occorr having been examined, the archbishop, in accordance with the tenor of the letter, dispensed him, the son of a priest and an unmarried woman, to be promoted to holy orders and to hold a benefice even with cure of souls, provided that if he obtains such benefice he receives holy orders within the statutory time, and resides therein.

Ends: "Datum Ardmache . . . presentibus ibidem magistris Thoma Oluccaren decano nostro Ardmachano, Willielmo Moner officiali [curie] nostre Ardmachane, et abbate monasterii apostolorum Petri et Pauli de Ardmacha," &c.

173. Charter to Terence M^eart. f. 40 (39).

14 August, 1411. With consent and on conditions as in no. 22 (the mortgage clause being omitted) the archbishop grants him the lands of

[19*]

Ballbranagh in the lordship of the church of Armagh at Termoun, at an annual rent of 6s. 8d. English, payable 1 November and 1 May.

Dated at Armagh.

174. Memorandum.

f. 40 (39).

12 January, 1413. Dermot Mcgork got a charter of Achrych, Duesk, Molynmor, and Molynebeg in the lordship of Termoucomyn.

Obviously a later insertion.

175. Citation of Robert (Montayne), Bishop of Meath, to a provincial council in St. Peter's Church, Droghda, 12 October.

f. 40 (39).

He is commanded to be present and to cite the Archdeacons of Meath and Kenlis and the clergy and people of his diocese.

176. Citation of Arthur (MacCawell), Bishop of Clogher (Clochoren.), to 20 August, 1411. the same.

f. 40 (39).

Differs from no. 175 only in the names of the bishop and the diocese, and in the substitution of the Dean and Chapter of Clogher for the archdeacons of Meath and Kells.

A note states that letters similar to no. 175 were sent to the Bishops of Meath, Kilmore (Triburnen.), Connor (Coneren.) and Down, and letters similar to no. 176 to the Bishops of Raphoe (Rathpoten.), Derry, Dromore, Clonmacnoise (Cluanen.), and Ardagh (Ardakaden.).

177. Admission to the vicarage of St. Catherine's, Kylmadimok, vacant by 11 September, 1411. the resignation of Sir (?) John Proute for the purpose of exchanging it for the vicarage of Cloynkeyn, of Sir Patrick Ocoyn, priest, presented by Thomas le Boteler, Prior of the Hospital of St. John of Jerusalem in Ireland.

f. 40 (39)*.

He is instituted, and invested as in no. 8.

Dated at the manor at Termounfeghyn.

178. Letter of Sigismund, King of Hungary, Dalmatia, Croatia, etc., and 10 January, 1409. Marquis of Brandamburg, Vicar-General of the Holy Roman Empire, and Governour of the Kingdom of Boemia, and (cum) his wife, Barbara, Queen of Hungary, Dalmatia, and Croatia, to all princes and other governours.

f. 41 (40).

Announces that Laurence Ratholdi of Pastoch, master of the seneschals (dapiferorum) and supreme dispenser, of noble descent, brought up from childhood in his royal court, proposes to visit the shrine (limina) of St. James in Compostella and the Purgatory of St. Patrick in Ireland, and to wander through various regions in search of military adventure. Desires for him and his company a favourable reception and free passage without payment of tribute or other exaction.

Dated in the Castle of St. George.

Printed from another copy in *An. Boll.* xxvii. 45.

179. Charter to John Ruffus, the archbishop's chamberlain. f. 41 (40).

17 August, 1411. With consent as in no. 22, grants him the villa of Ymyrmangan, with the tithes thereof, for a term of forty-eight years or the lifetime of John, if he shall die within that term, at a rent of 1 mark a year, payable at 1 November and 1 May.

Sealed by the archbishop and the chapter. Dated at Armagh.

180. Sentence in a matrimonial cause in accordance with disclosures **August × October, 1411.** (comperta) at the archbishop's visitation. f. 41 (40)^v.

It was proved that Mariota Orelli had married Walter Roghed, and that at his death she had married Patrick M^ekan, who was related to him in the third and second degrees. The latter marriage is therefore declared null, and M^ekan and Mariota are condemned in the fees (feodis) of the court.

The date is inferred from the position of the document in the Register (see no. 182).

181. Safe conduct for B., Bishop of Clonfert. f. 41 (40)^v.

25 July, 1410. It is addressed to the archbishops and other prelates and ecclesiastical men, and to the secular lords and people (plebeis) of Ireland, and states that the archbishop has taken under his protection and that of Armagh Cathedral, the primatial church of all Ireland, the Bishop of Clonfert, in the province of Tuam, which is subject to him as Primate (jure nostro primatico).

Dated in the manor at Athboy.

182. Letter to the Prior of Tristirnagh in the diocese of Meath, and the **4 October, 1411.** official of the court of Ardagh (Ardakaden.). f. 41 (40)^v.

Commissions them to absolve the Dean of Ardagh and his accomplices from the excommunication to which they had been sentenced for imprisoning and treating with violence Thomas Scurlag, Prior of St. Peter's, near Trym, and his clerks and familiars, and to relax the interdict laid upon them.

183. Proceedings of a provincial council at St. Peter's Church, **12 October, 1411.** Drogheda. f. 42 (41).

The suffragans were preconized to certify the mandates and citations for the council which had been sent to them. Robert (Montayne), Bishop of Meath, presented a certificate (quoted) under his great seal that he had received the citation, no. 175 (quoted), and had acted accordingly. The Bishop of Kilmore (Triburnen.) made a similar statement *viva voce*. John, Bishop of Connor (Coneren.), appeared by his proctors, Masters James Devenys, rector of Cragfergus, and J [ohn] Taylor, vicar of Dundalk, whose letters of procuracy (quoted) were dated Cragfergus, 12 September, 1411.

184. Record of a case heard before Stephen Bray and John Bermyngham, **October or November, 1411.** the king's justices of the Chief Place in Ireland.

Runs thus:—

f. 42 (41)ʀ.

“Loueth. Johannes Taaff filius Ricardi Taaff de Lascartane ponit loco [*MS.* polo] suo Nicholaum Taaff et Willielmum Faunt sub alternatione versus Aliciam Houeth in placito iniuste detentionis recordatur per Nicholaum Archiepiscopum Ardmachanum Hibernie Primatem.”

Bray was chief justice throughout Fleming's episcopate, and Bermyngham second justice from 13 June, 1403, to his death, in 1414, with the exception, apparently, of a short interval following 12 May, 1404, when another was appointed to the same office (*L.M.* I. ii. 207, cp. *C.P.B.I.* p. 184, no. 26). The only clue to the date is therefore the position of the document in the Register.

185. Letter of the archbishop, chaplain of the king, to King (Henry IV).

October or November, 1411.

f. 42 (41)ʀ.

Prays him to provide a remedy for the miserable state of Ireland. States that his chaplain Thomas (Cranley), Archbishop of Dublin, with the consent and will of the Council and of all his faithful lieges, had been sent as a messenger (nuncius) to him to explain the miseries of the country.

The date is shortly before that of no. 186, on which see note.

186. Letter from certain magnates to the King (Henry IV). f. 43 (42).

October or November, 1411. After having thanked the king for letters in which he had commanded them to certify the state and governance of Ireland since the departure of his son Thomas (of Lancaster), they state that before the letters were delivered to them many of his lieges, assembled at his council held at the Naas, elected the Archbishop of Dublin (Thomas Cranley), his special orator, and Richard (O'Heden), Archbishop of Cassell, to be ambassadors to him on their behalf to declare the state and governance of Ireland; and that nevertheless, since the coming of the letters, “the said most reverend father in God, the presenter of the same,” and they had assembled to discuss the evils of Ireland. “With a view to . . . certify them the better to you, and for us lawfully to acquit the said Thomas to (you), we have specially requested in your most gracious name and royal majesty and for the very great trust which we have always found in his loyalty, when he comes to declare fully to (you) the evils of your said land, your said orator and ambassador . . . beseeching your . . . majesty to accept and graciously bestow faith . . . in your said orator . . . and thereupon to ordain a gracious remedy.”

Ends: “Vos hounblez liegez N. ercheuesque Dardemagh, Patrik euesque de Fernez votre chaunceller Dirland, Robert euesque de Mith, Gerald count de Kyldare, Dauid Wogan chiualer, Thomas Flemyng chiualer, Christofre de Prestoun chiualer, lez maire et baillifs de votre cite de Dyuelyn, lez maire seneschal et baillifs de votre ville de Droghda, John Darcy, Christofre Holywod et Christofre Plunket.”

In French.

The text is corrupt. The date must lie between the return of Prince Thomas from Ireland in 1410 (Gilbert, *Viceroy*s, 300) and the death of Robert Montayne, Bishop of Meath, 24 May, 1412 (Ware i. 148). It probably followed 19 March, 1411, when Patrick Barret had his patent as chancellor (an earlier patent, 18 May, 1410, being apparently ineffective), *Cal. Pat. Rolls*, 1408, 172, 282. These indications agree with the position of the document in the Register, which points to October × November, 1411.

187. Citation similar to no. 85, the date named being 14 March.

20 November, 1411.

f. 43 (42)^v.

Dated in the manor of Dromeskyn.

A marginal note names St. Mary's, Drogheda, as the place of the visitation.

188. Letters of Orders granted by John (Madock), Bishop of Kildare.

4 April, 1409.

f. 44 (43).

Certify that, on letters dimissory from his diocesan, he promoted Malachy M^caedan, subdeacon of the diocese of Armagh, to the diaconate on 'Sitientes' Saturday (5th in Lent), 22 March, 1409, and on the holy Saturday of the Pasch, 4 April, 1409, to the presbyterate, both in Kildare Cathedral.

Dated 'in our palace of Kyldare.'

There is an error in the dates. In 1409 Easter Even fell on 6 April, and 'Sitientes' Saturday on 23rd March. The dates given for these days are inconsistent with each other, and neither of them suits any year from 1394 to 1438. It may therefore be suspected that the document is a forgery.

189. Letter of administration of the goods of Sirs John Mole and Walter

22 February, 1412. Tanner, chaplains.

f. 44 (43).

The above, executors of Simon de Evertoun, chaplain, lately deceased, died intestate. Administration is committed to Stephen Bray and Richard Whyt, marshal.

190. Citation addressed to John (Mac Menamin), Bishop of Raphoe

28 November, 1411. (Rathpoten.).

f. 44 (43)^v.

The bishop had been cited to appear in the Provincial Council at St. Peter's Church, Droghda, 12 October, and had not done so. He is now cited to appear in Armagh Cathedral on 14 December.

Dated at Armagh.

191. Letter to Thomas (O'Loughran), Dean of Armagh, the resident canons,

January × February, 1412. the colidei, and the clergy of the diocese of Armagh.

f. 44 (43)^v.

Arthur Oneyll and his brother Rory Oneyll, having sworn to pay the rents due by them and their subjects for occupation and detention of the archbishop's lands, and to restore the lands to him and his tenants, true natives thereof, and not having fulfilled their oaths, and having therefore,

by canons and provincial constitutions, incurred sentence of greater excommunication, the above are to admonish them.

Incomplete.

The position of the document suggests the date given above. Nos. 190-209 seem to have been written by a single hand.

192. Collation of the rectory of St. Fintan's, Dromyng, vacant by the **20 February, 1412.** death of Master Richard Barry, to Nicholas Alyxander, clerk of the diocese of Meath. f. 45 (44).

Form as in no. 8. Dated at Droghda.

193. Charter of Nicholas Dardix concerning the lands of Fachard. **1262 × 1269.** f. 45 (44).

Patrick (O'Scannell), Archbishop of Armagh, having bound himself and the Church of Armagh, by letters of obligation, in 200 pounds of silver, Dardix undertakes to remit the same and return the letters as soon as the archbishop has infeoffed him of the land of Fachard (if Dardix recovers it by the great assize in which he has put himself) and has placed him in seisin thereof in the same state as that in which the archbishop recovered it, and has given him a charter thereof from himself and his chapter. Dardix will hold the land at a rent of half a mark a year. He binds himself and his heirs to the archbishop and his successors in 200 pounds of silver to observe the contract. He concedes also to the Lord Edward 60 pounds sterling as often as he or his heirs contravene it, and to his bailiffs who labour in compelling observance thereof a cask (doleum) of wine out of his goods, as often as their labour is due to his defect.

Ends: "Hiis testibus domino Milone Dei gratia episcopo Ardachadensi dominis Thoma de Molendinis Johanne de Hyda Adde [*sic*] Cusak juniore Ricardo de Overtoun Roberto de Alemaynn Alexandro Curteys Galfrido de Wythingoun Gilberto clerico et aliis."

The date is fixed by the facts that Archbishop Patrick O'Scannell got restoration of the temporalities of the see, April, 1262, and died early (16 March according to Ware, i. 68) in 1270.

194. Letter of the brethren of the priory of St. John (Baptist) Athirde, **28 January, 1412.** of the order of Crouched Friars under the rule of St. Augustine. f. 45 (44)^v.

States that they have appointed brother William Gernoun their proctor to seek from the archbishop confirmation of the election of brother John Broun as prior.

195. Decree of election of brother John Broun as prior of the same. **28 January, 1412.** f. 45 (44)^v.

Brothers William Gernoun, William Say, and John Paker signify to the archbishop that the priory being vacant through the resignation of

John Palmer, they had on 27 January elected the above, being a priest, unanimously by inspiration, "which election I, William Gernoun, senior brother . . . made in the stead of all the others in these words" (form given). They pray for confirmation and mandate for induction and installation by the archdeacon.

Dated in the cloister (clausuram) of the Priory.

196. Letter of Orders.

f. 46 (45)^v.

11 April, 1411 (?). Certifies that on the Saturday in the week of Pentecost, 17 May, 1410, in his chapel at Termonfeaghyn, the archbishop promoted Sir Peter Chamyr, acolyte, to be sub-deacon, and on the vigil of Easter, 11 April, 1411 (ordained him deacon).

Incomplete.

197. Collation of the Rectory of St. Patrick's, Achalong (*in title*, Achalonga),

3 March, 1412. vacant by the death of Master John Ocor, Prior of the Colidei, to John Hertylpoll.

f. 46 (45)^v.

Dated in the manor of Dromeskyn.

Form as in no. 8, omitting institution and investiture clause.

198. Letter to Patrick Omongan, herenagh of Kylchiryll (*also written*

March, 1412. Kitchirill) in the diocese of Derry.

f. 46 (45)^v.

Confirms him by metropolitanical authority in the lands of Kylehiryll, which from time immemorial he and his ancestors (antecessores) have held by charter from the church of Derry.

Breaks off at the end of the page.

The position of the document suggests the date given above. Cp. note on no. 191.

199. Letter in favour of Sir Matthew M^ckacy, priest, a native of the

March, 1412. diocese of Armagh.

f. 47 (46).

States that it appears from letters patent of his promoter that he was promoted to all holy orders, and certifies that he is of good character. He has left the province, and the archbishop asks that he may be favourably received.

See note on no. 198.

200. Proceedings in a matrimonial cause.

f. 47 (46).

27 October, 1411. States that the archbishop had received from Antony (de Calvis) cardinal priest of St. Mark, who had charge of the Pope's penitentiary in the absence of Antony (de Cajetanis) and Peter (Gerardi), Bishops respectively of Porto and Tusculum, greater penitentiaries, a letter dated at St. Peter's, Rome, 24 April, 1411 (quoted), to the following effect: A petition of John Peche and Anne Dardyce (*also written* Dardycz), of the diocese of Meath, stated that they, though related in the fourth and fourth degrees, contracted marriage, which was solemnized in the face of the church

without publication of banns, and consummated, and that the attention of the ordinary having been called thereto, he proceeded short of a definitive sentence; and prayed that, to save the scandal of a divorce, they might have absolution and dispensation. By special *circa rocc* command of the Pope the writer commits the matter to the archbishop as next (vicinior) ordinary of the place—the ordinary being held as suspect by John and Anne—authorizing him, when the pair had been separated for such time as might seem to him expedient, to absolve them from the general sentence of excommunication which they had incurred, enjoining penance, and binding them to fast and say 100 Aves and Paters each every Friday during their marriage, to permit them to marry and live together, and to legitimate their children, on condition that the survivor remained for ever unmarried. The archbishop accordingly held an inquiry, at which Peche appeared personally and Anne by her proctor, Sir John Dermot, the archbishop's chaplain, and gave sentence as above. The process was committed to writing by Simon Rochfort, clerk of the diocese of Meath, notary. The acts took place on 27 October, 1411, in St. James's Church, Athboy, diocese of Meath.

Ends: "Presentibus discretis viris Ricardo Whyt nostro armigero, Nicholao Alixandyr ut dicitur auctoritate imperiali notario, et aliis," &c.

201. Presentation by Thomas Daltoun, chaplain, of John Coke, chaplain, **21 March, 1412.** son of Bertram Coke, of the diocese of Meath, to the rectory of St. Mary's, Manduelestoun, vacant by the death of Master William Mowner. f. 48 (47).

Form as no. 113.

202. Grant by Hugh de Lacy, Earl of Ultonia, to Albert, Archbishop of **November, 1241.** Armagh, of the land of Machergalyn, and the manor of Nobyr (*in tittle* Nober), in compensation for all the lands which de Lacy held of the church of Armagh, at a rent of a pound of wax, payable every Easter. f. 48 (47).

Ends: "Hiis testibus Johanne de Alnoto et Thoma de Bartoun fratribus minoribus, Simone de Clifford, Roberto de Cruis (?), John de Clintoun, Rogero Thalmy et Galfrido filio Philippi, miltibus, Willielmo capellano comitis, Rogero de Kenley, Roberto de Capella, Simone de Drogheda et Eudone de Lindeseya clericis et multis aliis."

Note in Ussher's hand, "Vid. Placita a^o 3^o Edv. II, fol. 82."

203. To Master Donat Okerulan, Dean of Derry. f. 48 (47)^v.
12 April, 1412. The Prior and friars preachers of Diria have complained to the archbishop, as principal conservator of the privileges of the Order in Ireland, that certain executors of wills have detained legacies that had been left to them. He commits to the above the determination of the cause.

Dated at Droghda.

204. Grant of an indulgence of forty days to all "parochiani" of the
April, 1412. archbishop and others whose diocesans ratify the indulgence,
 who contribute to the reparation of St. Patrick's church at Dyuelek (*in title*,
 Dywlyke) in the diocese of Meath. f. 48 (47)^v.

The date is suggested by the place of the document in the Register.

205. Commission to Sir N. Nogill, chaplain of the parish of St. Nicholas
April, 1412. of Felda, to raise a subsidy in the deanery of Droghda.
 f. 48 (47)^b.

The subsidy—of 8 mks. 11s. 11*d.*—had been granted by the clergy of the
 diocese of Armagh, at a royal council held at Droghda on the Thursday after
 the Purification of B. V. M., to Thomas le Botiller, Prior of the Hospital of
 St. John of Jerusalem in Ireland, deputy of Sir Thomas de Lancastre, seneschal
 of England, lieutenant of Ireland, in the name of reward (*regardi*). It was
 assessed, by assessors appointed by the clergy, at 11*d.* a mark according to the
 ancient taxation now current, and 12*d.* on every carucate of land belonging
 to the clergy or the free tenants of the same, and 3*d.* on every pound of
 chattelers (*catallariorum*), and is to be collected from beneficed persons, free
 tenants, chattelers, and gavellers of the clergy.

The date is inferred from the position of the document in the Register. It is confirmed, as
 regards the month, by the date of the Council referred to, which is 3 × 9 February, or, supposing
 the year to be 1412, 4 February.

206. Certificate of Orders of Sir Helias Bristow, of the diocese of Dublin.
28 April, 1412. f. 49 (48).

States that in his metropolitanical visitation of the diocese of Meath the
 archbishop cited the above-named, and that he produced letters of Thomas
 (Cranley), Archbishop of Dublin, and certain witnesses, proving that he was
 promoted to the subdiaconate on 'Sitientes' Saturday before Passion Sunday,
 8 March, 1409, in the parish church of the Naas, by John (Maddock), Bishop of
 Kildare, that he was ordained deacon on the vigil of Easter, 22 March,
 1409, in the parish church of Novan, by Robert (Montayne), Bishop of
 Meath, and that the order of the presbyterate was conferred upon him on
 the Saturday in Pentecost week, 10 May, 1409, in Kildare Cathedral, by
 John (Maddock), Bishop of Kildare, in all cases on letters dimissory. The
 archbishop gave sentence (quoted) accordingly.

Dated at Athboy.

The year of the ordinations is incorrectly stated. All the dates suit 1410.

207. Citation for a metropolitanical visitation of the deanery of Slayn in the
c. April, 1412. diocese of Meath. f. 49 (48)^v.

The archbishop having begun his visitation on 14 March in St. Patrick's
 Church, Trym, commands the dean and apparitors of Trym (*crossed out* :

above the line, in some hand, Slayn Loë Syddan, the last two names being crossed out to cite the rectors, vicars, and chaplains in the station (*above line, in some hand, or deanery*) of Syddan to appear in St. David's Church, Syddan, on [blank in MS.] May.

The year is fixed by comparison with no. 187, the month by the text of the citation.

208. Letter of excommunication and interdict addressed to the rectors **May × June, 1412.** of Clonard, Castellrykard, and Cloynlegh, in the diocese of Meath. f. 49 (48)^r.

The archbishop, then holding his metropolitanical visitation of Meath, states that Dalwalgh (*also written Dalwagh*) Ocagaun, publicly called the horse-stealer (*furem caballorum*), and his accomplices stole seven pigs from the archbishop's tenant at Balithogir, thus incurring sentence of greater excommunication by the provincial constitutions of Armagh and the synodal constitutions of Meath, and enjoins the above-named to admonish Dalwalgh to restore the said eight [*sic*] pigs within eight days, and Raymond Leynagh Bremeia to compel him, as his subject and familiar, so to do. If this admonition proves ineffectual, they are to denounce as excommunicate Dalwalgh and his accomplices (together with their instigators (*auctores*), &c.), and Raymond, their lord and master, and those who ratify (*ratihabentes*) their evil deeds, at mass on Sundays and festivals, until they have merited absolution. If they prove obdurate, they are to be admonished to restore the pigs within twelve days or make reasonable composition for the same; and if they fail to do so, they and the places where they sojourn are to be placed under interdict.

The date given above is suggested by the position of the document in the Register.

209. Citation of the Abbot of St. Mary's, Novan, O.S.A., to a visitation on **June (?) , 1412.** 6 July. f. 50 (49).

The archbishop is visiting the diocese of Meath.

This citation certainly belongs to the visitation of 1412. It must have been issued not long before 6 July in that year.

210. Letter of excommunication and interdict addressed to the Dean and **30 August, 1413.** Chapter of Dromore, Master Thomas Omostead, Archdeacon of Dromore, Magnellus M^egylmor, vicar of Achdyryg, and the other secular clergy of the diocese. f. 50 (49)^r.

States that Odo M^egynassa (*in title M^eganassa*), captain of his nation, and superior person in the lordship of Oveagh, had made a statute that any clerk going to the archbishop's court for the despatch of business should pay to Odo five marks in money or its equivalent in kind (*in pecunia vel estimatione*), and that under this statute he had despoiled John M^ebruyrn, clerk, of two cows, Sir Donald M^elourar of four, and Patrick M^edonegan of two. The

above are enjoined to admonish Odo to renounce the statute and to restore the goods within eight days. If the admonition proves ineffectual, they are to denounce him as excommunicate at mass on Sundays and festivals and to place him and his lands and the places where he may sojourn under interdict.

Dated in the manor of Dromeskyn.

211. Presentation by Sir John Bellewe (*in title* Bedlew), knight, lord of **4 January, 1414.** Bellewestoun, diocese of Meath, and of the second (alterius) portion of the villa of Dundalke, diocese of Armagh, to whom the presentation belongs for this turn, of Sir Patrick Oweyn, chaplain, to the vicarage of St. Nicholas, Dundalk, vacant by the long-continued (diutinam) occupation by Master John Tayllour of two incompatible benefices. f. 50 (49)^v.

Form as no. 113.

212. Citation directed to William Yong, Archdeacon of Meath. **27 June, 1412.** f. 51 (50).

States that in virtue of a composition between the Archbishop and Chapter of Armagh, and the Bishop of Meath, the Archdeacons of Meath and Kenlys, and the religious and clergy of Meath (no. 215), Robert (Montayne), late Bishop of Meath, and the archdeacons, religious, and clergy of the diocese were bound to pay £40 sterling, English, [within three months] of 14 March, the day on which the present metropolitanical visitation began in St. Patrick's Church, Trym, in the name of procurations, and that this sum has not been paid. The archbishop admonishes Yong and commands him to admonish the Archdeacon of Kenlys and the clergy of his own archdeaconry to pay the amount thereof due by them within twelve days; and if the monition is ineffective, he suspends him and places under sentence of greater excommunication the several persons (singulas singulares personas) of the religious and clergy of his archdeaconry as a chapter, corporation (universitatem) or college. He further cites Yong and commands him to cite those just mentioned to appear before him or his commissaries in St. Mary's Church on the Meath side of Droghda on 11 July.

Dated at D[roghda].

213. Certificate that the foregoing letter was handed to Sir John Dermot, **27 June, 1412.** rector of St. Columba's, Clonmore, [messenger] of the archbishop, in [his] dwelling-house [outside] the walls of the villa of Droghda on the Meath side, for delivery to William Yong, Archdeacon of Meath, and another of like tenor for delivery to the Archdeacon of Kenlis. f. 51 (50)^v.

214. Certificate of Orders of Sir Simon Somyrsede of the diocese of Meath, **June (?), 1412.** priest. f. 51 (50)^v.

The above, being cited during the archbishop's metropolitanical visitation of

Meath, proved that he had been promoted to the subdiaconate on the Saturday after Pentecost, 6 June, 1411, in the chapel of the manor at Talagh, ordained deacon on Ember Saturday, 19 September, 1411, in the chapel of the manor at Fynglas, both by Thomas (Cranley), Archbishop of Dublin, on letters dimissory, and advanced to the order of the presbyterate on Ember Saturday, 19 December, 1411, in St. Columba's Church, Kenlys, by the late Robert Montayne, Bishop of Meath. The archbishop gave sentence (quoted) accordingly.

Breaks off at the end of the page.

This is probably to be dated before 27 June, 1412, when the ordinary business of the visitation seems to have been finished (no. 212).

215. Letters patent of Brother William (de Paul), Bishop of Meath, **1 December, 1348.** William de Sancto Leodegario, Archdeacon of Meath, and Henry Powel, Archdeacon of Kenlys, and the clergy of Meath. f. 52 (51).

States that a composition was unanimously agreed to between Richard (FitzRalph), Archbishop, and the Dean and Chapter of Armagh, and the above in the matter of visitations, to the following effect:—That the archbishop and his successors shall freely visit the diocese of Meath, on condition that they shall receive as procurations £80 and no more, of which 60 marks shall be paid on the day on which the archbishop enters the diocese for the purpose of visitation—three months' notice of the visitation having been given to the bishop or his vicar-general or other deputy and the clergy of the diocese—and the other 60 marks within three months thereafter. And when, observing the Roman form of constitution put forth by Pope Innocent IV, the archbishop visits the diocese after the lapse of three years from the beginning of his preceding visitation, procurations shall be paid as above. But if he visits after two years, only 80 marks of silver shall be paid; and if after one year, 40 marks: in either case in two portions as above. If the archbishop visits contrary to this agreement, he may lawfully be resisted. If his legitimate right of visitation be resisted, or the above procurations be not paid, he may proceed against the persons so offending by ecclesiastical censures, even after the end of his visitation, either within the diocese of Meath or in any part of the diocese of Armagh among the English. The parties, at their common charges, will procure confirmation of this composition from the Pope. The Bishop of Meath caused these letters to be written by Master William de Tadelowe (? Cadelowe), clerk, notary public, and they were sealed by the bishop, the archdeacons, and the clergy.

Dated "in our congregation in the parish of Lechercor near Trym."

Ends: "Presentibus reverendis et discretis viris magistris Thoma de Melton iuris civilis professore rectore ecclesie parochialis de Trym officiali

domini episcopi Midensis Matheo Crompe iuris perito officiali domini archidiaconi Midensis Michaelo Darcy iuris perito officiali domini archidiaconi de Kenlis Willielmo de Monemuta Ricardo Broun iuris peritis Midensis et Armachane diocesum testibus ad premissa vocatis specialiter et rogatis.”

Compare the composition of 9 April, 1265, in *Reg. of St. Thomas*, 71.

216. Letter of interdict against the diocese of Meath addressed to Master **30 August, 1412.** Richard Rath, rector of Rathfegh, diocese of Meath, official of the court of Meath. f. 53 (52).

States that although Robert (Montayne), late Bishop of Meath, the Archdeacons of Meath and Kenlys (*also written* Kenlis), and the religious and clergy of Meath were bound under the composition (no. 215) to pay £40 sterling within three months of 14 March, 1412 (as in no. 212), a great part of this sum has not been paid and is refused. The above is therefore enjoined to admonish the archdeacons, religious, and clergy of the diocese to pay it within 14 days. In the event of the admonition being ineffective the archdeacons, &c., “who claim that they constitute (facere) a chapter, corporation (universitas), or college in the church of Meath,” are placed under interdict, and the several persons from whom the procurations are due under greater excommunication. Rath is to cite the archdeacons, &c., to appear before the archbishop or his commissaries in St. Nicholas’s Church, Dundalk, on 15 September. He is also to publish the archbishop’s monitions and censures in public and more noted places of the diocese.

Dated at the manor at Termonfeaghyn.

217. Refutatory apostles addressed to Pope John (XXIII). f. 53 (52)^v. **August × September, 1412.** State that Sir Robert Deysetyr, rector of Kyllagh, diocese of Meath, appealed from certain charges brought against him by Henry Sceriaunt, clerk, to the Apostolic See, but directly and ‘tutorie’ to the court of Armagh; that the archbishop thereupon, according to custom, inhibited the latter from attempting anything to the prejudice of Deyseter, while the case was still unheard; that Sceriaunt appealed against the inhibition, and that the appeal being frivolous the archbishop does not forward (non differo) it.

The date is suggested by the position of the document in the Register.

218. Names of persons ordained by Philip (Nangle), Bishop of Clon- **24 September, 1412.** macnoise (Cluanen.), by command of the archbishop, in St. Nicholas’s Church, Dundalk, on Ember Saturday before the festival of St. Michael. f. 53 (52).

Acolytes—John Payn, brother of St. Mary de Urso, Nicholas Heyn, canon of St. Mary’s, Novan, William, clerk of the diocese of Armagh, Robert Duff, of the diocese of Meath.

Sub-deacons—Laurence Nagan of the diocese of Armagh, Richard Boriaun of the diocese of Meath.

Deacons—John Logan, rector of Derver, William Aueff, monk of Melifont, Thomas Nugent, and Geoffrey Borran, brothers of St. Leonard's, Dundalk.

Priests—Sirs William Crux of Meath, Robert Sweteman, William Broun of Meath.

219. Confirmation by Archbishop John (Colton) of the Abbot and **14 May, 1390.** Convent of the Cistercian house of St. Mary de Viridi Ligno, in the diocese of Dromore, in the rectory of the church of Nova Villa de Coly. f. 54 (53)^v.

Sealed by the archbishop and the dean and chapter. Dated at Droghda. The year is also described as the thirteenth of the consecration of Colton.

220. Citation directed to Adam del Naase, Archdeacon of Kenlis. **24 November, 1412.** f. 54 (53)^v.

In almost identical terms with no. 212. But the period allowed for payment is 15 days, the archdeacon is not suspended, and the body of the clergy is laid under interdict as well as excommunication. The citation is for St. Mary's Church, Carlingford, 9 December.

Dated in the manor of Dromeskyn.

221. To William Yong, Archdeacon of Meath, and Master Richard Rath, **18 January, 1413.** rector of St. Mary's, Rathfegh, diocese of Meath, concerning the procurations of the diocese of Meath. f. 55 (54)^v.

States that in virtue, &c. (as in no. 212), but that some beneficed persons named in an annexed schedule, in spite of the excommunications published by Rath, the principal collector of the procurations, still refuse to pay them. Hence Rath has prayed that the sentences of excommunication should be strengthened (agrarare). The archbishop accordingly commands the above to cause them to be denounced as excommunicate in noted (insignia) places and parish churches in the deaneries of Molynger, Clonard, Loċ, Athnurhyr, Trym, and Seryne, till they merit the benefit of absolution.

222. To William Yonge, Archdeacon of Meath, and Adam del Naas, **11 March, 1413.** Archdeacon of Kenlis. f. 55 (54)^v.

Preamble as no. 212. The archbishop admonishes the archdeacons and commands them to admonish the religious and clergy of the diocese of Meath to pay what is due within 8 days. The results of disregard of the admonition are to be as in no. 216.

Dated at Athboy.

After the date is a postscript apparently intended for the Archdeacon of Meath only, citing him, and directing him to cite the religious and clergy of

his archdeaconry to appear before the archbishop or his commissaries in St. Michael's Church, Derver, on 6 April.

A note adds that a similar citation was issued to the Archdeacon of Kenlys.

223. List of persons ordained by Philip (Nangle), Bishop of Clonmacnoise **18 March, 1413.** (Cluanen.), by mandate from the archbishop, in St. [Mary's] Church, Athirde. f. 56 (66)^v.

Acolytes—Walter Obewlan, William Fynter, John Ruer, all of the diocese of Armagh, Adam Gower, monk, Turlough M^ckay, of the diocese of Armagh.

Subdeacons—John Sawage, Geoffrey Palmer, Thomas Warynge, and John Warynge, monks, Robert Duff, of the diocese of Meath.

Deacons—Henry Rede, diocese of Meath (has title for all orders), Nicholas Heyn, canon of Novan, Charles Omoloyne, Avelanus Omolachelyne, and John Omoloyne, of the diocese of Clonmacnoise, Brother John Payn.

Priests—Sir William Awell, monk, Sir John Crystor, diocese of Dublin (has title and letters dimissory for all orders), Richard Doryan, of the diocese of Meath, Laurence Nagan, of the diocese of Armagh, John Jordaun, of the diocese of Meath (the last three have titles for all orders).

224. List of persons ordained by the same, by command of the **17 April, 1413.** archbishop, on 'Sitientes' Saturday in St. Peter's Church, Droghda. f. 56 (66)^v.

Acolytes—William Barrett and Henry Ferrowir', O.S.A., Magonius Ohilly and John Okyltaun, O.P., John Boyte, William Talbot, diocese of Meath, William Whyt, monk, Christopher Allyn, Edmund Penteney.

Subdeacons—Thomas Tyrlagh, William Fynter, John Ruer, Walter Bewlaun.

Deacons—John Sawage and Thomas and John Warynge, monks of Melifont, Robert Duff, diocese of Meath.

Priests—Charles and John Omulloyne, diocese of Clonmacnoise, Henry Rede, diocese of Meath, John Whylle, minorite, John Payn (*in another hand is added de Urso*).

The date is incorrect. The scribe began to write 'April,' changed his mind and wrote 'March,' then crossed that word out and wrote 'April.' But 'Sitientes' Saturday (the Saturday after the fourth Sunday in Lent) cannot fall so late as 17 April. The true date is probably 17 March, 'Sitientes' Saturday, 1414 (1413 O.S.). This ordination seems, from a comparison of the names, to have taken place not long after that recorded in no. 223.

225. Commission to Sir John Dermot, rector of Cloynmo[r], to absolve
17 April, 1413. from excommunication Adam del Naas, Archdeacon of Kenlys,
 and relax the interdict against him for delay in the payment of procura-
 tions (as in no. 216); and to the latter to do the same for the clergy of his
 archdeaconry. f. 57 (62).

226. Institution of Sir John Exlantoun (*in no. 227 Exlanton*) or Baker,
20 May, 1413. priest, (chaplain) of the collége of Kilmaynan, presented
 by William Foule, Prior of the conventual church of Kymaynan, by authority
 of Thomas le Botiller, Prior of the Hospital of St. John of Jerusalem in
 Ireland, to the vicarage of Molary (*in no. 227 Molari*), on the death of Sir
 William Fotyn (*in no. 227 Fotyne*). f. 57 (62).

Dated in the manor of Termoufeghyn. Form as no. 8.

227. Presentation referred to in no. 226. f. 57 (62).

17 May, 1413. Dated at Kilmaynan. Form as in no. 113, with some
 modifications.¹

228. To Philip (Nangle), Bishop of Clonmacnoise (Cluanen.), and the
24 May, 1413. chapter and other clergy of the diocese of Kilmore
 (Triburnen.) f. 57 (62)*.

States that inquiry as to certain charges made against the Bishop of
 Kilmore was lately committed to the above bishop and the Bishop of Achonry
 (Akaden.) by the Apostolic See at the instance of Patrick Osyredan, clerk of
 the diocese of Kilmore, who made many accusations against him at the Apostolic
 See; and that in the proceedings before Nangle, the latter unjustly (as it
 is said) made diverse charges against him, and though frequently requested
 to recall them did not do so. Hence the Bishop of Kilmore appealed directly
 to the court of Rome, and "tutorie" to the court of Armagh. Accordingly
 the archbishop, according to the custom of the church of Armagh, inhibits
 the above from doing anything to the prejudice of the appeal while it is still
 unheard.

229. Letter in favour of Christin Oferagaid, a pilgrim to the Holy
24 May, 1413. Sepulchre and the Holy Land. f. 57 (62).

States that the above has visited Rome and the holy places and resorts of
 pilgrims (peregrinationes) there five times, and other places; begs for him a
 favourable reception and safe conduct on his present pilgrimage; and grants
 an indulgence of forty days to all who assist him with their goods, both the
 archbishop's "parochiani" and others whose diocesans ratify the indulgence.

The name of the writer is omitted, but the description of the year as the tenth of his consecration
 implies that he was a bishop, and suits Fleming.

¹ For "cum omni . . . devotis," we have "reverentia debita cum honoré"; and "cum omnibus
 . . . universis" is omitted.

230. Letter of the archbishop, engaged in the metropolitanical visitation of **End of March, 1412.** the diocese of Meath, to the secular clergy of the deanery of Rathtowth. f. 58 (63).

A report having been made to the archbishop that through the withdrawal of the altarage of the villas of Curtlaghestoun, Justhestoun, Babestoun, Curraghstoun, Balmacarnean and Distoun, Beutoun, Dardistoun, Raystoun, Prestoun, Swynesden, Belgrew, Feypowestoun, Nottestoun, and Belandy and the tithes of corn and hay of the villas of Belgrew, Balmacarnean, and of 12 acres of the land commonly called Keldraghfelde, anciently assigned to the support of the parochial chaplain ministering in the chapel of Kylbryd, and the consequent want of a chaplain, divers of the inhabitants of those villas died without the sacraments—notwithstanding the ordinance of Archbishop John (Colton) in his metropolitanical visitation that, on account of the distance from the mother church of Dunboyng, and the dangers of floods, the parish priest in the said chapel [should have] the altarage and tithes of corn . . .

Incomplete.

The position of this letter in the Register suggests a date in October or November, 1413. But there was no metropolitanical visitation of Meath in that year. It must therefore be placed in the visitation which began at Trim 14 March, 1412 (no. 187). In the visitation which began at Trim on 11 March, 1409, Ratoath was visited on 21 March (nos. 85, 106). Hence it may be concluded that the present letter is of date about 24 March, 1412.

231. Institution by the archbishop, guardian of the spirituality and **21 November, 1413.** spiritual jurisdiction of the church of Down, *sede vacante*, of Sir Richard Canlan, chaplain of the diocese of Meath, presented by the patron, to the rectory of St. Nicholas, Ardtuele, vacant by the death of Sir Thomas Hunt. f. 58 (63).

Dated at Dundalk. Form as in no. 8.

232. Mandate to Master W. Pyrroun, Archdeacon of Armagh, to induct to **November, 1413 × January, 1414.** the vicarage of Drumcarr Sir John Whyt (*elsewhere* Why), priest, presented by the Abbot and Convent of St. Mary, Dublin, of the Cistercian order, on the death of Sir W. Galwey. f. 58 (63).

The date is inferred from the position of the document in the Register.

233. Mandate to Master W(illiam) P(yrroun), Archdeacon of Armagh, **29 January, 1414.** to make inquiry, as in no. 84, as to the vicarage of St. Feghin's, Termonfeghyn, to which John Preen has been presented by John Lyde, Prior, and the Convent of St. Mary's, Louth, on the death of Sir John Trymlet. f. 58 (63)ʸ.

234. Certificate that Sir John Cristofor, of the diocese of Dublin, was **21 December, 1412.** ordained deacon on Ember Saturday, 20 December, 1412, in St. Ronan's Church, Dromeskyn, on letters dimissory. f. 58 (63)ʸ.

Dated in the manor of Dromeskyn.

235. Certificate of Philip (Nangle), Bishop of Clonmacnoise (Cluanen.), **March, 1413.** that by authority of the archbishop he conferred the order of priesthood on the same on Ember Saturday, 18 March, 1413, in St. Mary's Church, Athirde, on letters dimissory. f. 58 (63)ʳ.

Sealed with the archbishop's seal and attested by him.

Mutilated at end.

236. Letter to the Bishop of Meath. f. 59 (64).

January, 1414. States that the archbishop had appointed Robert Wolf' his proctor for collecting alms throughout the province for the repair of the metropolitan church, which had been maliciously burnt; and begs admission for him into the diocese of Meath.

The document began on a preceding leaf, now lost.

The place of the document in the Register (see nos. 233, 238) suggests the date given above.

237. Agreement made in the king's court at Droghda in the time of **4 June, 1242.** Maurice, son of Gerard, justiciary, before Walray de Wallisey, Robert de Banner, and Michael de Kennenyl, itinerant justices, between Archbishop Albert and Robert Tele, tenant of three carucates of land and ten marks rent in Kylklochy and in Mayne Baly Maccanter; which the archbishop claimed as the right and free alms of the Church, because Robert, in the presence and with the consent of his wife Beatrice, had granted it to him as such, in return for two carucates in Kylklochy, which Robert formerly had by grant of Archbishop Donat (O'Fidhubra), together with a landing-stage in the fishery and the profits thereof (portu in piscatur' et bonis inde provenientibus), saving for the archbishop the profits (commodis) of (de) his men in his land of Kylklochy which he retains in his own hand, the fishers also remaining in the landing stage and fishery and (taking?) half the profits (medietatem tocius commodi provenientis) from outsiders fishing there.

f. 59 (64).

The archbishop concedes to Tele pasture for at least 10 cows and 100 sheep in the land which he retains, at an annual rent of 1d. for each cow or 10 sheep, payable 1 August. Tele is to have the two carucates—which, if he has no issue of Beatrice, are to pass on his death to her for her life, and on her death to revert to his heirs—at a rent of 2lbs. of wax or 12d. payable at Easter.

238. Mandate to [the Archdeacon] of Armagh to induct John Preyn, clerk, **31 January, 1414.** presented by the Prior and Convent of St. Mary's, Louth, into the vicarage of St. Feghin, Termonfeghin. f. 59 (64)ʳ.

Dated in the manor of Dromeskyn.

239. Admission of the same to the same vicarage. f. 59 (64)ʳ.

31 January, 1414. The presentation is said to have belonged to the prior and convent for this turn.

Dated at the same place.

240. Certificate of excommunication (*according to the title* addressed to the
4 November, 1413. king's court). f. 59 (64)^v.

Notifies that in the course of his metropolitical visitation of the diocese of Meath in 1410 the archbishop had sentenced William Balf, burgess of Athboy, to greater excommunication for contumacy in a cause concerning usury promoted by John Madok, burgess of Drogheda, and that he has remained obdurate for more than four years. He desires the addressees to act accordingly.

The year of the visitation seems to have been 1409, not 1410, as written in the Register. There was no metropolitical visitation of Meath in the latter year; and the latter part of the document implies that the visitation was proceeding more than four years before November, 1413.

241. Dispensation for marriage within the prohibited degrees. f. 60 (56).
1415 (?). States that the archbishop had received a letter (quoted) from Peter (Gerardi), Bishop of Tusculum, presented to him by Barnabas Gernon of Gernonestoun, sealed with an oblong pendant seal, "ad similitudinem sculpture," representing a bishop sitting in a chair, of red wax on white wax, in the manner of the Roman court, in which Peter, who, together with Antony (de Cajetanis), Bishop of Porto, had charge of the Pope's penitentiary, by special *viva voce* command of the Pope, gave him authority to grant dispensation to four men and four women of his city and diocese to marry within the fourth degree of kindred or affinity. The letter was dated at Bononia 12 September, 1410. Accordingly the archbishop, as sole delegate or executor of the Apostolic See, grants such dispensation to Gernon and Alice de Werdon, related in the fourth and fourth degree.

Incomplete.

The date given above is suggested by those of nos. 242 ff.

242. Institution of Sir John Whyte, priest, rector of Drakestoun, diocese
22 June, 1415. of Meath, presented by Adam Elmeley, proctor in Ireland of the Prior and Convent of Lantonia Prima, diocese of St. David's (Menneven.), Wales, to the vicarage of St. Peter's, Drogheda, vacant by the resignation of Sir Nicholas Tempset for the purpose of exchange with Whyte. f. 60 (56)^r.

Dated in the manor of Dromeskyn.

A note states that a mandate for induction was issued to the Archdeacon of Armagh.

243. Certificate by Edward (Dautesey), Bishop of Meath, of the citation
4 July, 1415. to a metropolitical visitation. f. 61 (55).

States that he had received the archbishop's letter dated in the manor of Dromeskyn, 23 March (quoted: form as no. 85) for the holding of his visitation of the diocese of Meath, beginning at St. Patrick's Church, Trym, on 4 July, and that he acted accordingly.

244. Letter of excommunication and interdict to the prior and colidei of
25 July, 1415. the Church of Armagh. f. 62 (57).

They are ordered to admonish by name Masters David and Dionysius Oulean to pay the rents due to the archbishop for the lands of Oulean, within 8 days. If the admonition is ineffectual, they are to excommunicate them by name: and if they continue obdurate under the excommunication for eight days, they shall interdict the places in which they sojourn.

245. Letter of sequestration, to Sir W., vicar of Keppok. f. 62 (57).
July & September, 1415. Since the archbishop has sequestered the tithes of corn and hay on account of defects in the chancel of the church, for which the rector is responsible (*ex parte rectoris*), the above is commanded to admonish the faithful, on pain of greater excommunication, not to dispose of such tithes without the archbishop's special licence.

The date is inferred from those of nos. 244, 247.

246. Dimission of Sir John Okerwyll (*in title* Kerwill), priest, (*in title* c. **September, 1415.** chaplain), rector of Kyllalon, diocese of Meath. f. 62 (57).

Okerwyll having appeared before the archbishop in his metropolitanical visitation of Meath, and having exhibited apostolic letters and processes following thereon, the archbishop pronounces him true rector.

The date is given as A.D. 1415 and the 12th year of the archbishop's consecration. It therefore lies between 1 May, 1415, and 24 March, 1416. Since the visitation began 4 July (no. 243), it must be subsequent to that day. Killallon was in the deanery of Fore (Ussher, *Works* i, p. cxvii., which would probably be visited about two months after the commencement of the visitation (see nos. 85, 106, 118, 207, 212), *i.e.*, about the beginning of September. This falls in with the place of the document in the Register.

247. Resignation of the vicarage of St. Brethany and St. Frethany,
29 September, 1415. Dunlere, by Sir Thomas Nanny, chaplain. f. 62 (57)^r.

The instrument of resignation (quoted) was read in the cemetery of St. Peter's church, Rathedrumnew, before John Blyssot, and Nanny appointed Nicholas Alysaunder, chaplain, rector of Dunbeyng, John Nottyngham, literate, and William Cok, literate, his proctors.

Ends: "Presentibus tunc ibidem reverendis viris dominis Johanne Darcy rectore de Rathedrumnew, Roberto Sweteman capellanis testibus Ardmachane diocesis," &c.

248. Letters of Orders of Sir Nicholas Alexandre, rector of St. Mary's,
30 December, 1414. Dunbeyng, (*in title* Dunbeyng). f. 62 (57)^r.

States that the archbishop on Ember Saturday, 21 December, 1414, promoted him to the order of priesthood in the chapel of the manor of Dromeskyn.

The date of the ordination is incorrect. December 21 was Friday in 1414.

249. Presentation by Thomas le Boteler, Prior of St. John of Jerusalem in **5 October, 1415.** Ireland, of Sir Robert Sweteman, chaplain, to the vicarage of SS. Brethanus and Frethanus, Dunler, vacant by the resignation of Sir Thomas Nanny. f. 63 (58).

Form as in no. 113, with variations similar to those in no. 227.

250. Letter to a prelate, unnamed, urging him to deal less harshly with **30 October, [1415].** his flock. f. 63 (58).

Dated at Athboy.

From the dates of the preceding documents it may be inferred that the year was 1415. Fleming died long before October, 1416 (see note on no. 254).

251. Appointment of Master John Logan, rector of Derver, and Richard **April (?)**, 1416. Whyte, the archbishop's marshal, as his proctors at a royal council to be held at the Naas on the Monday before the feast (19 May ?) of St. Dunstan. f. 63 (58).

The place of the document in the Register marks the date as between November, 1415, and June, 1416 (see nos. 250, 253-255); and it was certainly earlier, but not much earlier, than 19 May, if the deposition of St. Dunstan is the feast referred to. Thus the date is determined approximately.

252. Application to King Henry to grant to the convent of the monastery **c. May, 1416.** of St. Peter and St. Paul, Knoc, near Loueth, O.S.A., and those to whom the right of election belongs, licence to elect an abbot, the last abbot having been deprived. f. 63 (58)ᵛ.

The date is inferred from the place of the document in the Register.

253. Letter to E(dward Dautesey), Bishop of Meath, concerning procu-
c. 1 June, 1416. rations. f. 63 (58)ᵛ.

States that in virtue of the composition (no. 215) the bishop, archdeacons, &c., were bound, &c. (as in no. 212, the date being changed to 4 July). The archbishop therefore admonishes the bishop, and commands him to admonish the archdeacons, &c., to pay the amount still unpaid within 15 days. Otherwise he cites him and commands him to cite them to appear before him at St. Peter's Church, Droghda, on the Thursday after the feast (29 June) of St. Peter and St. Paul.

Breaks off at the end of the page.

This obviously refers to the visitation of 4 July, 1415 (no. 243). It is therefore later than September, 1415; and it was probably written in or very shortly before June, 1417 is certainly too late. Hence the date is fixed as above.

254. Appointment of [*blank in MS.*] as proctors for the Dean and Chapter **c. 1 July, 1416.** of Armagh, guardians of the spirituality and spiritual jurisdiction of the archbishopric, *sede vacante.* f. 64 (59).

The proctors are to hold the rectory of St. James's Church, Athboy, in the diocese of Meath, annexed to the archbishop's mensa.

Incomplete.

The date must be later than 22 June, 1416 (see no. 256). But if we may accept Ware's statement supported by Swayne ii. 100, that Archbishop Fleming died in June, Ware, i. 85, it may be within a week or two of that day.

255. Acquittance to the bailiff and community of the villa of Dundalk in **20 June, 1409.** the county of Loueth. f. 64 (59)*.

States that the archbishop has received from Richard Chepman, bailiff, and the community of the villa, on oath, a final account of the customs (*consuetudinibus et custuniis*) of saleable articles sent into or out of Dundalk, from the Tuesday after Pentecost (5 June), 1408, which were faithfully expended on the fortification, aid, and pavement of the town and the walls (*clausuram murorum*).

A note adds "a portion of another, and, as I esteem, a better form." It is a variant of one clause of the acquittance, which does not alter the meaning.

256. Collation during the metropolitanical visitation of Ardagh (Ardakaden.), **22 June, 1416.** of the vicarage of the Church of St. Fregius, Cloyn, in that diocese, vacant by the death of Sir Andrew M^ckeichan, to John M^ckeichan, clerk. f. 64 (59)*.

Form as no. 8. Dated in the manor at Termefeghyn.

A note states that on the same day a mandate for induction was issued to the archdeacon, Master Maurice M^cgillananyd.

257. The first few words of a grant. f. 64 (59)*.

258. Grant by Archbishop Milo (Sweteman) with consent as in no. 22, **21 November, 1365.** to William and Arthur M^cbrunyn, sons of Master Arthur M^cbrunyn, of certain lands in the archbishop's holding of Kylmor (*in title* Kilmore; *also written* Kellmor) now held by the latter, for their lives, after the death of their father. f. 65 (61).

The lands are Teachrana, Drumuntm^circh, Drumanuchroilechi, Eochailleingne, Druimlösti, Burinn, Olunlechara, Meclortain, Tannach, Crayunnmela, Druimarta, Callineathasaich, Sechis, Bernathirim, Cloinicahain (?) Earthinbuyth, Drumauun, Clachannagobar, Edan ganla, Kran, Lisdunagan, Cullochachachi, Crokeait, Druimasuath on the south side. They are to be held—with full right of herenaghy (herenacie) in the entire holding of the church of Kylmor—as long as the grantees are pleasing, &c. (as in no. 22). The annual rent is to be 1 mark 8*l.*, payable 1 May and 1 November.

Sealed by the archbishop and the chapter. Dated at Down.

Printed in Ussher, *Works*, xi. 436. Translated in King, p. 37.

259. Certificate that in the dwelling-house of the certifier (not named) at **3 June, 1460.** Droghda Schaglyn Carnele espoused (affidavit) Johanna Rochfort. f. 65 (61)*.

Ends: "Presentibus Thoma FitzRobert et Johanna Knowne (?) ville de Drogheda," &c.

260. Letter of Edmund de Mortuo Mari, Earl of March and Ultonia, Lord **14 January, 1419.** of Wygemere, Clare, and Trym, to the treasurer and chamberlain of the exchequer of his liberty of Meath. f. 66 (60).

States that Archbishop John (Swayne) made supplication that he and his predecessors from time immemorial had had an annual rent of £8 16s. 7½*d.*, payable 1 November and 1 May, out of the manor of Trym, for the site of the castle and villa of Trym, as appears from a record there, of which he was peacefully seised on 1 November, 1418, but that since then it has not been paid. The Earl, with the assent of his kinsman (consanguinei) Thomas Talbot, knight, seneschal of the above-named liberty, and of his council in the same, commands that arrears of the rent be paid to the archbishop and that in future it be paid at the proper terms.

Dated at Trym.

Note: "Per petitionem per ipsum senescallum et consilium in dorso et priuato sigillo suo consignatum. Duppl."

261. Letter to E(dward Dauntesey), Bishop of Meath, and his clergy [. . .] **June, 1416.** f. 66 (60)*.

States that the archbishop had received an appeal of Sir John Gynga, rector of the church of Nova Villa of Fertullach in the diocese of Meath, to the Roman court, but "tutorie" to the court of Armagh, stating that John Omyagi, in virtue of a bull fraudulently obtained, was disturbing him in the possession of the rectory. In accordance with ancient and laudable custom the archbishop inhibits all persons from disturbing Gynga while the appeal is pending in the Roman court. And he admonishes Fergal M^egoighgan, captain of his nation, Odo Flavius M^egoighgan, Cornelius son of Bernard M^egoighgan, Macrobius Oboechan, Constantine the younger (juniorum) M^ekegan, and all other parishioners, under penalty of greater excommunication, to answer to Gynga for the fruits, rents, oblations, and issues of the rectory, and to obey and be attendant to him in all things lawful and honest, while the appeal is pending.

There are many erasures and alterations in this document, which is apparently a draft.

262. Notarial instrument. f. 67 (65).

19 January or February, 1454. Sets out that in the residence of the notary at Drogheda John M^ebryn, Cistercian Abbot of Viride Lignum, diocese of Dromore, then engaged in suing before Archbishop John (Mey) for letters of indulgence in the matter of charitable aids for his monastery, which had been accidentally burnt—inquiry having been made concerning a sentence

passed by him (de sui sententia quam tulerat), according to report, as executor, in favour of Sir Patrick Okelly or Okynnegan against Sir Henry Offerchan, rector of Myntereny or Tamlaghtlege, in virtue (vigore) of a certain grant of possession (conquestus) obtained by the former, but in such a way as to render it invalid (licet nulliter et sinistre), for the removal of the latter from his rectory—denied on oath that he had ever in the cause of such grant (conquestus) passed (protulisse) any sentence, or intended to pass (preferre) any, since he did not think any (sentence) ought to be passed in such matters (cum non vult esse in talibus proferend') except with the express counsel and assent of the primate. He desired a public instrument to be made.

Ends: "Presentibus reverendis et discretis viris magistro Jacobo Leche ecclesie Armachane canonico ac Donato M^ekclgen clerico Rathpotensi, Patricio Omurran carpentario," &c.

The date is given in three forms: (1) 19 [. . .] 1453, (2) the 7th [so Reeves: the number is now lost] year of Nicholas V, (3) the second indiction. The last holds good for the year 1454 (N.S.). The second implies a date before 18 March, 1454. Hence from the first it is determined as 19 January, or 19 February, 1454.

263. Notarial instrument.

f. 67 (65)^v.

March, 1454 × March, 1455. Sets out (i) that in the residence of the notary at Drogheda, Sir Donaldus M^ebard, chaplain, who had lately lived with Henry Walshe of Knokkengarre, in Lacialia, diocese of Down, swore (1) that he had learned from Walshe and others that Isabella, Walshe's daughter, had animals of her own among those of her father, (2) that after Walshe's death, about six years before 1 May last, his animals were taken to the 'place' of the Prior of Down, and when mention was made of Isabella's animals among her father's, the prior said it pleased him that she should have them for her dowry (maritagio et commodo), (3) that the prior often threatened to sell out her father for a debt sepius ex debito quod sibi debuit venditare), and that Walshe denied the debt: (ii) that William Stokys swore (1) that the animals Isabella had among her father's were "3 liliaghts, 1 bolet kowe, and 1 ox," (2) that he knew this from having had charge of them for a time, (3) that by permission of Isabella her father had them for his use (refrig[e]rium), (4) confirmed (2) of previous witness.

Ends: "Hiis presentibus discretis viris Patricio Zeman, Cristoforo apparitore ac Ricardo Tankard," &c.

The date is given as A.D. 14 [. . .], the 8th year of Pope Nicholas [V].

264. Letter of protection of Sigismund, King of the Romans, [King 9 July, 1417. of Hungary], Dalmatia, Croatia, &c., for the Council of Constance.

f. 68 (67).

All attending are to have full liberty and security, and all princes, vassals and subjects of the empire, and the citizens of Constance, are commanded to maintain their liberty, not only up to the election of the future pope, but for the whole time of the meeting of the council and the six months following it.

A note adds that by way of confirmation the letter is sealed by Frederick, Marquis of Brandenburg, arch-chancellor and elector of the Holy Roman Empire, Lewis Arnen (?), William, Henry and John, counts palatine of the Rhine (Reni) and Dukes of [. . .], princes of the Holy Roman Empire, also Lewis, Count of Octogen, Master of the Imperial Court, Gunther, Count of Swartzburgh, Judge of the same, the master of the citizens, and the consuls of Constance.

A note states that the foregoing safe-conduct was sealed with ten seals, and that by command of the king John de Strigonio, Provost and Vice-Chancellor, had similar safe-conducts prepared for the several nations with the same number of seals.

265. Notarial instrument.

f. 69 (68).

27 July, 1413. States that Peter (D'Ailly), cardinal [priest] of St. Grisogonus, commonly called the cardinal of Cambrai, being absent in remote parts, holds the church of Limoges in commendam by dispensation of the Apostolic See, and that Nicholas Viandi claims that it should be conferred on him by the Pope, with the consent of D'Ailly, the latter to have a pension therefrom for a fixed number of years. Accordingly an agreement was come to, in the presence of Master Theodoric de Crakenborch, notary of the court of the apostolic camera, between Peter de Tullia, Canon of Narbonne, writer of apostolic letters and notary of the apostolic camera, D'Ailly's proctor, on the one part, and Reginald de Carnoto, Dean of Beauvais, Master Michael Bonis (?), Treasurer of Nevers, Geoffrey Danby, Licentiate in Laws, Michael Maillard, almoner of the House of God at Bourges, and Peter Negrandi, canon of Evreux, friends of Viandi, on the other part, to the following effect: that the church of Limoges be conferred on Viandi by the Pope, and the benefices of Viandi—including (in illa: *sic*) his prebends at Rheims and Bourges—should be conferred on D'Ailly, with expectation (sub expectatione) of dignities, personatus, administrations, or offices of the same churches; that D'Ailly be granted an annual pension of 80 gold florins of the camera for six years, payable at the Roman curia, at Avignon, or at Paris, according to his pleasure; that in these letters shall be added penalties of excommunication, suspension, interdict and deprivation of the church of Limoges, and perpetual inhabilitation in regard to all benefices (should Viandi not pay the pension); that Viandi is [to lodge] security [for the fulfilment of this arrangement] in the bank of a merchant 'in the present city (?)'; that the

first year's pension shall be paid immediately after the appointment of Viandi, to Guillermo [*sic*] (Fillastre) cardinal priest of St. Mark, the pensions for the other five years to be paid each in the first month of the year. That if Viandi, or others in his name, procure the collation of benefices to D'Ailly, the latter shall receive the value of those benefices 'in portatis,' if it amount (ascendat) to 100 florins, as payment (in defalcationem) of the pension in whole or in part.

For the observance of the foregoing Viandi is to oblige himself and his heirs and successors and the church of Limoges to the powers (viribus) of the courts of the apostolic camera, of the castle (castelletum) of Paris, of the little seal of Montpellier (Montispessulani), of the cabeolus (and) seneschal of Limoges, and to all ecclesiastical and secular courts. The bulls of the pension and the instrument of obligation are to be delivered to Fillastre before Viandi gets possession, and to be retained by him in the Roman curia. Reginald de Carnoto and the other friends of Viandi named above have similarly obliged themselves, their heirs and successors and their goods, to the courts just mentioned.

Incomplete, breaking off at the end of the last page of the Register.

For Peter D'Ailly, Nicholas Viandi, and the transaction here recorded, see Eubel i. 32, 166, 314. For William Fillastre, *ibid.* 32.

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- Bewleue: see Beaulieu.

¹ Identification uncertain.

² Casew, 190 perambulation of Meath, 1596: "John Delaboyde of Bellander." "Ballyantry" in Petty's map.

³ Carnanstowne in Petty's map.

⁴ In 1660 Oliver Lord Granilison asked "permission to change the site of the parish church of Tamlaghtlege to another locality, to be called in future the church of Ballymore," *Morrin*. iii. 334. Other names of this place are ταμλαχτά γλεαδ, τόν ηρη ζείτ (which survives in the form Tanderagee), and perhaps μυντερ ταμλαχτά Λόεζ. (See Hogan *s.v.*)

⁵ Possibly Beutoun is Baytown, a townland in the parish of Kilbride. See, however, Swynedden.

⁶ Might be read Beutoun: but it is spelt Bewton in *Inquis*. Meath, Car. I, no. 3.

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¹ *Inquis.*, Meath, Car. I, no. 92, among lands in the par. of Dunboyne, which adjoins Kilbride, has "Nottstoune . . . Phepoeston alias Bolyes": see also *ibid.* no. 3, which mentions Pheipostowne with Bewton (Baytown Park) and Swynesdene (q.v.).

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¹ Identification doubtful.

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¹ Leslie, p. 339.² Identification doubtful.

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¹ Reeves, *Antt.*, 31.

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¹ A list of the possessions of Llanthony in Ireland (*Fiantis* 1460) begins with the rectories of Dullake, Julyanston, Killarvan (called also Kilkervan, *ibid.* 3564), Colpe (which included Mornanton, *alias* Marynerton): *ibid.* 1547, Morechurche, Stamollen, Clonallwey. A comparison of this list with no. 117, with the map before us, justifies us in identifying Marinerestoun with Mornington. Kilkervan with Kilsharvan, and Nany with Julianstown. This older name for Julianstown survives as that of the stream on which the town stands—the Nany Water.

² Morrin, iii, 322: "Kilcloney, *alias* Clonkerny."

³ Cp. *Fiantis* 467.

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¹ See above, p. 178, note ¹.² *Fiants*, 1460: "Kilcowle, extending to Killovan."

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¹ The identification assumes that *M* was mistaken for *D* by the scribe.

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¹ *Fivnts*, 1723; Priory of St. John, Ardee, leased with "half the rectory of Rosse, called Maghyrrosse in Inferny [i.e. Farney]."

² Identification doubtful.

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¹ See above, p. 178, note ¹.

² What place is intended is doubtful: but Fleming of Mortoun is associated with Whyt of Kilmoon as supervisor of tenants of the archbishop, apparently in Meath. Probably each came from the neighbourhood where he was to exercise his office. Cp. Sweteman. nos. 79, 157, 167, 169. and Index s.v. Moretoun.

Mullary (μαδ λαριαρε)—Molari—Molary, bar. of Ferrard, Co. Louth, Rectors of: see St. John of Jerusalem.

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Newtown—Nova Villa—Novimidia, near Trim, par. of Newtownclonbun, bar. of Upper Navan, Co. Meath: see St. Peter.

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- St. Finian (Finnian), Church of, Greencastle, Chaplain of: see William.
- St. Fintan (Fintán), Church of, Dromin, Rector of: see Alexander; Barry.
- St. Fraech (Fraeac)—Fregius, Church of, Cloone, Chaplain of: see Trenotus.
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- St. Frethanus—Frethany—Furudran: see St. Baithin.
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- St. Grisogonus, Cardinal Priest of: see D'Ailly.
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¹ See *Fiants*, 6797. It was on the Meath side, outside the West Gate, and was called "de Urso," from its founder Ursus de Swemele (*Cal. Pat. Rolls*, 1358, p. 26).

² See Reeves, *Ant.*, 312.

- Somerville, Master William, Archdeacon of Armagh, p. 99.
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- Tamlaghtlege: see Ballymore.
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- Teachgowo: see Seagoe.
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- See also Newtown; St. Patrick.
- Trimnet—Trynlet, Sir John, vicar of Termonfeckin, 82, 233.

¹ Apparently = Tamlaght Killietragh (Reeves, *Ant.*, 300).

² *Inquis.* Tyrone, Car. I, no. 40: "Termon Mac Gwyrek *alias* Termoncomyn."

³ Identification uncertain.

- Tristernagh (Τριστερνάδ?)—Tristirmagh, par. of Kilbixy, bar. of Moygoish, Co. Westmeath, Prior of, 72, 182.
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- Turry—Tyrry, par. of Tynan, dist. elect. div. of Glenaul, bar. of Tiranny, Co. Armagh, 40.
- Tyrlaghog: see Tullaghoge.
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- Waryng—Warynge, John, monk of Mellifont, 223, 224.
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- Waspall—Waspayn, Sir Richard, vicar of Carlingford, 55, 153.
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- Whythed—Whythet, Master John, s.r.f., proctor at the Council of Pisa, 71, 104.
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- With: see White.
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- Wolf, Robert, quaester, 236.
- Worcester—Wigornien., Diocese of, 121.
- Wygemere: see Wigmore.
- Wythingoun, Gilbert de, clerk, 193.
- Ymyrmangan, 179.
- Yog', Brother John, 125.
- Yong—Yonge, William, Archdeacon of Meath, 212, 213, 221, 222.
- Zeman, Patrick, 632.

¹ Identification doubtful.² *Insulis*. Meath. Car. I., no. 3: 'Swynesdene juxta Bewton.' Bewton is probably the town of Baytown Park, par. and bar. of Dunboyne, close to which is Waynestown (in Petty's map Wyamestonne). Baytown Park is not represented in Petty's map. If, however, Bewton is identified with Baytown, a town in Kilbride parish, Swynesden must be regarded as a lost denomination.

VI.

A NOTE ON FOUR ARMORIAL PENDANTS IN THE ACADEMY'S
COLLECTION.

BY E. C. R. ARMSTRONG.

PLATES X, XI.

Read MAY 13. Published, JULY 20, 1912.

THE Royal Irish Academy collection contains four specimens of the small enamelled copper or bronze shields generally known as "armorial pendants." Three of these were formerly in the collection of Dr. Petrie and in the ms. Catalogue of the Petrie objects now in the Academy's collection in the National Museum; one of them (No. 938) is described as "Part of the trappings of a horse, containing the arms of the owner, of about the thirteenth century," and there is a note: "There are several small pendant ornaments in the Faussett collection, of bronze, in form of kite-shaped shields with arms enamelled, like those in my collection."¹ Two others numbered 939 and 940 are described as "similar to the last." A fourth specimen in the collection has no number and it has not been possible to trace its entry in the Museum Registers. It has been in the collection for many years.

Although unfortunately the provenance of the shields is not in any case definitely stated, I think we shall find that we can regard one as being undoubtedly Anglo-Irish. A number of these small pendants are known; many are preserved in the British Museum, and there are specimens in several of the provincial museums in England. Numerous references to them can be found in the Proceedings of the Society of Antiquaries of London and of other kindred societies. One notice in the *Archaeological Journal*, vol. iii, p. 79, is of interest, as it is there stated that "Mr. John G. Nichols exhibited several of these scutcheons, formerly in the collection of the Dean of St. Patrick's." The objects are described, and it is added that they appear to have been hung on the trappings or harness of horses, as one specimen exhibited pre-

¹ See Proc. Society of Antiquaries of London, Second Series, vol. vii, page 141, where it is stated that a number of these shields from the Faussett collection are figured in "Collectanea Antiqua," vi, p. 278.

served the adjustment by which it had been attached to the leather. It is added that in a MS. in Trinity College, Cambridge, there is a drawing representing a charger with a breastband which has a row of these scutcheons, hung all around it. These small pendants were also worn by heralds, messengers, and dependants of princes and great nobles, to show in whose service they were engaged; and it has been pointed out that there is thus an analogy between them and the badges worn by the modern king's messengers.¹ Some years ago a part of a palimpsest brass found at Luppitt, Co. Devon, was exhibited to the Society of Antiquaries of London,² and attention was called to the fact that the brass, representing a portion of a lady in the costume of a widow, which can be dated to the second quarter of the fifteenth century, has two small armorial shields used to fasten the cord of the mantle (Plate X, fig. 1).

Attention was also called to two monuments, one an effigy of a knight, preserved in the Public Library at Zürich,³ dated about 1400 A.D. (Plate XI), and another, a monument belonging to the fourteenth century, of a member of the Cockayne family, in Ashbourne Church, Derbyshire⁴ (Plate X, fig. 2), in which small shields are used as decorations on the camail of the knights. These small shields appear therefore to have been used either for personal decoration or for ornamenting horse-trappings, and may be attributed to the fourteenth or fifteenth century.

Mr. G. D. Burtchaell, M.R.I.A., Athlone Pursuivant of Arms, most kindly examined the shields with me, and assisted to identify the arms upon them; he also supplied me with some information as to the family of Weyland.

The first is probably one of the three from the Petrie collection, as it has a label somewhat like those used on others of the Petrie objects; though the number is crossed out and does not agree with that in the catalogue, it is probably Petrie 939 or 940 (Plate X, fig. 3). It is a small heater-shaped shield, and measures $1\frac{1}{8}$ inches in length and $\frac{1}{4}\frac{5}{8}$ inch across at the top; it has a loop for suspension, measuring $\frac{3}{8}$ inch from the top of the shield. The field is dug out and filled with red enamel, and three lions are cut out in the metal; the lions are now covered with a fine green patina, but the exposed metal was most probably originally gilt. The blazon of the arms would therefore be, gules three lions passant guardant gold, *i.e.*, the Royal Arms of England. It is the best preserved of the three, and is a nice little specimen of Champlevé enamel. The next, which appears to have been the third from

¹ British Museum Guide to the Mediaeval Room, p. 56.

² Proc. Society of Antiquaries of London, Second Series, vol. xxi, p. 479.

³ Archaeological Journal, vol. xix, p. 2. (For other foreign examples, see note, p. 8.)

⁴ Journal British Archaeological Association, vol. vii, Plate xxxix, facing page 375.

the Petrie collection, measures $1\frac{3}{8}$ inches in length, and 1 inch across the top of the shield; it has also a loop for suspension, measuring $\frac{1}{2}$ an inch from the top of the shield (Plate X, fig. 4). The field in this case has been left plain, and the exposed part of the metal was probably gilt, the design, a sleeve, was enamelled; the enamel has now almost entirely perished, but a speck remaining in one corner leaves no doubt about its colour, which was red; the arms are, therefore, gold a maunch gules, being the well-known coat of the Hastings family. This family held the Earldom of Pembroke from 1339 to 1389, and Lawrence (Hastings), Earl of Pembroke, who was born about 1318, and died in 1348, also held the Lordship of Weysford or Wexford.¹

The third example, Petrie No. 1040, is the most interesting. It measures $1\frac{1}{4}$ inches in length and $1\frac{1}{8}$ inches across at the top: the loop for suspension measures about $\frac{1}{2}$ inch from the top of the shield (Plate X, fig. 5). In this case practically all the enamel has disappeared, but from some slight traces that can be discerned the shield seems to have been covered on both sides with green enamel. The device on it appears to be an ape with a long tail, and curiously shaped head. The ape is not often met with as an heraldic device, and in this case I take it represents not the coat-of-arms, but the well-known crest of the FitzGerald. This curious crest and the legend probably invented to account for it are so well known that they need not be recalled.²

Apart from other considerations, this little shield is interesting, as being a very early example of the use of the ape as a crest or badge by the Leinster FitzGerald, as it is probably not later than the fifteenth century. A slab showing the FitzGerald arms, with an ape as a supporter on the dexter side, built into the wall of the White Castle, Athy, has been recently figured by Lord Walter FitzGerald, who says, "The probable date is early in A.D. 1500; and, as far as I am aware, it is the earliest existing example of a monkey used as a supporter."³ The use of crests and supporters was introduced considerably later than that of the actual coats-of-arms, and the earliest reference to the use of the monkey as a crest by the FitzGerald family that I am aware of is in an armorial manuscript of 1530, written by Thomas Wall, Windsor Herald of Arms, and afterwards Garter, now in the possession of Mr. Oswald Barron, F.S.A., where the following entry appears among the crests of Irish nobles:—"78. Therle of Kyldare beryth to his crest a marmoset in his kinde

¹ "Complete Peerage," edited by G. E. C. [Cokayne], 1895, vol. vi, pp. 209-211.

² "Who shall undertake to say how these tales arise? One thinks of the crest of the Lathoms, and of the Earls of Derby, their descendants, with its eagle and baby legend, or of that of the Leinster FitzGerald, with its ape and baby story" ("Peerage and Pedigree," by J. Horace Round, vol. i, p. 316).

³ Journal Co. Kildare Archaeological Society, vol. vi, p. 513.

bound by the mydel with a chayne gold in a wreith gold and vert manteled geules doubled ermyns."¹

The last shield measures $\frac{1\frac{1}{2}}{6}$ inch in length and $\frac{1\frac{3}{8}}{6}$ inch across the top; the poop for suspension measures about $\frac{3}{8}$ inch (Plate X, fig. 6). The shield has been elaborately decorated. The field has been silvered, and small incisions made to represent ermine; in the centre is a red champlevé enamel cross, and what are intended for five escallop shells, gilt. The blazon is, therefore, ermine on a cross gules five escallops gold. This coat is given by Papworth as being that of the Wayling or Weyland family.² The family of Weland was settled in Ireland from an early period, and there are numerous references to the name of Weland, Welaund Welond, Weyland, and Wheland in the Calendar of Documents relating to Ireland³ of about the period during which these small shields were worn. I think, therefore, that though the Academy's specimen is unrecorded, there is every probability that it was found in Ireland.

DESCRIPTION OF PLATES.

PLATE X.

FIG

1. Part of Brass of a lady from Luppitt, Co. Devon. (Reproduced by kind permission of the Society of Antiquaries of London.)
2. Monument in Ashbourne Church, Derbyshire. (Reproduced by kind permission of the British Archaeological Association.)
3. Armorial pendant with the Royal Arms.
4. " " " Hastings Arms.
5. " " " FitzGerald Crest.
6. " " " Weyland Arms.

PLATE XI.

Effigy of a Knight in the Public Library, Zürich. (Reproduced from the Archaeological Journal.)

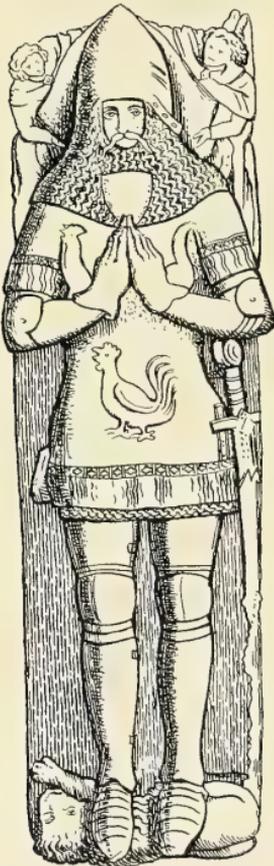
¹ "The Ancestor," vol. xi, October, 1904, p. 183.

² Papworth, "Ordinary of British Armorial," 1874, p. 654.

³ See volumes i, ii, iii, iv.



1.



2.



3.



4.



5.



6.



ARMSTRONG.—ARMORIAL PENDANTS.

VII.

PREHISTORIC STONE IMPLEMENTS FROM THE RIVER BANN
AND LOUGH NEAGH.

BY W. J. KNOWLES.

PLATES XII-XIX.

Read JUNE 10. Published AUGUST 7, 1912.

THE stone implements of prehistoric age from the River Bann and its immediate neighbourhood, and also from Lough Neagh, are peculiar in their character, and differ as a whole from those found elsewhere in Antrim and Derry. I, therefore, consider it advisable to describe those implements from the Bann and Lough Neagh as a group by themselves, and not to mix them up with other objects of prehistoric age found in the North of Ireland.

In May, 1880, I read a short paper before the Anthropological Institute, London, on "Flint Implements from the Valley of the Bann," in which I drew attention chiefly to the large, coarsely made, pick-like implements of flint and the pointed flakes with a worked tang. In 1893, at a meeting of the Royal Society of Antiquaries of Ireland, which was held in Belfast, I read a paper on "Irish Stone Axes and Chisels,"¹ in which I treated the Bann group as a principal division. In this paper I dwelt chiefly on the axes and chisels, leaving still a large variety of the Bann implements undescribed, but in the present paper I intend to treat of the whole series.

Flint and other stone implements were found abundantly when the deepening of the bed of the Bann by the Board of Works was in progress many years ago, and Sir William Wilde, in his Catalogue of the Royal Irish Academy's Museum, mentions twenty flakes obtained from the bed of the Bann, which were presented by the Board of Works. At a meeting of the Kilkenny Archaeological Society, held in January, 1865, Mr. Robert Day, jun., presented eighteen specimens of flint implements from Toome Bar, the presentations comprising specimens of the perfect spear or knife, the partly formed celt, and the broken flint weapon. In 1867 Mr. Wm. Gray, in

¹ Jour. R.S.A.I., vol. iii, 5 Ser., p. 140.

illustration of a paper on flint flakes, exhibited flakes from Toome and elsewhere. In January, 1867, Mr. John Evans, F.S.A., F.R.S., read a paper before the Society of Antiquaries of London on "Discoveries of Stone Implements in Lough Neagh," numbering in all above 100 stone hatchets, and upwards of 1000 flakes, &c., and he states at the same time that Mr. Robert Day, jun., of Cork, had informed him that he had upwards of 120 stone implements and 2000 flint-flakes, &c.

In 1909 Mr. Wilfred Jackson, F.G.S., gave an account of the diatomaceous deposit of the Lower Bann valley and prehistoric implements found therein.

I have on various occasions described the Larne series of prehistoric implements, which I considered to be older than the ordinary flint implements of other parts of Ireland, and I should think that if the race which made the Larne implements survived the changes caused by the sinking of the land round the north-east coast, they may have re-appeared in the Bann valley, as some of the implements found there resemble those of the older series from Larne, Island Magee, and elsewhere on the north-east coast. The manufacturers of the Larne type of implement were not confined to Larne and Island Magee, but occupied all the coast of Belfast Lough and all the coast of Antrim northwards, as we find the remains of their industry at several places, particularly at Carnlough, Whitepark Bay, Portrush, and Portstewart. I imagine they may have entered at the mouth of the Bann, near which we find implements of the Larne type, and that they would make their way up the river to Lough Neagh.

Nearly everywhere along the Bann flint-flakes and implements are to be found, but there are several noted stations along the river which have produced flakes and implements in profusion. Considerable quantities have been found from the mouth of the Bann up to Coleraine. Mount Sandal, south of Coleraine, opposite the Salmon Leap, is a station where many of the characteristic Bann implements have been found. Further south, as at Aghadowey, some have been found. Near Kilrea, where another salmon leap was cut, great quantities were obtained; also at Gortgole, Portglenone and Glenone, Culbane, New Ferry, and various places up to Toome Bar, where the Bann emerges from Lough Neagh. When the Bann was being deepened by the Board of Works, as already referred to, great quantities of implements of stone and bronze were obtained from the bed of the river. Rev. James O'Laverty, who lived at Portglenone at that time, obtained the greater part of his fine collection during the time the excavations were going on, and we see by reference in Sir William Wilde's Catalogue of the Museum of the Royal Irish Academy that finds at Toome Bar, Portna, &c., on the Bann during the drainage and sinking of the bed of the river were presented

to the Academy. Since then the digging up of the diatomaceous clay at different places along the river has brought to light a large quantity of flint and other implements. Numbers of implements and flakes have been washed out on the shores of Lough Neagh near Toome, and the waters of the lake being shallow, antiquaries have obtained large collections by wading and picking up the objects, which were visible on the shallow bottom. Sir John Evans obtained many things in this way. I remember going with our little band of Ballymena antiquaries, including Canon Grainger, Rev. Dr. Buick, and seven or eight others, to Toome, and divesting ourselves of boots and stockings to wade along the shores of the lake, and coming home laden with miscellaneous collections of implements. The summer of 1911 was a very dry one, and the waters of the lake were low and favourable for wading. I therefore visited Toome with several members of my family, and by wading we found some characteristic implements. Rev. W. A. Adams searched the shores of Lough Neagh near Antrim in the same season, and made some very good finds, including a bronze axe.

The River Bann is noted for its abundance of salmon and other kinds of fish, and there is reason to believe that the prospect of a good supply of food was one main inducement for the prehistoric people to settle along its banks. Flakes for knives and spears must have been in continual demand, and therefore they were produced in abundance and of all sizes, from those of 6 and 7 inches in length to the most tiny flakes, many of which have been manufactured into small knives, borers, and scraping tools. Many of these flakes and other implements have been found in the bed of the Bann, but more by digging up the surface of the river's banks. How so many implements got into the bed of the Bann may be a question that should be considered. In cutting of fords and deepening the bed of the Bann stone implements have been found lying in a layer above that containing bronze weapons, and therefore it is considered that the theory of there being a Stone Age succeeded by a Bronze Age is incorrect; but when everything is fairly weighed and considered it will be found that the position of objects deposited in fords of a river is not proof of succeeding ages of culture. The banks of the river are being continually denuded, and objects contained in the denuded portions would be redistributed by the running water and the newest object perhaps dropped first, and something older on top of that, and so on. During fishing and other operations many implements might be dropped into the river and lost, but the greater quantity obtained from the bed of the Bann came, I believe, from the denudation of the banks of the river.

The digging up of the diatomaceous-clay at Culbane for brick-making has yielded abundant material for local collectors of antiquities. Rev. Dr. Buick

obtained from that place a large addition to his collection, and the Rev. A. H. Beattie, who lived at Portglenone, got almost his entire collection from the brick-works. I was myself a competitor with these and other collectors, some of them from England, for the objects found there, and was successful in obtaining a fair proportion. The collections of Monsignor O'Laverty, Rev. Dr. Buick, and Rev. A. H. Beattie have lately been dispersed by auction, and I was fortunate in being able to secure some of the best articles in these collections that came from the Bann. The illustrations, which have been made by my daughter, Margaret Knowles, are taken from examples in my own collection, but from my long experience of the subject, and my frequent visits to different parts of the Bann, I believe I am giving a fair general view of the various implements that have been obtained from this interesting locality.

I shall first describe the flakes and the implements made from flakes.

Large Flakes slightly dressed at the Base.

A good many large symmetrical flakes show by slight dressings in parts that they have been used as cutting-tools. I show in No. 1 a symmetrical flake. It is slightly dressed at the base on both sides, so as to remove any sharp or jagged parts, and thus enable it the better to be inserted in a shaft as a spear, or in a shorter shaft as a knife. In No. 2 will be seen a flake less symmetrical, but of the pointed kind. One of the sides is quite regular, but the other, that to the left of the figure, judging from the thickness of the flake at the dressed part, has had a good breadth of wing removed. This flake could also have been usefully employed as the point of a spear. It is now fairly symmetrical, though very little further dressing, after all the pains that had been taken, would have made it more suitable for a spear-head; but the undressed edges are now all good and sharp, and their being symmetrical, or the reverse, would not signify for cutting purposes; and therefore I think it is more likely that this flake was employed rather as a knife than as a spear. From the slight dressing at the base, which is merely enough to remove sharp edges or points of projecting flint, it may have had a handle of hide or soft vegetable substance to protect the hand when used as a knife.

Both Nos. 1 and 2 were found between Coleraine and the mouth of the Bann, probably from material dredged from the bed of the river in order to deepen it. Both show black patination, and have the outward appearance of chert from the Carboniferous limestone; but from slight chips, accidentally removed, here and there one sees that the material is flint. No. 3 shows a flake from Culbane. It is of greyish-mottled flint; and, like the others, only shows slight dressing at the base, and could be used,

like those already described, either as a knife or spear-point. It shows slight teething along the edges, either from use in cutting or from knocking against other stones in the river.

I show in No. 4 another flake which is pointed, but not so symmetrical as Nos. 1 and 3; but in its natural state it would appear to have been more regular in form than No. 2. It would be less suitable in its present form for a spear-point than for a knife. A little trimming of the edges, where they project most on each side, could have made it regular and suitable for a spear-head; but the edges, being all good and sharp, have evidently been retained for cutting purposes, and only the portion nearest the base has received a slight dressing, as in the other three cases. This circumstance, in my opinion, favours the theory of its having been a knife rather than a spear-head; and I believe the three flakes previously described were also employed as knives. This specimen was found in the valley of the Bann, in peat some distance from the river, on the County Antrim side. It is formed of grey-mottled flint, like No. 3. In Plate XII will be seen some more flakes dressed at the base for shafting. The curved points in Nos. 4, 6, 7, 8, 13 and 14 make them unsuitable for spears. The curves in the points of Nos. 6 and 8 are natural; but those in the points of 4, 7, 13 and 14 have been made intentionally—possibly with the view of supplying a blunted surface for the forefinger to rest on in order to exert pressure when cutting, as has been suggested by some authors. The flakes with curved or oblique points are not rare. A little irregularity in the outline of a flake would not, so long as the edges are sharp, affect the cutting quality of the flake, as we see in No. 9; and therefore it is provided with a good tang for shafting. No. 10 is also irregular, by having one side projecting much further from the midrib than the other; but the projecting part has not been chipped off, for the reason, in my opinion, that the projecting part has a sharp edge suitable for cutting; therefore this also would be used rather as a knife than a spear-head. Some flakes of the pointed kind, with symmetrical sides, and having a worked tang at the base, may have been mounted as spears (see Nos. 11 and 12), but they could also have been used as knives.

Many flakes from Lough Neagh and the Bann, even though irregular in shape and without points, may have been turned to serviceable use. If the edges were sharp, they could be employed as cutting-tools, or for scraping or hacking. The flake shown in No. 13 has been employed in hacking or some other hard usage, as will be seen by the edge to the left. It appears first to have been hacked and blunted, and afterwards to have received a considerable amount of dressing to make it have somewhat of sharpness again.

Three more examples of pointed flakes are shown in Nos. 15, 16, and 18.

They were all found at Culbane, and have portions of the sides removed at the point. These may have been used as spear-points, but they would not be serviceable as cutting-tools. Probably they may have been used for boring holes in some coarse substance, such as wood. I fear we cannot rely on any report of a flake being found with a handle attached, especially one formed of mcss; but I believe the flakes like those described must, in most cases, have had handles. We find pointed flakes similar to those found along the banks of the Bann in use by the natives of Australia—some of flint, some of quartzite, and some spear points of modern bottle-glass, all having handles of some kind. My son, William, who is at present living in Australia, has sent me a fine series of such implements. It is astonishing to see the fine pointed flakes of quartzite the native Australian can produce; although one would imagine quartzite to be more intractable than flint. But apparently they have flint also, as some of these flakes appear to be of that substance. The handles on my specimens from Australia are of gum or resin, found abundantly in that country. Even spear-heads and arrow-points are affixed to their shafts by this substance. I show in Pl. XIII a number of Australian flakes with their handles, for the sake of comparison with Irish flakes, and for the suggestion they offer as to the way the natives of the Bann valley may have put handles on their flakes. No. 30 is a flake apparently of flint, with edges irregular, but everywhere sharp. It would compare very well with our Irish specimen, No. 9. I believe its sole use was for cutting purposes. It has a handle of gum, slightly broken. No. 27 is a very regular flake, also apparently of flint. It has a handle of gum, fairly large and rounded, to fill the hollow of the hand, and has evidently been a knife or small dagger. No. 29 is a large pointed flake of quartzite, probably a dagger, also with a handle of gum. No. 26 is its scabbard, made of bark, and bound round with coarse cord. No. 2 has also its scabbard; but one illustration of such an object is sufficient. No. 28 is a saw formed of small flakes of quartz stuck into gum. The shaft is 20 inches long, but only part of it can be shown. Other saws have a double row of teeth. If the small flakes that form the teeth were detached, it could only be guessed that they were artificial. It is possible that some such saws may have been in use along the Bann when the flakes I have described were made and being used; but it is only by inference that we could conclude that such an instrument existed, as we could not expect that a saw, with its teeth, fixed in a handle, would remain intact until the present day, in order that we might find it and thus prove its existence. No. 25 is described to me as a circumcision knife, with its handle of wood fixed to the flake by gum. The flake is very irregular, but has sharp edges. If either it or the flake described as No. 30 was found free from its handle, it is very probable no one would

take the trouble of collecting them. And so, many flakes from the Bann district, of irregular shape, may now be denied a place in our collections, while formerly they may possibly have been valued as useful implements.

I have seen the flake with handle of moss, in the Academy's Museum, from the Bann. The handle is very loosely attached, and if found in close association with the flake, the find is a very interesting one. Sir John Evans figures a flake with a handle of skin. I have not myself found any handle connected with a flake, but I have a handle of wood from Culbane. It is somewhat globular in shape, made of a gnarled root, that would not split easily. A hole has been made in the handle, into which a flake or other small implement could be fitted, and made secure by wedging and cementing. No care was taken by the finder to observe whether a flake or other implement was found near the handle; therefore we can only speculate on the use of the so-called handle. I have tried it with a flake inserted, and show it in that condition in fig. 24. The figure compares very well with the Australian flakes, which have gum handles (see figs. 27, 29).

There are many of the Bann pointed flakes like Nos. 15, 16, and 18 that have both sides near the point dressed off by the coarse kind of chipping so commonly seen in Bann implements. The flakes have thus a more pointed appearance than they would have in their natural state, and they are generally referred to by antiquaries as borers. It is possible that those of finer make may have been used for boring holes in leather, but some of the coarser pointed implements, if intended for boring, would no doubt be used for boring holes in wood in order to bind together pieces of timber used in the construction of huts. Some of these or any other of the tanged flakes may have been used, as suggested by Sir John Evans, in spearing fish.¹

I show in figs. 17, 18, 19, 21, 22, and 23 a number of examples graduating from the slightly dressed with thickish points down to those which have long and slender points. No. 18 shows fine dressing at the point and round the side edges. The base has also all angular parts removed. There is no dressing on the under or bulb side. It was found at the bottom of a peat bank at Gortgole near the Bann. The flake shown as No 19 has its point neatly dressed all over the ridge face and along the edges on the bulb face. It was found at Culbane. No. 17 was found near Coleraine, and has a shorter and stouter point than No. 19, with an indenture on each side. That on the right side would seem to be caused by a defect in the flint, but the indenture on the left side was evidently made intentionally. No. 21 comes from Gortgole, about three miles below Portglenone. There is a tang formed by dressing from the bulb-face

¹ *Archaeologia*, xli, part ii, p. 404.

towards the ridge-face, and the point is formed by dressing in the same direction. The point in No. 22 is more slender than that of No. 21, and shows finer dressing, which is directed towards both faces. It was found at Culbane. In No. 23 the sides of the flake have been dressed off from base to point on the one side towards the ridge-face, and on the other towards the bulb-face. It was found at Culbane. The number of flint tools from the size of No. 23 to somewhat similar objects about an inch or less in length is very considerable, all made much in the same way by chipping off the sides of the flake. No. 20 shows two views of a stout flake having the dressing entirely on the bulb-face. It is a stout implement formed by very coarse dressing, and may have been used in boring, or perhaps in pointing a spear. It was found at Portglenone. Examples of this kind are not rare. I show in Plate XIII, Nos. 31 to 41, a number of small flakes dressed along one or both edges, forming implements supposed to be borers or knives. No. 34 is stout of its kind, dressed on both sides towards the ridge-face, but irregularly, so that the dressed sides appear uneven or lumpy. It has been in contact with the diatomaceous clay at Culbane, as that material is still adhering to the hollows of the dressed parts. No. 35 was found at Gortgole, and is also dressed on both sides towards the ridge face, but the dressing is of a more regular kind than that of the last specimens. No. 32 comes from the Bann near Portglenone. It is dressed on both sides towards the ridge-face, and has a fine point. No. 39 is from Glenone (on the Co. Derry side of the river, opposite Portglenone), a place which has supplied a considerable number of the small borers. It is dressed on the right side towards the ridge-face, and on the left side towards the bulb-face. No. 33 is from Mount Sandal near Coleraine, and is dressed straight across the flake on the left side, so that that side shows a thick back, while the other side is more of an edge, though slightly dressed. At the point the part described as an edge is blunted or rounded by dressing or use. No. 31 is a very fine and thin implement, dressed along the sides towards both faces. It has originally been a very narrow pointed flake, and has a very fine and sharp point. If delicately used it could bore holes in fine skin or leather. Both sides of No. 40 are finely dressed towards the ridge-face, but on the bulb-face only the left side is dressed. No. 37 is slender, and has a sharp point. It comes from Glenone. No. 41 is like No. 33, dressed on one side to show a thick back, while the other side is sharp and knife-like, but either irregularly dressed or injured by use. The shoulder to the left of the top end, taken in connexion with its size, shows it to be similar to the pygmy implements found in various countries, and latterly in great abundance by Rev. R. A. Gatty at Scunthorpe in England. It was found at Glenone. No. 36 shows the ridge of the small flake from which it was made close to the right side of the

implement. The dressing on this side of the implement is quite perpendicular to the faces of the flake, showing a thick back and knife-like edge, but the part opposite the shoulder on the right side is rounded by dressing like the borers. This specimen has also the character of the pygnies. No. 38 is a fine specimen like No. 31, but dressed from the sides towards the ridge-face only. It was found at Culbane.

These are only samples selected out of a great number of specimens. It is hard to conceive what use these thin, delicate objects could have been employed in. They might have been useful in boring holes in fine leather, but that they might have been employed in the construction of fishing-hooks is, I think, deserving of consideration.

Before leaving the subject of the so-called boring-tools I must refer to the pointed flakes, which show a dressing all along the edge usually towards the ridge-face, sometimes being only slightly dressed when the flake is broad, but in some cases having the sides cut away close to the midrib, thus leaving only a stout triangular implement that could be used either for pointing a spear or for boring purposes. It would seem that there is often a regular gradation from one kind of implement to another. Taking the broader flakes dressed round the margins, we find, whatever their uses may have been, that they resemble the Mousterian points of Palaeolithic age. Some of these are very large and massive. No. 42 is a specimen of this kind. It has likely been made from a large flake or spall, though there is now no appearance of a bulb or a midrib as in ordinary flakes. Both faces are plain and flat, and the dressing is towards one face only, that shown. It was found at Culbane, and is 6 inches long, $3\frac{1}{2}$ inches broad towards the base, and $1\frac{1}{2}$ inches thick. The side not shown is plain and shows no dressing whatever. The implement is quite as massive and fills the hand as well as a Palaeolithic implement of the same dimensions. It is made of reddish-coloured flint. Fig. 43 is an implement somewhat similar to that shown in fig. 42, but in regrouping of the figures into Plates it is shown on its side with its point to the left. It was probably dredged from the bed of the Bann near Coleraine, as it comes from that place. It is formed of greyish flint, and shows part of the original nodule along the base. It is rather finely dressed along the two principal sides. There is no bulb visible, but it may have been dressed away. It is also massive, and is 4 inches long, 3 inches broad at the base, and $1\frac{1}{8}$ inches thick. No. 44 shows an implement formed from a thick and heavy flake. It was found at Culbane, and is dressed by coarse chipping to a stout point. The implement is quite an inch thick, and the bulb-face at the point is slightly dressed. The implement represented in No. 45 was found at Gortgole. It is a stout implement and thick for its size. The point is somewhat curved, owing to the chipping

dipping deeper on the right side near the point. This may have been mounted in a shaft as a spear or dagger or, perhaps, as some sort of pick. Owing to the coarse chipping on the side, there is no cutting edge. There is shown in No. 46 a flake considerably thinner than those last described. The edges are all neatly dressed, but in their present state they are not cutting edges, but would be suitable for scraping. It was found at Culbane. No. 47 shows one of those flakes which has the side hewn away to near the midrib. When the sides are removed, we have a stout triangular implement, with the bulb-face as one side of the triangle, and the dressed sides the other two. We could find a regular series of flakes from those having the edges only slightly dressed to No. 47, showing the sides dressed into the midrib. A section of this implement is shown. It was found in Aughnahoy on the Co. Antrim side of the Bann, near Portglenone.

There are various flakes of irregular form that have been turned to use, as we see by the dressing along the edges. No. 48 represents a thin knife-like flake that has the edges neatly dressed towards the ridge-side. It was, no doubt, used as a knife. It was found at Culbane. No. 49 is a flake of peculiar form. The bulb is at the left side, and the long projection to the top is a wing of the flake. Along the base, which now appears as its right side, it is dressed into scraper-like edges. It was found near Portglenone. No. 50 shows a thick flake with its three sides all dressed to scraper-like edges. It is formed of reddish-brown flint, and has a sort of glazed patina, like many flakes or implements that come out of the Bann. It was found at Gortgole. There is represented in No. 51 a thin flake of irregular form; the bulb is at the top on the underside, but there is no midrib on the side shown. There is a piece of the outer crust of the nodule from which it was derived, appearing round the base of the flake, and that part is dressed to a scraping-edge. The right and left sides are also dressed to scraper-like edges, but both are slightly concave. This implement and No. 49 are similar to the broad scraper described as a *racloir* by French archaeologists. It was found at Culbane. No. 56 is a doubled-edged scraper, but also dressed for scraping along the side-edges. The strong, deeply-dressed scraping-edges are, however, at the two ends. It also was found at Culbane. Fig. 57 shows a scraper of the beaked kind made out of a heavy flake very thick at the scraping-edge. It was found at Aughnahoy, near Portglenone. These few scrapers that have been described fairly represent those found at various places along the river.

Nos. 52, 53, 54, and 55 show four thin flakes that have rather a knife-like character. No. 53 is dressed with rather delicate flaking into knife-like edges on both right and left sides. It was found in the Bann at Coleraine. No. 52 was dressed over the greater part of the back with thin flaking running close

to the surface; it was no doubt used as a sort of knife. No. 54 is also a thin flake similarly dressed with thin flakes running along the surface. The flaking covers the entire surface, and the edges are quite sharp and knife-like. The bulb is at the top on the under side; and along the base end on the under side there is about half an inch of the entire face chipped. No. 55 has also thin cutting edges, particularly on the edges to the left. It is slightly twisted so that the edges are not in the same plane. Nos. 53, 54, and 55 came from Culbæne. In a great many flakes that are irregular in shape, especially those of small size, one can see small portions of the edge chipped, the chipping arising perhaps from repeated use of one spot. In Nos. 58 to 65, for example, there are eight small flakes which illustrate this use of the edges. No. 62 shows minute chipping along both edges, near the point, as if it had been used in scraping a hard substance like bone when the small chips would be removed from the fine edge by the pressure. No. 59 shows fine chipping, chiefly on the oblique edge, near the point. Nos. 58 and 64 show small indentures on the left side, as if the pressure of scraping had continued for a longer time than usual till sufficient flakes were removed to form a circular hollow. No. 61 shows dressing on the right side, making it a small side-scraper. No. 63 shows fine chipping on the oblique edges near the point, but on the under side, so that the dressing is not seen in the figure. Nos. 60 and 65 show little spots on thin edges where small chips have been removed. It is only by looking carefully that this minute chipping can be observed.

I have passed in review the various kinds of flakes produced along the banks of the River Bann and shores of Lough Neagh and the different ways they have been dressed by chipping, so as to form a considerable variety of tools or implements. Pointed flakes were the kind the people evidently wished most to produce, and in this they were largely successful, as I believe pointed flakes are the most numerous, though collectors as a rule reject unsymmetrical flakes, and we may underestimate the numbers of these. I have myself a large number of flakes which are not pointed, and in many cases I find the edges have been used for some purpose. There is one kind of flake referred to by Sir John Evans in his paper read before the Society of Antiquaries, which I have not mentioned. It is figured as No. 6 of the plate illustrating his paper. He says: "Other flakes again, more especially the very thick ones, have been chipped away at the two sides, leaving the flat face uninjured until the flint has assumed a boat-shaped form. The purpose of these scaphoid implements is at present unexplained." I have a few of these objects. The flakes used in producing them dipped deeper into the core and had a heavy pointed end.

They would seem to be accidental forms. Most of the other flakes passed in review have been dressed in a similar way to those Sir John Evans mentions—the sides having been chipped away, leaving the flat face uninjured. That kind of dressing was pretty general.

We see that the making of the flakes was a great industry along the shores of Lough Neagh and banks of the Bann. Where the raw material came from I cannot say with certainty. The banks of rivers and rivulets and the shores of the lake would supply some, the surface of the soil would yield some boulders, and probably the people may have gone to the outcrop of the Chalk on the county Derry side, or they may even have gone to the outcrop of the Chalk on the Antrim seashore. There is an outcrop of Chalk at Portrush and another at Downhill, and flints may have been procured at these places and carried up the Bann. However it was procured, the material was of large size and good quality, as one can see by the implements produced.

Other and larger implements have yet to be described, for instance, the kitchen-midden and other types of flint axes, the large pick-like implements also, some of which have sharp though very narrow cutting edges.

Kitchen-Midden Axes.

Kitchen-midden axes are so named from being the characteristic axe found in the Danish kitchen-middens. The edge is clean-cut and formed entirely by fracture, and therefore different from that of most other flint axes, which are produced by chipping and grinding. Sir John Evans' definition of the edge of a kitchen-midden axe is, that it was formed by the intersection of two facets. Sir John Lubbock (now Lord Avebury) describes the Danish axes as flat on one side and convex on the other; but while this is not a general characteristic of Irish axes of this kind, as far as my observations go, yet some are flatter on one side than the other. No. 68 shows a very typical specimen of the Irish kitchen-midden axe which was found at Culbane. It is made of reddish-coloured flint, and is $3\frac{1}{2}$ inches long and $2\frac{1}{4}$ inches broad at the cutting edge. It is equally convex on both faces. No. 69 was found at Movanager, near Kilrea, on the county Derry side of the Bann. It is made of a yellowish flint, and is equally convex on both faces. It is $3\frac{1}{2}$ inches long and $1\frac{1}{2}$ inch broad at the cutting edge. No. 66 was dredged from the Bann at the locks near Kilrea. It is $4\frac{1}{2}$ inches long and $2\frac{3}{8}$ inch broad at the cutting edge. It is weathered a dark brown colour. It is convex on the side shown, and nearly flat on the side not shown. No. 67 is an axe of same type found near Toome, on the Bann shore, and while the edge itself is not improved by grinding, yet the

angular ridge bounding the edge facet has been ground and smoothed. The corresponding ridge on the side not shown is similarly treated. This specimen is $4\frac{3}{4}$ inches long and $1\frac{1}{2}$ inch broad at the cutting edge.

Although the Danish kitchen-midden axes are not ground, yet the people who used them must have been acquainted with the art of grinding, as portions of ground or polished flint have been found in the middens. The Irish axes of this kind generally do not show any trace of grinding, yet there is the specimen shown in No. 67, showing grinding and smoothing near the edge; and I have another specimen, apparently an axe of this kind, the edge of which has been greatly injured by use, and has been undergoing repair by chipping and grinding. It could not be said that the users of kitchen-midden axes along the Bann were unacquainted with grinding; but I think a fracture edge as in the kitchen-midden axes must have been considered more lasting than one formed by grinding. In the axe factory near Cushendall many axes of kitchen-midden type have been found, and some intended to be ground even show a narrow line of the natural crust where the edge is to be made. I think the belief was that if the edge just reached that natural line and was not cut into by grinding it would be a better and more lasting edge. As I have here mentioned, this type of axe is not confined to the Bann. I have examples from many parts of Antrim; but it is plentiful everywhere in the Bann valley, and is a typical axe of that region. As regards the way in which the kitchen-midden axes were made, some authors have the idea that the facets forming the edge were struck off after the axe was otherwise completed. I do not believe that this was the way the edge of such implements was formed. I rather suspect that the edge was first observed on a broad spall or flake, which was then chipped down into the shape of an axe to suit the edge. On some specimens in my collection I have observed the bulb of percussion in the middle of one of the sides. In other examples the place the bulb formerly occupied on the side of an axe is easily observable by the extra amount of chipping that has taken place in order to smooth the bulb down. I have mentioned this theory to some antiquaries, who expressed themselves convinced of its truth. In some instances so much chipping may have taken place over the faces of the axe that traces of a bulb cannot be seen; but in such cases, and indeed in cases in general, the two facets forming the edge furnish evidence that the edge was the first to be formed, as the side chipping always cuts into one or both of the edge facets, but the latter never into the side chipping. In the case of two axes in my collection one of the facets is formed by the outer crust of the nodule from which the axe was formed. The smaller implements we call knives are formed somewhat similarly. Good edges are there, in the first instance, on a flake, and one is chipped off to form

a back, and one is preserved for cutting. Some of these are rather chisels, shaped with an upright stem like an axe, and we know that the edge was there before the small chisel was formed.

There are some examples of flint axes of the ground and polished kind found along the Bann and in the Bann valley, but I cannot say they are plentiful; I have only in all about ten or a dozen. I show two specimens in figs. 70, 71. No. 70 has been polished all over, but it has not been sufficiently ground to remove all traces of chipping. It is squared at the sides, and is 5 inches long and $2\frac{1}{2}$ inches broad at the edge. It was found at Culbane. No. 71 is a fragment of a larger flint axe which has been very well finished. In the portion that remains not a trace of chipping is visible, and it has been nicely squared at the sides. A new edge has been first chipped and then ground, but the new edge has again got chipped and broken in use. It is in its present state $3\frac{3}{8}$ inches long by 2 inches broad at the cutting edge. It was found at Culbane. I show in No. 72 a polished axe, so well ground and polished that not a single mark of chipping is visible. It is made not of flint but of fine hard rock of greenish shade, somewhat jade-like in character, and so hard that it cannot be scratched with a knife. It is nicely squared on the sides like the two flint axes last described, and is $5\frac{3}{4}$ inches long by $2\frac{1}{4}$ inches broad at the cutting edge. It was found close to the Bann, three miles north of Kilrea. The finder let it drop on a stone, and a small piece of the butt end was broken off. He then only brought away the larger piece, which was sold to me. I asked him to go back and try to find the smaller piece and bring it to me. This he did, and was successful in finding it. The break was a clean one, and now even in its mended state I should say it is a unique example. This is the only specimen of this kind of hard rock which as far as I know has been found in the neighbourhood of the Bann or Lough Neagh. From its hardness and superior finish it is more suitably classed with the flint axes than with those of other rock, afterwards to be described.

Rough-pointed Flint Implements.

Rough, unpolished flint implements are plentiful along the shores of Lough Neagh and banks of the River Bann and for some distance on each side of the river. The majority are pick-like implements made out of nodules of flint. Some are 8 to 10 inches long, heavy at the butt, and ending in a point or very narrow cutting edge. Those with cutting edges come nearest the kitchen-midden axes; therefore I shall describe that kind first. I show in No. 73 a very fine and typical specimen from Culbane, which was found while digging up the diatomaceous clay. It is $7\frac{1}{4}$ inches long, rather cylindrical or rudely triangular near the butt, where it is 6 inches in circumference. The

half nearest the point becomes two-sided, and it ends in a very narrow cutting edge. No. 74 was found in the Bann, and is triangular till within $1\frac{1}{2}$ inch of the point when it becomes two-sided, and ends in a sharp cutting edge formed of two facets slightly broader than those in the last example. No. 75 was found on the shores of the Bann nearly opposite to Ballymoney. It is 6 inches long and 5 inches in circumference at the butt; it is dressed from two sides, and a section through it at the centre would be almost quadrangular. It ends in a cutting edge formed by the intersection of two facets as in the two previous examples. The majority of the specimens of this kind are like Palaeolithic implements that had been pulled out, thus gaining in length and losing in breadth. All the three specimens last described show more or less of the old crust of the nodule from which they were formed. There are also, as among Palaeolithic implements, specimens with an edge all round, but in this case also longer and narrower than the more ancient implements. I show in No. 76 a very fine, longish-oval specimen from Culbane, which has still the diatomaceous clay adhering to its chipped surface. It is $7\frac{1}{4}$ inches long and $2\frac{3}{4}$ inches broad in the centre, from which it gradually narrows towards the ends, terminating in narrow cutting edges, which show plainly that these edges were formed in each case by the intersection of two facets, but the edges are now somewhat blunted or chipped. The side edges are sharp and in the same plane. The flint composing the implement is reddish-brown. No. 78 is also an implement that has an edge all round, and the two side edges are in the same plane. It has a cutting edge formed by the intersection of two facets at each end, that on the thickest end of the implement being the broadest. It was found like No. 74 near the Bann, opposite to Ballymoney, and is $7\frac{1}{2}$ inches long by $2\frac{1}{4}$ inches broad at the thickest part. It is formed of brownish-coloured flint. No. 77 is also a very symmetrical implement, with two edges all round running in the same plane. At one end I see indications of an edge of the same kind as that on the last two specimens, and there was likely a similar cutting edge on both ends, but one end is now a good deal knocked or hammered, and it cannot certainly be decided whether it had an edge or not. It was found in the Bann at Coleraine, and is now patinated a yellowish-brown colour.

A few examples of flint implements with points at the smaller ends and without cutting edges are shown in figs. 79 to 84. No. 80 is a very fine and typical example of the pick-like implements. It is carefully though coarsely made, and is quite triangular in section. It resembles No. 74, only that the one has been made with a point and the other with a cutting edge. It was found at Lough Tammin, about two miles up the slope of the valley opposite Portglenone. It is $6\frac{1}{4}$ inches long and $5\frac{3}{4}$ inches in circumference

near the base. At this part portions of the original crust of the nodule out of which it was made are still visible. No. 81 is also finely pointed. Half of the implement towards the base is rudely triangular, but the half near the point has two side edges with the face shown in the figure coarser than the other. It was found at Culbane, and is $6\frac{1}{4}$ inches long by $5\frac{3}{4}$ inches in circumference in the thickest part. There are several examples of this longish-pointed kind of implement, but they are not so numerous as those which have narrow cutting edges. There are also specimens pointed at both ends. I shall now show three short pointed implements with heavy butts, a class which is fairly numerous. No. 85 is an example with a curved but fine point. It is representative of several other implements with similarly curved points. It is somewhat cylindrical in section, and shows very coarse and irregular chipping. It was found in the Bann at Coleraine, and is $4\frac{1}{4}$ inches long by 7 inches in circumference at the base where it shows part of the original crust. It was evidently a hand weapon, as the base fits the hand well. No. 86 is a similar weapon found also at Coleraine. It is 5 inches long and $7\frac{1}{2}$ inches in circumference at the thickest part. The point has a slight curve, but it is not so fine as in the last described specimen. No. 87 was also found in the Bann near Coleraine. It is rudely triangular in the worked portion towards the point. It has been formed by very coarse chipping, and has a well-rounded base to fit the hand, showing the original crust of the nodule from which it was made. It is $4\frac{1}{2}$ inches long by $7\frac{1}{2}$ inches in circumference round the base. Although the last three specimens come from the Bann near Coleraine, they are quite typical of a series found at other parts of the Bann and the shores of Lough Neagh. I show in No. 83 a pointed implement of flint from Lough Neagh. A nodule has been split into four, and the implement figured has been made out of one of the quarters. It is somewhat triangular in section. The chipping is finer on this specimen than in those shown in 85, 86, and 87. It was found during the excursion of the Ballymena antiquaries already referred to. It is 5 inches long and $6\frac{1}{4}$ inches in circumference. Nos. 79, 82, and 84 represent a series of small implements of the pointed kind, which are numerous and found at all stations along the Bann. They appear to be all pointed, as I have not found one of this small variety with a cutting edge. Like the larger kind, these small implements are mostly formed by coarse, irregular chipping. No. 79 comes from Gortgole. It is triangular in section, 3 inches long and $2\frac{3}{4}$ inches in circumference. The example shown as No. 82 was found at Culbane, and is somewhat quadrangular in section. It is $3\frac{3}{8}$ inches long and $3\frac{1}{2}$ inches in circumference in the thickest part. No. 9 was found in the Bann near Coleraine. It is 3 inches long and $2\frac{1}{2}$ inches in circumference. These smaller pointed

implements are, on the whole, more numerous than the larger kinds, and there are many similar implements of sizes intermediate between the two kinds. All these pointed implements have one general character in common—that is their formation by coarse, irregular chipping.

It is not easy to form an idea of how these coarse-pointed implements were used. I do not think they could have been used as agricultural implements of any kind, as they are seldom met with far from the banks of the river; and the banks of the Bann, subject as this river must have been to periodical flooding, were not suitable for farming, if the inhabitants were inclined or had knowledge to practise that industry. I think we might speak with certainty of those having sharp-cutting edges. I believe they were used without doubt as cutting tools. Some years ago I bought from Mr. W. G. Lawrence, of Wandsworth, London, two coarse flint implements from the Thames. They struck me at the time as being very like those from the Bann. I have made inquiries since as to whether any other implements of the same kind were found in the Thames, and have been informed that some English collectors have a series of these; but if anything has been published on the subject, it has escaped my notice. They are shown in figs. 89 and 92 for comparison with the Irish implements. No. 92 is flat on one side and highly convex on the other, that shown. It has a cutting edge at the lower end of the figure. No. 89 is triangular in section and pointed.

Besides the coarsely chipped implements already brought under notice, many very finely made arrow and spearheads have been found in the Bann valley, the lozenge and kite-shaped kinds being the most numerous. Some of these I have described and figured on more than one occasion. Hammerstones and fabricators that have been used in the manufacture of the various implements are often found, and the cores from which flakes have been struck are abundant, especially small cores. Figs. 93 to 96 show four examples of these small cores. They all show that they had been used for the purpose of producing very small flakes.

Besides the flint implements that have been passed in review, the Bann valley and shores of Lough Neagh have yielded a large quantity of axes, chisels, and various implements made of rocks of other kinds, that most used being a kind of metamorphic shale, generally called clay-slate.

Implements of Clay-slate.

The black rock which yields the greatest number of implements is, I believe, that known as Carboniferous slate. It appears to be of nearly general distribution over Ireland. The fine axe 22 inches long in the Royal Irish

Academy's Museum was found in the River Blackwater, Co. Armagh, and is formed, I believe, of the same rocks as those I am going to describe from the Bann. Sir William Wilde calls the material clay-slate.¹ In the Bann implements various laminae of rock differing in shade are often visible, and that some layers are more easily affected by the weather than others, can be seen in the implements that have been long exposed. I have some stone hatchets greatly disfigured by such weathering.

Sir John Evans in his paper on "Archaeologia,"² on "Discoveries of Stone Implements in Lough Neagh," says: "The stone hatchets or celts, as they are commonly called, have been made principally of the following materials:—clay-slate, green-stone, lapis Lydius, serpentine, basalt, hornblende, schist, talcose-slate, and various other metamorphic rocks. A few occur in flint." Lapis Lydius, according to Sir William Wilde, is the chert or black substance derived from the Carboniferous limestone, corresponding to flint, and at Bundoran, in Co. Donegal, I got many implements made of this substance. It had a shiny fracture, and was quite black. I have searched among my finds from the Bann on various occasions, but have not found any articles made of material similar to that of the Bundoran implements. Lapis Lydius may, however, show different degrees of fineness, though I have seen it of the same texture and fineness in Galway as in Donegal. There is no reason why lapis Lydius should not be found, and if found made into implements, but it evidently has not been found in any quantity.

Figs. 88, 90, 91 show three implements of black rock, which are pointed and unpolished. They could all be matched by similar implements in flint, and therefore, I should say, form a connecting link between the flint and black stone implements. No. 91 has a thick butt at the top of the figure, and is pointed at opposite end. No. 88, like some coarse flint implements, has a rude point at each end. Both are made of very hard rock, which cannot be scratched with a knife; and though they do not show the smooth fracture and lustre of the Carboniferous chert I am acquainted with from Bundoran, yet this might be the kind of rock which Sir John Evans describes as lapis Lydius. It is certainly different from the clay-slate rock, of which so many implements are made. The fine-pointed implement shown in No. 90 is made of fine black rock, but is very light as compared with the size of the implement. We find very fine large flakes pointed like those of flint, and stone axes having the same form and character as the axes of clay-slate, made of this light material. The rock would seem to have been formed of fine mud; and I have an axe made of it, which the owner has used as a hone

¹ Cat. Mus. R.I.A., p. 43.

² Vol. xli, part ii, p. 400.

for sharpening his razor. It is supposed that some substance has dissolved and oozed out of the stone since the implements were made. No. 90 was found at Culbane, and is $6\frac{1}{2}$ inches long by $7\frac{1}{2}$ inches in circumference in the thickest part. While some pick-like objects have also been made of the clay-slate, the most numerous implements made from this rock are axes and chisels. The largest of the axes in my own collection is $18\frac{1}{8}$ inches long, and the smallest is $1\frac{5}{16}$ inches long by $\frac{7}{8}$ inch broad near the cutting edge. This small implement is well made and finished after the manner of a larger axe. Rev. James O'Laverty, in the "*Ulster Journal of Archaeology*," old series, vol. v, p. 122, mentions the finding of three stone clubs during the deepening of the Bann by the Board of Works; and he gives an outline of one at page 127 of same volume, grasped by a hand to show how it was probably used. I had the opportunity of seeing these so-called clubs at the sale of Monsignor O'Laverty's collection of antiquities in Belfast, in June, 1906; I believed that I had purchased the specimen in question with some other axes, and had removed them, and they were some days in my possession; but as another gentleman claimed the lot that I supposed I had purchased, I gave them up. While these articles were in my possession, I had a drawing made of the so-called club, which I now reproduce in fig. 113. Anyone having a knowledge of antiquities will see that the implement is an axe, and not a club. One of the other implements, described as a club, had a very broad edge, prepared for cutting, and was also undoubtedly an axe. Broad-edged axes, made from the clay-slate, were not uncommon. I show a specimen from my own collection in fig. 121. It was found near the watershed between the Bann and the Maine; but it is made of the clay-slate, and belongs to the Bann series of implements. It has not the usual shape of stone axes, and its handle-like butt-end might suggest to some persons that it was used as a club; but as it has an edge at the lower broad end, like other axes, I would call it, like fig. 113, an axe. I show in figs. 117, 124, and 125 three axes made of clay-slate. No. 117 is the longest axe from the Bann valley that has come into my possession. It is $18\frac{1}{8}$ inches long, and has been longer, as the original edge has been broken off, and a new one ground in its place. It is $3\frac{3}{4}$ inches broad and $1\frac{1}{2}$ inches thick, and weighs $3\frac{3}{4}$ lb. It was found at Culbane while digging up the diatomaceous clay for making into brick—an extensive industry at this place. No. 124 is a flat, thin axe, $15\frac{1}{4}$ inches long, $3\frac{3}{8}$ inches broad, and five-eighths of an inch thick. It is in appearance like the large axe from the Blackwater, described by Sir William Wilde, and which he suggests may have been the coulter of a plough, though he says it bears no evidence of having been so employed. The arras on my specimen is intact, and it has the same thickness throughout. It was broken by a clean fracture near the centre;

and it has suffered a little injury at one corner of the edge by the spade of the finder striking it. Otherwise the edge is good and sharp; and I am convinced that the edge was the only part intended for use; and that such a specimen could not have been intended for the coulter of a plough, or any other use than that of an axe. I have also another of those thin axes, $18\frac{3}{4}$ inches long, but not quite symmetrical, and the edge is oblique. It has suffered from weathering. No. 125 shows an axe made of the clay-slate, and exhibiting along the edge several layers. It is 14 inches long, 3 inches broad, and 2 inches in thickness, and was found at Culbane, in August, 1904. It was found after digging away about a foot of peaty soil, then about two feet of the diatomaceous clay, when the axe appeared standing upright, with the edge uppermost. It is a very perfect specimen, ground only, with no trace of polishing. I have several specimens nearly similar to No. 3, varying from 13 to 16 inches in length. Some are nearly cylindrical in section. I have a good many axes 10 to 12 inches long; some very perfect specimens from 5 or 6 to 8 inches long. In fig. 128 I show two views of an axe $8\frac{1}{2}$ inches long, $2\frac{3}{4}$ inches broad, and $1\frac{7}{8}$ inch thick. The view to the left is in perfect condition; but the face shown in the right-hand figure has been much exposed to the weather; and we see how softer layers have been eaten into or removed while harder layers are scarcely affected. No. 98 is another axe with one straight side, probably formed by sawing, while the other side is worked into shape by coarse chipping. The ground edge shows several layers of the clay-slate. It is $6\frac{1}{2}$ inches long, $2\frac{1}{2}$ inches broad near the edge, and $1\frac{1}{2}$ inch thick. The edge is the only part ground. It was found at Culbane while digging the diatomaceous clay. No. 99 shows a very perfect axe from Ballyscullion bog, on the borders of the Bann, on the County Antrim side. It is made of clay-slate, but has been ground all over till not a trace of original chipping is visible. There is no trace of polishing, and the striae of the grinding are still quite plain on the surface. It is $7\frac{1}{4}$ inches long, $3\frac{1}{4}$ inches broad near the edge, and $1\frac{1}{4}$ inches thick. The base of the axe is ground to a sharp cutting edge. Many of the Bann axes and chisels have a cutting edge at both ends; but the edge at the butt-end of the axe is always narrower than the usual edge.

In Plates XVI and XVII are shown some axes and chisels of various types. No. 97 is a small axe somewhat lozenge-shaped. It is formed of clay-slate, and shows several layers on the edges—the two lower sides of the lozenge are both cutting edges—the other sides are rounded. It is $3\frac{7}{8}$ inches long, $3\frac{1}{2}$ inches broad, and 1 inch thick. This is the only specimen I have of this shape, and I am of opinion that the original form of the small boulder from which it was made has suggested its present shape. However, neither No. 100 nor 101 is of the ordinary type of axe, and they were, no doubt, specially designed, and

therefore so may No. 97. No. 100 is one of several axes in my collection of the same shape. I believe the axes of this kind, with straight squared sides, have been formed by sawing thin slabs of the clay-slate. No. 100 is $4\frac{1}{2}$ inches long, $2\frac{1}{4}$ inches broad at the cutting edge, and $\frac{3}{8}$ inch thick. It is ground at the edge only. Fig. 101 has expanding edges caused by the grinding of the sides in the centre. I have an axe similarly shaped by chipping the sides. No. 101 is 3 inches long and 2 inches broad at the cutting edge, and is $\frac{7}{8}$ of an inch thick in the centre. It was found at Culbane. No. 102 is evidently a portion of a larger implement, perhaps an axe like No. 103. It supplies the best evidence of the sawing of the slabs of clay-slate rock which I have already referred to. The method of sawing adopted was to saw the slab partly on both sides, and when nearly met in the middle not to spend time sawing all the way through, but to tap it till it broke. On the right side of this chisel it can be seen that the sawing from the two sides had nearly met, and only one thin raised portion shows the part that was broken. The cuttings on each face on the right side were exactly opposite each other, but on the left side, while the lines of sawing were opposite at the lower end or edge of the figure, they moved away from each other towards the top or butt end, and the difference between the lines was at that part three-sixteenths of an inch. On the side view is seen distinctly the portion broken off, which has been smoothed down, but not to the level of the sawn portions. This specimen was found at Culbane.

I formerly did not believe that the prehistoric people in Ireland had resorted to sawing of rocks, like the New Zealanders and inhabitants of the Swiss lake-dwellings, to form axes and chisels. I thought the hardened shale rock had broken naturally into the various shapes we found exhibited in the axes, but No. 102 has thrown a new light on the subject, and now I believe that the straight sides observed in many axes and chisels are the result of sawing the clay-slate. We thus see a new industry along the banks of the Bann which we did not previously suspect. I have not met with any saw-like flints, nor would any flake be long enough or straight enough in the edge to cut the long, straight sides of many chisels and axes found in the neighbourhood of the Bann. If this people felt the necessity for sawing the rock, I do not think it would be beyond their capability to invent some such saw as is shown in fig. 28, Pl. XIII. They evidently struck off large quantities of small flakes, and it would not be hard to fix a number of these in a frame of wood to use as a saw. They may, however, have worked patiently with the point of a flake in one groove till the sawing was completed. However it was done, I believe the act of sawing to form the axes and chisels cannot now be disputed. No. 103 is an axe with

straight sides like No. 100. It is ground at the cutting edge only, and has evidently been shaped by sawing. It was found at Aughnahoy, on the banks of the Bann, three feet below the brick-clay, and is $7\frac{3}{8}$ inches long by $2\frac{1}{2}$ inches broad at the cutting edge, and $\frac{5}{8}$ inch thick. No. 104 is a chisel which was found at Culbane. It has been shaped by sawing, and is 7 inches long by $1\frac{1}{8}$ inches broad, and $\frac{1}{2}$ inch thick. A number of chisels of various sizes are seen in figs. 105, 106, and 107. No. 105 is a thin, sharp-edged chisel which was found at Culbane. From the sharpness of its side edges it might as readily be called a knife as a chisel. It is $5\frac{1}{4}$ inches long, $1\frac{1}{2}$ inches broad, and three-eighths of an inch thick. No. 107 is a stout little chisel which was found at Culbane, and has been shaped by sawing. It has got a slight grinding on the two principal faces, and is $3\frac{1}{8}$ inches long, $\frac{3}{4}$ of an inch broad, and $\frac{3}{8}$ of an inch thick. It has a sharp-cutting edge. No. 106 was also found at Culbane, and has been formed by sawing. No grinding is visible except at the edge. It is $4\frac{1}{8}$ inches long, 1 inch broad at the cutting edge, $\frac{1}{2}$ an inch thick. No. 4 was also found at Culbane. It has apparently been formed by sawing, but has been ground all over, and has an edge at each end, both equally sharp. No. 5 may, from its weight, be rather looked on as a narrow axe. It is 10 inches long, and has been formed on the right side by sawing. It is $1\frac{1}{4}$ inches thick at its thickest part, and $1\frac{3}{4}$ inches broad. It was found in the bottom of the Largy bog near the Bann on the county Antrim side. No. 6 comes from Culbane. It is 8 inches long, $\frac{7}{8}$ of an inch broad, and $\frac{1}{2}$ an inch thick. It has been formed by sawing, and has got a slight grinding on both faces. There is only one edge, which is shown at the lower end of the figure. There are many other axes and chisels having long, clean-cut sides, which could hardly be formed by continuous rubbing in one groove by the point of a flake. Some are 7 to 10 inches long, and I believe the straight sides in these implements could only be formed by one long saw, and the only saw I can imagine that would fit the case is a rod or frame of wood having flint teeth fixed therein.

In figs. 111 and 112 I show two axes of a kind which Sir John Evans draws attention to in his paper "Discoveries of Stone Implements in Lough Neagh." One kind is ground flat crosswise, while it is convex lengthwise. No. 112 is of this kind, two views of which are given: that shown to the left has the usual convexity of an axe; that to the right gives a three-quarter view, showing position of the other face that is ground flat crosswise, while it is convex lengthwise. It was found at Grangemore, within about a mile of the mouth of the Bann, and is $3\frac{7}{8}$ inches long. No. 111 is an axe which for the greater part is equally convex on both faces, but has been ground flatter on one side at the edge, thus making it into a sort of

gouge. There are many specimens of this kind. No. 111, from about an inch above the edge, is equally convex on both faces, but towards the edge it is ground flatter, and even hollowed at the edge, thus forming a complete gouge. It is $3\frac{3}{4}$ inches long, and was found at Portglenone. Two views are also given of No. 112.

Nos. 118 and 120 show a flake and an axe of the kind which is light in weight as compared with the size. The flake is a very well-formed specimen, slightly injured at the point, and the axe is well and finely ground, with an edge at both ends. It is similar to the axes of clay-slate, and I consider these implements of light weight must have been formed of a thicker layer of extra fineness in the formation to which the clay-slate belongs. Implements of this light substance, as far as anyone can conceive, could be of no use to the early inhabitants along the Bann, and therefore I should say it must have been of normal weight when the people formed it into implements. The theory that some ingredient forming the rock had dissolved and escaped since the implements were made was first suggested to me by Canon Greenwell, and is, I believe, a plausible one. Kinahan, in his "Geology of Ireland," frequently mentions beds of "Calcareous Shale" as part of the rock comprised in the Carboniferous Slate. He mentions rocks having the same characteristics of the Lower Limestone Shale and Old Red Sandstone as occurring in the valley of the Blackwater, where the axe 22 inches long, formed of clay-slate, was found.¹ The clay-slate of which the Bann implements are formed must have occurred in the form of small boulders, which have supplied the people on the banks of the Bann and Lough Neagh with material for axes. If among this material were some Calcareous shale, we might have such a rock as would probably explain these light stone implements. If they were originally made of Limestone shale, the lime would probably dissolve out of the implements when exposed to the waters of Lough Neagh and the Bann, which have a strong tendency to dissolve limestone. As a proof of this, I find that flints from the Bann which have had little cavities filled with chalk when they were made into implements have now lost the lime, and only the empty cavities are to be seen, thus detracting greatly from the symmetry of these objects. Flint implements from Larne, or other parts where exposed to sea-water, are not affected in the same way, and such cavities as were filled with chalk when made into implements still remain in their original condition.

Some of the implements from the Bann and Lough Neagh have a pointed character, and are like ground or polished picks; others are knife-like, with a

¹ Wilde's Catalogue, R.I.A.

thin cutting edge. Figs. 105 to 107 show a few examples. No. 119 is a sort of double pick, with slight indentures formed by chipping at each side at the centre, as if to have a place for a withe or other handle, so that either of the two ends which are pointed could be used. The two principal faces are somewhat flattened. It is $10\frac{1}{4}$ inches long; but as one end is a little injured, it was slightly longer in its original state. It is $2\frac{1}{2}$ inches broad by $\frac{2}{3}$ of an inch thick, and appears to be formed of clay-slate which has been ground and smoothed over or polished. It was found near the shores of Lough Neagh, opposite Randalstown. No. 116, which was found at the same place, is $10\frac{1}{2}$ inches long, and made also, I believe, of clay-slate; but, like No. 1, of a fine quality. It has a flat side, which would appear to have been used as a hone. The side shown is convex, and it terminates in a point, that is cylindrical in section. No. 114 is a knife-like implement, with sharp sides and point, but somewhat injured. It is $6\frac{7}{8}$ inches long and 1 inch broad at the widest part. It was found on the shores of Lough Neagh, at Toome. No. 109 is a knife-like implement, thin, with a sharp cutting edge on each side. A portion at the point end has been broken off, and the break has been ground and smoothed. It has a handle which is pierced with a hole. It was found at Culbane, and is still $6\frac{1}{2}$ inches long. No. 123 was evidently made for a knife. It is $4\frac{2}{3}$ inches long and $1\frac{1}{3}$ inches broad at the widest part. It has been ground to a cutting edge all round both sides, and has a sharp point. It was found on the banks of the Bann, one mile from Toome, on the Portglenone side. No. 122 is only a broken-off point of a knife. It was found at Culbane. In addition to those figured and described, I have several other interesting examples of a similar kind from Lough Neagh and the River Bann.

Grinding-stones.

This paper would not be complete without some account of the stones on which the clay-slate, axes, and chisels were ground into shape. A considerable number of sandstone boulders have been found along the Bann, and many have been dug out of the brick clay, which are smoothed or grooved on one or more sides, presumably by grinding the stone axes on them. This, with the exception of some small hand-specimens, seems to have been the only kind of grindstone used from first to last, as the striae caused by rubbing backwards, forwards, and across on the sandstone are still visible on the faces of the axes, crossing and recrossing in all directions. I have from fifteen to twenty of these grinding-stones of various sizes. The New Zealanders not only sawed their rocks into the form of axes and chisels in the way the early inhabitants along the Bann did with clay-slate, but they ground their axes on

slabs of sandstone, just as the Bann people did. I have one grinding-slab from New Zealand which I could match with some of those from the Bann. I show in Plate XIX, fig. 126, a sandstone slab, ground on both its flat faces, which was found in the brick clay of Culbane, 4 feet from the surface. Close to it was found a nest of six stone axes, ground and completed. Possibly the person who ground these axes intended to return next day and grind some more; but I suppose a flood—a thing which must have been of frequent occurrence along the Bann—had come in the meantime, and either was long in subsiding, or covered all with a deposit of mud, so that the place where the grinding-slab and axes had been laid down could not be found. This or some other cause prevented them from being found until they were brought to light a few years ago. This slab of well-rubbed sandstone is 13 inches long by 8 inches broad. I show an axe resting on this grindstone.

Axe-hammers.

All the implements I have previously described might, I should say, be looked on as those of one people, and to represent one stage of culture, but other objects of stone have been found in the Bann which may be of later age and belong to a higher stage of culture. There is no doubt that a succession of peoples came to this beautiful valley abounding in food, each bringing superior implements, and perhaps a higher degree of culture. We can easily judge for ourselves that such waves of culture succeeded each other by the finding of bronze implements and of an early type of iron implements in the Bann and Lough Neagh. I am not, however, dealing with metal objects on the present occasion, but only with those of stone, and, owing to stone axe-hammers and other pierced stones having been found in the Bann, I am taking notice of them.

An old man now living in Portglenone, over eighty years of age, and who worked at the excavations made in the bed of the Bann by the Board of Works, remembers Rev. James O'Laverty collecting the antiquities found during the deepening of the river. He was down along the banks of the Bann every morning to procure, if possible, whatever was found, but he had a competitor, a dealer or pedlar, who was there every morning also for a similar purpose. No doubt his Reverence got the lion's share, as he obtained a very large and good assortment of prehistoric implements. Father O'Laverty did not write much about the objects he found, as far as I have been able to discover. I know of only one paper of his,¹ in which he deals chiefly with the age and succession in point of time of the various kinds of implements found while deepening the bed of the Bann. He allows the editor of the "Ulster Journal of

¹ Ulster Journal of Archaeology (O.S.), vol. v, p. 122.

Archæology" to describe and figure an axe-hammer from the Bann in vol. iii, p. 234, of that journal. We learn both from him and Father O'Lavery's paper in vol. v, that this axe-hammer was found in the bed of the Bann. At the sale of the late Monsignor O'Lavery's collection of antiquities in Belfast a few years ago I purchased the axe-hammer referred to above. I also purchased a hamper of miscellaneous stones mostly perforated, and found in it one other complete axe-hammer, and another shaped but only partly bored. The boring does not seem to have been done by rotary motion, but by punching. It is possible that these axe-hammers and other perforated stones may belong to a time when there were metal punches to bore them; but while that may have been the case, and if we found the punches it would help to prove it, yet I am of opinion that the small pick-like flint objects, three of which I have shown in Nos. 79, 82, and 84, and which are very abundant in all parts of the Bann valley, could usefully have been employed in boring holes in other stones. If held between the finger and thumb in one hand and struck repeatedly with a hammer-stone held in the other after the manner in which quarrymen use their steel-pointed jumpers when boring holes for blasting purposes in the present day, the boring of an axe-hammer could easily have been accomplished. One flint borer employed in this way might soon be used up, but what would it signify if a dozen or a score of these coarsely, and evidently hastily, made articles were required for boring a single hole? The partly bored axe-hammer I have mentioned is bored to a depth of $\frac{1}{3}$ an inch on one side and $\frac{2}{3}$ of an inch on the other.

The axe-hammer in my possession, which is described in the "Ulster Journal of Archæology,"¹ is $6\frac{1}{2}$ inches long and 4 inches broad at the widest part, and weighs two pounds. I show two views of it in fig. 127. Sir John Evans in his "Stone Implements and Ornaments"² refers to an implement of this kind: "This Irish axehead is formed of pale green horn-stone, and is now in the British Museum." On a late occasion, when in London, I called to see the axe-hammer which Sir John Evans said was in the British Museum, and I was shown one which is very like my specimen in make and finish, but smaller and lighter in colour than its dark and bigger brother in my collection. The specimen in the Museum is labelled, "Pierced Axe-hammer, River Bann, Ireland, Ulster Journal of Archæology, iii, 234. Given by Rev. G. Wilson, 1883." This specimen may have been bought from the pedlar above referred to. From the finish, shape, and likeness of the ornamentation, I should say that both implements were made by the same artist. They were probably found in the Bann at the same time.

¹ Vol. iii, p. 234.

² 2nd edition, p. 198.

Conclusion.

Sir John Evans in his paper on "Discoveries of Stone Implements in Lough Neagh" says these discoveries may almost be ranked with those of the prolific caves of Dordogne or those of the Pfahlbauten of the Swiss lakes. That was in 1867, nearly half a century ago, and during the intervening time finds of implements and flakes have increased largely, I should say to four or five times the quantity recorded by Sir John Evans. The finds of stone implements from the Bann and Lough Neagh ought certainly to occupy a very important place in the prehistory of Europe. Referring to the age of these implements, Sir John Evans puts before us the state of civilization of the north of Ireland about the year 1600, and adds that "the picture he gives is by no means inconsistent with the extensive use of the readiest materials which come to hand, such as bone, wood, and stone, for most of such simple implements and weapons for the chase as might be required, rather than that of metal, which was not readily accessible, or only to be procured by commerce or barter;" but later on he adds, by way of qualification of the above statement, that he does not desire that the observations he has made as to the method of life or degree of civilization existing in Ireland in the days of Elizabeth should be understood as implying that the implements he has been describing do not date back to a period far more remote than three centuries ago.

The implements of flint and clay-slate have been found in the brick clay or diatomaceous formation which passes under the ordinary peat, and I have one implement (fig. 103) marked as being found three feet below the brick-clay. These facts, and the fact that the forms of many of the implements show that they were survivals from a more ancient period, would lead me to believe that they were of Early Neolithic age.

In order to give a general idea of the numbers of the various kinds of objects found, I append a summary of those in my own collection :—

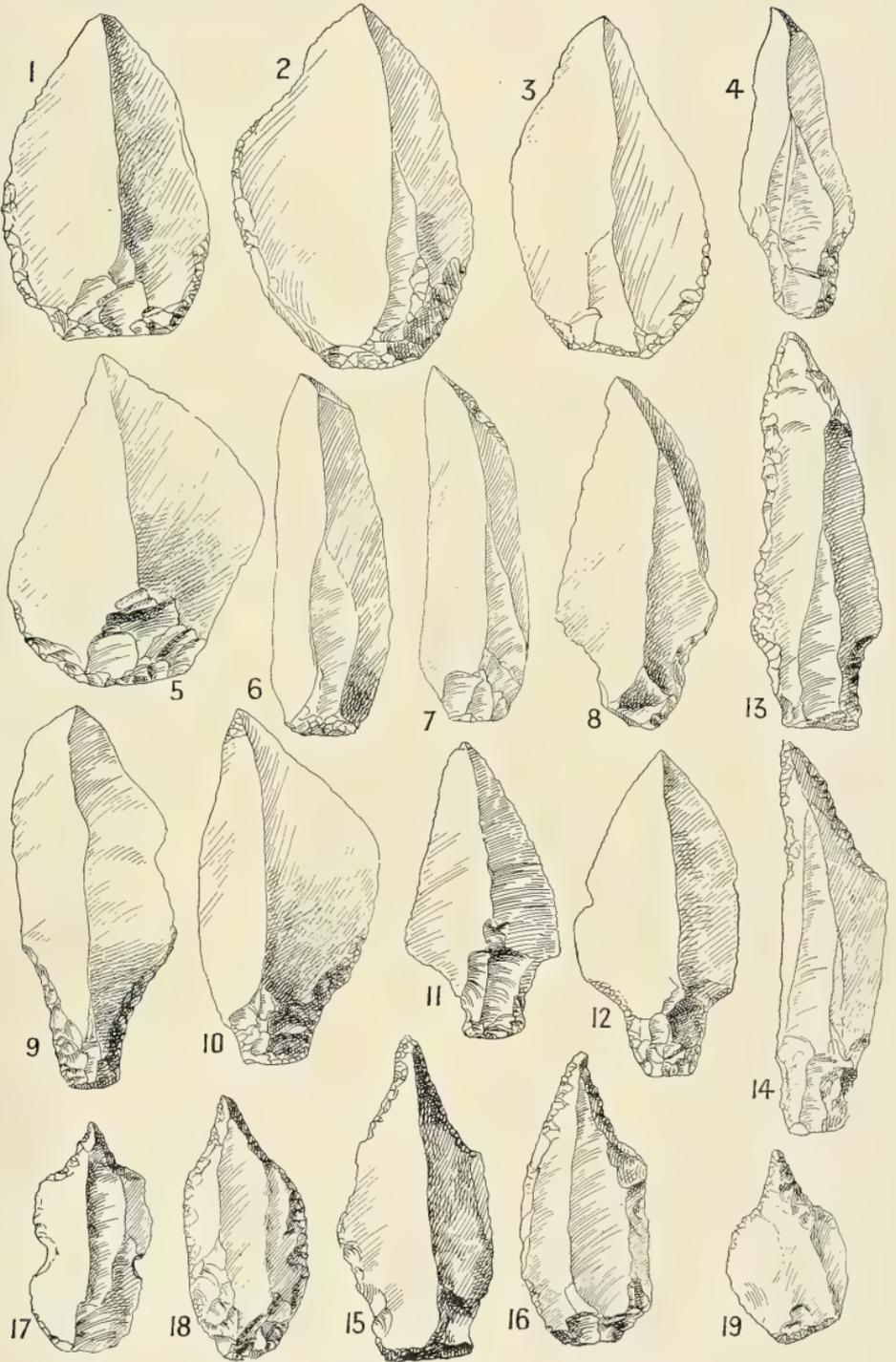
Flint.

Flakes—One-half of which show work on some part,	3,296
Cores—Mostly small,	669
Pointed implements, with cutting edge at one end,	88
Do. with point at one end and edge at the other,	10
Oval implements with cutting edge at both ends,	21
Do. small size without distinct edges or points at the ends,	25

Pointed implements without a cutting edge, long,	22
Do. do. do., medium,	55
Do. do. do., small,	70
Pointed implements finely made and slender,	10
Implements with a point at each end,	4
Pointed implements, stout and short, with heavy butts (hand weapons),	42
Kitchen-midden axes,	82
Ordinary flint axes (some polished),	16
Scrapers,	241
Miscellaneous—Including hammer-stones, fabricators, flint-knives, } and arrow-heads, under-estimated at	100

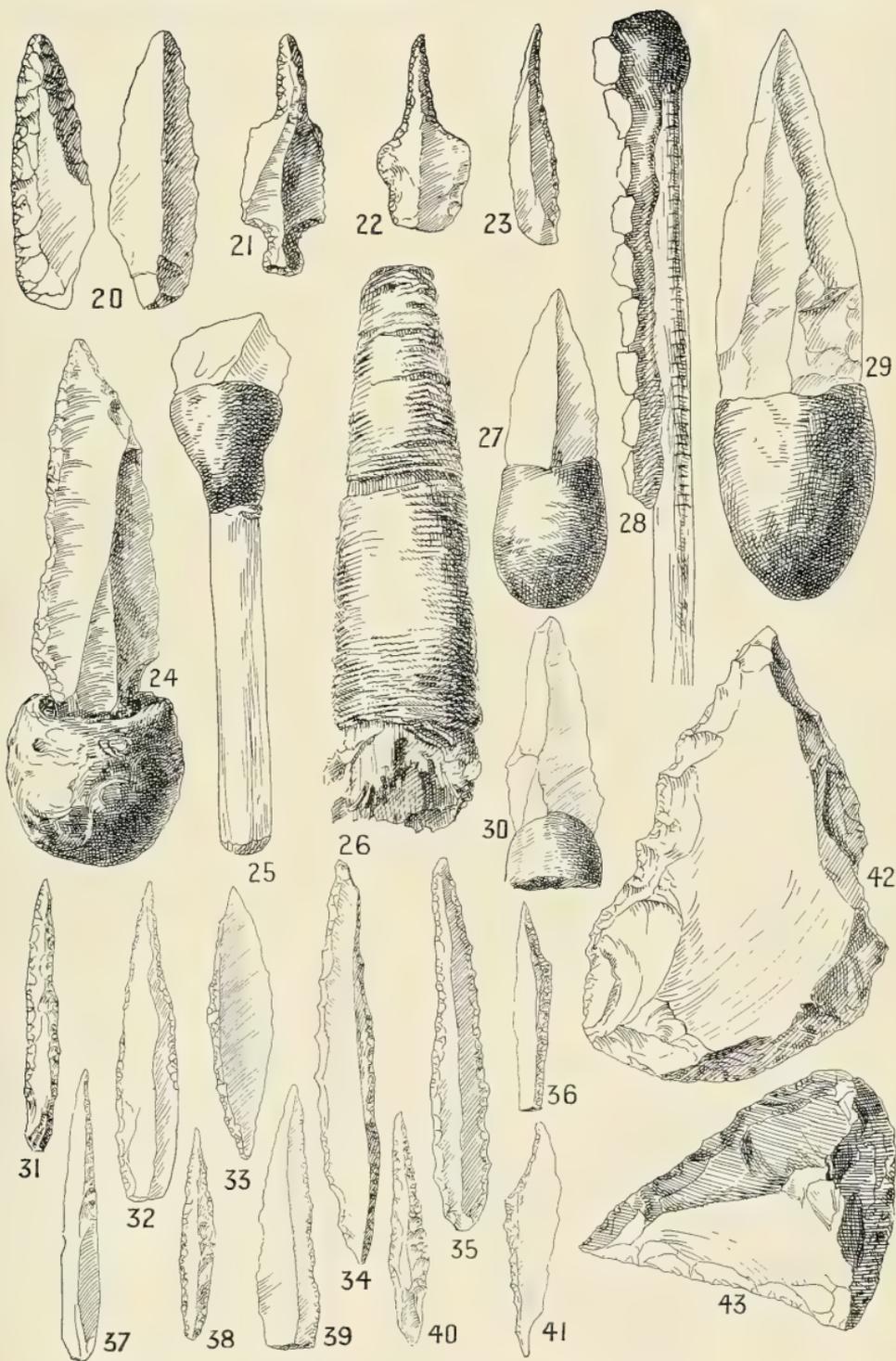
Clay-slate.

Axes ground,	718
Do. of light weight,	23
Chisels, ground at edge,	115
Flakes, of light weight,	5
Grinding-stones,	21
Total,	5,633

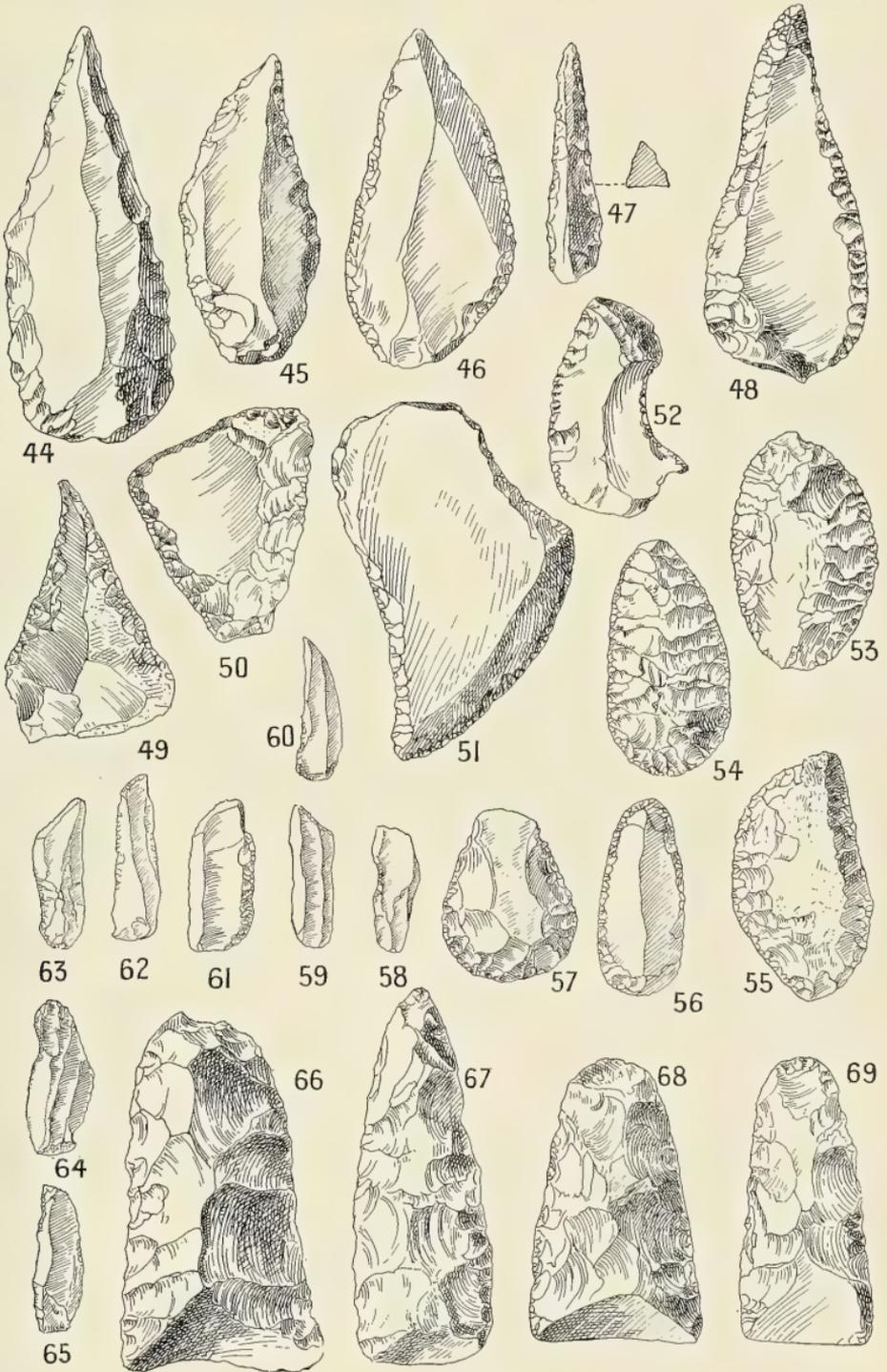


KNOWLES.—PREHISTORIC IMPLEMENTS FROM RIVER BANN.

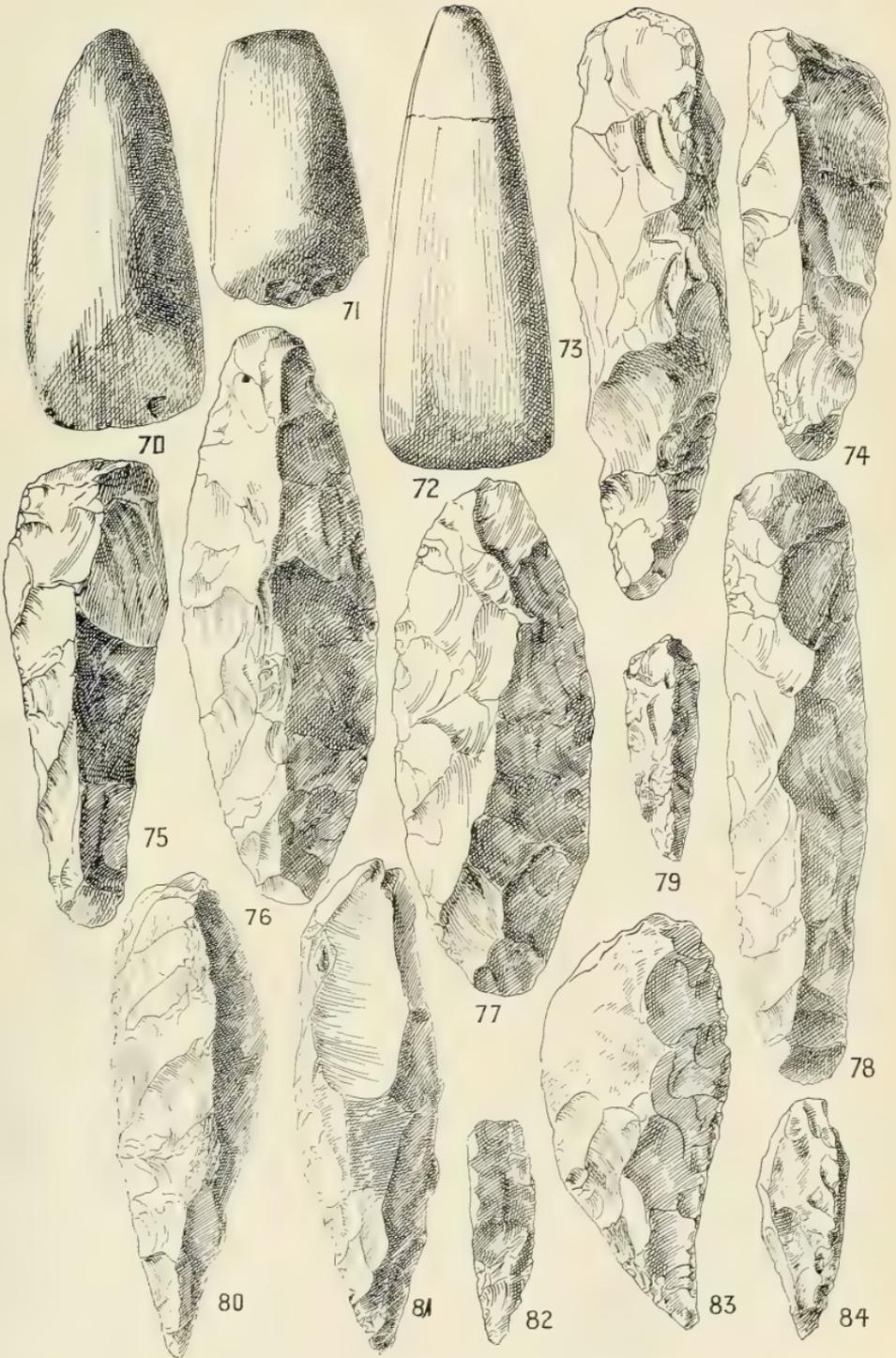
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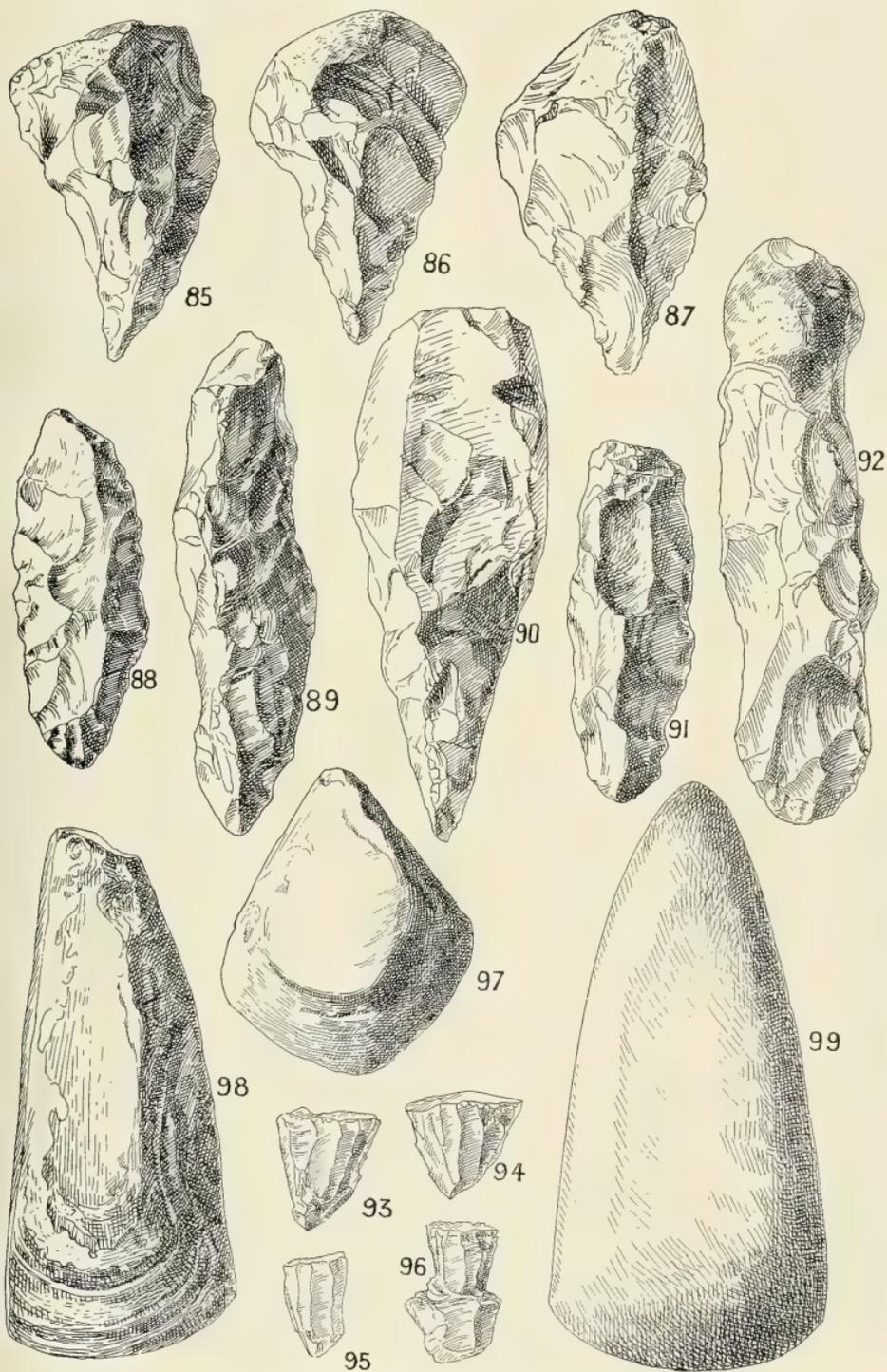
KNOWLES.—PREHISTORIC IMPLEMENTS FROM RIVER BANN.
(Figs. 31-41 $\frac{1}{4}$. The others $\frac{1}{2}$.)



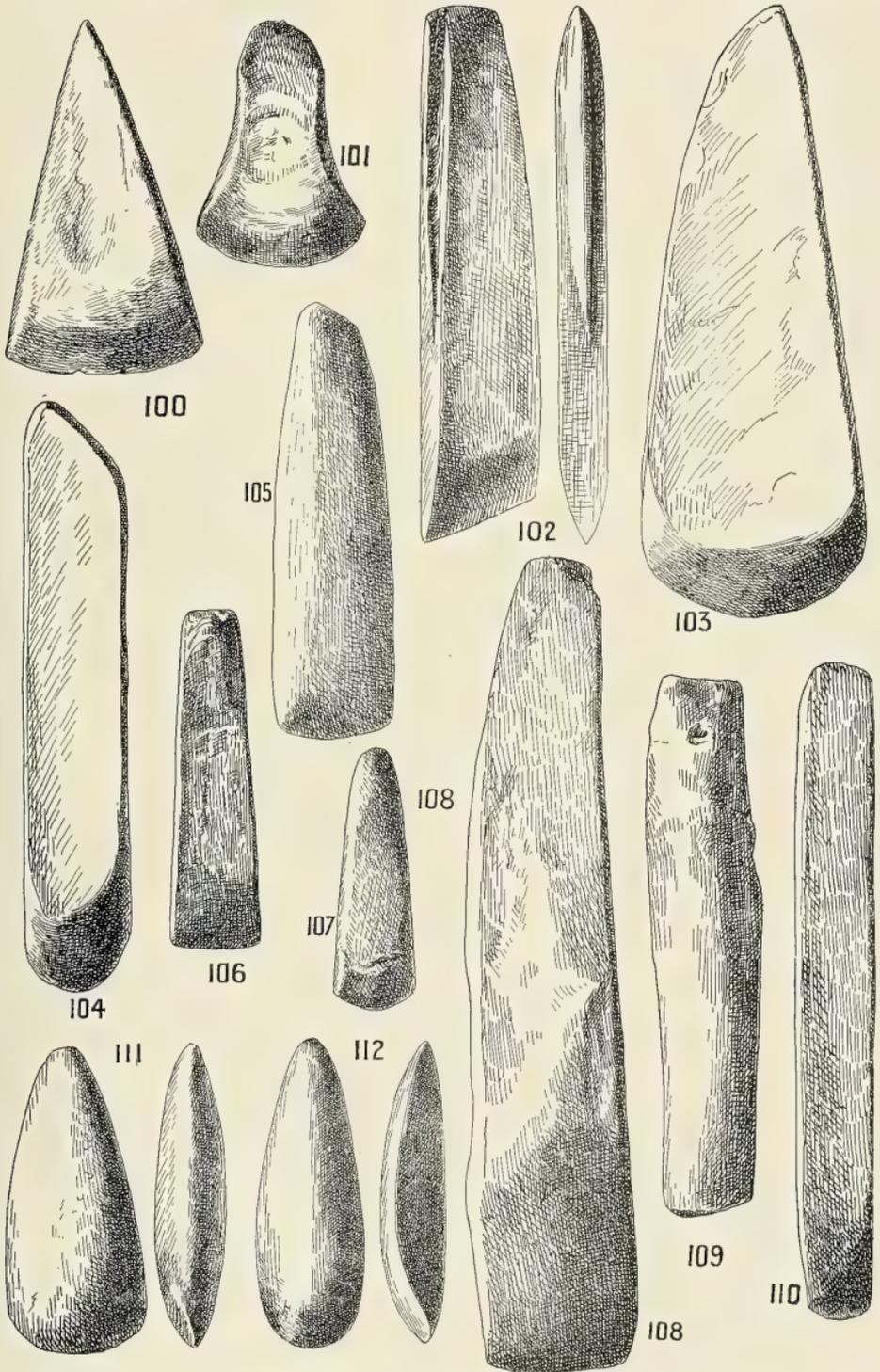
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(All figures $\frac{1}{2}$.)



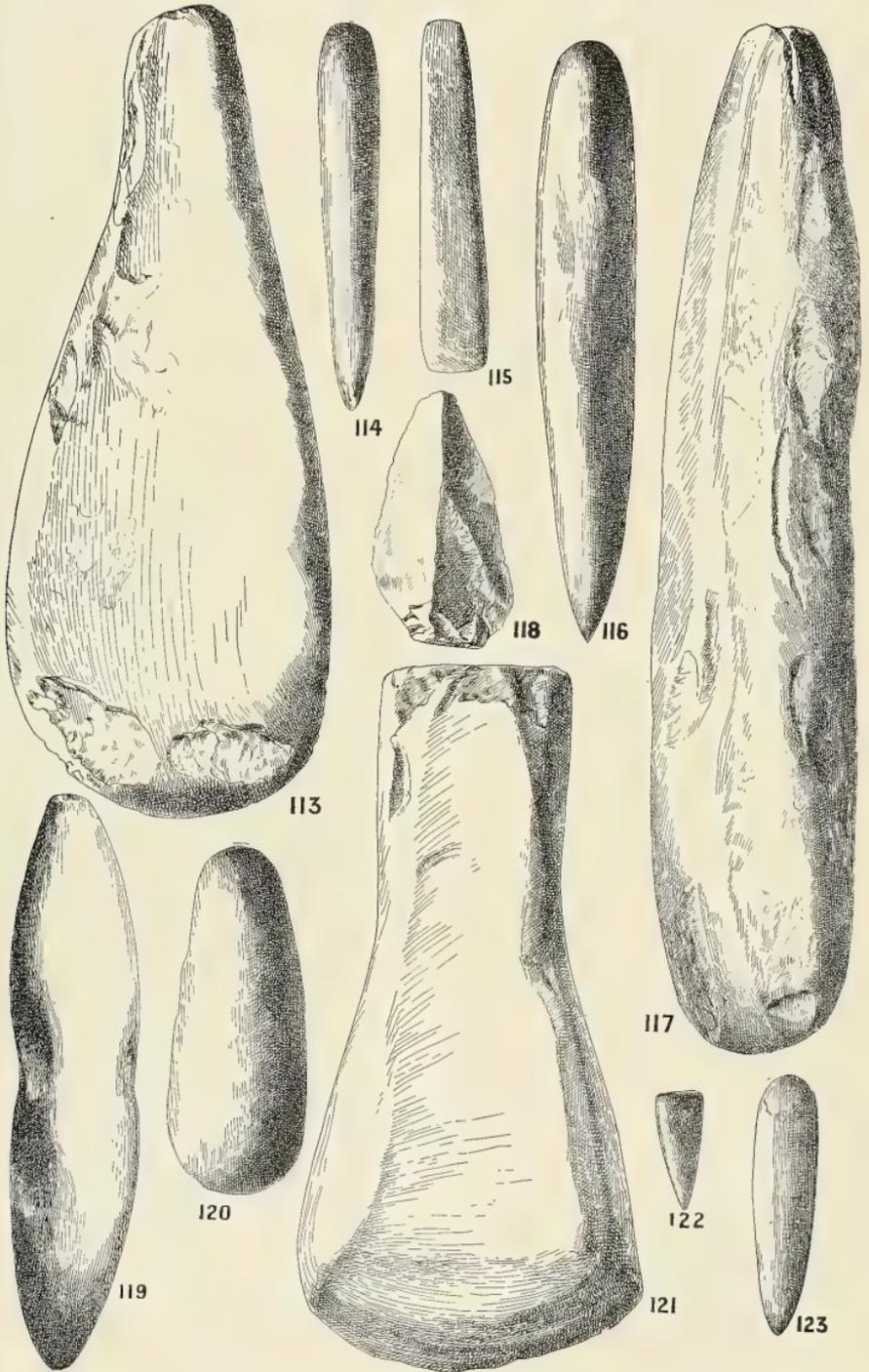
KNOWLES.—PREHISTORIC IMPLEMENTS FROM RIVER BANN.
(All figures $\frac{1}{2}$.)



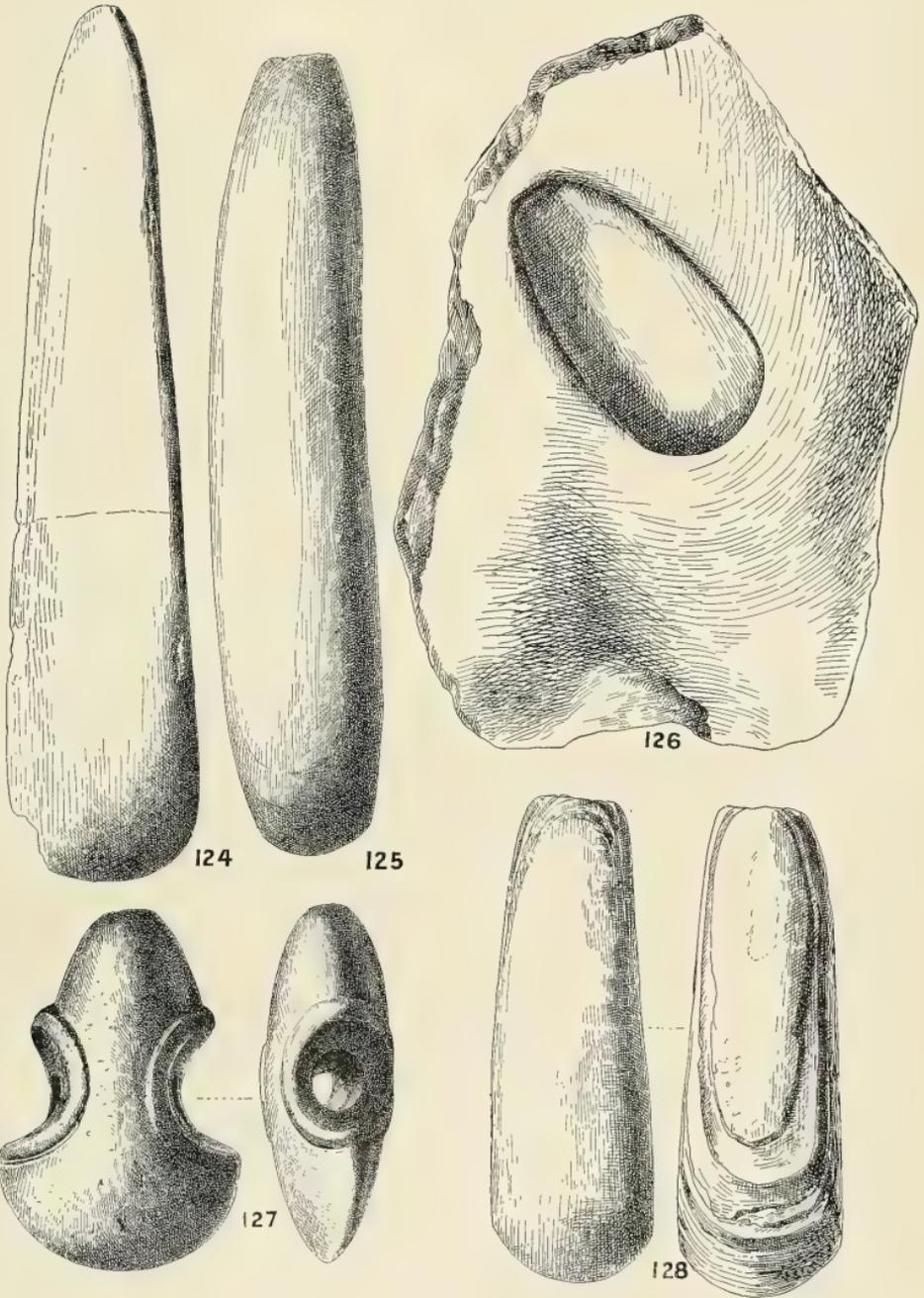
KNOWLES.—PREHISTORIC IMPLEMENTS FROM RIVER BANN.
(All figures $\frac{1}{2}$.)



KNOWLES.—PREHISTORIC IMPLEMENTS FROM RIVER BANN.
(All figures $\frac{1}{2}$.)



KNOWLES.—PREHISTORIC IMPLEMENTS FROM RIVER BANN.
(All figures $\frac{1}{2}$.)



KNOWLES.—PREHISTORIC IMPLEMENTS FROM RIVER BANN
(All figures $\frac{1}{2}$.)

VIII.

BRASIL AND THE LEGENDARY ISLANDS OF THE NORTH ATLANTIC: THEIR HISTORY AND FABLE. A CONTRIBUTION TO THE "ATLANTIS" PROBLEM.

By THOMAS JOHNSON WESTROPP, M.A.

PLATES XX-XXII.

Read JUNE 10. Published AUGUST 12, 1912.

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THE subject of the imaginary islands of the western ocean has again and again been touched upon by Irish writers, but, up to the present, on purely local lines. I certainly do not claim even comparative completeness for this paper, but have striven to trace out the origins, whether in nature or in human fancy, for these beliefs. A collection of the early references to Brasil and St. Brendan's Isle is given which may be useful to students, even outside our islands, and the bearing of such fancies on the discovery of America must be of perennial interest. As such I offer this study to others.

I.—THE IRISH SEA-BELIEFS.

The early inhabitants of Ireland, keenly intelligent, poetical, and with an unusual appreciation for natural beauty, stood on the western coasts face to face with phenomena of mystery and might. It is not wonderful that the great strength roaring beneath their cliff-forts and on the sandhills of their settlements deeply impressed them. Older races had bowed in awe before tamer seas: the Egyptian had feared the "great green one"; the Hebrew had seen God's path in those great waters, and had heard their hymns of praise or cries of deep anguish, when the trouble was on the sea, and it uttered its voice and raised its hands on high; the early Greeks had evolved from its waves

and whirlpools the forms of the Sirens, Charybdis, and Scylla, with her barking waves; the tutor of Nero foretold the loosening of its bonds and the discovery of an unknown continent; while even in the deserts, far from its shores, the Arabian prophet pictured "black night on the deep, which wave on wave doth cover, cloud upon wave, gloom upon gloom." Much more so the Irish, on the outskirts of the known world, felt the wonder that we cannot shelter ourselves from, even by knowledge of natural laws; and their scholars were not unacquainted with what the Scriptures and the classics had to tell.

The coast-dwellers saw the mirage or the cloud-bank brooding on the water: to them it was a floating island,¹ possibly to be disenchanting, as Bofin had been. They saw the foam spring high out to sea, and strange reflections below the waves; it was a magic land that lay there, and the gold-roofed towers and domes glinted deep under the waters²; nay, it rose over the waters once in seven years, as men could attest. The ships of the Danaan and Sidh³ (demons and gods) sailed visible to all, reality and no mirage to the older tribes. The current suddenly foamed in a long tideway, or twisted and writhed; and to the onlookers it was clear that some vast monster swam or turned beneath it; while those lost at sea or in the surf, trying to land, were devoured (thought the survivors) by monsters. The Irish, of course, had no monopoly of such views. Even at the end of the sixteenth century Hakluyt⁴ contradicted those who said that the currents "bee swallowed by and cast up againe by the breathing of Demogorgon."

The Irish went farther; they regarded the waves as sentient prophetic beings, for, in our oldest writers, "the great waves of Erin"—Rudhraigh, Clíodhna,⁵ and Tuath—raised their deep voices to foretell disaster and crime, and the wave of Malbay mourned for the death of Keane of Ross, so late as in the reign of George II. To the early bards the waves were the white-maned horses, the silver-horned stags, and the many-hued salmon of

¹ So also on the opposite shore of the Old World the Chinese had legends of "Isles of the Blessed," 700 miles eastward in the Yellow Sea; places of everlasting spring, gladness, and beauty. Their secret was revealed to the Emperor Tshé Huan Ti about B.C. 219. Youths went out to find the Isle, and saw it in roseate light on the horizon, but storms drove them away. Similar stories are told in Japan of the happy isle of Oraison, far out to sea.—Nansen, "In Northern Mists," vol. i, p. 377.

² Legend of Kilstuithin, *infra*; also "Voyage of Bran" (Revue Celtique, x, 1889, p. 55).

³ "Demon ships" are even recorded in early Annals. See under A.D. 648 (Annals of Ulster); see also A. F. M., 744; also for an appearance at the Fair of Tailltinn in A.D. 763 and A.D. 956, "Ships sailing in the air"; see "Book of Leinster," p. 274 a 37; Ulster Journal of Archaeology; 1859, vol. vii, p. 137; and "Irish Mirabilia" in the *Speculum Regale* (1250), Kuno Meyer, *Eriu*, vol. iv, p. 12.

⁴ "Voyages," vol. ii, p. 9.

⁵ Dr. Joyce, "Irish Names of Places," vol. i, part ii, chap. v, probably Glandore, Co. Cork. Tuath was probably at Dundalk. Sir Samuel Ferguson, so rich in allusions to ancient Irish beliefs, gives this legend in "The Tain Quest," "Roared and wailed white Cleenagh's wave—Rose the onn of Inver Bory."

Manannan mac Lir, the sea-god; they were, when calm, the flowery meads over which his chariot sped with flashing, bounding coursers.¹ Some, even in our time, saw them as misty human forms—storm-spirits—before great gales.²

In the centre of all this weird mystery the pagan Irish placed their heaven, the "Land of Youth," the "Land of the Living," with so firm a belief that, even when they adopted a faith in whose paradise "there was no more sea," they brought their belief along with them.³ Devout Christian writers rendered "Tir Tairngiri" as the "Land of Promise" and the "Kingdom of Heaven" in notes on the Epistles to the Corinthians and the Hebrews;⁴ the blending was complete and lasting; "Magh Mell of many flowers" was the "Land of Truth," the "Land of the Promise of the Blessed," "whose truth was sung without falsehood." This, however, was equally the "Land of Fair Women," fitter for Islam than for "the Faith"; to this Isle, Connla, King Conn's son, was lured by the woman of the fairy mound.⁵ It was the "Land of the Living," to which the fairy bore Oisín "across the western wave" for three centuries; there Bran, son of Febal, and his comrades dwelt with the fair lady and her daughters. On the other hand, the longing for a land where there should be no sorrow, or age, death, or decay, the pathetic desire to escape the sadness of life, led even the austere and pious to seek for a happy island: the penitent Hui Corra went out "to meet the Lord upon the sea"; and Brendan, the holy and blameless, eagerly sought the "Land of Promise." Saint or sensualist, joyous or troubled, yearned for the blessed island, as elusive as the mirage itself.

The island was not alone in the deep; "thrice fifty islands" as large as, or "twice and thrice" larger than, Erin, "were counted"; many of these, we shall see, figure in the Voyages of Brendan and elsewhere. The classics were brought into unison with this belief, as the psalms had been; and we hear of "the Hesperides to the west of Aran, where the sun goes to his couch." The kindred races in Britain doubtless contributed their quota: "Cingitur oceano memorabilis insula, nullis desolata bonis; non fur, nec praedo, nec hostis insideatur; ibi, nec vis, nec bruma, nec aestas, immoderata furit . . . Ver manet aeternum, nec flos nec lilia desunt, nec rosae, nec violae flores, et poma

¹ See, e.g., "Voyage of Bran" (ed. Kuno Meyer, 1895), p. 10.

² "Irish Local Legends," by Lageniensis (Rev. J. O'Hanlon), section xxx.

³ Those who held that Eden lay eastward were met (both by those who held that the Earth was spherical and those who held it was flat) by the argument that Asia reached around to opposite Europe, so that the farthest east was near the west shores of Ireland.

⁴ Cited by the late A. Nutt ("Voyage of Bran," ii, p. 226) from seventh- and eighth-century mss.

⁵ A beautiful girl of the Aes Sidh took him in a *currach* (canoe) of glass over the sea—Lebor na hUidhre.

sub una fronde gerit pomus," says one bard, singing about Avalon¹; "deep-meadowed, happy, fair, with orchard lawns"—

". . . that desired gate
To immortality and endless rest,
Within the landless waters of the West,"

as the modern poets have rendered it.

We must now study the effect of this deep-based belief on Irish literature and, through it, on the belief of Western Europe, and, through that, to the vast results in the spirit of discovery and colonization. Practical as the result was, the poetical side was maintained among the Irish from the days when they wrote of "the secrets of the hoary deep, the dark illimitable ocean, without bound, without dimension," to the tales of the fishermen and peasants of our coasts and islands at the present day.

2.—EARLY "IMRAMA" OR SEA-TALES.

The early Gael loved sea-tales. How many of these were lost in the wreck of Irish literature we may never know; some may even yet be recovered, but no less than five have reached us, so we can form a good idea of the Irish belief about the outer sea. These are the voyages of Bran son of Febal; of Maelduin son of Ailill, "edge of battle"; of the Ui Corra; of Snedgus and MacRiagla and of St. Brendan. The spirit of the five *imrama* is identical; some dominant passion sends the hero out to sea; Bran to seek a fair lady; Maelduin to avenge his father; Snedgus and his comrade to save a condemned man from a fiery death; the Ui Corra to seek the Lord on the sea; and Brendan to reach the Land of Promise. The incidents are closely alike: Bran and Maelduin are pulled by a clue to their lovers; the Miller of Hell and the isles of laughter and weeping are visited by Maelduin and the Ui Corra. The legends of Maelduin and Brendan have equally got the isle of singing birds, the walled islands, the monsters, sea-cats, and pursuing whales,² and the visions of hell recur in several. The punishment of the robber after the banquet is in the tales of Brendan and Maelduin, the woman drawing water at the magic brazen fort³ is in those of Hui Corra and Maelduin. As we shall see, Plato's description of Atlantis is closely similar, and may have become

¹ An early versifier of Geoffrey of Monmouth. Avalon (Insula pomorum) had no serpents, spiders, or tempests.

² This recalls the tales in Nieuhoff's voyages, and is well illustrated by the quaint pictures in the map of Olaus Magnus (reproduced in Nördenskiöld's Atlas). Arngrim Islandus in "The true state of Island" (Iceland), 1592, p. 531, tells us much about the "cete grandia instar montium," Trollwall, Tuffwall, and Diabolica Cete. The *Trollhuular* are also described in the "Speculum Regale," a work angrily refuted by Arngrim.

³ Compare the curious fort (cashel), palisade (sonnach), and bridge in "The Vision of Mac Conglinne" (ed. Kuno Meyer, 1892, p. 36)—a contrast (yet parallel) recalling the contrasted ramparts of Château Gaillard (of "iron" and "butter") in the saying of Richard Cœur de Lion.

known through some Greek-reading cleric. The same seems true of Lucian's "True History." The affinities to the sagas of Ulysses, Aeneas, and Hindbad of the sea are striking, and the author of "Bran" certainly knew something of the legends of Ulysses and Dido. The possible Norse influence we must study later. The "Bran" legend mentions Mongan, who died in 620, as about to be begotten; the "Hui Corra" were later than Ailbe of Emly, who died 551; and their saga names Mocholmacc son of Colman, in Aran, whose feast was on July 25th in the calendar of Oengus. The Hui Corra themselves were commemorated on 31st December; but the years in neither case are given. The time setting of Snedgus is 639-642; and Brendan died in 576.

The legends very probably date from the ninth century to the end of the eleventh, the earliest manuscript of "Maelduin" being just before 1100, while one of "Brendan" is alleged to be of the ninth century. "Bran" and "Maelduin" are frankly pagan; the others are devoutly Christian. "Bran," though varnished, shows the most primitive texture, while "Maelduin" may date before 850. "Snedgus" is the least interesting, being nearly colourless. Some of the episodes have affinities to Adamnan's "Vision"; the latter and St. Brendan's "Navigatio" had wide-spread influence on Italian thought, and are among the ancestors of the great Florentine epic.¹ The lesser stories (apart from the niche in British literature given by Tennyson to Maelduin) had little influence; but how far the "Navigatio" of Brendan reacted on Dante and the fifteenth-century explorers can hardly be estimated—certainly not in these pages.

Let us now briefly study the *imrama* arranged rather in order of primitive character than by the date of their alleged periods.

BRAN.²—Bran son of Febal, sleeping near his fort (*dún*), hears sweet music, and awakes to seize a magic apple branch. An unknown woman sings of "a glorious island round which sea-horses glisten—a fair course against the white swelling surge." In it dwells no wailing, treachery, death, or sickness; it glows many-coloured in incomparable haze, with snowy cliffs and strands of dragon-stones and crystals. She vanishes, and Bran, with twenty-seven followers, embarks. They meet the sea-god Mananann mac Lir in his chariot, visit Magh Mell, the Isle of Laughter, and the Isle of Women, whose queen draws Bran to it by a magic clue. Entranced by love, the visitors do not note the flight of time; in apparently undiminished youth and strength they return to Ireland; it is only when the first to step ashore falls to ashes, as if

¹ A. F. Ozanam, "Dante" (Paris, 1840), p. 334; Voyage of Brendan; see also Achille Jubinal, "Les sources poétiques de la Divine Comédie," 2nd ed., Paris, 1836, tome v, p. 373.

² "Voyage of Bran," vol. i, p. 12.

centuries dead, that they know the truth. The survivors tell their tale without landing, and sail out into the deep, never to be seen again.

MAELDUIN.¹—Ailill, "edge of battle," has a son Maelduin, but is killed and burned by the men of Leix before his son's birth. The boy playing in the ruined church, on the ashes of his unknown father, is taunted for not revenging his parent. He goes to his mother, a nun, in the Eoghanacht of Ninuss, in Burren, Co. Clare, and learns the truth. Nuca, a wizard, advises him to make a currach or boat of three hides (like St. Brendan in 540), and the youth and his comrades sail away. They approach a fort on the shore of an islet, and hear a man boasting of having killed Ailill; but a storm sweeps them into "the great endless ocean." They visit numerous islets, some walled, some with high cliffs, others low and sandy. On one demons enjoy a horse-race on a magic race-course; on others red-hot swine issue from caves all day, but after sunset retire, so that wondrous birds and the seafarers can feast on golden fruit in safety. On other islands, ants as large as foals are seen. In a wonderful white *dún*, a cat leaps on four pillars and a rich banquet is spread. Maelduin's foster-brother steals a necklace from the wall, and the cat springs through him, burning him to ashes. A fiery river burns a spear thrust into it. A lady entertains them in a brazen fort, and, angry at the advances of Maelduin, vanishes with her *dún*. The voyagers see isles of psalm-singing birds, magic fountains yielding whey, milk, and wine; a rainbow stream; boiling, glassy, and cloudy seas; a submarine country with roofed *dúns*, people and cattle (one of which is seized by a hideous serpent coiled round a tree); an isle like a silver column with hanging veils (perhaps an iceberg), and an island of women more complaisant than the lady of the *dún*. They visit island monasteries in the farthest deep with anchorites and monks from the community of St. Brendan of Birrha,² and from Torry Island.³ A recluse bids them to return home, foretelling that they shall find the slayer of Ailill, but he must be forgiven for the sake of Him who preserved them through all the dangers of their journey, though they, too, were worthy of death.

THE HUI CORRA.⁴—Lochan, Enne, and Silvester were sons of Conall and his wife, Canderg, daughter of the Erenagh of Clogher. Their parents, despairing of issue, fasted against the devil; they had three sons and dedicated them to the fiend "by heathen baptism." When the youths grew up they destroyed half the churches in Connacht to honour their patron. They intended to destroy Clogher, but were kindly received by the Erenagh, their grandfather. That night Lochan dreamed of heaven and hell, and, full of remorse, won over

¹ *Revue Celtique*, vol. ix, p. 447, vol. x, p. 63.

² Perhaps the other Brendan, St. Brendan of Ardfert.

³ A legend still told in Torry closely resembles one in the *Imrunn*.

⁴ *Revue Celtique*, vol. xiv, p. 37.

his brothers; after a year's study they insisted on being given a penance. They were told to rebuild the churches, and, at the end of the year, came to that of Sen Comman at Cenn mara (Kinvarra), on the border of Clare and Galway. Impressed by a glorious sunset and the unfrozen sea, when the lakes were sheeted with ice, they got a boat of skins and sailed forty days westward "to meet the Lord on the sea." They, too, visited the Isle of Weepers, the Isle on a Pillar, the Rainbow Stream and the Island of Hell. They meet the anchorite Dega, disciple of St. Andrew, and the monks of St. Ailbe. They reached an island full of purple and red flowers, shining grass, and gorgeous birds, woods full of honey, and sweet-flavoured lakes. A hermit, a disciple of Christ Himself, sent them to the Point of Spain to build a church, the fame of which reached the *comarb* of St. Peter at Rome. The survivor, a bishop, told the tale to St. Mocholmoc of Aran in Galway Bay.

SNEDGUS.¹—Certain men of Ross (on the borders of Monaghan and Louth) murdered King Domnall (A.D. 639 to 642) for his tyranny, and were sentenced to be burned in a house. Snedgus and Mac Riagla, sent by St. Columba, commuted this doom to being set adrift in little boats²; and while themselves returning in a *currach* to Iona, determined to explore the outer sea to the north-west of Erin. They visited a river of milk, a walled island, islands of catheads, houndheads, and swineheads, an island of birds singing canticles, and an island where the men of Ross, saved from the sea, dwelt with Elijah and Enoch till the last battle of Doomsday. At last they came to an island of devout folk, whose king bid them to go back. In a year and a day they reached Erin, with the prophetic message that foreigners will overcome and dwell in half that island, "because of the great neglect the men of Erin show to God's testament and his teaching."

BRENDAN.—The greatest *Imram* is that of the *Navigatio*. It exists in various stages,³ and is possibly a ninth-century sermon,⁴ elaborated up to

¹ *Revue Celtique*, vol. ix, p. 14, from the "Yellow Book of Lecan."

² Punishment of setting adrift on the sea in a boat of one hide is recognized in other Irish writings. See "Tripartite Life of St. Patrick" (ed. Whitley Stokes, vol. i, pp. clxiv, 222-288). MacCuill, a son of death, on his repentance so goes on the sea. One recalls the verse in the "Chronicon Scotorum," 622, on the death of Conaing, son of Ardan, "Great bright sea-waves and the sun that punished him in his weak wicker skiff." See also Adamnan's "Life of St. Columba," lib. ii, ch. lxiii, for the stinging marine animals (? jellyfish) hustling the skin-currachs. Caesar, it may be remembered, describes *currachs*, "De Bell. Civil.," l, liv. See also Pliny, "Nat. Hist.," vii, lvi; Solinus, cap. xxxv, for other descriptions of these hide-boats. For the intervention of clerics on behalf of prisoners, see St. Patrick's "Epistle to Coroticus," and Ann. Four Masters, 684, "Adamnan went to Saxon Land" to request a restoration of the prisoners from Magh Breagh.

³ "Early English Poetry" (Percy Society), Thomas Wright, F.S.A., 1844, and Ozanan, *loc. cit.* British Museum, Cotton Vesp. D xi Bx. Also "Anglo-Norman Trouvères" ("Blackwood's Edinburgh Magazine," vol. xxxix).

⁴ A ninth-century ms. is said to exist in Rome (Vatican Library). There is also a twelfth-

its present form by the eleventh century. It was known in some form to the Arabian geographers in Spain about 1150. It spread beyond Ireland among the Normans, being translated for King Henry Beauclerc and his wife¹; and the Anglo-Norman Conquest spread it more and more. It passed to the Portuguese, and probably stimulated the designs of Prince Henry the Navigator, and a little later those of Columbus. It affected monastic eschatology, and was a source of Dante's great poem.

What truth lies behind it is difficult to guess. Matter-of-fact writers have treated it as a genuine log-book; but poets, like Florence MacCarthy, have more truly seen in it a revelation of great symbolic beauty. It is more than probable that St. Brendan (like SS. Columba, Colman, and Flannan) was actually a daring voyager; and that in some lost "Life," his actual visits to various islands were told. The present tapestry is embroidered with many threads of other makers. Legends of monks and hermits, who fled to the sea-rocks from Skellig to Iceland; tales, perhaps, of Helluland, "Vinland the Good," and "Whiteman's Land," overheard from the Norse Viking² by Irish friends and thralls; behind all lay the vision of the first Christian saint, who saw from an island-rock the sea of crystal; the sea of glass mingled with fire; the great river, with its leafy trees, and their fruits; the burning mountain cast into the sea; the angels holding the winds that they should not blow on the sea, and the vast monster rising from the waves. The Book of Lismore³ has the simplest and probably the earliest version, lacking many marvels; but we are less concerned with the actual facts than with the stories that so impressed the world.⁴ Columbus was in touch not only with the Portuguese, but with Bristol, the merchants of which sent seven expeditions to search for Brazil before the fifteenth century ended. He also (as we have often noted) had at least one Irish sailor with him on the great voyage of 1492; from any or all of these he may have heard the Brendan legends.

century copy (Hardy's "Descriptive Catalogue of Matters relating to the History of Great Britain and Ireland," vol. i, p. 159).

¹ Versified in France. The mild command of King Henri and Adlass his Queen won the poet to write "What to St. Brandan erst befell."

² See *infra*. I do not attempt to decide whether the Irish or Norse tales had the precedence; but the former probably had an earlier basis, and they helped each other.

³ *Anecdota Ozoniensis*, "Lives of the Saints from the Book of Lismore" (Whitley Stokes, 1890), p. 247.

⁴ Besides the other works here quoted, see Cardinal Moran's "Acta Sancti Breccani" (1872), and Rev. J. O'Hanlon's "Brendaniana" (1893), and "Lives of the Irish Saints," vol. v (May 16th), p. 407. The literature is large; some suggestive notes occur in a paper by Rev. T. Olden in *Journal Roy. Soc. Antt. Ireland*, vol. xxi, p. 675; and "Curious Myths of the Middle Ages" (Rev. Sabine Baring-Gould), p. 250, "The Terrestrial Paradise," and p. 524, "The Fortunate Isles."

It seems well established that Braenfinn¹ (as he was named from a "fair rain" which flooded Fenit, near Tralee, or from his "fair body") was a son of Findlug, and born at Alltraige Caille, near Fenit, Co. Kerry. He was foster-son of the noble and holy lady, Ita of Kilkeedy, and founded two great monasteries at Ardfert and Clonfert, where fine remains of later, but still ancient, cathedrals and churches exist. He is surnamed from Clonfert or from his patronymic "Mac Findloga" to distinguish him from the other famous saint of Birrha. He died May 16th, 576. He was famous for his voyages, the first a failure, the second successful. The legends tell of his going "alone to Sliabh Daidche, where he saw the mighty intolerable ocean on every side, and beheld the beautiful noble island with trains of angels." Brendan took a hide-boat and sailed finding many islands; some seem genuine, others purely fanciful. The Isle of Sheep; the bird-full island, with very little wood and no grass, but with a rivulet and sandy beach; the island with enclosures and "cashels"; the islands with cliffs and creeks, waterfalls, stores of fish, sea-cats on the reefs, and hermits on the plateaux—had equivalents off the shores of Kerry and Connacht. The walrus, with furze-like bristles, and huge boar's tusks; St. Ailbe's Isle; the flat island of the monks, covered with white and purple flowers, "marigolds," and large grape-like apples; the island of trees full of fruits and flowers, seem comparatively credible. So do the wonders of the north, the flakes of glassy ice, impeding the hide-boats; the whirlpool (of the Maelström or Corrievreckan?); the great icebergs, shining clear as crystal; the volcanoes covered with cinders and slag, like a forge, and throwing up flames, and the dark dwarfs (? Esquimaux) who carry off a monk; though ill-assorted with the apparently tropic isles. With these are absolute fancies, the whale "Iasconius," on whose scaly rind the saint spends a night² (which later myth-makers developed into two Easters or even into seven years'

¹ Brendan of Cluain (fearta) in "Calendar of Oengus" and "Mart. of Tallaght"; Brendan, Abbot of the Happy Isle, see "Chronicon Scotorum" and "Ann. Four Masters." The Normans call the saint *Broladre* and *Brendan l'ancien*, the Norse, *Alebrandus* and *Bishop Brene*, or the Bishop of Brene. One, however, suspects Alebrandus to be the Adelbrand who discovered Newland to the west of Iceland in 1255, and attracted the Brendan tales to himself in the usual fashion. It is also possible that some of the adventures of the noted traveller Bertrandon de Broegmore, a Burgundian, noted for his pilgrimages, may have been attracted to "Borondon." Von Linschoten, a Dutch writer, speaks, in 1589, of the Isle of San Borondon 100 leagues west from the Canaries; the Spaniards call it "San Morondon."

² This was a most favourite episode with later readers; the idea has been quaintly illustrated in early manuscripts. It was known to the Norse ("The True State of Island," 1592, by Arngrim, in Hakluyt's *Voyages*, 1598, p. 531). Arngrim says that the belief in "whales like islands" arose from the Bishop of Brene, called by the ancient Norwegians Brendanus. He gravely refutes the legend "how could the anchor hold on the slippery skin of a whale," "Oh, silly mariners that in digging cannot discern whale's flesh from earth!" He, however, tells of floating islands, p. 523. It is well illustrated by the maps of Olaus Magnus (1557) and Gustaldi (1564); see "Voyages of the Brothers Zeni" (F. W. Lucas, plate iiiii, and Periplus, plate xlv, and Facsimile Atlas, p. 59.

sojourn); the rock where Judas enjoys each year a brief respite¹ from the everlasting bonfire, and the island, surrounded by darkness, save once in seven years, as is still believed of Brasil, Kilstuitheen, and Manister Ladra. In the end Brendan reaches his goal—the island of fruit-trees, where the sun sets not, with no limits, and its great, still river, flowing from the north—the Land of Promise—“when the Most High brings all nations under subjection that land will be revealed.” It is hard to blame those who imagined that America and the Ohio were intended.²

Some of the northern features may have been derived from monks who visited Iceland and left there the books and crosses found by the Norsemen when they “discovered” that island about 868.³ Dicuil, the Irish geographer, knew of it, and wrote of “Thile” and the frozen ocean before 825.⁴ An Anglo-Saxon map of the tenth century shows “Tylem” to the north-west of Ireland, and “Island” north of “Norveci.”⁵ It is less easy to see whence the accurate ideas of the tropical isles were derived save from eastern pilgrims met at Jerusalem, or from pure imagination. [Since writing this, I see the suggestion that the description by St. Isidore, Bishop of Seville, relating to the Fortunate Isles, about 599–636, originated the “Insula Uvarum” of St. Brendan and the grapes of Vineland, but Jerusalem pilgrims may have exchanged notes, or Irish wanderers seen the isles of the Mediterranean. The passage in the works of Isidorus Hispalensis tells of the Fortunate Isles: “Fortunatae Insulae faelices et beatae fructuum ubertate . . . poma sylvarum parturiunt, fortuitis vitibus juga collium vestiuntur.”⁶ This certainly has much in common with the Sagas and *Imrama*. Copies of Isidore’s maps exist of the seventh and tenth centuries.] The Irish lay on “the fringe of things” of the Old World; it is unendurable to live in mist on the edge of a precipice, so they mentally and actually strove to penetrate the gloom beyond them, and, in the words of Seneca, “Thule was no longer earth’s bounds.” Then every suggestion was welcomed and expanded into detailed assertion, till the whole took shape round the nucleus of St. Brendan’s expedition to the “gardens ever blossoming across the western sea where none grows old.”

¹ One of the tenderest thoughts of some “humble and holy man of heart” that could not leave even Judas to suffer without mitigation. Matthew Arnold has versified it in modern times.

² I have seen some eighteen years since a Christmas supplement to a Clare newspaper showing the saint in modern pontificals preaching to several Indian chiefs of conventional costume and aspect.

³ For the Norse equivalents see Eireks Saga Vidförla of the fourteenth century. Eric, son of King Thrund, seeks the Deathlessland. Many of the Brendan episodes recur, such as the inaccessible tower or island and the isle of purple flowers. It may have a historic basis in the fact of King Eric in 1288 sending a certain Rolf to explore beyond Iceland.

⁴ Dicuil, “De Mensura Orbis Terrae.”

⁵ Encyclopaedia Britannica, xvii, p. 638.

⁶ *Opera*, ed. 1617. Originum, liber xiv, cap. vi.

3.—THE NORSE SAGAS AND IRELAND.¹

It may be worth examining a side-current of thought likely to have corroborated Irish belief, namely that derived from the Northmen. Dicuil, about A.D. 825, was told by monks who had been on Thule some thirty years before, much about that island, the frozen ocean, and numerous small islands. Some of the latter were "full of innumerable sheep and birds," recalling Brendan's isles, "but now, from the Norse pirates, they are empty of Irish monks."² The *Landnamabok* tells how Floke Vilgerdson came to Iceland about A.D. 868. He brought three trained ravens, to be let out at intervals, because (says the writer or editor, Ari Frode, A.D. 1148) the Norse had not yet any loadstone (*leidarsteinn*). Floke found that Christian "Papar" had left Irish books, bells, and croziers.³ Among Icelandic names referring to the Irish are *Irske leid*, *Irsku buter*, *Westmanna Eyjar*. Nearly two centuries later the sagas tell of a succession of sea-rovers reaching the mysterious lands beyond Greenland, "The Vinland Voyage over the Unknown Sea," and we must, even at risk of touching at too great length well-known ground, tell somewhat about the men who preceded Columbus and see how far any of them may have been in touch with Ireland. None of the sagas were written by or for critical persons; some, like the late *Flatoë Bök* (*circa* 1390), are full of mythic additions, perhaps none are free. Two centuries of tradition, even under the most favourable circumstances (such as prevailed in Iceland), may well have introduced marvels such as are found even in such historic and nearly contemporary Irish sagas as the "Wars of the Gaedhil" or the "Triumphs of Torlough." In other sagas of Iceland we have vampires and ghosts, embodying themselves in cattle or hiding in a heap of stockfish. So in the Vinland tales the grapes and self-sown corn may be taken (as Nansen thinks) from *Isodorus Hispalensis*, or from the Irish *Imrama*, or from monks trained by the Pentateuch and Psalms to think of the "Land of Promise" as full of corn and wine. The grapes (even leaving out the intoxicant ones of the *Flatoë Bok*) may be bilberries,

¹ For the following see generally:—"Antiquitates Americanae," 1837; The Discovery of America by the Northmen (N. L. Beamish), 1840; "Discovery of America" (A. J. Weise), 1884; "The Finding of Wineland the Good" (A. M. Reeves), 1890; "Discovery of America" (H. Harisse), 1892; "Discovery of the Norsemen in America" (Rev. J. Fischer, transl. B. H. Soulsby), 1902; and "In Northern Mists" (Dr. F. Nansen, transl. A. G. Chater), 1911. The first and fourth (especially the latter) collect all the Sagas and Annals. "The Heimskringla" (*civ*), "The Landnamabok," and "The Eyrbiggia Saga" are also accessible in translations.

² "De Mensura Orbis Terrarum." The monks "from our Scotia" had been on the island for 100 years before their expulsion.

³ "Landnamabök."

or cranberries, "Vinber."¹ Dr. Nansen is very probably right in thinking that Leif's real discoveries got embellished with touches from accounts of southern lands.² The tales of Eric the Red, his relations and friends, could hardly have failed to reach the Irish in forms such as we read in the tales of "The Finding of Vinland the Good." Bjarne,³ Eric's friend (c. 986), is said to have started from Iceland to Greenland, to have been lost in a fog, and reached an unknown land. His tale led Eric's son, Leif (who had been sent by that terrible royal missionary, King Olaf Tryggveson, from Wendland to Greenland "to proclaim the Faith"), to borrow a ship, and sail down the unknown coasts⁴ of Helluland (Labrador), Markland (?Newfoundland), and Vinland⁵ (?near Boston). His brothers, Thorwald and Thorstein, followed, in 1002 and 1005, then (though some doubt) Leif's brother-in-law, Karlsefne,⁶ with Thorwald, who was shot by the dark-skinned natives, and buried on Keelness (Kialarness).⁸ Leif found a wrecked crew on a skerry, and we hear of tempest-driven men⁹ reaching America. Thorkell (we are told) was driven by a gale from Vinland to Ireland, and died there in slavery, while Gudlaug (c. 1015-1030), trading with Dublin, was blown westward to the unknown land, so was Bjorn Ashbrandsson,¹⁰ who met the first of the Irish in America. In 1011 Helge and Finnboge, coming from Norway, met a certain Freydisa, and went to "Leif's booths in Vinland," while the year after the battle of Clontarf, Karlsefne brought his son Snorro, just born in Vinland, back to Iceland, where their descendants long flourished.

Ireland is again in contact with America in the saga,¹¹ which tells how

¹ N. Denys in 1650 found grapes as large as nutmegs, but rather acid, growing wild. Indian rice grows wild in Nova Scotia. Fischer, *loc. cit.*, p. 98.

² "In Northern Mists," vol. i, p. 384. Some have gone so far as to suppose that the Norse voyaged southward along the coast of Europe, naming their landing-places Helluland, Markland, and Vinland down to Spain! This presupposes a strange ignorance in the race that wasted from the end of the eighth century all the islands and coasts of western Europe. Professor Gelcich, "Materialien," p. 104, cited by Fischer, p. vi.

³ Reeves rejects the Bjarne story. Its hero is not named in the genealogies and topographies, or the historic Sagas—unlike Leif and his contemporaries. ("Finding of Wineland the Good.")

⁴ Krisni Saga. See "In Northern Mists," vol. i, p. 384.

⁵ See map of Sigurd Stephanus, an Icelander, on Plate XXI.

⁶ Vinland must not be confused with Finland and Wendland.

⁷ Nansen rejects the Karlsefne voyages. ("In Northern Mists." See also Geographical Journal, xxxviii, p. 557, and xxxix, p. 26.)

⁸ Kialarness, so called from the keel of a wreck on its shore when first discovered—a striking statement. ("Finding of Wineland," p. 43.)

⁹ We overrate the difficulty of such events. Bembo's "History of Venice," vii, p. 257, tells how a boatful of American Indians was found near England; Herrero ("Hist. Gen.," dec. i, lib. i, cap. 2), of two canoes of strangers drifted to the Azores; Wallace ("Islands of Orkney," 1700, p. 60), of a Greenlander in a canoe reaching Orkneys. See also Rev. Sabine Baring-Gould, "Curious Myths," p. 527.

¹⁰ "Eyrbyggja Saga."

¹¹ Landnamabok, 81 ("Settlement of Iceland," transl. Rev. T. Ellwood).

Ari, son of Mar, "drifted over ocean to Whiteman's Land, which some call Irlanda Mikla (the Great); it lies west away in the ocean nigh to Vinland, the Good, six days' (?weeks') sail from Ireland due west." Ari, on his return, told all to "Hrafn the Hlimrek trader," so called "because he spent a long time at Limerick in Ireland." Lastly, if the story and pedigree of Karlsefne be true, the latter was descended from a daughter of Kiarval, an Irish king. How far these stories, told in Limerick and Dublin, reached the Irish is hard to say; but it is hardly possible that the accounts of the voyages did not reach the country round the Danes' seaports. No trace of Vinland occurs in Irish literature,¹ but (if only through the stockfish trade)² it must have come again and again to the knowledge of the Irish, and strengthened their belief till Great Ireland and other wonderful lands in the heart of the Atlantic became known to Spain and Italy. The Arabian cosmographers of the twelfth century, and the map-makers, who almost invariably showed unknown islands on their charts, from 1300 onward, passed the story down to the explorers from 1492, Columbus and his successors.

Vinland, too, was never forgotten in the North. Adam of Bremen,³ about 1069, heard of the island of that name from Danes. The Icelandic Annals tell of Bishop Erik Upse of Greenland going "to seek Vinland" in 1121; how Adelbrand and Thorwald Helgisson found "Newland," west from Iceland, in 1285; how, three years later, King Erik sent Rolf to explore it, and, aided by Icelanders, he twice visited it (in 1289 and 1290); and lastly how seventeen men reached Markland in 1347.⁴ Latest of all may be the alleged voyage of Skolno to Labrador in 1476,⁵ on the eve of the voyage that once for all, in the fulness of time, opened America to the old World by the South, where the North had failed.

The stockfish trade linked Bristol and Iceland; and Bristol was close linked by trade to Dublin and Limerick; so probably, from just after the battle of Clontarf down to the very year of the voyage of Columbus, corroboration of the deep belief engendered by the tale of Brendan was never lacking to Ireland.

The features in common⁶ of the Norse sagas and Irish *inrama* are few—

¹ However, the same is true of many important events in English and Continental history, secular and religious.

² Hakluyt's "Voyages" (1599), vol. iii, p. 201. Nordenskiöld's "Periplus," p. 92. Weise *loc cit.*, p. 193.

³ "Descriptio insularum aquilonis." He adds, "it is not a fable." The next paragraph about the ice sea is not found in the oldest copies. (Fischer, *loc. cit.*, p. 3.)

⁴ *Annales Risemani* (c. 1319), Icelandic Annals, *Annales Vetustissimi*, Flatoë Annals.

⁵ "In Northern Mists," vol. ii, p. 70.

⁶ I wrote these lines (indeed this copy) before hearing of Dr. Nansen's conclusions. I fully accept his views as to Isidore being a source, but think the "vine and corn" may also have a biblical origin.

the vines in Vinland, the wooded and grassy shores, and the attack of the dark-skinned natives, the "wonder strands," the sea full of maggots which attack Bjarne's hide-boats, and the adventures with whales are the chief. The Norse accounts were probably written about 1200, and are all preserved in manuscripts over a century earlier than the landing of Columbus in the West Indies.

4.—ATLANTIS AND OTHER LOST LANDS.

Though it has not been demonstrated that Plato's descriptions of Atlantis were known to the Irish, the probability is considerable.¹ Seneca's works were actually in the Library of the great Hiberno-Italian school of Bobbio,² while St. Gall had another famous early library to which scholars (and perhaps monastic redactors of the Brendan Saga) would most likely have resorted. This is no place to go deeply into the question as to whether Plato actually heard³ a genuine legend of Egyptian priests from the time of Solon, and if so how an alleged historic event of B.C. 9600 could have been handed down even to the Egyptians of the early dynasties 5000 years later. The point which concerns us is the unmistakable likeness of the mythical Atlantis to the islands seen by Bran, Maelduin, and Brendan. As in "Bran," where the sea-god Mananann is father of Mongan by an Irish princess, so, in Atlantis, his equivalent, Poseidon, has ten sons by mortal mothers. Atlantis has a marvellous fort with rings of three fosses and two walls of bronze, tin, and aurichalchon or red copper; so, in the legends of Maelduin and Hui Corra, is the ring-fort with brazen rampart, palisade, and bridge over a wet fosse. Atlantis was walled all round, so are the Irish legendary isles. In both we hear of wonderful temples and altars, founts of hot and cold water, well-planted groves and a wonderful racecourse; the parallel is close indeed, whatever degree of connexion there may be between them. Atlantis is said to have lain outside the straits of Gibraltar, to have been as large as Asia (Minor) and Lybia combined, and, after overrunning all the Mediterranean shores to Tyrrhenia and Egypt, its armies were checked by Athens; eventually it sank in a day and a night during an earthquake, and was entirely submerged by the sea, leaving dangerous shoals.⁴ The resemblances between Lucian's "True History" and

¹ Professor Zimmer. The results are questioned by Alfred Nutt ("Voyage of Bran," i, p. 128).

² Judge Madden, "Early History of Classical Learning in Ireland," pp. 9, 10.

³ He may have invented it for purposes of discussion (if not of satire, like Swift). So late as 1755 a political tract was published in Ireland entitled "A Voyage to O Brazeel, a submarine island lying west off the coast of Ireland" (see "Ulster Miscellany.")

⁴ Plato, "Timaeus," vi, and "Critias," iii, viii-xv. For scientific support of story, see Dr. Robert Scharff's paper, Proc. R. I. Acad., xxiv (B), p. 268. Also "The Lost Atlantis."

the Irish tales are most striking. Islands high and woody, abounding in vines, apples, fruits, and gorgeous flowers, perfumes and melodious birds; a frozen sea, rivers of fire, wine, and milk; religious rites on a whale's back; an island with the yells of men in torment and sulphurous air, hound-headed men; and the Island of the Blessed where it is always spring and none grows old, occur in the Samosatran tales, as they do in the Irish; even the brazen fort has an equivalent in the brazen monument to Bacchus and Hercules, and the wonderful racecourse is not forgotten.

Doubtless Seneca¹ alludes to Atlantis in the *Medea*: "In later years a time shall come when ocean shall relax its chains and a vast continent be disclosed. A [new] Tiphys shall find new worlds, and Thule shall no longer be earth's bounds."

" Venient annis
Saecula seris, quibus oceanus
Vincula rerum laxet et ingens
Pateat tellus—Typhisque novos
Detegat orbis nec sit terris
Ultima Thule."

It is pleasant to recall that the "Tiphys" of this prophecy, Columbus, knew and was encouraged by the verse to fulfil it over fourteen centuries after.²

Lastly, Plutarch placed the Isle of Ogygia five days' sail westward from Britain, and told of a great continent beyond the ocean.

The Atlantis legend reached the Arabian geographers³ along with the Irish and Norse tales. The great cosmographer, Abdulleh Mohammed Edrisi, about 1150, knew of "Great Ireland,"⁴ besides the real Birlanda or Irlanda, Anglit or Angiltara, and Reslanda, Islanda or Iceland. He also marked the "Isle of Birds" and the "Isle of Sheep." Through them the names of the islands became known to the Spaniards and Portuguese of the later centuries. The Arabs were believed to have crossed the Atlantic; and the Observatory of Sagres, under the influence of Prince Henry the Navigator, collected

¹ *Medea*. Seneca elsewhere quotes a poem (circa A.D. 16) on the Northern Sea with its darkness, sluggish waves, savage whales, and sea-dogs. The monsters embody the danger and terror of the sea.

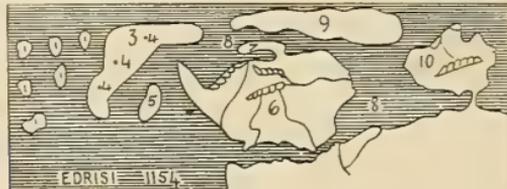
² Ferdinand Columbus, chapter vii, ed. Nienhoff's "Voyages," 1703, vol. ii, p. 566.

³ See "Life of Brandon," T. Wright, *Introd.*, p. v. Edrisi gives seven "empty" islands to west of Ireland—Gazirat Birlanda, Gazirat Angiltara, Gazirat Squosia (Scotta), and Gazirat Islanda. He also mentions Gals or Wales, and how Ptolemy tells of 27,000 islands in the ocean. Edrisi names the isle of female demons, of sheep, of birds, Gazirat Khusran (the Isle of Illusion) and "Shasland" (see "Northern Mists," vol. i, p. 200, chap. xiii).

⁴ The maps placed Great Ireland between the south of Ireland and Guinea. The Norse in 1570 fancied that Vinland extended nearly to Africa ("Finding of Wineland the Good," pp. 14-16).

all records of voyages,¹ with the result that Madeira was rediscovered (or discovered if the alleged Bristol settler be mythic), and the voyages commenced which at last doubled the Cape of Good Hope.

The nearest neighbours of the early Irish were not without similar beliefs. The Britons believed in the elusive Isle of Avalon, Avilion, or Ynys yr Afallon. Some have derived it from Avalloc, god of death; but from the apples of Eden



1. KHALIA. (Empty Isles). 6. GAZIRAT ANGILTÂRA.
 2. FIRST PART OF CLIMATE. 7. GAZIRAT SQUÔSIA.
 3. GHAZIRAT BIRLÂNDÂ. 8. AL-BAHRAL MUSLIMASH-SHAMÂL.
 4. KHARÂB. (Desert). 9. GAZIRAT ISLÂNDÂ.
 5. GALS or VALS (Wales). 10. GAZIRAT DÂNÂMARKHA.

and the Hesperides to those of the Edda legend and the Isles in the Irish Tales the apple has been symbolic, and the name is probably merely the "Apple Island."² It was also the Isle of Glass, Isle de Voirre, and so confused with Glastonbury, "urbs vitrae"³; one recalls the currach of glass in the story of Connla, the bridge of glass in "Maelduin," and the great crystal tower (or iceberg) with fringes of crystal.

The Welsh, too, had their great lost land sunk by a drunken, careless prince. There was also the lost land of Lyonesse, or Lennoys, of which the Scilly Isles are said to be the last remnants. Florence of Worcester (died 1118) tells of its flourishing condition and how it sank, like Atlantis, beneath the waves. It, like Avalon, was never placed on the early maps, and there is no evidence that it affected either the Irish or Iberian beliefs, though it secured a place in English literature through Tennyson and Swinburne. The voyage of Madoc, son of Owen Gwynned, about 1170, though told of a historic prince of North Wales, has not hitherto been shown to be earlier than the version of Humphrey Lloyd (about 1560), published twenty-four years later in Powell's "Historie of Cambria,"⁴ and did not affect other countries. "If you

¹ Abbé Raynal, "History of Settlement, &c., of Europeans": Major's "Life of Prince Henry the Navigator."

² Rendered "Insula Pomorum" in Vita Merlini.

³ Vita St. Gildae, twelfth century.

⁴ Hakluyt's "Voyages," vol. iii. pub. 1600, p. 1, gives the tale of Madoc. Meredith ap Rhys, a bard who died in 1477, told part of Madoc's Voyage, which makes the tale pre-Columbian.

cut a sod on St. David's Head and stood upon it you could see the Islands of the Blessed."¹ Scotland, too, had her "Flaith Inis," which was surrounded by clouds and tempests, with an island, "Caerecennfinn," between Scotland and Ireland, where the Irish of Ulster placed their "Tir Hudi." The Bretons had their submerged city of Is; the French and Portuguese told of the mythic Isles of Maida, Asmada, or Asmanda and Isle Verte, or Ilha Verde, suggesting the *Inis Glas* of other legends. The Spaniards had their tale of Antilia² and the Isle of the Seven Cities of the Gothic kings and bishops who fled from the Moors to them in 714,³ while Ireland, England, France, Portugal, and Spain agreed in believing that outside human trade, rarely within the limits of sight, lay Brasil and St. Brendan's Isle, the Fortunate Islands, the Isle of Birds, and the Isle of Sheep. There was an imaginary island, Mam, and further north, Bund, Frishlant, or Frisland, Estland, Daithuli, Drogeo, and Estotiland.⁴ Nicholas Zeno (men afterwards told) had, about 1380, been wrecked on Frisland and saved by its chief, Zichni; and he and his brother had visited Estotiland (Labrador?), Estland, and Drogeo. It is far from improbable that the published copy of the Zeni map, "rotten with age," and the description were the results of misunderstanding notes about Scotland (Escotiland), Greenland, and Iceland (Eslanda). But the Icelanders in 1570 regarded Frisland as a large island separate from their own.⁵ A possible confusion among storms, mists, and icebergs led the "buss" of Emanuel Frobisher's fleet in 1578 to report an unknown island thereafter shown as "Buss" till the eighteenth century. Two maps, one by Ruysch, in 1508, mark an island to the west of Iceland with the words "Insula hec in Anno Dñi 1456 fuit totaliter cōbusta."⁶ It is curious that the Sagas tell of

¹ "Chambers's Journal," No. 76, vol. ii, June, 1885, p. 371.

² Derived from Aristotle's note of the discovery of the Atlantic Island by Carthage. Coins of the great city have been found in Corvo.

³ Under Don Rodrigo, the last Gothic King of Spain, and King Sebastian after the battle of Alcazar. Nordenskiöld ("Facsimile Atlas") gives Ruysch, 1508 (No. xxxii), with a long note on Antilia, King Roderigo, and the Bishops. Legend said that a Portuguese crew had reached Antilia and attended the Mass; the sand of the island was one-third golden. It was 2,500 miles from Cipango.

⁴ For all these fanciful islands I rely much on A. E. Nordenskiöld's magnificent series of reproductions of early maps in his "Facsimile Atlas" and "Periplus," and Jomard's "Monuments."

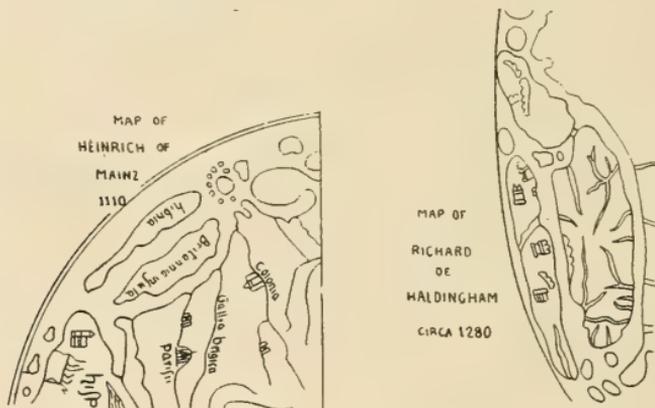
⁵ "Frisland" is shown not far from the north-west coast of Ireland in the map of Domingo Olivez, 1568 (Nordenskiöld's "Periplus," map xxix). Columbus identified it with Ptolemy's Thule, which Marinus places in 63° north latitude if (but the matter seems taken from a later writer than his son) the passage in the account of Ferdinand Columbus be genuine.

⁶ A. E. Nordenskiöld's "Facsimile Atlas," No. xxxii, and his "Periplus" (Transl. A. Bather, Stockholm, 1897), p. 92. The island is shown with the same note on maps of Cantino, 1502, and Ruysch, 1508; as also in the Sigurd maps showing Vinland, &c., 1570. See also in the Olaus Magnus map, 1557. Also Nansen's "In Northern Mists," vol. ii, pp. 122, 123, "Mons excelsus VVitzare," a resort of pirates; and Gourmont's map of 1584.

an island, "Hvitserk," between Iceland and Greenland, and in sight of both.¹ As for Buss, the latest of the host of imaginary lands, Thomas Wiars says that it lay E.S.E. and fifty leagues from the S.E. point of Frisland, in latitude 57°. It had two harbours four and seven leagues north from the southern point and much ice round it; they left it on September 12th, and reached Galway on the 25th. Certainly, if circumstantial assertion can prove the reality of non-existent isles, Frisland and Buss deserved their place on the maps of nearly three centuries.²

5.—THE MYTHICAL ISLANDS IN EARLY MAPS.

Interest in the islands of the Atlantic hardly existed before the twelfth century among the map-makers.³ The "Life of St. Brendan" had been spreading over the Continent for over a century before it began to affect the



Maps without "Brasil" Island.

maps, as Edrisi had been affected nearly two centuries earlier. Apart from his works, there is no certain trace in the other maps of the imaginary isles (so far as I know) till the portolanos of Dulcert,⁴ in 1325 to 1339.⁵ These

¹ Hakluyt's "Voyages" (1599 ed.), vol. iii, p. 44.

² Their features are elaborately named, which has never occurred in the representations of St. Brendan's Isle, Brasil, Daithuli, or Asmaidas.

³ In the very curious map of 1119, in the Liber Guidonis (Burgundian Library, Brussels), even Britain, Ireland, and Thule are omitted.

⁴ The Dulcerts, or Dalaortos, were Genoese; see Konrad Kretschmer, "Die Entdeckung Amerikas," &c. (Berlin, 1892); also, Nansen, "In Northern Mists," vol. ii, p. 226. The maps are dated 1325, 1329, and 1339. A map (closely similar, but drawn in Modena), of about 1350, gives "Illa de brezill." For Kretschmer's note on Brazill, see *loc. cit.*, p. 214. The mythic island is pronounced with the accent on the first syllable, unlike its continental equivalent.

⁵ See Plate XX. The early Anglo-Saxon map gives an unnamed large island to S.W. of Ireland.

charts, founded on experience and, as their name implied, showing the route from port to port, avoided the conventional, and strove to draw information from every source. Nothing can mark the line between the scholar's map of the world and the merchant's chart better than the contrast between the great map of Richard of Haldingham, about 1280, and Angelino Dulcert's work. The latter gives in the 1325 map "Insula de montoniis sive de brazill," and in the Catalan portolano, 1339 (Periplus viii),¹ "Insula de Berzil," to the west of the Shannon's mouth, and the "Insil diculy,"² to the north-west of Ireland (Per. viii). The "Charta navigationis" called "Portolano Laurenziano Gaddiano seu Atlante Mediceo" follows the last in giving "Insul de Berzi" and "Insil dach" in similar positions (Per. x). The island corresponding to Brazil is also found in the Venetian map of 1367 and the far superior Catalan map³ of 1373 (Per. xi), which marks a large circular island "Insula Berzil," in the same place, west from the Shannon,⁴ as also St. Brendan's Isle and Mam (the later Maida or Asmanda) to the south of Brazil. It will be remembered that the compass was apparently known in the thirteenth century to Roger Bacon, and later to Dante's tutor, Brunetto Latini; but the latter says that sailors would not have it on board, regarding it as "an infernal spirit."⁵ It only became popular about 1360, so that its use, the making of the early maps, and the "appearance" of Brasil, all seem to be contemporaneous. The Solerio map of 1385 is even more interesting, for it marks two Brasils, the "Insula de berzil" to the west of Ireland and "Brazir" in a group of islands off the coast of Spain, the latter being evidently the mountain of Brazil in Terceiro, though the Azores are quite misplaced here (Periplus xvii).

FIFTEENTH CENTURY.—The I. de Brazi is shown among the Azores, and a nameless isle, the mythic "Brazil," to the west of Ireland in the Venetian map of Andrea Bianco in 1436 (Per. xx).⁶ Another chart as early, or earlier,

¹ For simplicity of reference, I only refer to Nordenskiöld's Facsimile Atlas (Fac.) and Periplus (Per.), even when the maps occurring in them have been reproduced in other accessible works.

² An island, "Artetum," occupies its place on Haldingham's map, 1280. Captain Thomas (Proc. Soc. Antiqu., Scotland, 1875, vol. x, p. 706) regards Daouli as Sanchule or St. Kilda. I venture to suggest (from it being always shown so close to Ireland, and from St. Kilda being out of the old trading tracks) that it is "Trahuli," or Inistrahull, off Donegal, if not Rockall (Rokol or Rockell in maps from 1697 to 1715).

³ Not the earlier one given on Plate XX, which also shows the Island.

⁴ Brasil is usually shown to the west of North Kerry (from Tralee to the Shannon); much has been made of its variable position; but this mobility it shares with real islands, like Japan, Ceylon, and Madagascar, on the maps of the same period; indeed, Ireland itself is often misplaced.

⁵ Much is collected by Nordenskiöld; Periplus, p. 47; Weise, "Discovery of America," pp. 61, 62; and others, on this important question.

⁶ He also gives an unknown island, "Scorafixa" (perhaps Stockfixa or Stockfish), supposed by some to be Newfoundland. The word "Baccalaos," used in later days, is said to have the same meaning.

at Upsala (Per. xix), shows the large round "Y. de Berzil," opposite the Blaskets, and a nameless island (Asmanda) to the south of it. Bianco also marks "Antilia" and the "Y. de la Man" (Per. xx). The islands reappear, I believe, without names, in the planisphere of Johannes Leardus, 1448 (along with nameless isles in the position of Brazil and Asmaidas); while Gratius Benincasa marks Daithuli, Isolo de Bracill, and "Isle dita Mate" as lying round Ireland (Per. xxxiii and p. 61) in 1467. One of the finest maps before Columbus, that of Fra. Mauro (there is a full-sized facsimile in the Library of Trinity College, Dublin), in 1459,¹ identified Brasil with the Fortunate Islands, "I. del Berzel, anesta isola de hibernia, son dite Fortunata," marking it due west from the Dingle Peninsula. Mauro was known as the "Cosmographus incomparabilis"; he was a Venetian friar, and a medal was struck in his honour. In 1482-6 the "Ptolemaeus Ulmae" (Fac. xxix) maps² give the Fortunate Isles, and what is possibly the first printed allusion to St. Brendan, "Brandianus magna abstinentiae vir de Scotia"; the map is also interesting for marking *Atlanticum*, an island off the African coast. To this century belongs a Catalan compass chart, given by Nordenskiöld (Plate V); it marks Ylle de brazill a double island and (twice as far from Irlanda as it) another Brazill to the west of it, Illa Verde, and still further to the north, "Fixland," apparently Iceland.³ In 1490 the "Ptolemaeus," published at Rome (Fac. iii), marks Deorum Insule off North Portugal. In the very year when Columbus first reached the islands of America, Martin Behaim (or Bohemus) of Nürnberg made his famous globe. It shows Brasil and St. Brendan's Isle, the latter half-way between Ireland and Japan (Cipango), in 1492. In 1481 he had come to Portugal and worked under the patronage of John II. He returned home in ten years, but again visited Lisbon, where he died in 1506.

If interest in geography was getting so keen and bearing fruit in the Portuguese expeditions down the coast of Africa, and the Spanish ones to the West Indies, it might be expected that it grew keener than ever after the great turning-point in history of that year, when "Columbus gave a New World to Castile and Leon." Two names passed from mythic and half-mythic islands; "Brazil" and "Antilia" attached themselves to actual countries; but though Antilia passed from the map of the Old World, Brazil still held its own off the Irish coast, though its name had been transferred to the land of the giant river and forests, greater and more beautiful than bard or monk

¹ Given on Plate XX.

² By Leonard Hol; it was offered by Nicholas Germain to Pope Paul II.

³ Plate XX.

had fancied in wildest romance. I believe "Priscilia" first attaches to the modern Brazil in Reisch's *Margarita Philosophiae* in 1515.

England, having so narrowly lost her chance of being patron to Columbus, was now taking her place among the world-explorers. In August, 1497, the minister of the Duke of Milan wrote to his master from England to say that Cabot had found two large and fertile islands, San Juan and Prima Vista, and had found the "Seven Cities," 400 leagues from England. Eleven months later the Spanish Ambassador in London wrote to Ferdinand and Isabella, telling of Cabot's discoveries and second expedition, and telling how "the men of Bristol have, for the last seven years" (since 1492), "sent every year, two, three, or four caravels to search for the Isle of Brazil and the Seven Cities."¹ Next year, 1499, the real Brazil was discovered. Nevertheless, Conte Freducci's Map in 1497 (Per. xxii) marked the large circular indented Brasil, and in 1499 to 1500, Juan de la Cosa on his fine coloured map marked it and Daithuli; he also distinguished Eshlanda (Iceland) from Illatille (Thule) in the northern seas (Per. xxii and xliii).

SIXTEENTH CENTURY.—The increasing traffic with America might have been supposed to have swept all the mythic isles into the "Never-Never Land," whence they had come; but this was not the case; and we must see how for some three centuries the islands held their own, while, perhaps, the earliest and latest of the group, Brasil and Buss, were found on maps till past the middle of the nineteenth century. I need only give the principal maps onward to the eighteenth century.

In 1508 the Ruysch "Ptolemaeus" (Fac. xxxii), published at Rome, shows Antilia half-way between the Azores and Terra Nova (South America), also an island (probably Huitserk), about where Frisland is shown on later maps, with the note, "Insula hec in Año Dni. 1456 fuit totaliter cōbusta." It is interesting to find it and two islands near Terceira sinking into the sea by volcanic action in such a late period. Subsequent research may also reveal similar causes for belief in lost islands; but this is a question for science alone. Glareanus (Per. p. 173), in 1510, shows a large island (evidently Asmaida) to the south-west of Ireland. The Argentine "Ptolemaeus" map in 1513 (Fac. xxxv) marks Daithuli to the north-west of Ireland, Obrassell to the west, and Salnaga to the north of Ireland²; Almeidas further away to the south-west. In 1524 the Argentorati "Ptolemaeus" (Per. p. 177) shows Brazil and Asmaidas in their usual chart position, but it omits Ireland.

¹ Calendar of Spanish State Papers, vol. i, p. 177; and Calendar of Italian Papers (1864), vol. ii, p. 262.

² Plate XX gives one of the 1,513 maps with Brazil and Dathuli. Most of the place-names are omitted in this copy.

Diego Ribero (Per. xlviiii), in 1529, again shows Brasil opposite to the Brasscher (Blaskets) off Kerry. Gerard Mercator, in 1538, shows the "Insula Septem Civitatum," and, between the appearance of his map and 1542, Alonzo de Santa Cruz (in a Map of the World "in gussets," ready to be used on a globe), gives (Plate II) Yslanda, Debrasil, and Asmaidas. An alleged Cabot map, dated 1544, marks San brandon, noting that it was discovered in 1494 (xciiii, recte .xcvii, 1497), off Cape Breton. A beautiful coloured map of Georgio Calapoda, in 1552 (Per. xxvi), shows Y. de brasill among the Anglie insulae as a large, red indented circle, and Y. de Mam (Asmaidas) as a crescent. These forms occur in the Benincasas map, 1467, and perhaps prove a connexion; in the same way the conventional forms of Ireland fall into three types. Brazil appears in the Map of the World in a pretty little illuminated Atlas of Baptist Agnesi, a Genoan, in 1544, but not in his valuable map of Ireland.² In 1554 both Bresil insul and Las maydas are given in their usual position (Per., p. 147).

In 1558 the very remarkable, though mythical, Zeni map was published in Venice. It probably (as we noted) arose from obscure descriptions and a faded sketch-map; but hence Milton's "cold Estotiland" (possibly Escotiland, Scotland), Frisland, Estland (probably derived from Iceland and part of Greenland), and Drogeo seem to originate.³ Gastaldi's map in 1562, and Lafreri's in 1566 (Fac., p. 129), may be noted. The latter shows Brasil and Maida to the east of Labrador, and far nearer to it than to Ireland the Isle of Demons also appears on the American coast. In 1568 Domingo Olives (Per. xxix) shows Illa de brasill a double island to the south-west, and Frixland, a large isle to the north-west of Ireland. Mercator, in 1569 (1587 and 1595), gives Frisland to the south-west of Iceland, and in 1569 Brasil and Maida (Fac. xlvii and p. 95).⁴ Other very interesting maps were made in 1570 by an Icelander, Sigurdus Stephani.⁵ They give Norway; the mythic giant-land, Iötunheimar; Riseland; Gronlandia, a deep bay, and then Helleland, Marchland, Skraelingland, and the Promontorium Vinlandia, opposite to Ireland. The latter and England lie almost in mid-ocean, and above them are the

¹ A fine facsimile, by E. W. Dahlgren, Stockholm, is dedicated to Baron Erik Nordenskiöld, in 1892.

² Ms. T.C.D., K. 3. 15; on the front page is "Leonardi Marinorii est liber iste de Ancona, 1544." The map is not included in Nordenskiöld's list of twelve maps by Agnesi, 1529-1562.

³ "Voyages of the Brothers Zeni." Fred. W. Lucas, 1898.

Hakluyt includes the Zeno story in his *Voyages*, vol. ii, p. 121 (ed. 1599). Had we untouched originals, a more certain conclusion could be arrived at. No doubt "voyages" and maps were very jealously guarded in archives; and publicity was the thing least desired by the mariners of the fourteenth and fifteenth centuries. "Stillandia" (Iceland) on the 1552 map reads like "Frislandia."

⁴ See Plate XXII.

⁵ Engraved in "Gronlandia Antiqua" by Thomod Torfaeus, 1715, Copenhagen, and reproduced in Weise. "Discovery of America," 1884, p. 22. An outline is given on Plate XXII.

Orcades, Hetland (Hialtlant, Shetland), Feröe, "Frisland," and "Island." The last two are never confused in these maps.¹ I cannot believe that so mythical a sketch-map can give any real clue to the position of Vinland, discovered over five and a half centuries earlier. Abraham Ortelius² in his "Theatrum Orbis Terrarum," in the same year, gives Brasil, west from Connacht, and St. Brandon, west from the last, also Friesland and Island. Mercator, in 1587 (Fac. xlvi), gives Maida, S. Brandani, and Bresil to the west of Kerry, while Petrus Martyr, at Paris (Fac. p. 131), has Frisland and St. Brandon's Isle, the latter in mid-ocean. Cornelius Wyffiet, "Descriptionis Ptolemaicae Augmentum," Louvain, 1597 (Fac. li), while giving a small map of Estotiland (Labrador) and Greenland, omits all the mythic isles. The "invention" of such had not ceased, for, in 1598 and 1599, Hakluyt gives Iceland, with Frisland, half way between it and Estotiland. Not content with this, he collects a circumstantial report of the finding of Buss, the latest mythic island of the North Atlantic, and which (with Brasil, the earliest to find place on the maps) held its own down to very recent times.

SEVENTEENTH CENTURY.—The most interesting section of the map-history of Brasil and its sister isles ends with the sixteenth century. A few instances may be given to show the continuity of the belief. In 1608 Mathias Quadus of Cologne published a Map of the World (Fac. xlix), a fine work, but showing St. Brandon's Isle as large as Ulster, half-way between Hibernia and Baccalaos (in North America), also Drogio and Frischlant.³ About 1655 a Dutch map shows a large island at Rockall, perhaps Buss, and Brasil in about the position of the Porcupine Bank. Jacob Aertz Colom, 1668, only gives Frisland, while the 1661 map of John Jansson of Amsterdam gives only the west side of Buss and an islet near it. There is also a large map of Buss, without date, by John Seller, Hydrographer to the King; it is easily recognized by the figures of two walruses to the north-east of the island. In 1680 the English Atlas of Moses Pitt gives Brasil and Maida; the former, to the south-west of Ireland and due west from the Land's End, is once more large, while Freesland is nearly as large as England, and lies between it and Greenland. Buss and its islet also appear.

¹ For them see also Nieuhoff's "Voyages" (1703), vol. ii, p. 445; and map of 1644, by La Pagere, shows Frisland far to south-west of Iceland, off Greenland. Also Hakluyt's "Voyages," 1599, vol. ii, p. 33; Voyage of Martin Frobisher, 1577. Frisland was surrounded by ice, and had high mountains and no habitations. In 1578 it was "very hie and craggy, and almost covered with snow, great yles of ice being on the sea like mountains, and very foggy," p. 40. It was probably part of Greenland, not Iceland, as some suppose.

² Ortelus, born in Antwerp, 1527, where he died 1598. He was Geographus Regius to Philip II of Spain.

³ The latter maps are chiefly from the series in Trinity College Library, Dublin, especially in the Fagel Library.

EIGHTEENTH CENTURY.—So far as I know, Estotiland, St. Brandon's Isle, and Antilia do not appear in any map after 1700; Brazill, Buss, and Maida survived. Guillaume Delisme, in his Map of the British Isles in 1702 (published in his Atlas, 1714 and 1720), and his Map of Europe, 1724, gives the Isle de Bus, Frislande, and the Roche (Rocher) de Bresil. The latter is on the first meridian from Ferro. It is thus noted in 1702:—"In this parallel 51° latitude and 1° longitude several sea-charts represent an isle to which they give the name of Brasil at 46½° of latitude and 356°, or about, of longitude; another which they call Asmanda. I do not know on what foundation these two isles have been placed; but I have difficulty in persuading myself that there are isles so short a distance from our coasts which have remained unknown to us up to this." The note is repeated in "*Le Nouveau Théâtre du Monde*" by Guendeville in 1713. Two years later Louis Renard¹ shows Brazil (west from Kerry) and Buss. Maida appears in the Maritime Atlas of 1749, and in Faden's Atlas of 1776, where Mayda Island is laid down as in longitude 20° west and Green Island or Ilha Verde in longitude 24°, while O Brazil is in Jeffrey's American Atlas in the same year in longitude 17° 35' west, and lying west from Cape Clear. St. Brendan's Isle is also given. Buss was only eliminated in 1850. Brazil was finally removed from the charts so late as 1865. John Purdy's general chart of the Atlantic (corrected to 1830) says that the Brazil Rock was high and was fixed at 51° 10' north, and 15° 30' west. In a chart of currents in A. Findlay's edition of "*Purdy*," and in the "*Memoir, Description, and Explanation of the North Atlantic Ocean*" (p. 487) we read "Brazil Rock, lat. 51° 10', long. 16°. M. Bellin in 1742 states that this rock is marked in lat. 51° 10', long. 19° 30' Paris." Its existence has been doubted by Messrs. Verdun and Border. "It was, however, seen in the year 1791 by the company and master of an English merchant ship, the commander of which favoured the editor of the present work with a description of it, stating that it is really a high rock, or islet, apparently bold-to, and to which he passed so near that he could have cast a biscuit on shore." "We suspect that if it exists it is more to the westward." Findlay's doubts increased, and he eliminated Brazil finally in 1865, after it had held its place for over 550 years on the maps. A rock of little literary interest named Aitkens Rock to the north-west of Ireland was found to be a submarine bank; the Porcupine Bank, and the bottom round Rockall give evidence of submergence by abundant shallow-water shells. Local histories assert that the Channel Isles were connected with France up to 709, and that when St. Lo visited Jersey on inspection in 565 he could cross

¹ Atlas de la Navigation et du Commerce.

into it by a plank. It is supposed by some that the shore at Cotentin sank, so that the sea easily ate away the low land for 12 to 15 miles between it and the islands as at present. Inis Fiteae in Corcovaskin, now Iniscaeragh or Mutton Island, was split into three (Inismatal, Iniscaerach, and Seal Rock) between 799 and 802. The Godwin Sands, the coasts of Norfolk and Suffolk, where villages and eleven churches have been swallowed by the sea in a few centuries, and in our own time the rapid cutting away of the land at Ardmore, Co. Waterford, show how without any vast cataclysm, save in the case of Inis Fiteae, islands may become shoals. The only question is whether the land sank in sufficiently late times to have affected tradition. Two cases between Terceira and St. Michael were upheaved in modern times. A volcano rose over the sea 15 leagues to the north-west of St. Michael in 1719, and sank in 1723. It was said to have previously appeared in 1638. In 1720 another island rose about a mile from the shore of St. Michael; and in the same year a third was upheaved, twenty-eight leagues away toward Terceira. It was two leagues across, and when it sank was long traceable as a shoal. The question therefore should be scientifically investigated very fully before the possible upheaval and submergence of islands, especially near such a volcanic region as Iceland, can be denied, still more so before the disappearance of Kilstuithin or Manister Ladra can be relegated to myth. To sum up, the mythic islands (so far as I am aware, for the finding of other early maps may move back the dates) appear from at least the following years. The "Fortunatarum Insulae" appear on the eighth-century map of Beatus (Periplus, p. 11); 1325, Brasile and Daithuli; 1373, St. Brendan's Isle, and Mam; Mam (as I believe), Mate, 1448, or Manda (Asmaida), the latter is named first in 1513. The Fortunate Isles are identified with Brazil, 1459. Antilla appears *ante* 1420; the Seven Cities, 1450; a nameless island corresponding to Frisland, 1508. Almeidas is first named in 1513; Frisland before 1500; Estotiland, Drogeo, and Estland in 1558 on the Zeni map, alleged to be copied from one of 1390; and Buss, in 1599.

6.—COLUMBUS AND THE MYTHIC ISLANDS.

This is no place for any elaborate study of the most interesting question relating to the mythic islands, namely, how far the belief in them affected the discovery of Columbus. A few notes must suffice. It will be remembered that Christopher Columbus based his great enterprise on three errors—the extension of Asia so far eastward as to reach within a comparatively short distance from the west of Europe; the inaccurately small circumference of the world; and the existence of large islands in mid-ocean. The maps of two centuries and the traditions known to him bore out the last item. The

Spaniards believed so firmly in the Isle of the Seven Cities that they actually inserted a clause in the Treaty of Evora with Portugal, reserving "the islands which had not been found," and the people of the Canaries also petitioned to be allowed to annex it. Columbus,¹ as his son Ferdinand records,² knew of Seneca's future continent and of Aristotle's "Antilia." This almost certainly implies knowledge of the Atlantis legend. He gathered all he could learn of those and of St. Brendan's Isle and the Seven Cities. He had heard of Antonio Leone (or Leone) reaching an island 100 leagues west from Madeira, of two floating islands, more to the south-west, mentioned by Juvenius Fortunatus, and of a Madeiran asking for a caravel in which to seek for Antilia. Peter Velasques, a pilot, told Columbus at La Rabida how in the time of Prince Henry, his Master (born 1394, died 1460), James de Fine, going from Fayal to Cape Clear, in Ireland,³ about 1450, got under shelter of an unknown isle to the west of Ireland. Peter Velasques, of Galicia, confirmed this of his own knowledge, and Columbus had a letter of Vincent Dea, a Portuguese, telling how he had seen an island beyond Madeira. The great explorer went northward, heard what the Bristol merchants (indistinguishable seekers for Brasil) had to tell, and in February, 1477, sailed 100 leagues beyond Thule (Iceland). There, if the passage be not an interpolation, he may well have seen manuscripts⁴ such as exist, dated fifty to seventy years before his visit, telling, in matter-of-fact words, of Greenland, Helluland,⁵ Markland, and Vinland (the last "stretching towards Africa"), with wide channels between, and manuals are often more convincing than folios. He was in touch with Galway, the centre of Irish lore of Hy Brasil, for he included among his sailors in 1492 William Irez, of Galway, in Ireland.⁶ He cites religious legends for accounts of the wonderful birds and plants of the ocean islands. He fully expected to meet such islands on his way to Cipango, Cathay, and the Indies: what he did not expect was to be walled off from

¹ For what follows see the Diary of Columbus, 9th Aug., 1492 (I use Nieuhoff's edition of his "Voyages" ed. 1759, vol. iii. chap. ix.; Notes of Ferdinand Columbus in Pinkerton, "Voyages" (ed. 1819), vol. ii, p. 77; Memorials of Columbus (Trenfel & Wurtz, 1823, p. xx, Introd.); Hakluyt's "Voyages"; Weise's "Discovery of America"; and many other works.

² If the work be not a forgery, it seems at least to show interpolation. HARRISSE shows that it dates after 1497: Ferdinand, ed. 1868. The part relating to Thule and Frislanda may be taken from La Casas, or from some source used by him. See also Lucas (Voyages of the Brothers Zeni, 1898, p. 24). No Spanish original of Ferdinand's work is known, only an Italian "translation" at Venice, published 1571.

³ See the name in Ireland's map, 1330; Clau de Clara in the Catalan Atlas, 1375; Clara in the Upsal map, 1450, and Agnesi, 1544.

⁴ Some of the most interesting little works, from 1400 to after 1450, are published by Reeves in "The Finding of Wineland the Good," pp. 13-16.

⁵ The Frissbók (Codex, Frisianus, c. 1420-30, col. 136, p. 34) says "there is an open sea flowing between Vinland and the land of the Frisians," *Woods*, p. 14.

⁶ "Guliermo Ires natural de Galuy en Irlanda."

Asia by a vast continent. The belief in the islands must have been of the first importance to encourage him and his men on their daring voyage when they burst into the silent sea.

7.—THE MYTHIC ISLANDS OF IRELAND.

Turning from the wider aspects and interest of the subject, it remains for us to record what is believed in Ireland about the shadowy isles of bliss. Brasil we have found constantly in the belief of all south-western Europe the other islands belong to Irish lore alone. So unhesitatingly did the Irish give them a local habitation that they can be placed on the maps as definitely as any real islands.¹ When we examine the sea-bed, we see that it is not impossible (save Brasil and the land between Teelin and the Stags of Broadhaven) that islands may have existed within traditional memory at all the alleged sites. Going northward up the coast the mythic isles are—Cantillon's Rocks, off Ballyheige; Kilstapheen, near Loop Head; Kilstapheen, or Kilstuithin, in Liscannor Bay; the island off Skerd Rocks, in Galway Bay; the actual Inish Bofin; Imaire Buidhe bank; Monaster Ladra (or Letteragh), off Annagh Point, in the Mullet, Co. Mayo; the Sunken Land, between Counties Mayo and Donegal; and the doubtful Tir Hud, to the north of the latter. Brasil is of a different class, and must be reserved for separate study.

BALLYHEIGE, CO. KERRY.—One of the most beautiful views (where all are beautiful) on the Kerry coast is that over the site of the alleged island to the vast rugged peaks of Corcaguiny, culminating in the great peak of Brandon, that recalls the legendary voyage of its saintly hermit into the isles of the outer sea. Outside the golden rim of sandhills and the silver crescents of surf (the "sea-horses" of Bran's dream before his bold voyage) lie certain dangerous reefs just below the surface. In the adjoining parish the ancient family of Cantillon dwelt from the reign of Henry III,² and popular belief connected them (or, in a variant, the MacElligots,³ with the rocks. The version of Crofton Croker only varies in embroidery from what I have heard in south-west Clare and in Kerry. It runs thus:—An early Cantillon won and married a sea-maiden (the princess, Durlfulla, "Leaping Water," says Croker); such love has always an ill-starred fate. She died young, and was buried in an island, on which was a little church, for, like Undine, her mortal love had to be paid for at a great price. Her royal father ordered his subject waves to cut the roots of the island, and whelm it "beneath the grey and

¹ See Plate XXII.

² I have gone at some length into their history and that of Ballyheige in a paper on the promontory forts of North Kerry; *Journal, Roy. Soc. Antt., Ir.*, vol. xl, pp. 119-123.

³ Dr. C. Smith's "History of Kerry," p. 210 (230 in later edition).

endless deep," and when this was done he enjoined on the mer-folk to bear from the shore the remains of her descendants for burial. Thenceforth the coffins of the Cantillons were borne to the limits at low water, the human mourners departed, and left the obsequies to the mermen. The task was to end when human eye saw the sea-folk and human ear heard their dirge. At last, late in the eighteenth century, a too curious Clare man hid behind a rock, and saw and heard all. The "merrows" crowded round him, rejoicing that their duty to mortal dust was ended, and bore off the coffin for the last time. No other Cantillon was removed, and landward burial-places had to be adopted.¹ The "Church Bank" is $1\frac{1}{2}$ fathoms under low water.

KILSTAPHEEN, LOOP HEAD, CO. CLARE.—The Rev. John Graham, of Kilrush, in 1816, told of an ancient city, south from Loop Head, overwhelmed by an irruption of the sea long ago. The towers and splendid edifices were sometimes seen beneath the waves by those sailing over them. It was peopled by the enchanted inhabitants, who raised destructive storms over it while the waters were calm elsewhere. Graham heard it from the Behanes, Lauder, of Kilrush, and the Contis and Coonerties, of Carrigaholt. Eugene O'Curry confirms this in 1839, but gives no details. I did not hear it at Carrigaholt, Doonaha. Moveens, or Kilkee, where I collected most folk-lore in the Irrus of Corcavaskin. There is, however, a tourist legend about it probably derived by some guide-book from the Halls.² It is 4 fathoms deep on the shoal.

KILSTUITHIN, LISCANNOR, CO. CLARE.—This is a dangerous reef on which the sea boils and spouts high sheets of foam; it is reputed to be the site of a lost church and city, but no Saint Stuithin or Stuihin is known. Eugene O'Curry's identification with St. Sciothin's Island, off Co. Louth, and Canon Dwyer's note on "St. Scioth," are inaccurate and unfounded.³ Some have connected its sinking with the great wave, and, presumably, earthquake, that split Inis Fitea (Mutton Island, not far southward) into three, in about A.D. 800. The belief in Kilstuithin seems common all round the bay from Moher to Milltown Malbay. The legends are numerous and lengthy, so I will only condense the principal.

Three chiefs, Ceannur of Liscannor, Ruidhin of Moher, and Stuithin, made a cattle raid to Loop Head, and were pursued and defeated at the creek between Liscannor and Lehinch; or a Dunbeg man plundered them, or Stuithin only, who was attacked at Bohererochaun, south from Lehinch.

¹ See Smith, *loc. cit.*: T. Crofton Croker's "Fairy Legends of the South of Ireland" (ed. 1862, p. 190, Cantillon's funeral) and *Journal*, Roy. Soc. Antt., Ir., vol. xi, p. 121.

² Mason's "Parochial Survey," vol. ii, p. 490. Kilrush Parish, Co. Clare, by Rev. J. Graham. "Ireland, its Scenery and Character," Mr. and Mrs. S. C. Hall, vol. ii, p. 436; and "Folk-lore," vol. xxi, p. 486.

³ "Handbook to Lisdoonvarna" (1876), p. 64. "This church under the waves."

Stuithin either fled to his island and sank it by magic, or lost the magic key of it in the pursuit at the Boher, when the island at once sank. When the golden key is recovered from its hiding-place, under the Ogham monument, on Mount Callan, the island shall be disenchanted and rise over the sea. Its golden roofs are at times seen and its thyme-fields smelt by those sailing over it. It rises once in seven years¹ over the waves with gold-roofed towers and huge buildings, but whoever sees it dies before its next appearance. The "Monks of Kilcrea"² (Gleeman's story) records the belief in "lost Kilsapheen, its palaces, and towers of pride . . . all buried in the rushing tide and deep sea-waters green." Gerald Griffin clearly alludes to it: "Oft, through the breakers dividing, a city is seen . . . the bodement they say of the wonderful sight is death to the eyes that have seen it."

There is a long and evidently varnished (if not entirely fictitious) story by J. Geraghty in *The Irish Penny Journal* (vol. i, p. 362). He says that Kylestafeen extended 100 miles to the west of Ireland, that it is seen once in seven years, and if anyone can then drop earth on it the charm will be broken. Another legend says it was swallowed by an earthquake, and the name "Crochán" is connected with its submergence, with the collapse of the mountain at Dugort in Achill, and the breaking of Dunbriste in North Mayo. Otway was told that a whole barony fell away from the cliffs of Moher and Malbay, and that its magic key was under "Cuneen Miul's tomb" on Mount Callan.³ It is from 1 to 3 fathoms deep on this reef.

SKERD, GALWAY BAY.—In 1864, Roderic O'Flaherty identified O Brasil with Beg Ara, or Little Aran, an imaginary island in Galway Bay. "Skerde, a wild island of huge rocks, the receptacle of a deale of seales," was the place of the apparition. It sometimes appeared to be a great city; sometimes it was full of flames, smoke, and apparitions of people running to and fro,⁴ or like a number of ships, or great stacks, or ricks, not only on bright days, but on cloudy ones.⁵ I myself heard no such legends at either Aran or Carna, to either side of Skerd, but Brasil is often mentioned in the former islands.

INISHBOFIN, CO. GALWAY.—It may seem strange to include an actual island among legendary ones, but a firm local belief exists that Bofin ("White Cow Island") was once a floating island. At last, ages ago, some fishermen in a

¹ So in the Voyage of St. Brendan, chapter xiv, an island appears once in seven years. The same is told of Brasil and Monaster Ladra; see *infra*.

² P. 55 and notes, p. 436.

³ Ordnance Survey "Letters" (MSS. R.I.Acad.), Co. Clare, vol. i, pp. 300-4, vol. ii, pp. 74-99. Journal of Limerick Field Club, vol. iii, p. 197; Folk-lore, vol. xxi, p. 485; Rev. Caesar Otway's "Tour in Connaught," p. 387.

⁴ One recalls the "Island of Hell" in the *Invrana*.

⁵ Roderic O'Flaherty's "Chorographical Description of hIar Connaught" (ed. Hardiman), pp. 68, 69.

fog "deemed they drew near to some country." They cautiously approached the unseen shore, landed, and lit a fire (or shook the ashes out of a pipe, or dropped a lighted turf, off a bunch of seaweed); then the fog cleared, and the land stood fixed. They lay between the sea and a great water, and saw a hag (or a lovely girl) driving a white cow to drink; she struck it (or the elder fisherman struck the woman, or the younger fisherman caught the cow's tail and found a root of seaweed in his hand), and the woman and cow became rocks, say the natives, or disappeared in the lake as told at Omey.¹ It is most probable that this is the legend found in the "Topography of Ireland," by Giraldus Cambrensis, at the end of the twelfth century. Among the western isles was "Phantastica"; a heap (of cloud) appeared on the waters, which the natives fancied to be a monster. Seeing it motionless, some lads rowed out in a *currach*, and failed to reach it during two days. On the third, by the advice of an old man, they fired a red-hot arrow at it, and the island became stationary and habitable, for "fire is hostile to anything phantasmal." As we shall see, the same "cure" was attempted in the last century to disenchant Manister Ladra.

IMAIRE BUIDHE.—The "cod bank" of Imaire buidhe, some forty miles out to sea, is believed to be an enchanted sunken land. Some fishermen were carried to sea for two days from O'Maille's country, and saw an unknown land with sheep on its pastures, yet dared not, for fear of illusions, touch the shore, imagining that it was O Brasil. The tradition was believed till recently in North Mayo. It was probably of this bank that the Bofin fishers told how a fog arose, and they heard in it the bleating of sheep and lambs, though sixty miles out to sea. They saw leaves of apples and oaks, "and then the fog rose, and nothing was seen but the foam curling on the billow and the tossing of the porpoise."²

MANISTER LADRA, CO. MAYO.—Lewis³ tells of "a shoal called Monaster Ladizi (Ladiri) over which the sea constantly breaks with great violence," about a mile to the west of Annagh in the Mullet. It was probably believed to have been an island with a church, or monastery, on it, and then to have sunk, occasionally rising over the waves, but eluding pursuers. Otway, in 1839, fell (like myself) under the fascination of the Mayo coast and its beliefs, and lovingly sought for their legends. According to "Mr. Mickletony"

¹ O'Donovan, "Ordnance Survey Letters, Co. Mayo" (to which Bofin then belonged), vol. i, p. 485; Otway's "Tour in Connaught," p. 391; and local legends collected by Dr. Charles R. Browne (Proc. R.I. Acad., vol. iii, Ser. III, pp. 119), Dr. Fogarty, and myself (*ibid.*, vol. xxxi, Part 2, p. 58). Fire is a great preventive against magic; only human beings can light it. See Lady Wilde's "Ancient Legends, Mystic Charms, &c." (1887, vol. i, p. 71).

² "h'ar Connaught," pp. 68-72, "Tour in Connaught," p. 38, p. 394.

³ "Topographical Dictionary of Ireland" under *Kilmore Erris*.

O'Donnell, of Termoncarra, near Annagh, "Monaster Letteragh" rose, once in seven years, outside Iniskea, and was covered with churches and a monastery and tower. He had seen it himself from the "saddle of Achill"; a delightful green land with trees, houses, and people "extended many a rood." He added (probably "to amuse the gentleman" in the style of the times) that he had seen a woman come out of a house to cut a cabbage. Mr. George Crampton, an agent, said that it was a "Thalore tha whouy Druidhaigh"¹ (as Otway writes it), a druid land. It was arable and wooded, with a lofty castle on a mountain peak like Nephin. The fortress was occupied by armed giants sleeping beside their war-horses. Once in seven years a great bell rings, all awake, and the island becomes visible. Its monarch "Muiganoch Faigh Ree," "King of the three kingdoms behind" (Ireland), can be questioned as to untold heaps of gold, but at the least error in the questions the king vanishes in mocking laughter, or in thunder. Watty O'Kelly one time invoked the king, from the cliff opposite Eagle Island, to restore him a lost calf; but he blessed himself, instead of the king, and the proud ruler "of three kingdoms, each three times larger than Ireland," cursed, and vanished in a peal of thunder. One Barrett, then living in the Mullet, embarked in his boat with a "coal of fire," pursuing the elusive land for "forty" days till the coal went out, so he could not disenchant it.² I heard of Monaster Ladra in North Mayo, but am unable to separate the beliefs about it and the Great Sunken Land so far as collected by myself. It (Edye Rock) is $1\frac{3}{4}$ fathoms deep.

THE SUNKEN LAND.—I found no name for this in north Mayo save when it was confused with Manister Ladra. Belief in it prevailed in north Erris and Tirawley from Dunminulla to Downpatrick. In 1839 it was said to extend from near Teelin to the Stags of Broadhaven and thence half way to America. A boatman knew a woman named Lavelle who saw from the shore (when gathering Carrigeen moss) a delightful country of hills and valleys, with sheep browsing on the slopes, cattle in green pastures, and clothes drying on the hedges. A Ballycastle boatman, a native of Co. Sligo, corroborated this, adding that he had seen it twice at intervals of seven years, and if he lived to see it a third time he would be able to disenchant it. He could talk of nothing else, became idle and useless, and died, worn out and miserable, on the very eve of the expected third appearance. Lastly, Owen Gallagher, Lieutenant Henri's servant, heard of one Biddy Took, who, when gathering

¹ I have to thank Professors Macalister and MacNeill for suggesting the Irish form "talámh atá faoi dhraoidheacht." I still seek the equivalent of the "Muiganoch Faigh Ree."

² Otway, "Erris and Tyrawly," pp. 79, 251, 400. One recalls the anonymous Arab ms. of 1484, called "Abstract of Wonders." ("In Northern Mists," vol. ii, p. 213) "In the great ocean is an island which is visible at sea at some distance . . . but, if one tries to approach it, it withdraws and disappears. If one returns to the place one started from, it is seen again as before."

Jillisk seaweed), asked some passing boatmen to put her out to an islet and fetch her back on their return: amused by her talk they brought her fishing, and soon got a "tremendous bite." They landed a green, fishy-looking child, quite human in shape, and in their fright let him escape and dive. The man who hooked him died suddenly within a year. Gallagher also said that he had fired at and wounded a seal; soon after, when far out to sea in his *currach*, he got lost in a fog-bank and reached an unknown island. An old man, moaning, with one eye blinded, stood on the shore and proved to be the seal. With more than human forgiveness, he warned his enemy to fly from the land of the sealmen, lest his (the seal's) sons and friends should avenge the cruelty.¹ Early Victorian stories did not lose in the telling.

The compiler of a manuscript dated 1636, and in the Library of the Royal Irish Academy, tells how the Fírbolgs fled to "the out islands" from the Tuatha De Danann: the latter in their turn fled—the writer knew not whither—"unless they do inhabit an island which lyeth far out to sea on the west of Connaught. And it is sometimes perceived by the inhabitants of Uaile and Iris. It is said to be seen from St. Helen's Head, being the furthest west point of land beyond the haven of Calbegs (Killybegs), now Teeling Head."² He confuses Monaster Ladra with the Sunken Land.

TIR HUDI.—General Vallancey tells of a phantom island appearing off the north-west of Donegal and the northern coasts. At the former place it is called Tir Hudi; it contains a city which once possessed all the riches of the world, the key of which lies buried under some Druidical monument.³ Vallancey is too fanciful and careless to be of much authority, and evidently confuses the Donegal "land" with Kilstuithin; yet it is curious that the unidentified island of Dathuli⁴ is shown to the north-west of Donegal. Otway had the good fortune once to see this northern phantom. "I was a witness to the appearance of land rising out of the sea near the Giant's Causeway," he says.⁵ There is also a belief in north Donegal of such a land "far outside Inistrahull," which can be never reached and is rarely seen, "a sea-form of the mist brumal."

BRASIL.—Most famous of all the phantom islands, and known along the

¹ "Erri and Tyrawly," p. 247 and p. 400. He cites Whitehurst and Hamilton on p. 245 for confirmation, and regards the evidence of the broken coast and traces of volcanic action in north Antrim as decisive. "Tour in Connaught," p. 439.

² James Hardiman's "Irish Minstrelsy," vol. i, p. 138. The present St. Helen's Head is far northward up the Donegal coast.

³ "Vindication of the Ancient History of Ireland," introd., p. 51.

⁴ Some have identified this as "San Chuli," a supposed equivalent to "St. Kilda." If not Inistrahull (y. trachull), it may be Rockall.

⁵ "Erri," p. 249.

whole western coast, is Brasil, Ui Breasail, or Hy Brazil.¹ We have seen how conspicuous a place it took in the maps of Italy, Spain, France, and even England and Germany. Its name is obscure; some say it is from the Irish *Bres*, noble, or, as Nansen says, "fortunate." It was certainly the "I del berzel, anesto isola de hibernia, son dite fortunato" of Fra Mauro. Others say that "Brazil" is Spanish, meaning a "red wood," suggesting the meaning "Land of Wood," i.e. Markland, as "Ilha Verde" is Greenland,² but the Markland equation seems very far-fetched. I only call attention to the name of a mythical Irish monarch, "Bress." A more historical person, Bresal, or Breacan, an early Christian missionary (a contemporary with Enda in Aranmore about A.D. 480), might also (like St. Brendan, St. Ailbe, and St. Flannan) have been chosen to give his name to an island which, at least from the seventeenth century, was so firmly believed in among the people of Aran, the very island which contains Breasal's grave.

It was clearly brought about in prehistoric times by mirage and fog-bank. The setting sun and the place of the dead helped its religious significance; it became Tir Tairngire and Magh Mell, the Isle of the Living, the Isle of Truth, the Isle of Joy, the Isle of Fair Women, the Isle of Apples, "an Eden, away, far away." Christianity, trustee to dead Paganism, made it the Land of Promise. Then the belief materialized before commerce, and it became (as Sir David Wilson³ writes) "an imaginary island of Brazil that flitted about the maps of the fourteenth and fifteenth centuries with ever-varying site and proportion, till it vanished." It was not a reef or a shoal, but a mist or mirage "sprung from the sea without root"; but it held its place on the charts from 1320 to 1865, and was said to have been seen at close quarters in 1791. It seized on the Celtic fancy from the *Invrana* of the eighth or ninth century to the poems a thousand years later. Moore longed to tread the golden path of rays to the "Isle of Rest"; Griffin sang of the Aran fisherman lost in its pursuit, and Hogan of "the charms of Hy Brazil, by spirit-hands painted, 'mid the waves' sunset glory." Far in the past the "Giolla an fhiuga" tells of a traveller from Spain, to "Espain," to Erin, to "the well of the bald white cow" (Inisbofin?) to "the garden of the Hesperides, on the west side, down from Aran, where the sun goes to its couch."⁴ Aran was strong in the faith in Brasil.

Apart from the map-name from 1327 and Mauro's note, I know nothing definite written till the reign of Charles I. The MS. of 1636, already

¹ I am not aware of any even moderately old authority for these last two forms.

² E.g. Fischer, *loc. cit.*, p. 94 and p. 99.

³ "The Lost Atlantis" (1892), p. 38.

⁴ "Irish Texts Society," vol. i, p. 21.

cited, tells how Captain Rich and several sailors saw an island off the west coast; it had a harbour, with headlands, and vanished in the mist. The famous enchanters inhabiting it by magic skill concealed it.¹ In 1644, Boullaye Le Gouz, as he came near Ireland, saw a phantom land, 1 to 3 miles distant from his ship, with trees and cattle. His pilot told him of a spectral island (*l' Buss*), near Greenland, and of many floating islands near the Pole.²

In the Dublin Parliament of 1663, an Ulster member (W. Hamilton, of Derry) said that a Quaker had a revelation that he (Hamilton) was "ordained" to win the magic land with a new ship. His letter remains (March 2nd, 1675), to a friend, whose cousin, "a wise man and a great scholar," had taken out a patent (not to be found), granting the island, in the reign of Charles I. Multitudes (he wrote) had seen "O Brazile, or the enchanted island," a "large absolute island," off the coast of Ulster.

Captain John Nisbet, of Lisneskay, in Fermanagh, had settled at Killibegs; he "fraught" a ship for France in September, 1674. After a clear, frosty night they ran into a fog and high sea near an unknown island. The mate, with eight persons, landed, the ship being in 3 fathoms of water. On landing, they passed a wood, and found cattle, sheep, and horses, with black rabbits. They reached a strong castle, and knocked and called in vain. They returned to the shore and lit a fire, the night being cold; a hideous noise ensued, and they fled to the boat. Next day an old Scottish gentleman and servants appeared on the shore, and told the captain, when taken on board, that the land was O Brazile, and that he and his men were long imprisoned in the castle "by the malicious, diabolical art of a great negromancer." The castle had fallen when the fire was lit. The island was 60 miles long by 30 miles wide, and full of furies; it was also called *Oiléan Shiar*, or West Island. The rescued men were brought to Killibegs; and by their ancient clothes, money, and old-fashioned talk persuaded many of their truth!³

In August, 1668 (Roderic O'Flaherty tells us, one Morough Ley (still living in 1684) was at Irrosainhagh, to the north of Galway Bay. He was carried off by two strangers to O Brasil for two days, and was then brought back to Seapoint, near Galway, hoodwinked. He had been given a medical work (modern tradition, still vivid, says that it was not to be opened for seven years). It is now in the library of the Royal Irish Academy. It is a vellum book, written in Irish and Latin; the date, 1434, is found on p. 76, and the

¹ "Irish Minstrelsy," vol. i, p. 70. He says that Brasil was marked at longitude 3° and latitude 50° 20'.

² "Tour in Ireland" (ed. Crofton Croker).

³ "Irish Minstrelsy," vol. i, p. 369.

name P. Lee is written in it. Morough Ley petitioned to be reinstated in his lands under the Act of Settlement, in 1664, but in vain; being of a hereditary medical family (as his name implies), he probably made his living by aid of a family book of medicine from 1668, and his new-found skill caused the legend.¹ O'Flaherty mentions O'Brasil, or Beg Ara, as "set down on cards of navigation," whether "real and firm land, kept hidden by special ordinance of God, . . . or else some illusion of airy clouds, . . . or the craft of evil spirits"; he then tells of the illusions at Skerde.²

The Aran people now believe that Brasil is seen only once in seven years. They call it the Great Land. In Clare, I have heard from several fishermen at Kilkee and elsewhere that they had seen it; they also told legends of people lost when trying to reach it.

I myself have seen the illusion some three times in my boyhood, and even made a rough coloured sketch after the last event, in the summer of 1872. It was a clear evening, with a fine golden sunset, when, just as the sun went down, a dark island suddenly appeared far out to sea, but not on the horizon. It had two hills, one wooded; between these, from a low plain, rose towers and curls of smoke. My mother, brother, Ralph Hugh Westropp, and several friends saw it at the same time; one person cried that he could "see New York"! With such realistic appearance (and I have since seen apparent islands in 1887 in Clare, and in 1910 in Mayo), it is not wonderful that the belief should have been so strong, probably from the time when Neolithic man first looked across the Atlantic from our western coast. It coloured Irish thought; stood for the pagan Elysium and the Christian Paradise of the Saints; affected the early map-makers; and sent Columbus over the trackless deep to see wonders greater than Maelduin and Brendan were fabled to have seen, till Antilha, Verde, and Brazil became replaced by real islands and countries; and the birds, flowers, and fruit of the *Imrama* by those of the gorgeous forests of the Amazon in the real Brazil. "Admiration is the first step leading up to knowledge, for he that wondereth shall reign."

8.—CONCLUSIONS.

I venture to suggest the following conclusions, leaving to scientific men the questions of subsidence and the formation of the ocean-beds, which some have put back to the dateless Miocene:—

1. The outer isles, Brazil, Brendan's, and Ailbe's, are purely mythical, or,

¹ "hIar Connaught," Hardiman's Notes, p. 69.

² "hIar Connaught," p. 68. I may add to the above works, "Irish Folk-lore," by *Lageniensis* (Rev. J. O'Hanlon), Hy Breasal, p. 114; Tir na nOg, p. 290. Crofton Croker's section on the last, in "Fairy Legends," only refers to towns under lakes.

at best, based on mirage and fog-bank. This may be modified, should it be proved that the Porcupine Bank (which so closely corresponds in position with Brazil) has been above water even in an early human period. If it be not Brasil, "the Deep says, It is not in me"! However, even the nine thousand years before the time of Solon may be inadequate to bridge the abyss of time between us and the sinking of the sea-bed through which the Erne and Shannon cut their ancient channels, now deep beneath the waves.

2. The traditional islands along the coast, which are represented by actual reefs, were very probably actual islands down to a late period. The case of Mutton Island, split into three parts between 799 and 803, shows that the deep hollows now found between the fragments belong to merely 1100 years of denudation. Other cases occur, such as the entire removal of Cankeeragh Head in North Kerry, behind the earthworks that defended it; the isolation of Dun Briste in North Mayo after the dry stone-wall and gate were built; the denudation of drift-capped rocks, like Glassillanadun, at Bofin and Caherrush in Clare, the comparatively recent opening of Bealachglas Sound at Achillbeg, changing the promontory fort of Dunnaglas to a detached islet. Anyone who has studied the ancient remains along the coast can readily believe that churches and towers and the very islands they stood on could be swept away, even since the Norman invasion (the latest page of old Irish history), and tidal, or even submerged, reefs alone remain. Take with these the vast inroads of the sea elsewhere within the last thousand years, at the Godwin Sands, the Channel Islands, the east coast of England, Heligoland—why extend the list?—and Lyonesse, Kilstuithin, and Monaster Ladra all seem possibly to have been no "baseless fabric," but real lands, in no remote geologic past. Everywhere "the strong-based promontory" and shore islet have yielded to the waves. Submerged forests and bogs, it should be noted, are found near the alleged sites of the Islands at Ballyheige, the Clare Coast, Aran, the Mullet, and elsewhere, bearing out the belief in fairly recent subsidence.¹

3. Of folk-lore, the power of fire to disenchant and fix firmly any phantom island is a cardinal article of belief; so is the appearance of these lands at intervals of seven years.

4. Some islands, though possibly none on these coasts, may have been upheaved and sunk by some volcanic outburst, as at Huitserk, near the great Iöculs of Iceland, and the islands near Terceira and St. Michael, not to look beyond the nearer Atlantic. Very possibly some such event originated the tradition of the vast continent sunk in the waves of which Plato told.

I hope that this attempt to concentrate our knowledge may lead other

¹ See vol. xxxi, Proc. R.I.A., part ii, pp. 4, 74.

workers to fuller study. That in many points I may have overlooked evidence or erred in judgment is to be expected in the beginning of an investigation. Should, as I fear, this prove true, I trust that it may lead rather to the amendment of the fault than to merely empty criticism.

APPENDIX.—DETAILED MAPS OF IRELAND, 1300–1600.

Apart from the general maps in which Ireland is introduced, the detailed maps are of very great importance. There may be said to be maps of three schools—(1) the Portolan maps from Dulcert to 1560, influenced from about 1480 by the Ptolemy maps; (2) the Elizabethan maps, overlapping the last, and their copyists' maps; and (3) the Down Survey, 1655, and the maps influenced by it. I give here only the principal detailed maps of the first type from 1300 to 1560. As I hope to deal later with the origin and place-names of the early maps, I will only briefly say that business relations with France and Italy from the Norman invasion onward are apparent from even the most casual study of Irish documents during the thirteenth century, and must have familiarized the merchants and mariners of France, Spain, and Italy with at least the coasts of Ireland. From the experience of these pioneers, and for the new-comers, "portolanos," or coasting maps, were compiled, giving the towns and chief features important to navigators before the compass came into general use. The contrast between these truthful and practical maps and the learned nonsense of the scholars' maps is very marked.¹

French (or rather Norman) influence underlies these maps from the first; we have such names as *le deng*, Dingle; *la Mene*, the Maine, *l'eocho* (eochoill), Youghal; *lebano*, Bannow, and *laiban*, the Bann in Derry; but non-Norman names as *Y. de lago*, *Lespor dirlanda*, *Toro*, and *Vaca* have evidently a more southern origin. Only a few tribe-names are recorded:—*Tirconnell* and *Ibane* (Ui Baghaine), or Bannagh, in Donegal; *Lumul* or *Omallos*, Ui Mhaille in Mayo; *I Barchi* (Ui bratha) or Iveragh, in Kerry, and *Corcala*, or Corca laidhe, in Co. Cork. Traces of folk-lore, such as the "368" isles in Clew Bay, now reputed "as many as the days in the year," St. Patrick's Purgatory, the Bull² and Cow off Kenmare River, and above all *Brasil*, or the Fortunate Island. The place-names abound round the coast up to the Bann at one side and Teelin on the other; but few can be identified from Co. Antrim to Co. Mayo.

¹ Compare, e.g., Haldingham's map at Hereford, 1280, with Vesconte's and Dalaorto's maps about 1320–30.

² It bears the very name *Bui* in the 1450 map (*boy*, 1529, 1544) that (as *Bo Bui*) occurs in the present legend of the Bull.

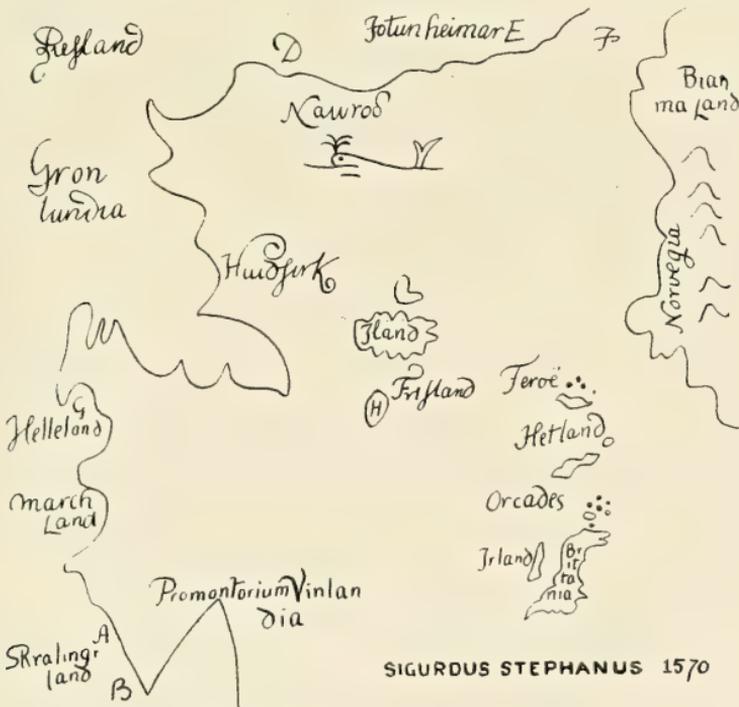
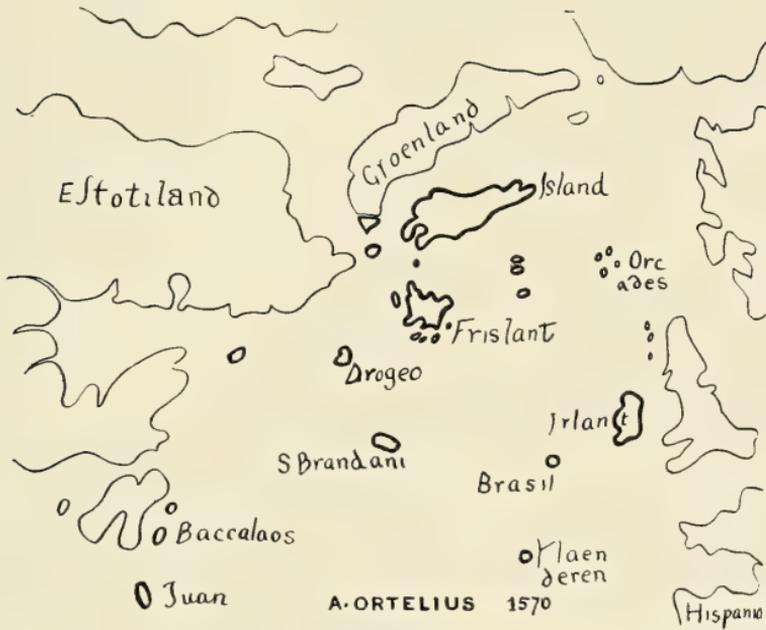
Taking the unmistakable names in the fourteenth-century maps alone, we find the following are given:—Tirconnell (*Terconal*, or *Triconel*); Aran, *abraa*; Teolin, *conteri dela* (and *cava de telan*); Achill, *archill*; Umhaille, *umallos*, Burrishoole (*Burgeis ui mbaille*), *Borgeali*; Clew Bay, *y e lacaris*, *y ceeterii*; Inisbofin, *boffin*; Ardillaun, *ardelin*; Aran Isles, *arini*; Limerick, *lagmerick*; the mythical O Brazil, *y de Brazil*; Mount Brandon, *mont S. Brandā*; Dingle, *te deng*; Skellig, *scalis*; Blaskets, *Brascher*, *blasct*; Valentia (*Dairbhre*), *drauri*; Dorsey, *drosey*; Bear, *bire*; Killaconenagh, *cauocanena*; Carbery, *corborg* (and *domborg*); Clear Island, *Clara*; Timoleague, *tamalac* (and *camelat*); Old Head of Kinsale, *Cap Vecco*; Kinsale, *andelforda*¹; Cork, *corcha*; Ballycotton, *bailecoti*; Youghal, *leochal*; Ardmore, *arimori*; Dungarvan, *garva*, Waterford, *gataforda*; New Ross, *rois*; Fethard, *fredit*; Bannow, *elebano*; Saltees, *salteis*; Wexford, *ocsorda*; Arklow, *archelo*; Wicklow, *Vichello* and *Uicallo*; Bray, *bre*; Dublin, *develin*, *duvelin*; Ireland's Eye, *irlandesi*; Swords, *sordes*; Lusk, *losco*; Drogheda, *drogai*, *doudrich*; Meath, *mida*; Dundalk, *dandul*; Carlingford, *carenforda*; Strangford, *stariforda*; Knockfergus, i.e. Carrickfergus, *chenocfirg*; Larne (Ollarba), *Ullerford*; Dunseverick, *donsobri*; Portrush, *Porto rossa*; The Bann, *lebana*, *laiban*.

In the following century a few additions are made. *Doega*, or *Doega*, in Achill; *Galuei*, or *Galway*; Kerry Head, or Cahercarbery (apparently), *Carcorbere*²; The Cow, *naca*; Dalkey, *delguei*; Ardglas, *argules*; Bonamargi, *momoarga*, *momeri*; Rathlin, *ragroni*; and Malin, *imaili*. By tabulating the results of all the accessible maps, many of the names, though doubtful in any one copy, can be reduced to limits of certainty.

The maps with the fullest details are those of A. Dalaorta, 1325; Perrinus Vesconte, 1327; A. Dulcert, 1339; Anonymous, "Portolano L. Gaddiano," 1351; Anonymous, *circa* 1360; The Pizigani, 1367; The Catalan Atlas, 1375; Anonymous, "Portolano Pinelli Walekenaar," 1384; G. Soleri, 1385; Jacobus Girolidis, 1426; A. Bianco, 1436; G. Benincasa, 1448; Anonymous, Upsal map, *circa* 1450; Fra Maura, 1459; Benincasa, 1467; Conte Freducci, 1497; Juan de la Cosa, 1500; Argentine, "Ptolemaeus," 1513; Diego Ribero, 1529; B. Agnesi, 1544; P. Descelliers, 1546; G. Calapoda, 1552; D. Olivez, 1568; Diego Homen, 1569. The later maps are frequently affected by the English maps from Dean Nowell, *ante* 1576, down to Speed.

¹ "Endelford," 1395, Patent Roll; "Edilvorth" on early seal; Quinzala on later maps from 1450.

² The name is very corrupt; forms like C. Stronbere, Stronber, and Castronbre occur. It is possibly "Cah-Corbre," or "Cahcorbere," as Kerry-Head was too important a sea-mark to be omitted, especially when Loop Head was not given.



The North Atlantic on Southern and Icelandic Maps.

IX.

MÓR OF MUNSTER AND THE TRAGIC FATE OF CUANU
SON OF CAILCHIN.

EDITED BY T. P. O'NOLAN, M.A.

Read FEBRUARY 26. Published AUGUST 15, 1912.

THE following text, now for the first time published, is drawn from the Book of Leinster, T.C.D., and facsimile copy, R.I.A., fo. 274a; Book of Fermoy, fo. 17a R.I.A.; and H. 2.15, p. 69, a fourteenth-century ms., T.C.D. I have for convenience divided the text into numbered sections.

I have followed mainly the reading of LL (L), except where that rather carelessly written manuscript is obviously wrong. The variants from the Book of Fermoy (F) and from H. 2. 15 (H) are given in the foot-notes. The latter ms. is later than L and F. It is closer in grammatical forms and in phraseology to F than to L. In §§ 5 and 6 its versions of the poetry are so distinct from those of L and F, that I give them in their entirety in the Addendum.

The term "foreign or outlander tribes,"¹ applied by L in § 8 to the men of Ossory, Decies, Ely, Muskerry Bregoin, East Femin, and Fermoy, is not a little interesting to the future historian of Ireland. I subjoin to the end of the Glossarial Index, which gives rare words, a list of persons and places mentioned in the text, as well as a table of the succession of the kings of Munster from Aengus mac Nadfraoich to Cathal mac Finngüne. This latter king has been confused by the scribes with Cathal mac Aedha, the brother or first cousin of Fingin mac Aedha Duib. For my reasons for ascribing a historical blunder to the scribes see the list of succession of Munster kings as well as the table of historical references to the personages mentioned in the text. These references I have found in—

- AT. Annals of Tighearnach, Stokes, *Revue Celtique*, vol. xvii.
 AU. Annals of Ulster.
 CS. *Chronicon Scotorum*.
 TF. Three Fragments of Annals.
 KFF. Keating: *Foras Feasa ar Eirinn*, Irish Texts Soc.
 AI. Annals of Innisfallen,
 FM. Annals of the Four Masters, } as quoted by Stokes, R.C. xvii.
 Ériu. Anecdota from Ir. MSS.

¹ See text edited by W. A. Craigie, *Rev. Celt.*, xx, pp. 335, s.g.

The following OI. (Old Irish) forms are found: *laa* 1; *deriud* 1; *oca cairib* side 2; *issa righthech* 2; *con[d]atarlai* 2; *argul* 2; *inna rigna* 2; *iar sudiu* 3; *oc ingairiu* 3; *in dóiri* 3; *Dán Chairedo* 4; *ísind insi* 5; *diliu* 6; *erig-siu* 7; *Ó Liathmáin* 7; *dúib* 8, 10; *for maccu* 8; *in cath sa* 8; *immotaeth dóib* 8; *im bethu* 9; *im thóibu* 9; *ind lénai* 11; *Cailchénai* 11; *Corco* 8; *slabrai* 11; *in n-aidchi sin* 11; *blaidnai* 6; *biäid* as a dissyllable 11; *do cuirethar* 10; *ind-sron* 10. Many instances of infixation occur. The readings of H: *acan* for *athguin* 9 and a *ndiaid Chuana* for *inni Chuanaig* 10 might be taken as evidence of phonetic simplified (?) spelling.

The date of the story is the first half of the seventh century.

The date of the language is not later than the tenth century.

MÓR MUMAN OCUS AIDED CUANACH MEIC AILCHINE.

LL 274a; Book of Fermoy, fo. 17a.*

1. Aed Bennāin rī Irlochra. Dā maic dēe lais 7 teora ingena. Senfocal¹ leo: "nī amaíl foracaib Aed Bennāin² a maccu." Mōr Muman ingen Aeda Bennāin. Robūi³ admilliud⁴ furri i⁵ tossa(i)g. Nitheissed⁶ acht co dorus tige.⁷ "Rotmairg⁸ a Mōr," ar in guth assind aer⁹ uāstu.¹⁰ Robatar imorro rigrad hÉrend oca cungid¹¹-si. Laa n-and¹² *din* cocuala inn¹³ guth. "Rotmairg,⁸ a Mōr." "Ba ferr lim dobertha oldaas¹⁴ a bithtarngire."¹⁵ "In ba i tossaig¹⁶ no fain deriud?"¹⁷ "I tossaig¹⁸ imorro," or sisi.¹⁹ Doratad²⁰ iarsin fualaṅg fōthe²¹ corolínḡ dar dua ind liss.²² (fo. 274b) Conafeis²³ cia du do dechaid.²⁴

2. Coroshir²⁵ Herinn²⁶ da bliadain.²⁷ Corodubui fri grein ocus gāith²⁸ hī certib²⁹ ocus³⁰ lothruib.³¹ Conatarlai³² do Chassiuil. Fingen macc Aeda³³ is ē³⁴ ba rī andsen.³⁵ Ingen rig na nDesi³⁶ leis. Bōi³⁷ oca cairib³⁸ side tri thráth. Laa n-and³⁹ luid issa rigthech⁴⁰[as]sind⁴¹ ingariu⁴¹ condatarlaic frisín tenid.⁴² Curid,⁴³ or Fingen, in⁴⁴ cale ucut⁴⁴ immac^h. Rotbia mo

* The variants are from F, with a few, where stated, from H, unless stated to be from L, in which cases F is in text.

1 Senfocal.	2 Bennan.	3 roboi.	4 aidhmilliud.	5 hi.	6 nitheissed.
7 tichi	8 Rotmaire.	9 aiur.	10 uasbi.	11 cunchid.	12 and L.
13 in	14 oltās.	15 taringiri.	16 tosaig H; tosaigh F; leg. tossuch.	17 F'dered.	18 tossuich.
leg. tossuch	19 or si.	20 first two syllables obscure.	21 fothi.	22 ind lis	
23 onafes.	24 cia deochaid, L.				
25 curosir, i blurred.	26 Eirind.	27 dá bliadain.	28 gaeith, i below the line.		
29 hicerdchib.	30 om. F, H.	31 lothrai.	32 atarla.	33 aetha.	34. isse
35 and.	36 nandaisi.	37 boi.	38. chair—	39 nand dino	40 rigtech, first syl.
obscure.	41-41 iarsind ingaire.	42 blurred.	43 cuirid.	44 caidiuc ut,	

delg,⁴⁵ ol⁴⁶ ind rigan ocus fōi lēe innocht.⁴⁷ Ni maith,⁴⁸ or Fingen. Cencop maith biditecen.⁴⁹ Nocōnfaifemni⁵⁰ 51curo foa-su lēsi.⁵¹ Bideicen, or⁵² Fingen. Tucthar dam⁵³ in delg⁵⁴ [adiagar dō H.] Sisi roderuig dōib .i. ind rigan.⁵⁵ Facbais⁵⁶ ind ingen⁵⁷ na ceirte⁵⁷ allathis ocus tēit chuce⁵⁸ issin imdai.⁵⁹ Can duit a ingen, or⁶⁰ Fingen. Is and nodasloinne⁶¹ ocus domnanic⁶² a cīall. Maith, or Fingen. Tarcaid-side comthrom⁶³ di argut friesi⁶³ hitossaig.^{63a} Amail⁶⁴ ropo⁶⁵ matan at[a]raigsi do eirgi lasna⁶⁶ caircha.⁶⁷ Nathō, or Fingen. Notannubsa⁶⁸ ar in rigan. At[a]raig^{68a} in rigan combāi oc⁶⁹ gārib impu. ⁷⁰Gaibid, or Fingen, in⁷⁰ mbrat corera ucut impe ocus ⁷⁰delg inna rigna im⁷⁰ a bratt. Niba i comairichas^{70a} frimsa, or ind rigan. ⁷¹Bid fir,⁷¹ or Fingen. Ani⁷² rorenais nī comraicfe⁷³ fris. Anfaid⁷⁴ si or⁷⁵ ⁷⁶is ferr a cenel,⁷⁶ or Fingen. IS fria⁷⁷ tra ⁷⁸dofedar cech deg-⁷⁸ben in Herinn⁷⁹ .i. fri Mōir Muman.

3. ⁸⁰Bui si i fail⁸⁰ Fingin co rruc macc dō .i. Sechnasach⁸¹ mac Fingin.⁸¹ Marb Fingen⁸² iar sudiu.⁸³ Condechaid⁸⁴ si co Cathal macc Finguine⁸⁵ .i.⁸⁶ co rrig Glen[da]main⁸⁶ .i. rige Muman a ⁸⁷Casiul in tres fecht.⁸⁷ A Glennamain⁸⁸ in fecht aile. A hAine⁸⁹ in fecht aile .i. Eogonacht⁹⁰ sin uile. Luid dīn co Cathal in Glendomain.⁹¹ ⁹²Tucad dīno⁹² siur di-si⁹³ in gait aniar .i. Ruithchern ingen Aeda Bennāin,⁹⁴ combāi⁹⁵ oc Dūn Chaireda ⁹⁶Crieh Ua⁹⁷ Liathā[i]n⁹⁸ oc ingairiu⁹⁹ in dōiri.¹⁰⁰ Ba hé dīn a hannacol.^{100a}

Locht mōr do Dūn Chaireda.

innach Lūachair boṅgair¹⁰¹ dō :

maccain congair in aird cheoil

¹⁰²sech nin athgēn nimathgeoin.¹⁰²

45 delc.	46 ar.	47 obscure, indocht legible.
48 maith sin.	49 biditlēcen.	50 noclonifamni L.
the fa is obscure, faidisi H.	52 ar.	51 curo faasud leissi,
delg F has here atnagardo with dot over g and d.	53 tuc clear, rest obscure.	54 after
57 obscure, 'cerde' visible.	58 chuici.	55 righan.
61 nodoss . . . oino.	59 isin nindhai.	56 facbais annsain.
62 dofainic.	60 ar.	61 nodoss . . . oino.
63-63 friesi diargat.	63a leg. hi tossuch ?	62 dofainic.
64 obscure in F.	64 obscure in F.	65 ropa.
65 ropa.	66 na is obscure.	66 na is obscure.
67 carce faintly legible.	68 F. The	67 carce faintly legible.
68a artraig, H.	69 ac.	68a artraig, H.
70-70 obscure.	70a Ni bia comarbus, H.	71-71 obscure.
73 ic . . . fea.	74 punc. del. over f.	72 indir . . . r.
75 ar.	76-76 obscure.	73 ic . . . fea.
77 frie.		74 punc. del. over f.
		75 ar.
		76-76 obscure.
		77 frie.
80-80 obscure.	81-81 blurred, to -gin.	82 Fingin L.
83 suidiu.	84 obscure.	80-80 obscure.
85 Findguine.	86-86 co omuin.	83 suidiu.
87-87 ac Cais fecht F;	88 a Glendomain.	84 obscure.
89 obscure.	89 obscure.	85 Findguine.
90 Eoghanacht.	91 Glendomain.	86-86 co omuin.
92-92 obscure.	'93 dissī.	87-87 ac Cais fecht F;
94 Bendain.	95 comboi.	89 obscure.
96 hi.	97 h. L, u. F.	90 Eoghanacht.
98 Liathain.	99 oṅgingairiu.	91 Glendomain.
100 daeiri.	100a hannocul.	92-92 obscure.
101 bongar F, bungargda H.	102 sech ni maith gen ni maith geoin; L has ninathgēn; the facsim. is again wrong with nimathgen, nimaitheob, H.	93 dissī.
		94 Bendain.
		95 comboi.
		96 hi.
		97 h. L, u. F.
		98 Liathain.
		99 oṅgingairiu.
		100 daeiri.
		100a hannocul.
		101 bongar F, bungargda H.
		102 sech ni maith gen ni maith geoin; L has ninathgēn; the facsim. is again wrong with nimathgen, nimaitheob, H.

4. Cotucad *macc* Mocherdda¹⁰³ cuice.¹⁰⁴ Óinmit¹⁰⁵ side *ocus* fáith Dē.
Gaib-sin, a íngen, or se.

Macca[i]n coḡgair^{105a} in a[í]rd cheóil

sech nimaithgen nimathgeóin.¹⁰⁶

Intí chongair o Loch Léin, (ar *macc* Mocherdda)¹⁰⁷

is dáig immonetar cēin.¹⁰⁸

Locht mór do Dún Chairedo

in nach Luachair boḡgair¹¹⁰ dō:

in fil locht fair *acht* mad oen.¹¹¹

nad¹¹² fil Luachair¹¹³ *im* a thōeb.¹¹³

113a De Eogonacht[aib] Locha Léin dond ingin, ar *macc* Mocherda.^{113a}
Atchūas do Mōir. Do chuaid side¹¹⁴ con[d]atuc¹¹⁵ cuicce¹¹⁶ combū¹¹⁷ in
a farrad. Do theigtis immorro¹¹⁸ an dīs sethar¹¹⁹ co mbitis oc cāiniud¹²⁰
Fīngin. Is and asbert si:¹²¹

5.

In tan do ceḡgat int śluaig,

¹²²timcheiull Glendomain¹²² a tūaid:¹²³

dibad¹²⁴ mar bain Locha Cend¹²⁵

ciammatāi¹²⁶ a Ruithchernd.

Fingin ba garg^{126a} ba dígluch,

ba gæth ba bæth^{126a} ba brīgach:

^{126a}slemun guide gargg tomtġa,

ba forb[f]aelid a śhomtha.^{126a}

Fil mo dāil i llaind¹²⁷ Lothra

lecht Fingin reil¹²⁸

issind insi¹²⁹ ata ¹³⁰dam

lecht¹³⁰ Aeda¹³¹ ocus damnatan.

Maccan coḡgair *in* uilind

in uilind *maccan* *congair*

atche femⁱⁿ^{131a} imloch cend

¹³²atġi loch cend canadmair.

103 *Dacorda*. 104 cuici. 105 *omnit*. 105a obscure. 106 maith is obscure.
107 *Dacerda*. 108 *chein* F, *aneidirchein* H. 109 *Caireda*. 110 *bongar* F, *bongarrda* H.
111 *aen*. 112 *nat*. 113-113 *imatġa*ibġ. 113a-113a *om*. F, H. 114 *sidhe*.
115 *condatuc recte*. 116 cuiciġi. 117 *comboi*. 118 *obscure*, F; *dono* H.
119 *sechtair* F; *amach seachtair* H. 120 *ocuinud*. 121 *atbertsi .i. indi Muman .i. Mor*.
122-122 *obscure*. 123 *atuaith*. 124 *obscure*, b is legible. 125 *leg. di* ba marba im loch
cend? 126 *cid imatġi*, which *leg.* or *cia aimmitġi*. 126a *illegible*. 127 *ilavuid*,
reads, perhaps, *ilavruib* or *ilavruib*. 128 *reil* is not in L. 129 *ruib*,
looks like *andruin atġa dam lecht Aeda*. 130 *dam lecht*, L, *damlecht*, F. 131 *obscure*,
then: *gair. atġe fem im imilind*. 131a *atche fem* (so fac.) (ms., which
is cut in this place, looks like *cem* or *ceni*, perhaps *fem* in F) is above the second *congair* in L.
132-132 *atġe loch cend canadmair*.

†Is annam iar n-imrim^{132a} eck
 etír Chassel ocus Loch
¹³³iniaite ēn finnabrach¹³³
 feras amran immadrock.

6. Bōi immorro Cathal oc cloistecht¹³⁴ friesi¹³⁵ i toib¹³⁶ in muine. Is and atrach[t]¹³⁷ side ocus asbert :¹³⁸

Is deithber. cen cop mōr mo thuasa.
¹³⁹ in iddiliu¹³⁹ imradud, in marbain innousa ?¹⁴⁰
 Cid in marbān ō robī.¹⁴¹ in^{141a} úir bliadnai no lathī¹⁴²
 is a dag doinacht conōi, conadermatar a chōi.¹⁴³

A ben ucut¹⁴⁴ na fer mol.^{144a} frisin¹⁴⁵ marb [o]¹⁴⁶ dochuaid¹⁴⁷
 (dodon)¹⁴⁸ carnech na dingnea¹⁴⁹ thetāil. condig feisín do ecaib
 A fír ucutān amne, uair fomairneca oc coe :¹⁵⁰
 bid sí¹⁵¹ do šerc-su basni nadmair inti¹⁵² cetabui.¹⁵²

Nochonacca[s]si¹⁵³ tra oc a chāiniud-som ond uair sin.¹⁵⁴

7. Dorat dino Mōr Ruthchern¹⁵⁵ do Lonān mac[F]indig.¹⁵⁶ Robāi side for fogail i fail Chathail. Cotarat Mōr a siar dō. Fechtas and tanic¹⁵⁷ rī na nDese. For lāim Chátail¹⁵⁸ nobid¹⁵⁹ Lonān. Erig-siu,¹⁶⁰ a Lonāin riasin¹⁶¹ rīg.

Na glūais Lonān mac Findnig (or Mōr) aniar a síd¹⁶² iar rimbir.¹⁶² Nibad danu fri grithu niba[dí]thiu^{162a} fri cure¹⁶³ in laech hē diatailcibe¹⁶⁴ laech dolleice a sūide.^{164a} Luid siar¹⁶⁵ dino in Lonān ocus a ben¹⁶⁶ [ocus a inunter]¹⁶⁶ co maccaib Aeda Bennāin.¹⁶⁷ Dosnarruid Cuano mac Cailchin¹⁶⁸ o Liathmuiniu¹⁶⁹ corruc¹⁷⁰ a muāi o Lonān, ocus corogonad fadéin ocus conerlui¹⁷¹ iar n-a guin corranic¹⁷² siar.

† See "O'Mulconry's Glossary," from YBL. (Archiv für Celt. Lexicho. 1 Band, 2 Heft, p. 250). "Droch .i. roth carpat, ut dixit Mor Muman: As annam iar n-imrim | iter casil ocus loch | inad atend findabrach feras amran frim dá droch. For the version of this and next poem given by H, see below.

132a. imrium. 133-133 ate enfindabhrach, F; L has iniaite ēn.
 134 accoistect F, ag eisteacht. H. 135 friasi. 136 toeb. 137 attract. 138 dixit, F;
 afbert, L. 139 ivid dilli. 140 in marbān imoossa. 141 boi. 141a ind. 142 laithi. 143 cōi.
 144 ucut. 144a. leg. m'uaill. ? 145 forsin. 146 not in L. 147 do coid don
 148 leg. car nech na dignea thētoil. 149 nadingne. 150 occaib. 151 idsi.
 152-2 tiadoboi. 153 leg. nīchon. 154 This sentence is not in F. 155 Ruitheerd.
 156 Binig with dot over b. 157 tainic. 158 not in F. 159 nabid. 160 airesi.
 F, H. 161 resin. 162-162 in L, over first r, is a mark, in fac. u. 162a ditiú. 163 cuire
 164 diatail cepe. 164a sude Ni bad itna fria cure an laech he dia ta il cepe laech do leieti a
 suidi. H. 165 om. 166 not in L. 167 Bendain. 168 Ailchīne. 169 muine.
 170 conuc. 171 conerlai. 172 curāinic.

8. IS iasie roimhad ead̄i amocetib Aeda Bennāin for maceu Cathail
*n. amocetorocht*¹⁷⁷ iad lanamāin siar dia n-inechāib.¹⁷⁴ *Ocus daug*¹⁷⁵ robōi
 euit do macead̄u Cathail *ocut*¹⁷⁶ sarugud.^{176a} Cindas¹⁷⁷ *churfith̄er*¹⁷⁵ in
 eath sa : or fir Muman. Mad meic¹⁷⁸ Cathail tiasat¹⁸² in¹⁸¹ agid mac ūAeda.
 iannotaeth dōil̄i am chomāiill. Tiagait¹⁸² *dino meic* Aeda in agid na¹⁸³ n-echtar
 thūat¹⁸³ *saib n. (O)draigi ocus* 184 na nDēise¹⁸⁵ *ocus Hele ocus Mūseraige*
 Breogai¹⁸⁶ *ocus A' b' th̄ir Fēin̄ ocus Fer Maige*.¹⁸⁷ Cuanu¹⁸⁸ ba h̄e n Fer
 Maige Fene. Meic¹⁸⁸ Cathail *dano or cind*¹⁸⁹ *Cheroo Loigle ocus Cheroo*
*Duibne*¹⁹⁰ *ocus Ciarraige ocus Cheroo Basciud ocus Cheroomrūd*. In tres laa
dino res̄a eath. is and tanic t̄iar aesa cerda^{190a} *co Cuanag. Bui Cuanu oc*
*tationd. T̄it eiaucu. Can d̄uib, or Cuanu. ocus eia nosaigid*¹⁹¹ *Aes cerdda*
ataneomnaic. Co Cuanag saiguit. Romachad Cuanu hi tres indossa, or se.
 Is and asbert in tres fer :

9. Anim do neoch bith cen tech,
 masad^{191a} f̄ir athguin Cūanach :
 fibthair in maig¹⁹² di s̄uidiu
 cen dēine^{192a} do Liath-muinu.

Asbert araile :¹⁹³

Nirbo dithrub eos indiu.
 int slige¹⁹⁴ do Liathmunu :
 immusretis cossa ech.
 Muman in bethu Chuanach.

Asbert¹⁹⁵ in tres fer :

Cossin laithe ronugad
 ganem¹⁹⁶ im th̄oibu Cūanach :
 ba aicde na dairthech¹⁹⁷ n̄i
 comla ri Dūn Liathmuni.¹⁹⁸

10. Foghen d̄uib, or se. Meise Cuanu, Féamai, or seat,¹⁹⁹ nitriciam.
 Roseic̄his²⁰⁰ deit f̄ein. Bia mac̄b̄ ria cind bliadna. Doratad²⁰¹ iarum in
 eath (fo. 275b). Lonan im̄oc̄s aniar in agid²⁰¹ Chūanach. Romemaid²⁰² tra

173 arnaroacht.	174 dianinehuib.	175 om.	176 issin.
176a sarubad, H.	177 Cindus.	178 cuirfid.	179 mād mic.
176a first syll. illeg.	181 ind.	182 tiagat. L has i below the line.	180 sat.
184 not in L.	185 Dēisei.	186 mūseraigi Breogain.	183 naithech, F, H.
188 Cuanu mac Ailc̄in d̄ino ba h̄e ba r̄i.	189 mic.	190 corco La O Duibne.	187 maigi F, maige Fēine. H.
190a cerdda H.	191 nosangid.		
191a massa F; acan H.	192 muig.	192a ce dene; fl. dara muig cend eamna, H.	
192 om̄l̄iu.	193 sligi.	196 is and asbert.	196 ganium, F: ronuahadh nocha. 4.
197 n̄a tairt̄led̄h, F; aige na tarhand, H.		198 liathm̄ūni, L.	199 siat.
200 Roseic̄his. F. roseic̄his. H.	201-201 in eath iarum ; Lonan inagid.		202 Romaid.

ria *maccaib Cathail* as *Indiu mór* co *IlLuachair* n*Degdad*.²⁰³ *Romemaíd*²⁰⁴ *dano* re *maccaib* ²⁰⁵*Aeda sair* co *Cend Currig*²⁰⁵ ²⁰⁶*Ad[r]ogrin*d imorro *Lonan inni Chuanai*. In *dubid immataruid*²⁰⁶ *dóib*. *Dober Cuanu* *for*gāb *fri*²⁰⁷ *Lonān* *com*boi *trít*.²⁰⁸ *Oc* *soúd* do *Chuanai*g ass do *cuire*dar.²⁰⁹ *cuilend* *athor*bai iñ *gab*ol²¹⁰ *Chuanach* *con*atarla *faen*.²¹¹ *Dober*^{211a} *dano*²¹² *Lonān* *fuas*ma²¹³ do *gai mór* *indseom*²¹⁴⁻²¹⁴ *ocus* ni *thuid*chid²¹⁵ de co *tall* a *ch*end de. *Is*²¹⁶ *and asbert* *maec* *Mocherda* :

11. ²¹⁷*Dresfid* *huimni* *ocus* *fern*²¹⁷
do *taig* *indiu* a *Ruith*chern,²¹⁸
biaid *brattán*²¹⁹ *fuidb* *im*²²⁰ *nech*.
fodaig *ilmonsa*²²¹ *Cuanach*.

Sescand *Cluana* *maccu* *Birnd*,²²²
dobert *bodb* *echt* *n-amra* *n-ind*:²²³
deccaid *i táeb* *ind* *lénai*,
lecht *Cuanach* *meic* *Cailchenai*.²²⁴

A chuilind *ind* *athfor*bai,²²⁵
rolais *ar* *cosa* *amrai*;
ole *sén* *uare*²²⁶ *ar* *dot*bi,
aithecht *thuathi* *dia* *slabrai*.²²⁷

*Is úarach*²²⁸
*indocht*²²⁸ *i tegh*lach²²⁹ *Cūanach*;
*a dagben*²³⁰ *in* *banna* *bán*
a ingen, *a oin* *maccān*²³¹

Ba fir son.^{231a} *Niro* an²³² *inn* *aic*hí *sin*²³³ *acht*²³⁴ *in triar* *sin*.

Aided *Cuanach* *meice* *Ailchizi* *insin*.

203 *nDedad*. 204 *Romebáid*. 205-205 *Aetha sair* *forsna* *ath*caib co *cend*
curraig, F, H. 206-206 *Adrogrind* *Lonān* *ind* *Cuanai* *induibib* *immatarraid*, F; *andiaid*
Chuanai, H. 207 *for*cam *for*. 208 *com*boi *trít*. 209 do *cuire*thar. 210 *athor*ba
in a *gab*ol. 211 *con*atarla *faen* F. co *tarla* *for* *lar* *anssin*, H. 211a. *dobert*, H.
212 *om*. 213 *lonan* *fuas*mad. 214-214 *trít* co *talm*ain, F; co *lár* 7 *nir*
leig *eirgi* *dó*, H. 215 *thuid*chid. 216 *As*.
217-217 *Dresfid* *uini*us. *Facsim.* L *dresfid* *ocus* *ferd*. These verses are not in H.
218 *ruit*acerd. 219 *bratan*. 220 *dar*. 221 *risona*. 222 *cluba* *mubirnd*, F.
223 *nama* *raind*. 224 *meic* *cailchenai* L. 225 *A* *cuilind* *innat*horba. 226 *sen* *uaire*.
227 *slabri*. 228-228 *uarach*-*indócht*. 229 In L: *is úarach* *innocht* *aithgelach*. 230 *cenach*
ben. 231 *ba fir* *on*, F; *a ingen*. *aenmaecan*. 232 *aic*seom. 233 *om*. 234 *act*mad.
235 *i*. a *mac* a *ben* a *ingen*. *Aided* *Cuanach* *mic* *Ailcine* *conicisin*. *Genelach* *Cuanach* *sund*.
i. *Cuanu* *maec* *Ailcín* *mic* *Dimai* *mic* *Findbair* *mic* *Findloga* *mic* *Deiche* *mic* *Confile* *mic*
Cuscraid *mic* *Fircuile* *mic* *Buain* *mic* *Mogaruit*h *mic* *Fergla* *mic* *Rossa* *ruaid* *mic* *Rudraige* 7 *rel*.

ADDENDUM.

The poem in §5 appears thus in H:—

In tan concengaid an sluag timcheall Glendamnach a tuaid,
dibad marbán Locha Cenn cid imata iar Ruithearn.

Fingin fa garg ba gnimach, ba baeth ba gaeth ba brigach,
fa min fa michar le mnaib, fa cruais a cath ca congail.

Fil mo dá ail a Lotra, leacht Fingin reill a brotha,
isin innad sin ata lecht nAeda agus Damnadtha.

Macraid Chaisil fā maith móir, deis Fhingín fa trentrom slóig,
Feimean magh Loch Cend fabla, is Loch Cenn can cimeada.

Fa haibinn do bimis trell, idir Chaisil is Loch Cend,
fa mor *maccan* oe cantol, an tan tigmis co Caisi[o].

In tán.

In §6 H has:—

Boi immorro Cathal ag éisteacht i taeb na fidbaidi agus tainig da n-innsaigi
Is and adubhairt :

Is bronach an chai a cumad, do nither le Moir Muman,
A cainead Fingin in fúilt, inbain le luad da labairt.

Cid im na badh inmain leam. luad Fingin nar smuin ein feall
nochar er filid fa crad, 's nochar feall ar tuarastal.

Inmain leam teacht tar a marb, a Cathail ón buideach badb,
tre can a fáigsin fa seach, adbar dam beith co bronach.

Is.

MÓR OF MUNSTER AND THE FATE OF CUANU SON OF
CAILCHIN.

1. Aed Bennain was the king of Ir Luachair. He had twelve sons and three daughters. There is a proverb about them: "Not as Aed Bennain left his sons." Mor of Munster was the daughter of Aed Bennain. She was in adversity at first. She used to go only to the door of the house. "Woe to thee, Mor!" said a voice from the air above them.

Now the kings of Ireland were seeking her hand in marriage. One day she heard the voice, "Woe to thee, Mor!" "I prefer that it should be given to me than be constantly promised. Shall it be in the beginning or at the end?" "In the beginning, indeed," says she. Thereafter great derangement was put upon her, so that she bounded over the mound of the liss, so that it was not known to what place she went.

2. She travelled over Ireland two years, and was blackened by sun and wind, in rags and marshes. She came to Cashel. Fingen son of Aed was king there. The daughter of the king of the Deise was his wife. She (*Mór*) was with his sheep three times. One day she went into the palace out of the pasture, and threw herself down by the fire. "Put out that woman," says Fingen. "You will have my brooch," said the queen, "and sleep with her to-night." "It is not good," said Fingen. "Though it is not good, you will have to do it. We shall not sleep with you till you sleep with her." "I must," said Fingen. "Let the brooch be given to me." She herself, the queen, prepared the bed for them. The woman left the rags below, and goes to him into the room. "Whence art thou, woman?" said Fingen. Then she told her name, and her sense came to her. "Good," said Fingen. He offers her first her weight of silver. When it was morning, she arises to go with the sheep. "Nay," said Fingen; "I shall protect you against the queen." The queen arises, and was in fits of laughter at them. "Put ye that purple cloak on her," said Fingen, "and the queen's brooch in her cloak." "She shall not be in equal dignity with me," said the queen. "It will be just," said Fingen. "The man you have sold you shall not consort with. She shall stay, for her race is better." It is with her, with *Mór* of Munster, that every excellent woman in Ireland is compared.

3. She was in the company of Fingen till she bore him a son, Sechnasach, son of Fingen.

Fingen died after that. She went to Cathal, son of Finnguine, king of Glenduin. The kingdom of Munster was from Cashel one spell, from

Glendomuin another time, and from Aine the other time. All these are Eoghanacht. So she went to Cathal in Glendomuin. A sister of hers was brought, stolen from the west, Ruithchern, daughter of Aed Bennain, and she was at Dun Chaireda in the country of Uí Liathain, tending sheep, in captivity. And it, indeed, was her dirge—

“It is a great fault to Dún Chaireda
that Luachair is not near it.
A fair boy of high music cries,
Though I know him not, he knows me not.”

4. Mac Dácherda was brought to her. He was a simpleton and a prophet of God. “Sing that, woman,” said he.

“A fair boy of high music cries,
Yet I know not myself, he knows me not.”
“The person who cries from Lough Léin (says Mac Mocherda)
It is likely thou knowest thyself.”
“A great fault to Dún Chaireda it is
That Luachair is not near it.
It has no fault but one
That Luachair is not beside it.”

“The woman comes from the Eoghanacht of Loch Léin,” said Mac Mocherda. Mór is told. She went and took her to her, and she was in her company. Now the two sisters used to go and lament over Fingen. Then she said:—

5. When the hosts advance
round Glennomuin from the north,
great destruction shall be around Loch Cenn.
Whither may its march be, O Ruithchern?
Fingen was fierce, was vengeful,
was wise, sportive, vigorous;
was crafty in entreaty, was fierce in threats,
very joyous were his riches.
My portion is in Lann Lothra.
The monument of Fingen conspicuous . . .
In the “inch” there is a building,
the monument of Aed and Damnait.
A youth sings in Uilind,
in Uilind a youth sings.
Thou seest *Femin* around Loch Cenn.

Thou seest Loch Cenn though it lives not.
 Seldom after the coursing of steeds
 between Cashel and Loch
 does the place of the fair-tufted furze
 make music against my two wheels.

6. Cathal was listening to her at the side of the grove. Then he arose, and said—

It is proper,
 Though my silence is not great,
 since dearer to thee is thought of the dead man than I am.

Even the dead, when he has been in the clay of a year or a day, it is his excellent, kindly nature that preserves, so that mourning for him is not forgotten.

Woman over there! do not pour praise upon the dead since he has gone. Love someone who will not do thy displeasure till he himself go to death.

Man over there as you are, since you have found me weeping, it will be the love of thyself that will act, so that the man who was first lives not.

She was not seen weeping for him from that time.

7. Mór then gave Ruithchern to Lonán the son of Findech. He was on foray along with Cathal. Mór gave her sister to him. On one occasion the king of Déise came. Lonán used to be at Cathal's hand. "Rise up, Lonan, before the king."

Do not move Lonán son of Findnech (said Mór), from the west from a sídh what he plies. He would not be the bolder against battle-shouts, he would not be a shelter against a company. Is the hero whom you would put from a seat a hero to whom you would return it?

Lonán went westwards then; and his wife and his people to the sons of Aed Bennáin. Cuanu son of Cailchin from Liathmuine attacked them and carried off his wife from Lonan, and he (Lonan) was wounded himself and escaped after being wounded, and arrived in the west.

8. After that war was proclaimed by the sons of Aed Bennáin upon the sons of Cathal, because the married couple did not arrive in the west under their protection. And, indeed, some of the sons of Cathal were at the outrage. "How shall this battle be fought!" said the men of Munster. "If it be the sons of Cathal who would go against the sons of Aed, they will fall on both sides, because of their equal pride."

The sons of Aed then go against the foreign tribes eastwards, viz. of Ossory and of the Deise and of Eile and of Muscraige Bregoin and of the east of Femen and of Fer Maige. Cuanu was king of Fer Maige Féne.

The sons of Cathal, indeed, were in front of [the men of] Corco Loigile and Corco Duibne and Ciarraige and Corco Bascind and Corco Mruad.

The third day before the battle three craftsmen came to Cuanu. Cuanu was at the chase! He goes to them. "Whence are ye," said Cuanu, "and whither do you go?" "We are craftsmen. We are going to Cuanu." "Cuanu has been killed in battle now," said he. Then one of the three men said:—

9. "It is a reproach to anyone to be without a house.
If it be true, the wounding of Cuanu,
People will sleep therefrom upon the plain
without hastening to Liathmuine."

Another said:—

"The road to Liathmuine was not a desert till to-day. On it used to run the feet of the horses of Munster while Cuanu was alive."

The third man said:—

- "Till the day on which has been stitched
sand around the sides of Cuanu,
the door to Dún Liathmuine was a structure which nothing would
reach."

10. "Welcome to you," said he, "I am Cuanu." "Alas," said they, "we shall not be able to heal thee. Thou hast wearied thyself. Thou shalt be dead before the end of a year." The battle was given then. Lonan came from the west against Cuanu. The sons of Cathal broke the battle from Iúde (?) Mór to Luachair Deglad. The sons of Aed burst the route before them eastwards to Cenn Curraig. Lonan pressed Cuanu hard. In Dubid they reached one another. Cuanu gave a cast at Lonan so that it went through him. When Cuanu was turning away out, a holly tree puts a pointed branch between the legs of Cuanu so that he fell flat. Lonan then gave him a blow with a big spear, and did not come from him till he cut off his head. It is then Mac Dácherda said:—

11. Oaks and alders will break
For thee to-day, Ruithchern.
There will be a little cloak of spoils around someone
Because of the many feats of Cuanu.
- Sescand of Cluain of the sons of Birnd
The war-goddess has wrought a wondrous deed there.
See ye beside the meadow
The grave of Cuanu son of Cailchin!

O Holly of the sharp point!
 Thou hast caught on the feet of a wondrous one.
 Evil was the luck of the hour when a
 vassal of the country cut thee for his cattle.
 Chilling is the cold in Cuanu's household.¹
 His good wife, the fair band,
 his daughter, his only son.

That was true. There remained near him that night only those three
 (Fer, adds, viz. his son, his wife, his daughter).

For pedigree of Cuanu see F.

HISTORICAL REFERENCES.

AEDH BENNAN.

Keating (For. Feas. vol. iii, p. 83) mentions amongst "the provincial kings and the territorial princes who attended the *Mórdháil Droma Ceat*" (A.D. 575):

Maoldúin mac Aedha Bennáin ri iarthair Mhumhan; Finghín mac Aedha Duibh mic Criomhthainn ri Mumhan uile. In the *Dionbhrollach*, p. 53, Keating says that SS. Fursa, Faolan, and Ultan were children of Aodh Beannan, King of Munster, do réir naomh-sheanchusa Eireann. "*Mors Aedho Bennain.*" AU. 618, *recte* 619, FM. 614.

Keating (vol. iii, p. 119), "It was about this time (in the reign of Suibhne Meann, 615-628), that Aodh Bennain, King of Munster, died."

"Congal, son of Maelduin, son of Aedh Bennain, King of Iarmumha, slain," AU. 689. Three Frag., p. 92; CS. 686, AI. AT. 670; FM. 689.

"It was about this time ('of Dombnell, son of Murchadh, first king of Ireland of the Clann Colman') that Cumascach, king of Ui Failghe, fell by Maelduin, son of Aedh Bennan, king of Munster." KFF. 2381.

Death of a Maeldúin, son of Aedh Bennan, king of Ir. Luachair, 785 A.D.

Keat. (l. 2429) says that "when Turgesius came to Ireland, it was Olchobhar, son of Cionaoth, s. of Congal, s. of Maelduin, s. of Aodh Bennáin, who was king of Munster.

Aedh Bennan ri Muman quievit.

Aedh Bendan don Eoghanacht iar Luachair.

mairg [do] sétaib dianadh ri, cén mair tir dianad buachail.²

¹ The words "inmocht aithgelach" in L are perhaps a gloss which has crept into the text. Cénmair diatuathuib dían buachail.

A sciath intan focrotha a bidbadha fobotha,
césu becan fora muin as ditiú dond Iarmumuin.

(Rev. Celt. xvii, p. 173, AT. cf. AT. 613).

Bellum Cathrach Cindchon la Mumain. Aengus Liathan ó Glind Damain victor erat 7 do téich Maelduin mac Aeda Bennan. AT., AU. CS. 639.

Loscud Mael[c]luin maic Aeda Bennain in Inis Chain. AT., AU. 640, CS. 639, AI. 634, FM. 639.

Aengus Liathan ó Glendamun mortuus est; unde dictum est. [Here an omission.] AT. 642? AT. 638, FM. 640.

This Aengus must have been a son of Cathal mac Aeda, with whom LL. has confused Cathal mac Finngüne.

“O’Donovan says that Cathair Cinncon was the name of a stone fort near Rockbarton, bar. of Small County, Co. Limerick.” Four Mas., A.D. 636, ap. AU. 639.

“Aed Bendan Airdrí Muman quievit; dond Eoganacht.” A.D. 619, CS.

“Cathal mac Aedha rí Muman mortuus est.” CS. 625. This Cathal is perhaps confused by LL. with C., son of Finngüne, son of Cu Cen Máthair. AU., Index, 742.

In a note by O’Flaherty *sub* AD. 629, in CS., are the words, “Bás Cailchin mic Dima ó Liathmuine.” CS.

“Cath Cathrach Cinn Con la Mumain. Oengus Liathana [O Glinn Damhain] victor erat et Maeldúin mac Aedha Bennain fugit.” A.D. 639, CS.

“Cath Cinn Con.” A.D. 641, CS, AT. 642, AU. 642, FM. 640, AI. 636.

“Bass Cuanach mic Cailéin, i. laoch Liathmuine, rí Fernmaige.” A.D. 641. To this Hennessey has the note ‘or of Cloch-Liathmuine, a place in the parish of Kilgullane, bar. of Fermoy, and Co. of Cork.’” CS.

“Maenach mac Fingin Rí Muman mortuus est.” A.D. 658, CS.

“Dormitatio . . . Maeldóid mic Fingin . . . Cū cen máthair mac Cathail, Rí Muman moritur.” A.D. 661, CS.

“Congal mac Maelidúin mic Aeda Bennain, Rí Muman, ab uno scholastico interfectus est.” CS., A.D. 686.

CATHAL MAC (FINGUINE?) AEDA.

“A battle between the Munstermen and Leinstermen, in which perished many of the Leinstermen, and Munstermen almost without number, in which Ceallach, son of Faelchar, king of Ossory, was slain; but Cathal, son of Finguine, king of Munster, escaped.” AU. 734.

So Keating (*For. Fea.*, vol. iii, 2337 ff.), who calls it the "battle of Bealach Féile," and says, "It was Cathal, son of Finghuine, king of Munster, who won that battle." *Three Frag.*, p. 57, call it battle of Aillinn.

The date of Cathal mac Finguine is a century after the time of Mór Mumhan. C. mac F. is the king, affected by the "Craos Deamhan," in "Aislinge meic Conglinne" Meyer (*ib.*, p. 200) says he was king of Munster from 694-737.

"It was about this time (736 AU.) that a meeting took place between Aodh Ollan (Aedh Aldan AU. 733-742) and Cathal, son of F., king of Munster, at Tirdaghlach (Terryglass), in Urmhumha, where they imposed Patrick's rule and law and tribute on Ireland." *Keat. FF.* 2347).

"After that (737 AU.), Flann, son of Cronmhaol, Bishop of Reachruinne (*recte* Reachra) (738 AU.), and Cathal, s. of F., k. of Munster, died." (*Keat.*, *FF.* 2356).

"A hosting by C., s. of F., to the Leinstermen, when he carried off the hostages of the Ui Faelain and great spoils." AU. 737.

"Death of Cathal, son of Finguine, king of Cashel." 741 AU.

The plundering of Magh Breagh by C., s. of F. (*Three Frag.* 720).

Cathal mac Aeda rí Muman mortuus est. CS. 625.

It is obvious that LL. has confused C. mac Aeda with C. mac F. The Cathal of our story was perhaps the brother of Fingen. Perhaps the mention of a son of a Cuanu in AT., AU. 734, AI. 723, FM. 730, and of another son of Cuanu, seven years later, in both cases with Cathal, son of Finguine, may explain the scribe's error. Furthermore a Seachnusach is mentioned *sub an.* 745, 746, a Cuanu in 738, an Aedh Dub, son of Cathal, 746; so the scribe got mixed. Cf. *Anecdota Ir. MSS.* iii. 61.

CUANNA MAC CAILCHÍN.¹

It was in their reign (643-654 AU. Conall Caol and Ceallach, two sons of Maolcobha, &c.) that Cuanna, son of Cailchin, king of Fearmaighe, that is, Laoch Liathmhaine, died, and this Cuanna was a contemporary of Guaire (d. 663 or 666), son of Colman, and there was a rivalry between them in hospitality and charity; and hence the two jesters, Comhdan [son of Da Cearda], and Conall composed between them this stanza on their rivalry, in which they say:—

Dáil gach neith dá mbí 'n-a láimh
Do[g]ni Guaire mac Colmáin;
A mhian fein do gach (n)duine
Dáiltear le laoch Liath-mhuine.

Céitinn. *For. Fea. ar. Eir.* iii. 130.

¹ See page 274.

In "Anecdota from Irish Manuscripts," vol. ii, p. 45, in a list of stories, is mentioned, "Aithi Ruitheirne la Cuana mac Cailcin."

Bass Cailchinn maic Dina o Liathmuine. AT. 629, AU. 628, CS. 629, AI. 623, FM, 624.

Cuanu mac Cailchín ri Fernmuighe (*sic*) i. Laech Liathmune, mortuus est. (For "Fernmuighe", read "Fermuighe", and for "Farney", "Fermoy." AT. 642? AI. 638, FM. 640.

It is remarkable that the last year for which AU. quotes the authority of "The Book of Cuanu" is the same year to which Tighearnach assigns the death of our Cuanu's father. If our Cuanu was identical with the author of "Liber Cuanach," he appears to have desisted from his scholarly work when he became king. Note also how the three poets praise Cuanu in the poem on his death, which shows that he had been a patron of literature.

FINGHIN MAC AEDHA.

Maonach, son of Finghin mac Aedha, dies about the same time as St. Ultan, 662 A.D. K. FF. 2181, AU., FM. 661.

Maenach mac Fingin rí Muman mortuus est. AI. 652, CS. 658; see also K. FF., vol. iii, p. 83. "Finghin mac Aedha Duibh mic Criomhthainn rí Mumhan uile," Finghin son of A., &c., king of all Munster, was one of the provincial kings who attended the Great Convention of Druim Ceat, A.D. 575.

Fingen mac Aedha Duib rí Muman (Ann. Tig.) A.D. 603.

Fingen mac Aedha rí Muman mortuus est, de quo coniunx dixit.

In Muma re lind Fingen maic Aeda robdar lan[a] a cuiledha, robdar toirttigh a treba.

Cathal mac Aedha do gabail rigi Muman. Ann. Tig. 619, Rev. Celt. xvii, 174.

Under this same year Ann. Tig. records the death of Aedh Bannan.

Maenach mac Fingin mic Aedha duib mic Crimthainn mic Feidlimidh mic Aengusa mic Nadfraich. AV. 662.

Aedh Dubh is identical with Aed Crón in Anec. Ir. MSS.¹ iii. 61.

MAC DACHEARDA.

Comhdhán mac Da Cearda died in the reign of Domhnall mac Aedha, rí Eireann (Keating, For. Fea. ar Eirinn, vol. iii, p. 129, Ir. Texts Soc. edit.), A.D. 628-642. Congán mac Dá Chearda is mentioned as one of eight persons living in Arnaigh during the time of Cathal mac Finguine. (See Aisl. Meic Cong., p. 6.)

¹ MS. adds (*perperam*); Bannan a Bregha (*loc. cit.*).

For further information about "the Son of Two Arts, viz., the extreme of folly and the extreme of wisdom," see Mr. J. G. O'Keeffe's edition of "Mac da Cherda and Gummaine Foda" in *Ériu*, vol. v., pp. 18-44.

Comgan mac da cherda mortuus est. AT. 640, AU. 640, CS. 639, AI. 634, FM. 639.

See also "Liadain and Curithir," ed. Kuno Meyer, pp. 12, 13.

"In óinmit tróg dina Déssib .i. Mac Dá Cherda. *Ib.*, p. 14.

"Comgan mac Mail Ochtraig .i. mac rí na nDési Muman," *Ériu* v., p. 20. From this it would appear that Mac Da Cherda was brother-in-law to Fingin mac Aeda Duib, whose wife was daughter of the king of Dési, § 2. Cf. also *Ériu* v., p. 35.

MÓR MUMAN.

"Mor Mhunan ingean Aedha Beannain mortua est. AU. 632." To which Hennessey has the note: "was wife to Finghin, king of Munster ancestor of the O'Sullivans."

"Bas Móire Muman," Chron. Scot. 663.

In "Anecdota from Irish MSS.," vol. ii, p. 53, is mentioned amongst a number of stories: "Neman fir Moire Muman."

Mor Muman, ben Fingen quievit. AT. 633, FM. 628.

GLOSSARY OF RARE WORDS.

The numbers refer to the sections.

acan, 9 H, phonetic for *athgun*.
adtiagar = *ad-tiagar*, 3 s. pres. ind. pass. of *ad-tiag*. *a. dó*, 'they go to him,' 2 H.
ad-ro-grind, 3 s. perf. of *as-grennim*, with pron. m. *d* infix, 'I press hard,' 10.
aicde, f. 'structure, work, building,' 9, where H reads *aige*.
aire, 2 s. ipv. 'rise, arise,' 7 F, H, where L. has *erig*.
aithgelach, 'sharp-cutting,' f. *dilh*, 'sharp,' and *gelim*. 'I graze, cut,' cf. *geal-scian*, ap. Dinneen, 'a surgeon's knife'; *gelistav*, in Cormac's glossary, and *gelestav*, Atkinson. Brehon Laws.
allathis, 'below,' *fäcbais na ceirta a*, 2.
angid, 8 F, *cia no-s-angid*, who protects you?
ar = *an + ro*, 'when' (with perf. tense), *ole sén uave ar do-t-bí*, 11.
artraig, 3 s., pret. of *artraigim*, 'I appear,' 2 H.

atanconnaic = *ad-dan-com-dnic*, lit. 'has happened to us,' i.e. 'we are.' *Aes cerdda a.*, 'we are poets,' 8. Where H reads *aes cerdda inn*, 'poets we.'
ataraig = *ad-da-raig*, 'she arises,' lit. 'she raises herself,' fr. *ess-reg-* with infix. 3 s. f. pron. *-si* in *ataraigsi* 2, is the emphat. pron. 3 s. f.
albert = *ad-d-berb*, 3 s. pret. of *as-biur*, with infix. 3 s. neut. *d*. 'She said it,' 4 F.
atche, 3 s. pres. subj. of *ad-ciu*, 'I see,' or possibly intended for *atchi* = *ad-d-chí*, 5.
atchi = *ad-d-chi*, 'he sees it,' 3 s. pres. ind. of *ad-ciu*.
atchuas = *ad-d-chuas*, 3 s. pret. pass. of *ad-fét*, with neut. pron. *d* infix. 'It has been told,' 4.
athgén, 1 s. perf., with pres. sense of *ad-gnin*, 'he knows,' 3, 4.

athgeóin, 3 s. perf. with pres. sense. of *ad-guin*, 3, 4.

ath-guin, *g. athgona*, 'wounding.' The prefix is simply intensive, and does not denote repetition, 9.

atnagar = *ad-d-na-gar*, 3 s. pres. ind. pass. of *ad-naic*? *a. dó*, 'it is bestowed on him,' 2 F. Cf. *atnag*, Fel. Oen. LB. note to Feb. 11, and see Mr. Purton's note in Rev. Celt., 27, 68.

atracht = *ad-án-racht*, 3 s. t-pret. of *ress-reg.*, lit. 'he raised himself,' 6. Cf. *ataraig*.

banna, 'band,' 11.

bas-ní, 'which will be the thing,' 6, *bas* being the 3 s. fut. rel. of *is*.

bennán, 'diminut. of *benn* = 'horn, peak, &c.'

bia, 2 s. fut. of *tá*, 10; 3 s. fut. of *td*, 2 H.

bhidéteen, 'it will be necessary for thee,' 2. cf. *issum écen*, 'I must,' Wb. 10 d, 24.

bith, verb. noun of *td*, 9, cf. Wb. 5a 13, 11c 10.

bla, *Loch Cend fabla*. Add. 'place, land.'

brothe leacht Fingin reill a brotha. Add. 'rushes (F), sedge (F)'

cale, f. 'peasant-woman, hussy,' 2.

cantol, 'singing,' Add.

cenach, 11 F = *cen acht* (F) 'only with, without (anyone) but.'

cencop = *cen eo* (r)-p. (lit. 'without that it be'), 'though it be not,' 2, 6.

cengat, 3 pl. pres. ind. conjunct. form of *cingim*, 'I step, march.' *do cengat*, 5.

ceirdchib, 2 F, dat. pl. of *ceirteach* (F) 'a rag'; or a mistake for *certib*.

céla-bíi, 'first was, was before,' 6.

cia, 'what? which?' *ceonafess cia du do dechaid*, 1, 'who? whom?' 8, 'whither?' *can duib 7 cia nosaigid*.

ciannatai, 5, = *cia ammi tdi* (F) 'how (is it that) we are silent.' For *tdi* = 'silent.' See Windisch, Táin Vocab. Cf. *imatai*.

ciá (1) 'whither? *ciá imatái*, 'whither may it be marching,' 5 F. See Meyer, *Contribb. sub 2 ciá* (2).

(2) 'why? what?' Add.

(3) 'even, though it be.' *ce*, 'though,' with 3 s. pres. and perf. subj. of *is*, 6.

cimeada, Add. acc. plur. of *cimbíd*, 'a captive, prisoner.'

cloistecht, 'act of hearing,' *oe c. friesi*, 6.

coistecht (*coitsecht*), 'act of hearing,' 6 F, verb. noun of *con-tuasim*.

com-airichas, 'equal honour, dignity,' 2.

com-uáill, 'equal pride,' 8, dat. s. of *com-uáill*.

conatarlai for *con-da-tarlai*, *da* being infix. 3 s. f. pron. and *tarla*, 3 s. perf. conjunct. to *do-ra-le*, 'happened, she put herself,' 2, 10.

conatarlaic, 3 s. perf. of a *con-* compound with 3 s. f. rel. pron. infix, *-da-*, of *do-air-leicin*, 'I throw,' 2.

conigi = *con-* with 2 s. pres. subj. from verb stem *-icc* = 'come,' 11 F.

con-óí, 3 s. pres. ind. 'guards, preserves,' 6.

corco, neut., 'a tribe,' 8.

crad, 'property, riches, treasure': *nochar é r Alid fa crad*, 'who did not refuse a poet as concerns a reward.' Add.

cunad, g. s. of *cumha f.* 'sorrow.' Add.

cungid, 'seeking, asking,' verb. n. of *condieig*, 1.

dáig (F) = *dóig* (F), 4. 'likely.'

dáig, 'for the sake of,' *do táig*, 11. *fodaig*, 11. *dairthech*: *ba aicde na d. ní*, 9; reading of L prob. corrupt. d. 'oak-house, oratory,' makes no sense here. Read with F *tairthedh*.

dam, 5, 'house building.'

Damnatan, prop. n. f. gen. of *Damnait*, 5.

dánú, compar. of *dána*, 'bold, daring,' 7.

décauid, 2 pl. ipr. of *décaim*, 'I see, look at,' 11.

deit, 'to thee,' *dó* + suffix. 2 s. pron., 10.

deithber, 'fitting, proper,' 6.

dermatar, 3 s. pres. ind. pass. conjunct. of *do-ro-moinethar*, 'forgets,' 6.

deruig, *ród*, 3 s. perf. of *dérgim*, 'I prepare a couch or bed,' 2.

dia tailceibe = *di* + *a(n)* + *to-ad-léice* (F) cf. *-tailced* = *to-ad-léced*, *tailcind*, *du-d-failci*, *du-failced*, note d. Thes. Palaeohib., vol. ii, p. 240. 'To whom you would let it back.'

-dig, 3 s. pres. subj. of *tiagu*, 'I go.' *cond.*, 6.

díli, 6 F: *díliú*, 6, comparat. of *díl*, 'dear, fond.'

díngne, 6 F; *díngnea*, 6, for *digneá*, 3 s. fut. of *do-gniu*, prototon, 'I do.'

dodon (F), 6 = *do* + *don*, 'thy lord.'

dofainic, 2 F = *donuanic* in L. cf. *dosfanic*, Fled. Bri. 41.

dofedar, 2, 3 s. pres. subj. rel. of *do-feáim*, 'I send.' *dofedar fri*, 'is compared, contrasted with.'

doléice = *do-n-léice*, 2 s. pres. subj. of *do-léicim*, 'I throw, put out,' with rel. infix. *-n-*, 7.

don, 6, 'lord.' See Ériu iv., 148, and Vocab. to Tog. Trai.

donnánic = *do-n-ad-ánic*, 3 s. pret. of *do-ice*, 'comes,' with rel. n. and rel. 3 s. f. *-da-* infix., 2.

do-su-arruid, 3 s. pret. (with 3 p. infix.) of a compound, *to-air-reth*, 'overtake, seize,' 7. *do taig*, 11 = *do-do-dáig* (F) 'for thy sake.'

do-t-bi: *ar-dot-bi*, 11: Meyer, Contribb. sub *ar-bdi* takes it as: 'was before thee, in store for thee.' This leaves no verb to express the action of *aithechthuath*. I take *do-t-bi* as a pret. 3 s. of *do-benim*, 'I cut,' with inf. 2 s. pron.

dreghid, 3 pl. fut. of *dreisim*, 'I break.' See Kuno Meyer, Todd Lect., Series xv, glossary.

dua, 'a mound,' *dar d. ind. liss*, 1, cf. Laws, *Glos. duac* and *Gloss Féil. Aen. dardoe*.

dubid, 10 = *dub-fid*, 'black wood, dark forest.'

dubui: *co-ro-d.*, 2; 3 s. pret. of *dubaim*, 'I grow black.'

dubib, 10 F = *dubaib* (?) 'dark places.' L has *dubid*, q. v.

eanna, 9 H. *cond e.* (?). A proper name (?) : cf. *Ériu*, v. 71.

écan, f. g. *éicne*, 'constraint, necessity,' *bid*-[*d*]it-e, 'you will be compelled,' 2.

eidírcheim, 4 H, 'remote'; *ane.*, 'from afar.'

ér, 3 s. pret. of *éram*, 'I refuse, deny.'

erlui, 7, *erlai*, 7 F, *con-e*, 3 s. perf. of *as-lui*, 'escapes.'

étoil, 'displeasure,' *car nech nā digneu th' étoil*, 6.

faasu, 2 s. pres. subj. of *foaim*, 'I sleep,' 2 F. *fabla* ? Add. = *fa bla* (?).

faidi: *co-ro-faidi-si*, 2 H, 2 s. pres. subj. fr. *faidim* (?) 'I sleep,' where F has *faasu* and L *foa-su*: cf. Mod. Ir. *faoidhim*, 'I die, rest (?) sleep (?)'

faifem-, *nichon*, f. -ni, 1 pl. fut. of *foaim*, 'I sleep,' 2.

faisiu, acc. s. of *faisiu* f. 'seeing, sight,' verb. n. of *ad-ciu*, 'I see.' The *f* is prothetic.

fáith, m. 'a prophet, seer,' f. *Dé*, 4.

feis: *co nā f.*, 1, = *fess*.

femin, 'reeds(?), weeds.' *atche f. in Loch Cend*, 5. The proper name *Magh Feinean* hardly makes sense: cf. Dinneen, Dict., sub *jeam*.

fer, 2 s. ipv. of *feraim*, 'I pour,' 6.

ferd, 11 F, where L has *fern*.

fern, m. g. *ferna*, 'an alder tree.' Used as a collective, 11.

fibhair, 3 s. fut. pass. of *foaim*, 'I sleep,' used impersonally, 9: cf. *fbaid*, LL 251 b 24, 2 pl. s-fut.

fidbaidi, g. s. of *fidbad*, f. 'a wood.' Add. *finnabrach*, 'fair-browed, fair-tufted.' *ionad aiteinn findabrach*, 5; note, where *f.* is either nom. s. with *ionad* or g. pl. with *aiteinn*.

foa, 2 s. pr. subj. of *foaim*, 'I sleep,' 2.

foáig, 'for the sake of,' with gen. *f. imnonsa Cuanaich*, 11.

foi, 2 s. ipr. of *foaim*, 'I sleep,' 2.

fo-m-airneca, 6, 2 s. perf. with infix.-m- 1 s. pron. 'thou hast found me.' See Windisch *Wört. airnecht i. fagail no frith*, etc., cf. *airniemair*, 'we found,' Er. 4, 152.

for-bfaelid, 'joyous,' 5.

forcam, 10 F = *forgab*.

forgab, g. *forgab*, 'a blow,' 10.

fothe = OI *foi*, 'under, about, upon her,' *doratad fualang*, f., 1.

fualang, 'madness, derangement,' i. (Dinneen).

fuasna, 'a blow,' 10.

fuasnad, 'a blow,' 10 F.

fuaid, g. s. of *foab*, 'spoils, plunder, espec. of weapons,' 11. cf. Táin, Windisch, 536: *bid ferda firfitir fuaid*; where see note ad loc.

gair, 3, 4, 'short, near': *innach Luachair bon-gair dō*.

gait, 3, dat. s. of the verb. noun of *gataim*, 'I take, steal.'

geoin, 3 F, 'a shout, cry.'

gluais, 7, 2 s. ipv. of *gluaisin*, 'I move, stir': here trans.

idsi, 6 F, leg. *bidsi*.

il-monsa, 11, g. s. of *il-monas* (?) 'many doughty deeds,' cf. *coitchenna*, g. s. of *coitchennas*, 'commonness,' in Sg. 203a15. F has *riomsa*. Or is it a formation from Gr. *eleēmōsunē*?

imata: *cid i. iar R.* Add., leg. with F. *imatāi*, 3 s. pres. subj. of *im-tiag*, 'I set forth, march.'

imatāi. See preceding.

imbir, 7 F: In 7 L, read *aniar a sid an-imbir*. *imbir* is 3 s. pres. ind. of *im-berim*, 'I bring, carry around, 1 play, ply, practise.'

immatarruid, 10, 3 s. pret. of *imna-to-air-reth* followed by *doib*, lit. 'there was a mutual overtaking for them,' hence 'they come up with, grapple with one another.' See *Glos. to Stories from the Táin* (Strachan), sub. *immasnithar doib*. cf. *tairthedh*.

immonetar, 4, 2 s. pres. ind. with 3 s. m-an-infix of *imm-fetar*, 'I know well.' The adv. *immanetar*, 'between themselves' (Wb. 13c 26) does not suit here.

immothaeth, 8, for OI. *immo-tóith*, 3 s. fut. of *tuitim*, 'I fall,' with prefix *immo-*, denoting reciprocity and *doib*, dat. of person concerned: cf. preceding.

immusretis, 9, 3 pl. past habit. of *imm-rethaim*, 'I run round, on, about,' with infixed f. s. 3 per. pron. -s-, referring to *int slige*.

- imossa*, 6 F, where L has *innoussa*. leg. *am-ba-sa*, 'I (emphat.) am younger,' or *ind-mou-sa*, 'in this greater way': cf. *ind laigin* = 'minus,' so *ind mou* = 'plus.'
- indócht*, 11 F, where L has *innocht*. *Ind ócht*, 'the cold.'
- indossa*, 8, 'now' = *ind-foss-sa*, 'this staying.'
- ind-seon*, 10 = *ind*. 5 + *seon*, emphat. suffix. pron.
- iniáite*, 5 L, corrupt. Read with note *inad atend*. *in iddiliu*, 6 = *inid diliu*. *inid*, 'since,' cf. *inid éd só fili and*, 'since it is as it is.' Ériu i. 120, 12. Or perhaps read *in did diliu*, 'is it dearer, more fitting, to thee?' See *innoussa*: cf. Sg. 222b. *ind inidlean*, gl. 'clanculum' and *inidil*, gl. 'clandestinus.'
- inn*, 8 H, 'we,' *aes cerda inn*.
- innach*, 3, 4, = *in-nach*. 'in the fact that not.' Ériu i. 12.
- innocht*, 2, 11, 'to-night.'
- innoussa*, 6. Read *in-did-diliu*, i. i. n. *indóssa*.
Indóo-so = *andóo-sa*: cf. *indaas*, *oldaas*, &c. 'Is thought of the dead man dearer to thee than I am?'
- laind*, 5 acc. s. of *lann*, f. 'church-land.'
- lénai*, 11, g. s. of *léna*, *lénae*, m. 'a meadow.'
- lothrai*, 2 F, acc. p. of *lothra*, 'a miry, marshy place.' cf. *lôth-omar*, LL 54a, 'a wash-tub,' *lôthor*, Sg. 49a, *lothur*, Carlsruhe Beda, 39 CL, 'a basin,' and see Windisch 'Wört. loth, lothor.'
- mad*, 4, = *má*, 'if' + 3 s. pr. subj. of *is*.
- mad*, 8, *mad meic C. tiasat*: *mad* = *mat*, 3 pl. pr. subj. of *is*, with *má*, 'if.'
- maid*: *ró-m*. 10 F, 3 s. per. of *maidim*, 'I break,' used impersonally.
- mar*: *díbad mar ba*, 5. *mar* = *már* = *mór*, 'great.'
- mása*, 9, = *ma*, 'if,' + 3 s. pres. indic. of *is*. OI. *masu*, *maso*.
- memaíd*: *róm*, 10, 3 s. redupl. perf. of *maidim*, 'I break, rout.' cf. *maid*.
- michair*. Add., 'gentle, loving.'
- mol*, 6. *molad* would be the *formolad* (see Archiv für Celt. Lexiko., vol. i, p. 7) of *mol*. So perhaps *mol* = *molad*, 'praise.' Read then:
A ben ucut na fer mol. frisín marb dochruaid do don.
'O woman over there! pour not praise upon the dead, thy lord has gone.'
- natainisiu*, 2 L, where the facsimile has wrongly *natamisiu*. *Natainisiu* = *no-t-ainisiu*, 1 s. fut. of *angid*, 'protects,' with prefix *no*, infix 2 s. -*t*- and emphat. 2 s. -*niu*.
- natanabso*, 2 H = *no-t-anab-so*, -*anab*, being 1 s. of the "F." fut. of *angid*.
- ni-t-r-icfan*, 10, 'we shall not be able to cure thee,' where *r* (= *ro*) expresses possibility.
- nocha* (?) 9 H: *cossin láithe romuadháid nocha im thoibn C.*, where L has *ganem* and F *ganim*, *Nocha* = 'not.' An leg. *nochtu* 'nakedness'?
- nochon* = *ní* 'not,' *no-chonfaifeim-ní* 2 F, where L has *nochon-icfan-ní*, a case of haplography. *nochon-accas-si* 6, *nocho-roacht*, 8, = *nd roacht* 8 F.
- no-da-sloinne*, 2, 3 s. pret. of *sloinnim*, 'I name,' with 3 s. f. rel. infix. -*da*- and prefix *no*-. See *no*- (3).
- no-saigid*, 8. 2 p. pres. ind. of *saigim*, 'I approach.'
- no-saigid*, 8 F, with punc. del. over *n*, 'who protects you.'
- no-t-anub-sa*, 2, 1 s. fut. of *angid*, 'protects,' with prefix *no*- (2), infix 2 s. -*t*- and emphat. 1 s. suffix -*sa*.
- ón*, 'from whom,' *ó* + rel. -*n*, *ón buidech badb*, 'from, by whom the raven or war-goddess is grateful.' Add.
- ór*, conj. 'since,' *ór is ferr a cénel*, 2.
- raind*, 11 F, *dobert bodb écht nama r*, 'war hath wrought a dreadful deed—an enemy (*náma*) in our estimation, *raind* = *rinn* = *linn*.
- rimbir*, corrupt reading of LL in 7. Read *anir a síd an r-imbir* or a *n-imbir*, 'what he has practised,' or 'what he practises,' cf. *imbir*.
- risonsa* (?) 11 F. (where L has *ilmonsá*) = *risson-sa* (?) this before that.
- ro-t-mairg*, 1, 1, 'woe to thee.' cf. *rou-marg-sa de síde*, 'I [we are] am sorry for that,' TBC. Windisch, p. 349. *Ro-t-mairg-si a Shattain*, 'woe to thee, Satan,' PH 3837. *am mairgy sea*, LU 52b. See Wind. TBC. l.c. *mairg* i. *mí-serve*, Archiv f. Celt. Lex. i. 9. *mairg* = *mo-óire*, Zimmer, KZ. xxx. Ériu ii. 22.
- saigid*, 2 p. pr. ind. of *saigim*, 'I make for,' *cia no-saigid*, 'whither go ye?' 8.
- saigmít*, 8, 1 pl. pres. ind. of *saigim*: *co C. S.*, 'we are making for C.' The accent is noticeable.
- sarubad*, 8 H = *sár-rubad*, 'excessive, violent, despoiling or thrusting with spears.' See *rubad*, Lecan Glos. Archiv f. Celt. Lex., vol. i, p. 92.
- scichis*: *ro-s*. 10 L = *ro-scilhis* F = *ro-sgidáis* H. 2 s. perf. of *sciehim*, *scithim* *sgisdaím* *ro-s. deif féin*, 'you have worn yourself out.'

sén, 11, 'blessing, luck,' *ole s. uare*, 'woe worth the hour.'

slabrai, 11, *slabri*, 11 F, d. s. of *slabhrae*, i. *cethir*, 'quadruped,' Arch. f. Celt. Lexiko., i. 28, 'cows, cattle.'

somtha, 5.- cf. *soim*, 'rich' (Lecan Gloss.) *dommatu*, 'poverty' (O'Mulconry's Gloss.), *somtha* = (?) 'riches.'

sóud, dat. of verb. noun of *sóim*, 'I turn.' *oc sóud*, 10.

taffand, 'chasing.' *oc t.* 8, verb. noun of *do-sennim*.

taig: *do t. = do do dhaig*, 11, 'for thy sake.' cf. *fo daig*, 11.

-tailcibe. See *diatailcibe*.

tairthedh, 9 F, 3 s. ipf. ind. of a compound. *to-air-reth-*, 'overtake, seize.' cf. *imma-tarraid*, 10.

arthand, 9 H, 3 s. pres. habit. of a compound, *to-air-reth-*, 'overtakes, seizes.' cf. *tairthedh*.

tia: *tia do boi*, 6 F = *inte*, *intí do boi*, 'the person who was, who existed.'

tigmis, Add., 1 pl. ipv. ind. of *tigim*, 'I come.'

tomtha, 5, g. s. (of respect) of *tomad*, 'threat, threatening.'

tossaig, 1, 1, 1, 2, i t., 'at first.' cf. i *tossugh*, Wb. 22b 8, 22c10; i *tossich*, Wb. 15d11; *hi tossuch*, Wb. 20b22, 5a11, 18c14; i *tossoch*, Wb. 18d11.

treis, 8, dat. s. of *tress*, g. *tressa*, *treise*, 'a fight.'

trell: 'space, time, while, occasion.' *fu haibinn do bimis t.* 'pleasant we used to be once upon a time.' Add.

tua, 6, 'silence.' cf. Ériu ii, 64.

-uagad ro-n-uagad, 9, 3 s. perf. pass. of *uagaim*, 'I stitch, sew,' or—which is more likely—a verb *uagaim*, 'I make a grave.' cf. *uag*, 'a grave.' *Ronuaadh* H is an instance of the common confusion of dental and guttural.

siarach, 11, 'cold,' adj.

uasbi, 1 F, misspelling for *uasdí*, 'over her.'

uastu, 1, 'over them.' Read *uastí*, 'over her.'

ucután, 6, a playful diminutive of *ucut*, 'yon, that yonder.'

uilind, 5. See Proper Names.

uimmi, 11, nom. pl. of *omnae*, f. 'a tree; oak.'

uinius, 11 F, 'ash-tree.'

NAMES OF PERSONS.

Aedh Bennán F. Bennain L. 1, 3, 7, ob. A.D., 619.

Cathal mac Finguine, 3, 6, 7, ob. 737. The Cathal of our story must be C. mac Aeda (ob. Chron. Scot. 625) and brother or first cousin of Fingen. Cathal mac Aeda became K. of Munster 619 AT.

Cuanu mac Cailchin, 7, 8, 9, 10, 11, ob. 629.

Damnait, g. Damnatán L. F. Damnadtha H. 5, apparently wife of Aed Dubh and mother of Fingin and Cathal.

Fingin mac Aedha, 2, 3, 4, 5, ob. 619.

Ingen rí na nDési, 2, wife of Fingin. The rí na nDési was Mael Ochtraig, father of Mac Dacherda. cf. Ériu v., p. 21.

Lonán mac Buiúg (F.) Findig, Findnig (L.) 7, called in *Lonán* 'the little blackbird.' Mochua, son of Lonán, died 654 CS.

Mac Dácherda, 4, 11, ob. 640.

Mór of Munster, ob. 633.

Rí na nDési, 7.

Ruithchern, daughter of Aed Bennan, sister of Mór, and wife of Lónan, 3, 5, 7, 11.

Sechnasach mac Fingin is perhaps identical with Maenach ('dear one') mac F., for whom see account of F.

SUCCESSION OF MUNSTER KINGS.

[This list is compiled from AU., FM., CS., AI., AT., KFF.]

AENGUS MAC NADFRACH, in Cashel, who died 489 AU., 488 FM., 487 CS., 484 AI., was father of

Eochaídh, who died AT. CS. 520. His son CRIMTHAND became k. 520 AT., CS. His son CAIRBRE k. AT., AU. 546, 547, CS. 543, AI. 532, FM. 537, ob. AT., AU. 578.

Cormac mac Ailella AT., AU. 548, CS. 545, FM. 548, called k. of Munster,' AT., p. 139. Rev. Celt., vol. 17, and 'k. of Leinster,' p. 140.

FERGUS SCANDAL, AT., AU. 518, ob. AT., CS. 583, FM. 583, 'cui successit Feitlimid mac Tigernaigh qui rex . . .' AT.

FEIDLIMID MAC TIGERNAIGH, ob. AT., AU., CS. 589.
 Garban mac Enda and Amalgaidh, his brother, AT.
 AMALGAIDH MAC ENDA, ob. AT. (CS. 603).
 FINGEN MAC AEDHA DUIB, AT. (AU. 602, CS. 603), ob. 619, AT.
 Cathal mac Aedha became k. AT. 619.
 Aed Bennan áird-rí Muman quievit, CS. 619, AT.
 CATHAL MAC AEDA, k. of M., AT. (AI. 620), ob. 625, CS.
 FAILBE FLAND, AT. 625, AU. 625, (CS. 626), FM. 622, ob. 636, AU., AT., CS.
 CUAN MAC AMALGAIDH, ob. 638, AT.
 Cuan mac Enda, ob. 646, CS.
 Cuan mac Amalgaidh maic Enda, ob. AT. (641 AI., FM., 645).
 Mældúin mac Aeda Bennain, ob. 658 CS.
 MAENACH MAC FINGIN, ob. AT. 658, CS. 625, AI.

Maenach mac Fingini mic Aedha duib mic Crimthainn mic Feidhlimidh mic Aengusa mic Nadfraich, ob. 661 AU.
 CÚ CEN MÁTHAIR MAC CATHAIL, ob. 661 CS., AT., AU. 664, AI. 656, FM. 654.
 Cu cen mathair mac Cathail mic Aeda mic Cairbri mic Crimtain, AU. 664.
 CORMAC MAC FAILBE FLANN, AT. 664.
 COLGAN MAC FAILBE FLANN, ob. AT. (677 AU., 674 CS., 676 FM.).
 FINGAINE MAC CON CEN MATHAIR, ob. AT., AU. 695, CS. 692, FM. 694.
 Congal mac Mældúin maic Aeda Bennan ri Iar-Muman, ob. AU. 689, CS. 686, AI. 670, FM. 689, AC. 689, AT.
 AILILL MAC CON CEN MATHAIR, ob. AT., AU. 700, CS. 697, AI. 687, FM. 700.
 CORMAC MAC AILILLA, ob. AU. 712.
 Cormac mac Maenaig, ob. 708, CS. 709, AT., AI. 701, FM. 710.
 CATHAL MAC FINGUINE, ob. AU. 741, AI. 730, FM. 737, AT.

NAMES OF PLACES.

Aine, 3, Knockany, Co. Limerick.
 Airthir Féimin, 8. See Féimin.
 Caisiul, 2. Cashel.
 Crich Ua Liathain, 3. District around Castlelyons, Co. Cork, extending to and including Great Island in Cork Harbour.
 Cluain maccu Birn, 11. cf. "Nem mac hui Birn pausat," AU. 654.
 Ciarraige (Luachra ?) 8. Co. Kerry, North and N.E.
 Corco Bascind, 8, co-extensive with the present baronies of Clonderlaw and Moyarta in south County Clare.
 Corco Duibne, 8, barony of Corkaguiney, Co. Kerry.
 Corco Loigde, 8, baronies of Bantry, Bear, and Carbery, Co. Cork.
 Corco Mruad, 8, Corcomroe, bar. Co. Clare.
 Cenn Curraig, 10 (?), In bar. Kenry, Co. Limerick: cf. Ériu iv, p. 170. In bar. Shanid (?) cf. R.C. 15, 442 and 14, 243.
 Cenn Chon. Note "Aedh Pennán." Cathair Cinn Con, a stone fort near Rockbarton, Co. Limerick.
 Désí, 2, 7, 8. Decies, bars. Co. Waterford and Ifa, and Offa, bar. Co. Tipperary.
 Dún Chaireda, 3, 4. In Crich Ua Liathain.
 Hele, 8. Eliogarty and Ikerrin, baronies, Co. Tipperary; and Ballybrit and Clonlish, baronies, King's Co.
 Eoganacht, 3, 4. Descendants of Eogan Mór.

Eoghanachtá Caisil and E. Loch Lein, who were a branch of the E. of Cashel, and lived to the E. of Lower Lake of Killarney in Magunihy, bar. Co. Kerry: cf. Ériu iii., p. 138.
 Féimin, 5. Magh F, a plain in bar. of Ifa and Offa, Co. Tipperary.
 Fer Maige Féne, 8. Fermoy, Co. Cork.
 Glendomain, Glennamain, 3, 5, Glanworth, Co. Cork: cf. Táin, B.C., Windisch, Vocab.
 Inne Mór, 10.
 Ir Luachair, 1, N.E. of Kerry, with adjacent parts of Limerick and Cork.
 Lann Lothra, 5, Lorrha in N. Tipperary.
 Liathmuine, 7, Cloghleaifin, bar. of Condons and Clangibbon, Co. Cork.
 Loch Cenn, 5, a lake which formerly existed to the N. of Knockainy, Co. Limerick. Hennessey, CS. cf. Lismore Lives, p. 98. It seems that there was another Loch Cenn in Magh Féimin: cf. Anecdota from Ir. MSS. iii, 60, E, and R.C. 16, 164.
 Loch Léin, 4, Lower Lake, Killarney.
 Luachair Degdad, 10 (T.B.C. Windisch, p. 851). Sieve Logher between Kerry and Limerick.
 Muscraige Bregain, 8, in bar. of Clanwilliam, Co. Tipperary.
 Osraige, 8, Ossory.
 Uilind, 5, Uilleann, seat of King of Cashel, B. of Lecan, 317. (Onomasticon, Hogan.) And see name of story mentioned in Anec. ii. 47, "Orgain Rátha Uilne."

X.

ON CERTAIN MEGALITHIC REMAINS IMMEDIATELY
SURROUNDING LOUGH GUR, COUNTY LIMERICK.

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PLATES XXIII-XXXI.

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I. INTRODUCTION.

LOUGH GUR is a very picturesquely situated piece of water in the County of Limerick, about three miles north of Bruff. Both in history and legend it is a place of great distinction; but I do not propose to concern myself in this paper with either of these aspects. Nor do I propose on this occasion to give a list of the extraordinarily varied objects, stone, bronze, and otherwise, which have been found in or near it, though such a list would be very interesting and instructive. I propose to confine myself to giving an account of certain megalithic structures immediately surrounding the lake. These objects have been mentioned by numerous writers; and some description has been given of them by each of the following authors:—Professor Harkness, F.R.S., formerly of this College, in the *Quarterly Journal of Science* for 1869, p. 388; the Rev. J. A. Lynch in the *Journal of the Cork Historical and Archaeological Society* for 1895, pp. 241 and 289; Mr. A. L. Lewis in the *Journal of the Anthropological Institute*, vol. xii, p. 517.

In none of these accounts, however, is there any attempt at a complete survey of the interesting objects concerned, nor are all the objects forming the various groups with which I deal mentioned in any of the papers.

On my first visit to this district I had not time to do more than gain a general idea of its antiquities; but I was so much impressed by them that I made up my mind to make a prolonged visit in order to obtain a complete and accurate survey of them. In this work, which occupied some time, I was greatly assisted by my wife, to whom some of the illustrations in this paper are due. Professor Alexander was good enough to accompany me, and to secure the assistance of one of his senior students, Mr. J. F. X. Hartigan. To these gentlemen, who were able to work with a theodolite and other instruments which I am not capable of employing, I owe the greater part of the Survey, and especially the accurate plans of some of the objects (figs. 1, 2, 3,

4, 5) which appear in this paper. It would be very unjust were I to omit my thanks not only to them but also to Mrs. Fitzgerald, of Holy Cross Cottage, the occupier of the land, whose great care of the large circle cannot be too highly commended, and for whose kindness and assistance to us in our work we were all most grateful. I have not attempted any philological, ethnological, or other discussion in connexion with these objects. A good deal has already been done in this way, and, if I may say so, much of what has been done seems to me to be very open to criticism. What I have been anxious to do is to give an actual and accurate record of the objects now existing, and, as far as I can, of their relationship to one another. There is, however, one historical point to which I must refer, since, as will be seen, it has a bearing on a matter to be discussed later on. The hill called Knockadoon (see Map) is bounded on the west and on the westerly parts of its north and south portions by the lake. On its east side is swampy ground, frequently over-flooded, once part of the lake. On the southern extremity it is guarded by the Black Castle, and on the north by Bouchier's Castle. This eminence of Knockadoon, which rises something over 400 feet, was obviously once an island. In fact, it was such in 1600. In *Pacata Hibernia* (p. 80 of the reprint of 1810) it is stated to have been "a place of exceeding strength by reason that it was an Iland and encompassed with a deepe Lough." From the present position of the ground it is obvious that there were two spots at which access to the island was comparatively easy. Probably there was a ford at each of these two places, and the two points were guarded by the castles. A good deal has been done in the way of draining the lake, and the result is that Knockadoon is no longer an island and that the level of the water of the lake has everywhere been much decreased.

It is clear that this lake has from a very early period been the centre of a considerable population. This population was doubtless attracted and supported by the great number of animals, birds, and fish which its shores and waters must have provided. As is well known, it has been a fruitful field for the discovery of skeletons of *Cervus Megaceros*. *Bos Longifrons* has also been found there. Many bones of both these animals, together with a large number of celts of the familiar Irish type from this locality, are now in the College Museum.

With respect to the names of some of the objects described in this paper, the following notes may be made:—The gallaun "A" is said by Mr. Lynch to be known to the people around as "The Pillar." I did not hear this term employed myself; and in any case it probably has no significance. The great circle "B" is called on the Ordnance map "Rannach Cruim Duibh." Mr. Lynch says that the great stone (No. 1 in my list) is called Ronadh Crum Dubh (surely that should be Cruim Duibh?), and that this means Black

Crum's Staff. The significance of this name has been much insisted on, but I refrain from further dealing with it, since such a task should be left to experienced Irish scholars and folk-lorists. The small dolmen "F" is called *Leaba na Muice*, i.e. the pig's bed, a term employed in the case of at least one other dolmen known to me in Co. Cork. Mr. Lynch's remarks on this seem to be due to a misapprehension of the meaning of the word "Mucoi" (for which see Henebry, *Journ. Ivernian Soc.*, vol. iii, p. 73). The cistvaen "H" is called *Giants' Graves*, a common enough name for such objects. It is also known as *Leaba Diarmuid agus Grania*, again a common name.

Not being an astronomer, I cannot myself make any comments on the bearings of the various structures described, but wherever it seemed possible to me that such bearings might possibly be significant, they were taken with a prismatic compass. I submitted them to my cousin, Captain Boyle Somerville, R.N., who is an expert in this matter.¹ The notes respecting the bearings which he has been kind enough to send me are appended to the descriptions of the objects to which they relate.

II. DESCRIPTION.

In order to simplify the division of the objects under description I divide them into the following Groups which are clearly shown and lettered as below in the accompanying map:—

- I. Objects near Holy Cross Cottage. These include objects A-E. (See fig. 1.)
- II. Objects between Holy Cross cross-roads and the Black Castle, F-I.
- III. Objects north of Lough Gur, N-S.
- IV. Objects on Knockadoon, J-M.
- V. Object on side of Knockfennell, T.

I. "A" (figs. 1 and 6).

"THE PILLAR."

This object is a large gallaun inclining at a considerable angle to the ground and of the following measurements:—

Maximum height above ground,	10 feet 2 inches.
„ thickness,	3 feet 5 inches.
„ length,	6 feet 9 inches.
„ girth,	18 feet 8 inches.

It is placed more or less to the north of the other objects in this Group; its exact bearing from the centre of the circle C over the centre of No. 3 stone being $55^{\circ} 48''$.

¹ It was a source of great regret to him as well as to myself that he could not come with us, as we had always hoped to make a joint survey of the district.

The distance from the centre of this circle to the S.W. angle of the gallaun is 1139 feet 5 inches. This gallaun when viewed from the other objects is not a horizon mark, since it stands on the lower slopes of the small eminence on which is an ordnance bench-mark.

I. "B."

"RANNACH CRUIM DUIBH" OF O.S.

This large circle, the most important of the objects in this district, presents several very remarkable features, and must be completely described. There is this difficulty concerning it, that it was restored, as Mr. Lynch says, by the Count de Salis and the tenants of the farm, the late Messrs. John and Edward Fitzgerald. It is, therefore, rather difficult to feel quite certain which of the stones are in their ancient position and which have been placed there by the restorers. Mr. Lynch states that "on inquiring from Mr. Edward Fitzgerald he informs me that he and his brother only introduced at the time of the restoration very few stones into the circle, and that all the rest belonging to it had fallen from their upright position and been covered by the earth from the surrounding rath." Mr. Edward Fitzgerald is unfortunately no more; and I can only give an account of the circle as it at present exists, and express my opinion as to those portions of it which are really ancient. The stones which compose it fall naturally into four groups:—

(1) Great stones projecting a considerable distance above the edge of the mound. There is no reason to doubt that all these are ancient.

(2) Lining-stones intervening between the others, and more or less the same height as the inner surface of the mound itself. I entertain no kind of doubt that the great majority of these are ancient.

(3) Small walling-stones, sometimes in two or even three tiers, which intervene at certain spots. These may or may not be ancient, but in any case are of little importance.

(4) Loose stones placed on the tops of others, and forming prominent objects along the margin of the bank. These may or may not be ancient. For my own part I have grave doubts about them, though the brother-in-law of the late Mr. Fitzgerald told me that the most curious in shape of these (the "eccentric stone," above No. 73 stone, see fig. 11) had not been placed there at the time of the restoration, but had been there as long as anybody could remember.

With these preliminary observations, I now turn to the description of the circle itself. It consists of (*a*) an encircling mound with a single entrance, and (*b*) a ring of stones embedded in or projecting from the mound.

(*a*) The *mound* is circular; the height of its inner wall, which is lined with stones, averages 3 feet; from this the bank slopes down more or less gradually,

in some places more steeply than in others, to the level of the surrounding field. The radial width of the bank is 30 to 31 feet; and the diameter of the space enclosed varies between 151 and 155 feet (average 153 feet). The level of the ground in the interior of the circle is higher than that of the surrounding field, from which one may conclude that the earth required to form the mound came from the exterior in the immediate neighbourhood. There is a single entrance through the mound, this being on the eastern side (see fig. 8); immediately opposite this on the western side are two large stones forming a kind of notch (see fig. 9). The compass-bearing taken from the centre of the passage through this notch is $258^{\circ} 34'$. As there are a number of trees on the mound, and as Holy Cross Cottage is immediately behind what I call the "notch," it was not possible to obtain a proper observation of the elevation of the hill-horizon as alluded to in the following remarks; but I should imagine that the estimate there made may be regarded as fairly accurate. On this bearing, Captain Somerville writes:—"If the magnetic variation is about 21° W."—(I understand that this is the case)—"and the elevation of the hill-horizon above true horizon, as seen along the bearing, is 3° , then the alignment is exactly for *Samhuin Sunset*, which is November 8th of our calendar. The elevation of horizon is important, as each 1° of difference would probably alter the date four or five days, backwards in the year if less than the 3° I have assumed, and vice versa. But the intention is obviously Samhuin, or else, of course, February 4th, when the declination is the same, viz. $16^{\circ} 30'$."

One thing is quite clear: when all obstacles were removed, a person standing in the entrance passage would get the sharpest possible sight of the Sun through the notch, which, though of course enormously larger, is very much on the lines of the notch in the near sight on the barrel of a gun.

The entrance passage is walled on either side with low slabs corresponding in height with the gradually diminishing slope of the bank. The two are not quite co-extensive, for the width (radial) of the latter is at this point about 30 feet, whilst the walling extends for 28 feet 6 inches only. The narrowest part of the passage is that where it enters the circle, and here it is 2 feet $8\frac{1}{2}$ inches in width (see fig. 8). Its average width is about 3 feet 6 inches. It may be added that it is only recently that this entrance passage has become known, as it was discovered by some men who were digging for "treasure." The plan (fig. 2), which has been most carefully prepared by Professor Alexander, and section (fig. 22), give an idea of the general arrangement of this circle.

(b) The stones, as already stated, can be divided into four groups, and in view of the great importance of this circle I think it advisable to give a brief account of each stone (see fig. 2, in which a few only of the more important stones have been numbered).

LIST OF STONES.

NOTE. \leftarrow = Left Tangential Measurement. \rightarrow = Right Tangential Measurement.

No.	Height.	Thickness.	Breadth.	No.	Height.	Thickness.	Breadth.
	\leftarrow 7' 9"	4' 3"	above, 7' 10"	12	\leftarrow 6' 8"	—	—
	\rightarrow 8' 8"	3' 8"	base, 6' 9"		\rightarrow 6' 5"	\rightarrow 2' 6"	5' 0"
	\leftarrow 3' 2"	M 1' 3"	3' 6"	13	\leftarrow 7' 2"	\leftarrow 1' 8"	6' 6"
	\rightarrow 2' 3"	—	—		\rightarrow 6' 6"	—	—
	2' 7"	—	2' 9"	14	\leftarrow 6' 0"	\leftarrow 2' 2"	8' 3"
	1' 10"	—	1' 6"		—	\rightarrow 3' 6"	—
	3' 5"	12"	2' 2"	15	5' 7"	1' 6"	8' 6"
	2' 4"	—	2' 0"	16	\leftarrow 2' 9"	—	3' 9"
	2' 4"	—	1' 3"		\rightarrow 1' 3"	—	—
	2' 9"	8"	1' 8"	17	\leftarrow 5' 2"	1' 3"	3' 4"
	\leftarrow 2' 9"	\leftarrow 1' 5"	2' 3"		\rightarrow 4' 7"	—	—
	\rightarrow 3' 2"	—	—	18	2' 10"	1' 8"	5' 0"
10	\leftarrow 5' 0"	—	5' 2"	19	3' 4"	1' 11"	4' 2"
	\rightarrow 5' 7"	\rightarrow 1' 8"	—	20	3' 0"	—	1' 5"
11	\leftarrow 5' 8"	—	4' 5"	21	2' 4"	—	2' 3"
	\rightarrow 5' 3"	\leftarrow 1' 7"	—	22	2' 8"	—	1' 6"

1.—This is a stone called by Mr. Lynch "Ronadh Cruim Duibh," of which mention has previously been made. It is much the largest stone in the circle, and leans inward 8 inches from the perpendicular.

2-4.—Stones lie along the tops of these three.

5, 6.—There is an unembedded stone between 5 and 6, and a stone on the top of 6.

7.—Two stones on the top of this.

8.—Two stones, one on top of the other, between 8 and 9.

9, 10.—An ancient thorn has intruded itself between 9 and 10, which apparently were originally one stone, which has been cleft by the tree. This stone is conglomerate.

12.—This is the stone to the north of the entrance, and it also has been split by a tree, but radially, so that the detached portion is behind, that is to say, on the inward side of the other. This portion is 7 feet in height and 3 feet 2 inches in depth.

13.—This is the stone to the south of the entrance. It is wedge-shaped, with the apex of the wedge to the bank.

14.—Leans considerably to the inner part of the circle.

16.—Buried in the bank.

17.—Has a smaller detached portion.

19.—Between 19 and 20 is a small block of stone fixed in the upper part of the bank. A similar piece between 20 and 21.

22.—Buried in the bank.

LIST OF STONES—*continued.*

NOTE. † = Left Tangential Measurement. ‡ = Right Tangential Measurement.

No.	Height.	Thickness.	Breadth.	No.	Height.	Thickness.	Breadth.
23	2' 9"	—	1' 0"	39	2' 10"	† 12"	2' 5"
24	2' 5"	—	1' 8"	40	2' 8"	—	—
25	2' 8"	—	2' 6"	41	† 7' 0"	† 2' 7"	1' 6"
26	3' 2"	—	4' 6"		M 7' 9"	—	6' 1"
27	2' 3"	—	2' 9"		‡ 5' 9"	‡ 2' 9"	—
28	3' 0"	—	3' 4"	42	2' 10"	—	3' 4"
29	† 3' 3"	—	8' 9"	43	3' 2"	11"	2' 4"
	M 5' 8"	M 2' 0"	—	44	4' 1"	1' 3"	1' 9"
	‡ 3' 8"	—	—	45	3' 2"	—	2' 8"
30	M 2' 11"	—	4' 8"	46	2' 9"	—	1' 4"
31	2' 10"	1' 6"	3' 5"	47	2' 5"	—	1' 6"
32	† 1' 10"	1' 8"	6' 6"	48	3' 0"	—	3' 0"
33	2' 9"	—	4' 8"	49	4' 0"	1' 3"	2' 10"
34	2' 9"	—	4' 9"	50	4' 6"	6"	2' 3"
35	2' 9"	—	5' 2"	51	3' 0'	—	4' 4"
36	‡ 4' 0"	9"	2' 8"	52	3' 10"	1' 2"	3' 7"
37	4' 6"	—	1' 10"	53	4' 3"	1' 8"	3' 9"
38	3' 9"	† 11"	1' 5"	54	4' 0"	—	8' 3"

23-28.—All buried in the bank.

29.—This is a large flat stone with slight outward splay. Between it and 28 is a low wall in which there are a doubtful old stone of small size, and a number of small stones, probably modern.

32.—Leans a good deal into the centre. Small stones in the bank between 29 and 30 and 30 and 31. A single small stone between 31 and 32; a loose round stone on the top of 31.

33.—A gap and a small stone between 33 and 34.

37.—A pointed stone with a projecting piece at its lower aspect.

38.—Small stones in bank between 38 and 39.

41.—This is the second most prominent stone, and stands at the S.W. portion opposite the Ronadh, which is in the N.E. portion.

44, 45.—There are small stones between 44 and 45 in the bank. On the top of 45 is a detached and deeply cleft stone 3 feet in height, 2 feet 6 inches in breadth at the base, and 1 foot 3 inches at the apex. This is one of the fourth group of stones mentioned on page 286, and may be regarded with suspicion.

52.—Leans inward.

53.—Leans inward a good deal.

54.—On top of this is a detached lump of stone 3 feet 5 inches in breadth and 2 feet 6 inches in height.

LIST OF STONES—*continued.*NOTE. \leftarrow = Left Tangential Measurement. \rightarrow = Right Tangential Measurement.

No.	Height.	Thickness.	Breadth.	No.	Height.	Thickness.	Breadth.
55	4' 5"	1' 4"	6' 6"	68	M 7' 8"	\leftarrow 2' 3"	8' 4"
56	2' 5"	—	1' 3"		—	\rightarrow 2' 1"	—
57	2' 7"	—	1' 3"	69	4' 7"	1' 5"	4' 4"
58	2' 1"	8"	1' 6"	70	\leftarrow 3' 9"	1' 6"	3' 0"
59	3' 6"	—	1' 6"		\rightarrow 4' 3"	1' 8"	—
60	2' 8"	—	1' 8"	71	3' 6"	1' 3"	2' 4"
61	2' 8"	4"	1' 10"	72	2' 7"	8"	1' 8"
62	2' 10"	1' 5"	3' 6"	73	\leftarrow 3' 4"	1' 0"	4' 7"
63	3' 6"	1' 8"	3' 6"		\rightarrow 3' 9"	3"	—
64	4' 8"	2' 4"	3' 3"	74	\leftarrow 3' 9"	M 3"	6' 0"
65	3' 6"	1' 6"	3' 10"		\rightarrow 4' 9"	—	—
66	3' 6"	1' 2"	2' 8"	75	\leftarrow 4' 10"	1' 3"	4' 3"
67	\leftarrow 6' 3"	1' 5"	5' 9"		\rightarrow 4' 0"	1' 1"	—
	\rightarrow 4' 2"	2' 2"	—				

55.—Small stones in bank between 55 and 56.

58.—Loose in bank and falling inwards.

62.—On top of 62 are two moderate-sized stones, and on the top of this again is a large stone 2 feet 4 inches in breadth and 2 feet in height. Another is wedged in between 62 and 63. All these may have been added.

65.—On the top of 65 is a small detached block of stone. Between it and 66, and between 66 and 67, are small and moderately large stones—a kind of wall, none of them being embedded in the floor of the circle.

67, 68.—These two stones (see fig. 10), by their sloping neighbouring edges, form the "notch" spoken of on p. 287, which is directly opposite the entrance. They are approximately at the western side of the circle.

69.—Two round stones between 69 and 70, and a detached water-worn stone on top of 70.

73.—Jambed by its base between the upper surface of 73 and the bank is a most curiously weathered stone, which I call the "eccentric stone," with a hole through it (see fig. 11). It is like the head of some animal. This stone is most suspiciously like a modern addition, but Mr. Fitzgerald's brother-in-law informed me that it had been there as long as anyone could remember.

75 has been cleft into two by the growth of a tree. The outer part adheres to the bank. The stone leans considerably towards the centre of the circle. Between 73 and 74 is a small stone in the bank. Between 74 and 75 are three fair-sized blocks of stone: and over the smaller pieces and between 75 and 76 are two stones in the bank.

LIST OF STONES—*continued.*

NOTE. † = Left Tangential Measurement. ‡ = Left Tangential Measurement.

No.	Height.	Thickness.	Breadth.	No.	Height.	Thickness.	Breadth.
76	3' 10"	1' 10"	4' 9"	92	† 3' 1"	10"	5' 3"
77	1' 10"	—	1' 6"		‡ 3' 6"	1' 2"	—
78	3' 8"	4"	1' 4"	93	† 4' 2"	10"	2' 9"
79	2' 0"	—	9"		‡ 3' 10"	6"	—
80	2' 4"	—	2' 6"	94	3' 8"	9"	2' 8"
81	2' 2"	—	1' 2"	95	2' 6"	10"	3' 0"
82	† 2' 7"	—	4' 6"	96	4' 8"	6"	1' 10"
	M 4' 6"	1' 1"	—	97	2' 2"	—	2' 5"
	‡ 3' 5"	—	—	98	4' 4"	1' 2"	2' 9"
83	5' 6"	1' 0"	3' 7"	99	2' 0"	—	1' 2"
84	2' 6"	6"	2' 4"	100	2' 4"	—	2' 6"
85	2' 9"	8"	2' 7"	101	2' 6"	—	9"
86	3' 0"	8"	—	102	4' 0"	1' 0"	3' 8"
87	3' 0"	1' 9"	2' 6"	103	3' 2"	—	2' 9"
88	3' 4"	1' 5"	3' 6"	104	4' 4"	1' 3"	3' 6"
89	5' 8"	1' 8"	3' 6"	105	5' 5"	7"	5' 1"
90	2' 10"	7"	3' 4"	106	5' 0"	12"	5' 6"
91	† 4' 6"	2' 5"	4' 6"	107	3' 4"	9"	5' 0"
	M 5' 10"	—	—	108	2' 0"	8"	2' 8"
	‡ 4' 9"	1' 5"	—	109	4' 0"	—	3' 0"

77.—Loose stone in bank between 76 and 77.

79.—Embedded in the bank and overlapped internally by 78 and 80.

82.—Small stones between 82 and 83.

84.—Fallen stone lying at the foot of this.

86.—Overlapped on other side by 85 and 87.

91.—This stone is something like an ace of clubs fixed by its stalk into the floor. There are two stones, one on the top of the other, between 90 and 91.

93-97.—Two small stones between 92 and 93. A single loose stone between 93 and 94. Between 94 and 95, on top of 95, and between 95 and 96, are small stones. There is a small stone between 97 and 98, and a stone on the top of 97.

99.—Stone on the top of this.

101.—Stone on the top of this.

102.—Between 102 and 103 are several small stones.

103.—On the right of 103 is a loose stone in the bank.

104-113.—Next to 103 is a large old thorn tree which has apparently tilted the next stone into the interior of the circle, since a large block lies at right angles to the margin of the circle between the tree and stone 104. The length of this

LIST OF STONES—continued.

No.	Height.	Thickness.	Breadth.	No.	Height.	Thickness.	Breadth.
116	5' 8"	1' 4"	4' 5"	112	4' 2"	2½"	4' 2"
111	3' 6"	10"	3' 3"	113	4' 7"	8"	6' 6"

recumbent stone is 3 feet 9 inches: and it almost certainly was one of the original stones of the circle. Between 106 and 107 are two stones—one on top of the other. There is a small stone between 111 and 112. Between 113 and 1 there is a pile of small water-worn stones, one on top of the other, obviously modern.

It may finally be added that the great majority of these stones are limestone. Some, like the "Ronadh," are of conglomerate.

I. "C."

SMALL STONE CIRCLE (see figs. 3 and 10).

In the next field to the large circle just described are two groups of stones, the first of which is a circle of the ordinary type—that is to say, it consists of a ring of stones separated by appreciable distances and without an embankment of any kind. This circle lies to the north of the large circle "B." and varies between 53 and 57 feet (average 55 feet) in diameter.

As already stated, the gallaun A bears from the centre of the circle over the centre of stone No. 3, 55° 48", and the distance from the centre to the south-west angle of the gallaun is 1139 feet 5 inches. The bearing from the centre of this circle to the centre of Circle A, over No. 10 stone, is 208° 11½". The distance between the centres of these two circles is 419 feet 9½ inches. As will be seen from the diagram, it consists of fifteen stones. The plan shows the length and breadth of these stones, and their distance from one another, and their description will accordingly be completed by the following notes:—

- (1). Placed at the magnetic north and more or less rounded. Conglomerate. Height, 3 feet 10 inches.
- (2). Shaped like the end of a mansard-roof and split radially. Conglomerate. Height, 3 feet 8 inches.
- (3). Irregular, rounded limestone. Height, 3 feet 1 inch.
- (4). Squarish and tabular. Conglomerate. Height, 3 feet.
- (5). Triangular and slightly tangential, but circular with projecting internal flange. Limestone, height, 4 feet.
- (6). Low recumbent stone. Conglomerate. Height, 2 feet 9 inches.

- (7). Squared table-like block of conglomerate. The top is remarkably flat, and the two south quoins have the appearance of being worked, but this is probably an accidental resemblance. Height, 3 feet 8 inches.
- (8). Irregular, tabular, limestone. Height, 4 feet 3 inches.
- (9). Irregularly pyramidal, limestone. Height, 3 feet 3 inches.
- (10). Quadrilateral, irregular, and tabular. Conglomerate. Height, 3 feet 1 inch.

Between this stone and the next is the main gap in the circle, situated to the south-west.

- (11). Truncated pyramidal, limestone. Height, 4 feet 8 inches.
- (12). The smallest stone irregular, limestone. Height, 1 foot 7 inches.
- (13). Irregular, tabular. Conglomerate. Height, 2 feet 10 inches.
- (14). Rounded block, with its long axis tangential to the circle. Conglomerate. Height, 1 foot 10 inches.
- (15). Rounded block of conglomerate, with its long axis tangential to the circle. Height, 2 feet 5 inches.

I. "D" (see fig. 4).

On the western side of circle "C," and in the same field, is an irregular group of stones named "Stone Circle" by the Ordnance Map. Without the history of the place it would be impossible to say what this may have been; but from the following quotations it would, at first sight, seem that it is all that remains of a circle. Professor Harkness says (p. 389): "A short distance northwards from this fine circle [i.e. circle 'B'] the remains of another are seen. This second one is entirely composed of blocks of stone. An old road¹ runs through the western side of this second circle; the portions which remain are, however, sufficient to afford a knowledge of its original size. Its diameter is larger than the fine stone and earth circle at Grange Cottage,² being 170 feet." Mr. Lynch says (p. 300): "About 30 yards north of the chief circle there is another circle with a diameter of 170 feet. It has no rath, and only six pillar stones are left. In Fitzgerald's time there were seventy-two stones in this circle, but about sixty-five years ago it was destroyed by Mr. Edward Croker, of Grange." Finally, Mr. Lewis (p. 524), who mentions the same facts as have just been alluded to, seems to have missed the remains which still exist, for he says: "It is said to have possessed seventy-two stones in 1826, but only sixty in 1828, and of these all but six were destroyed in

¹ No trace of this road now exists.

² Now known as Holy Cross Cottage.

1830: if any of these six are left now, they are probably built into some of the stone fences, for I did not see them."

As a matter of fact, as the plan (fig. 4) shows, there are twelve stones still in existence at the spot alluded to in the above papers. I first made sure that these were the remains of the circle in question. The tallest of these is the stone numbered 3 in the plan, and this is 3 feet 4 inches in height. None of the others exceeds 3 feet in height, and several are completely, or almost completely, covered with grass and earth. Of those which appear above the surface, some are limestone, some conglomerate. Mr. Lewis thinks that a line from the Gallam "A" through the centre of circle "C" would have struck the centre of this circle. From the segment which remains, Professor Alexander has been able to compute the diameter which the entire circle if it were a circle, possessed, and this would have been 225 feet. Now, if a circle of this diameter were to be described on the plan, it would intersect circle "C." Either, then, this was no part of a circle, or the stones have been so much disturbed as to make it impossible to draw any deductions respecting them.

I. "E." (see figs. 5 and 12).

AVENUE.

At the opposite or western side of the road leading from Bruff to Limerick, there is another collection of stones, described on the Ordnance map as a stone circle. This it clearly is not. At present it may be described as a double alignment or avenue, with a central stone between the two rows. Harkness thought that they might have formed the western side of circle "D"; but this is clearly impossible. Mr. Lynch thinks that it was the avenue leading to a completely destroyed circle in the same field. Harkness (p. 390), in his description, alludes to "a large cup-shaped depression about 210 paces in diameter: but whether this is a natural or an artificial production there is not sufficient evidence at present to determine." Mr. Lynch also alludes (p. 360) to this depression, which he says has a diameter of 230 feet. He adds: "Not a stone is now left of this circle, the last having been taken away about sixty years ago. There are traces of this circle having been formerly surrounded by a rath." There certainly is a cup-shaped depression in the field; but I think it better to agree with Professor Harkness that there is not sufficient evidence to say what it may have been, or indeed to decide upon its natural or artificial origin. Meantime the plan (fig. 5) will show what stones at present exist, and how they are situated with regard to one another. The highest stone is that numbered 4, and it is 3 feet 10 inches in height. No. 2 is 3 feet 7 inches in height, and No. 13 is 3 feet. None of the others comes up to this height, and some are completely grass-covered.

The bearings of this group of stones are as follows:—From the centre stone to the gallaun 250° . Along the western line of stones to the centre of the great circle "B" $236^{\circ} 50''$.

In completing the description of this group of stones it may be well to mention that there appear to have been other megalithic remains than those mentioned above as existent, which have now completely disappeared. Mr. Lynch says that at a distance of 100 feet due south of circle "B" there formerly stood a cromlech. This much-abused term has now an ambiguous meaning; but I gather from Mr. Lynch's further statement, gleaned from Mr. Edward Fitzgerald, "that the tops of the supporting stones approached each other closely from the two sides," that it was probably a dolmen. A series of flat stones is said to have led from it to "B." There is no trace of any of these things, nor is there of the gallaun 4 feet high by 6 feet broad, which is said to have been situated 250 yards N.E. from the same circle. (Lynch, p. 300.)

II. "F." (see figs. 13 and 21).

LEABA NA MUICE.

This a small dolmen situated on the top of an eminence on the southern side of the road from Holy Cross to Herbertstown. The plan shows the general shape, position, and size of the four stones of which it consists. (1) The capstone is of limestone, and its average thickness is 1 foot 5 inches. It now rests entirely on the fourth stone, but was no doubt at one time also supported by the other two uprights. The height of the upper surface from the ground is 3 feet 5 inches; but as the surrounding earth has been to some extent removed, this gives a false impression of the space under the stone, which is actually only 1 foot 6 inches in height. (2) Is of limestone, and leans towards the capstone. Its height is 2 feet 6 inches, and its mean thickness is 1 foot 2 inches. (3) Is a tabular piece of conglomerate. Height, 2 feet 6 inches; thickness, 10 inches. It leans away from the capstone, being 9 inches out of the perpendicular. (4) Which is completely hidden by the capstone is a tabular wedge-shaped block of limestone 1 foot 2 inches thick.

II. "G."

Continuing along this road past the so-called New Church, which is now in ruins, at its northern side by the margin of the lake are certain groups of stones described in the Ordnance map as "Stone Circles." After a careful examination of these objects, I have come to the conclusion that they are purely natural stones, and for these reasons.

Before the lake was drained, and at the time when the Black Castle was erected, it is quite clear that this piece of ground must have been under water; otherwise the defences of that castle, as at present to be seen, would have been without value or significance. In fact, it is still so at times; for a resident in the neighbourhood told me that he had seen the water up to the wall between the stones and the road, and had himself fished over the place where the stones are. This argument seems to me to be conclusive, as no stone circle would be placed under water, and in addition it may be added that the arrangement of the stones, which certainly in places does suggest segments of circles, is not really such as would convince any person who has studied many of these objects that there is anything other than a natural arrangement of stones present.

II. "H."

"GIANTS' GRAVES" (see figs. 14 and 20).

Still further along this road, and on its southern side, is a large cistvaen called "Giants' Graves." The general arrangement of this is shown by the plan (fig. 20); and the following additional observations may be recorded concerning it:—The cist is 12 feet long and 5 feet wide, and its long axis is nearly due magnetic east and west. It is 3 feet in depth, and is lined all round by large flat slabs. On the south side there is a line of tabular stones with their flat surface parallel with the edge of the cist, one of which is displaced out of line. These form the outer part of what may be described as a kind of ambulatory between the cist and themselves. The cist seems to have been originally covered by three or four stones, which are now more or less displaced.

No. 1 is wedge-shaped, tilted into the cist at an angle of 30° from the horizontal, and is 1 foot 3 inches in thickness.

No. 2 is tabular, and rests on both sides of the cist, 1 foot 6 inches in thickness.

No. 3 extends over the north-west corner, and is tilted towards the lake. It is an irregular pentagon, and is 1 foot 3 inches in thickness. It will be observed that when in place this stone would have covered in the end of the cist.

No. 4 is a small block over the south-west corner. I am not quite clear that this is an original stone, but its position is as I have described it. This completes what apparently was the covering of the cist. The remaining stones are arranged as follows:—

No. 5 is tabular, and lies east and west, and is 18 inches high.

No. 6 is 2 feet 3 inches high.

No. 7 is a tabular stone, 1 foot 3 inches in thickness, which looks as if it had fallen off the tops of Nos. 6 and 8. If it be so, and all the appearances point to it, there was probably a second cist, unlined by stones, underneath this slab.

No. 8 is 2 feet 6 inches in height, tabular, lies east and west, and pairs with No. 5.

No. 9 is a stone 1 foot 3 inches in thickness, lying partly on No. 3.

No. 10 is tabular, 1 foot 3 inches in thickness, and looks as if it were the boundary of an ambulatory on the north side of the cist. The width of this ambulatory at its narrowest point on both sides is about 18 inches.

No. 11 is a large stone situated 18 inches from the end of the cist.

No. 12 is an isolated tabular stone lying east and west.

II. "I."

GALLAUNS (see fig. 15).

On the brow of the hill above the Giants' Graves are two large blocks of stone, unmarked and unnamed on the Ordnance map. Both of these are of conglomerate, whereas all the outcrops on the hill are of limestone. I have no doubt whatever that one of these, which is bedded in the ground, is a gallaun, and feel pretty confident that the other also comes under this description. The larger and more southern of these two, which is embedded in the earth, and clearly a gallaun, is 4 feet 6 inches in height and 7 feet in length, and inclines at an angle of 60° to the lower slope of the hill. The northern block, which is rounded, measures 6 feet 9 inches by 4 feet, and is 3 feet 6 inches high. The compass-bearing from one gallaun to another is 210° ; and the compass-bearing at right angles to the line between the two stones is 320° . As will appear later, the first of these stones is a very prominent horizon-mark from one of the circles on Knockadoon.

III. "J."

STONE CIRCLE (see map).

As already mentioned, Knockadoon and the surrounding land appear originally to have formed an island guarded at its two approaches by the Black Castle and Bouchier's Castle. On the high ground are four stone circles. J is not visible from either of the other circles, and is 100 feet in diameter (outside measurement). It is a double circle, and the clearance of the ambulatory between the two rows of stones is 4 feet. Of the visible stones, none is more than four feet in height, and most of them much less; and it is pretty obvious that there was a small central circle, even if such had

not been described by Harkness. Thus, there are three rings of stone, viz. two outer, distant 4 feet from one another, and a small central ring. All these stones, with the single exception of the gallaun about to be described, are formed of limestone. The gallaun itself, which though small, is quite a remarkable object, is placed in the interior of the circle. It is not in its centre, but in the south-west quadrant. Unlike all the other stones, it is of conglomerate, 3 feet 2 inches in height, and 1 foot 7 inches by 11 inches. It is 15 feet 6 inches from the edge of the circle; and a line from the centre of the circle to the top of the gallaun has a bearing of 140° . Looking to the horizon, there are very distinctly visible, as will be seen from the accompanying sketch (fig. 15), first, the hill upon which the two gallauns I (*c*) are situated; to the north of these stones, and on the summit of this hill (which is not named on the 6-inch map), is an outcrop of rock (*a*), a prominent object from the circle under description. Immediately behind this is a conical hill belonging to the Galtees, and, as I take it, that which is called Baurmagurrahy (*b*). The bearing from the top of the gallaun to the outcrop just mentioned is 157° . The bearing to the point of the conical hill is 154° .

Professor Harkness excavated in this circle with very interesting results, detailed in his paper. He states that he opened the ground immediately west of the gallaun, "and at the depth of little more than a foot from the surface discovered human bones. These consisted of fragments of ribs, fragments of bones of the arms, a nearly perfect lower jaw, a portion of the upper jaw, the frontal and parietal bones of the skull, very nearly entire, with the temporal and occipital bones in a less perfect state. These bones had all belonged to one individual—a young person of from six to eight years of age." I do not quote his remarks as to the supposed characters, racial and otherwise, of these bones, because I cannot think that any such conclusions can safely be drawn from such very young bones interred for so great a length of time, and apparently not even in a cist. But some other of his observations are of great interest. "With these human bones, a small fragment of the antler of a stag, about $1\frac{1}{2}$ inch long and $\frac{3}{4}$ of an inch in breadth, was found. Surrounding the monolith which marked this burial-place was a rude circle of small stones, about 8 feet in diameter." As far as I can judge all these stones have disappeared; for I take it that the small central circle, of which I have made mention above, is that described in the following passage:—"A few yards west of the monolith" (i.e. gallaun) "in this circle is a small patch enclosed also by a rude ring of small stones. This has an elevation of about 9 inches above the ordinary level of the surface, continued within this earth and stone circle. On opening this patch, and at the distance of about 18 inches beneath the surface, a stone-cist was discovered.

The sides of the cist were composed of limestone flags, and the ends were also formed of the same materials. A flag of the same kind also covered the cist. This covering did not, however, extend over the whole of the chamber formed by the flags; the portion in which the lower extremities had reposed was uncovered. This, however, may have resulted from stones breaking the lid, as above the cist several pieces of rock were found. The lower portion of the cist was formed of small portions of flaggy limestones, which had been arranged with considerable care in the form of a pavement when the cist was being made. Several fragments of human bones were met with in this cist. These consisted of fragments of ribs, a portion of a femur, two os calces, a portion of a lower jaw, and other fragments. The portion of the lower jaw had appertained to a young person from six to eight years of age; and one of the os calces seems referable to the same individual. The other os calces appears to have belonged to a nearly, if not quite, full-grown person; and the fragment of the femur, which had the epiphysis fully united, seems also to have formed part of the skeleton of an adult. The length and thickness of the thigh-bone, when compared with the skeleton of a modern full-grown individual, indicates a person of small stature. The length of the cist also points out the small size of the body which had occupied it. This was not more than 4 feet 2 inches long; and as its depth did not exceed 18 inches, it is not probable that the body was buried in a crouching position. The remains in this cist had been to some extent disturbed; but this had resulted from the burrowing of rabbits, the bones of which were found along with the human remains. Associated with these there occurred also fragments of the bones of swine. A portion of the right side of the upper jaw of this animal contained in the cist exhibited the last molar tooth, which was of large size. The condition of this fragment indicated that it had long been buried, its state being similar to that of the human bones, and altogether different from the rabbits' bones, which have a very recent aspect. Among the bony fragments of this cist were two upper incisor human teeth of rather a large size, and having the cutting-surfaces considerably worn. The two bodies in this stone-and-earth circle seem to have been originally placed in a north and south direction, the heads being towards the latter." The various bones described by Professor Harkness are still in the Ethnological Museum of University College, Cork, and can quite easily be recognized from his description and figures.

The child's skull, and the fragments of an adult, probably—a small-sized female—are quite as he described them. There are two other pieces of inferior maxillae, labelled Lough Gur, which do not appear to correspond with anything described in this paper, but are in the box with the other specimens.

III. "K."

STONE CIRCLE (See Map).

This is the largest and most important circle of the group at present under consideration. It is a large circle, or rather a series of three concentric circles, composed of small stones. Thus it corresponds, save in size and in the possession of a gallowan, with the circle just described. The outer diameter of the outside circle is 102 feet 6 inches. The inside measurement of the second circle is 88 feet 6 inches. The average width of the ambulatory between them (inside measurement) is 4 feet. On the eastern side there is a considerable gap in the outer part of the circle looking towards the two gallowans on the side of the hill, and here there are some indications of an avenue. The compass-bearing taken at right angles to the centre of this opening is 153° . The two outer circles are best defined on the east, fairly well on the south, badly on the north, and not very well on the west. There is no stone more than 4 feet in height, and many of them are much less. With regard to the small central circle which seems to have existed originally this consists now of some scattered stones overgrown with grass and moss. I cannot speak with absolute certainty as to these representing a small circle, but I think that they do so. It is quite impossible to count the stones, but, judging from those visible and from the moss-mounds which represent others, there must originally have been something like 200. The two gallowans "I" are not horizon marks from this circle, but the outcrop and conical Galtee are. The magnetic bearing from the north stone to the southern side of the opening over the outcrop of rock to the top of the conical hill is 153° . From the centre of the opening it is $155^\circ 5''$. All the visible stones in this circle are limestone.

Something must now be said as to the compass-bearings of these two circles "J" and "K." Any person looking round the horizon on a clear day cannot but be struck by the conical peak of the Galtee and the outcrop of stone on the much nearer hill which lies just in front of it. "Here," one says to oneself, "is just the kind of thing which might have attracted the attention of early man as a suitable sight-point for observations of the heavenly bodies, and here is an opportunity of putting some of these theories to a test." Consequently we took the bearings recorded above, and I submitted them to Captain Somerville, whose very interesting remarks I now append. "'J' and 'K,'" he says, "are beautiful, and provide an absolutely definite and accurate alignment for the winter solstitial sunrise, if the horizon is elevated about 2° . Again, a difference in elevation from 2° would make a difference of a few days in the date arrived at. But there is no question about it at all; and if it *does* turn out to be a few days one way or the other, I should not be surprised.

You could not align a more difficult date than mid-winter sunrise: the movement of the Sun in azimuth is so slow just then that its furthest south-rising would not be easy to spot, even if you *saw* the sunrise every day for a week or so each side of the solstice, but (unless our climate has vastly changed since prehistoric times—it *may* have) just think of the chances of getting sunrise on any morning at that time of year! Well, then, it is of *great* interest and importance that circles 'J' and 'K' are so nearly in line with the outcrop and Galtee. And, equally so, is the observing point of the gallaun deliberately placed elsewhere than the centre of the circle. This may have two meanings. One that the circle 'J' was built a little wrong for the alignment, and so they put up a gallaun to mark where the centre *should* have been. The other (more interesting still) that 'J' in line with 'K' (their centres) was *originally* correct for the Galtee summit at winter solstice sunrise; and that the gallaun marks the necessary change due to precessional movement of the Sun." Captain Somerville adds that there is no star to fit the declination given, so that it must be the Sun if it is anything. He also informs me that the alignment of the gallauns "I" and the bearings of circle "L" next to be described with one of them do not appear to have any particular significance.

III. "L."

STONE CIRCLE.

This is a stone circle on the east extremity of the hill overlooking the partially drained land, once a portion of the lake. The first point to remark about this circle is that a portion of it, slightly to the west of north, consists of a natural outcrop of limestone, the lower piece of which forms a kind of pathway beneath the stone. In all the circles which I have examined I have never seen anything quite like this use of a large natural outcrop of rock, which might fairly be described as a small cliff, as part of a circle. The remainder of this circle has evidently been of the double circle type, and most of the stones have either disappeared or become covered with moss and earth, except in the north-east quadrant, where they are quite obvious. None of these stones is higher than 3 feet. Unlike the other circles on this hill, the stones would appear to have been almost continuous. From its fragmentary condition it is difficult—indeed impossible—to give accurate measurements of the circle. On the west side it assumes the appearance of a grass-covered wall, and more resembles the mound of a small rath than a stone circle. In this part, in fact, it somewhat resembles the circles in Group IV. But the appearances on the north-east and east make it quite clear that it is a stone circle; and further,

its position immediately underneath a cliff would render it useless as a rath. The southern and larger of the two gallauns is a horizon-mark from this circle, from the centre of which to the gallaun the compass-bearing is 193° . The compass-bearing to the centre of the outcrop is 185° .

III. "M."

STONE CIRCLE.

On the extreme slope of the hill and not far from the place marked as the site of Dún Gair on the Ordnance map are the remains of a small circle unmarked by the Ordnance Survey. Almost all the stones are covered by grass, and of the few which appear none is higher than 1 foot. This also was a double circle 49 feet in outside diameter and with a 2-foot clearance to the pathway. I have seen small single circles closely resembling this on the tops of hills in England. Such circles would not easily be recognized by those seeing them for the first time.

IV. "N."

GALLAUN.

At Lough Gur Cross there is a tabular limestone gallaun, the long axis of which bears 200° . It is 6 feet in height, 6 feet 9 inches in width at the base, and 5 feet 3 inches at the upper part. It is 1 foot 9 inches thick at the base and 1 foot thick at the top. As it lies in a garden at the back of a house, it is not possible to correlate it with any horizon-bearings.

IV. "O" and "P."

STONE CIRCLES. (See Map.)

These are two stone circles further north and on the opposite side of the road to the rath called Carrigalla Fort. The smaller of the two, *P*, is situated somewhat to the south of the larger, *O*. The bearing from the centre of the larger one through the centre of the smaller is 167° .

"O." (See figs. 16, 17, 19.)

The greater or northern circle is locally called the Lisheen. As the figures 16 and 17 show, it has been disfigured by the fact that an earthen wall has been run right through from east to west and slightly to the north of the middle line, and that the eastern side has also been much broken up by field

walls. As the section (fig. 19) shows, this circle consists of (1) a circular bank with (a) a circle of stones surrounding and standing up from its outer border, and (b) a stone wall of slabs lining the upper bank directed towards the centre of the circle. (2) A central bank surrounded by a series of stones along its outer edge. The following are the measurements of these parts:—

	feet.	ins.	feet.
Extreme width of the greater circle,	182	0	
Width of bank of outer circle,	14	6	
Extreme width of central circle,	48	0	
Height of outer surface of main bank from the ground,	3	0	
Depth of space between the two circles below outside ground about,	2	6	
Height of bank of inner circle,	1	6 to 3	

It would appear therefore that the bank supporting the inner circle, and possibly also that of the outer circle, had been heaped up from earth in the interior of the space, and this will therefore account for the fact that the floor between the two circles is at a lower level than the circumjacent field. The outer circle, as already stated, is very much broken up; and it is impossible to say of how many stones it may originally have consisted, or even with any approach to certainty how many of the stones now existing belong to the ancient structure. There are thirty-three stones in the central circle (see fig. 17), most of them being placed very close to one another. They are of tabular limestone, and the highest is 4 feet. This inner circle for a short distance on the eastern side is doubled—that is to say, there is a pathway between two rows of the stones. Fifteen feet east of this double-ranked portion is a straight bank co-extensive in length with the double-ranked part, and bordered by four smaller-sized stones. There is no other sign of double-ranking in this circle. The double-ranked part is 11 feet wide where it exists, and 30 feet in length. The bank with the four stones is therefore also 30 feet.

“P.”

The smaller or southern circle is situated a few yards from the greater. It is a flat-topped mound surrounded externally with slabs of limestone, some of which project above the level of the bank, others being practically co-terminous with it and covered with grass above. No stone projects more than 18 inches above the height of the bank. The extreme width of this circle is 33 feet, and the surface of the mound is 3 feet above the level of the

field around. To the west of this circle are two recumbent stones. The bearing taken from the centre of the circle through the middle of the interval between the two is 233°. The distance of the northern stone from the centre of the circle is 43 feet, of the southern 40 feet, and the distance of the northern from the southern is 25 feet 6 inches. It will be noticed that the smaller circle is not unlike the central part of the greater one, that is to say, it has a raised bank surrounded by stones, but there are no indications whatsoever of any portion having been double-ranked.

IV. "Q" and "R."

GALLAUNS.

These are two small gallauns north of the circles and on the western side of the road. They are quite small in size, and do not present any features of special importance.

IV. "S."

GALLAUNS.

This gallaun, on the other hand, is of considerable size and interest. It is situated on the very brow of the hill and overlooking a valley of fair size. It must have been visible from a great distance in the original state of the country, and indeed can now be seen from far off in many directions to the north of Lough Gur. It is a large tabular stone, the bearing of the long axis of which is 183°. There are no striking horizon marks with which I could correlate it. It is 8 feet 6 inches in height, 6 feet 6 inches in breadth, and 1 foot thick. It inclines to the west at an angle of about 75°. Mr. Lewis gives bearings from the centre of circle "O" to these three gallauns. As none of them is visible from the circle (as indeed he admits himself), these bearings can only be very approximate. I doubt if these gallauns would have been visible even in the early state of the country. But "S" would be a fine landmark from the valley, and the line *S, R, Q, N*, may have topographical significance.

V. "T."

This is a stone circle situated not very far from Lough Gur House. Strictly speaking, it is not a circle, since its larger diameter is 44 feet and its smaller 30 feet, but it is a complete ring or oval of stones of considerable size. The compass-bearing of the long axis is 288°. Though the stones of which it consists are of considerable size, they are low, none of them being more than

2 feet 6 inches in height. The following table gives their chief measurements and their distances from one another:—

	Radial Measurement.	Tangential Measurement.			
1.	6'6"	4'3"	Distance between	1 and 2,	8'0"
2.	6'3"	6'0"	"	"	2 and 3, 2'3"
3.	4'3"	4'0"	"	"	3 and 4, 10'9"
4.	5'0"	8'0"	"	"	4 and 5, 9'6"
5.	5'9"	3'0"	"	"	5 and 6, 11'0"
6.	10'9"	6'6"	"	"	6 and 7, 3'3"
7.	3'5"	2'4"	"	"	7 and 1, 15'0"

I cannot feel quite certain that No. 7 is not a boulder lying outside the circle and having nothing to do with it. This circle can be seen from parts of Knockadoon Hill, but I see no reason to suppose that there is any special connexion between it and any of the other circles described.

PART III.—GENERAL.

In his paper on "Some Stone Circles in Ireland," Mr. Lewis states that "but little is heard of circles in that country (Ireland), still there are some." This rather curious statement only proves how little is known of the pre-historic antiquities of this country outside (one might also add inside) its own coasts. True it is that we have nothing in the way of circles to compare in magnitude with Stonehenge, still less with Avebury; but I do not think I am exaggerating when I say that so far as mere numbers go there are probably more objects of this class of megalithic monument in Munster alone than there are in the whole of England. The circles around Lough Gur are the most interesting of the remains described in this paper, and it may be convenient to classify them in groups, with respect to each of which a few words may be said.

(1) There is the ordinary form of circle well known in Ireland and Great Britain. This consists of a ring of stones, often of considerable size, each of which stones is isolated from its neighbours by gaps. There is no surrounding mound, and often there is nothing in the shape of an avenue. To this class belong circles "C" and "T." As far as one can judge, "D," if indeed it were a circle, also belonged to it. Mr. Lewis thinks that the avenue *E* was connected with this circle; but I cannot at all agree with this view.

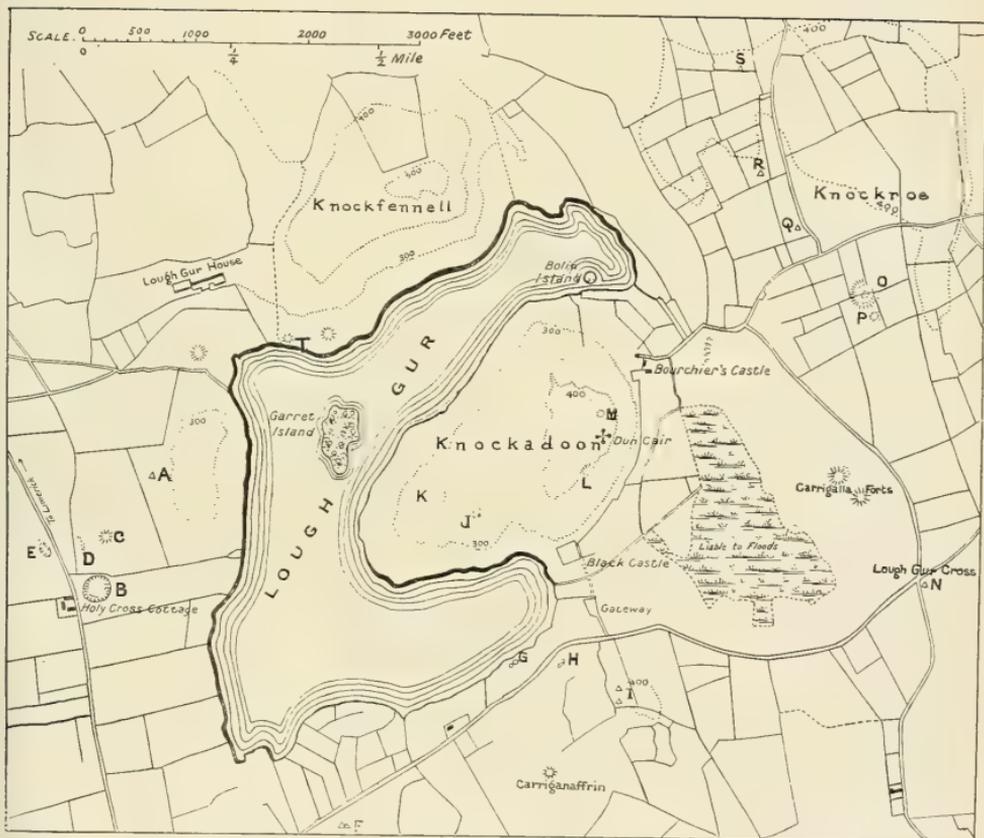
(2) Circles with a mound external to the stones. The stones line the circle, and are in contact with one another, and in some places project even markedly above the ground. Circle "B." I see no reason to separate this

class of circle from the others as some have done by supposing it to have been a place of defence against enemies. I am no military expert; but it seems to me as if it would have been hard to discover a worse kind of place for that purpose. You have a gentle sloping bank externally, up which a fierce rush could easily be made, and a sort of cockpit internally, from which there could have been no escape for the defenders. It is in close relationship with other circles and megalithic objects which could have had no military significance. Of course it may be argued that they were contiguous religious edifices to the military station, like the chapel near a castle. Or it may be argued that this particular circle was a cattle enclosure. That, at least, is possible, but it may pertinently be asked why such large stones should have been utilized, with the enormous labour it must have required to move and erect them for a purpose of that kind, when an ordinary earthen ring would have equally well served the purpose. All the evidence at present available seems to point to the fact that the stone circles were placed there for religious observances, in some, if not all, cases, connected with the worship of heavenly bodies. I see no reason for detaching this, or any other of the circles about to be described, from the general category of stone circles. Certainly the remarkable astronomical fact quoted on page 287 is all in favour of a religious explanation.

(3) Circles with a double-ranked bank. This form is surrounded by an earthen ring with two hedges of stone, one externally and one internally, a kind of ambulatory lying between the two. These stones are more or less continuous, that is to say they are often in contact with one another and not separated by gaps as in Group I. There may be a single or nearly single-ranked circle of smaller size in the centre. Circles "O," "L," and "M."

(4) Circles with double-ranked stones with an ambulatory between, but without any bank. There may be a smaller central circle here also. Circles "J" and "K."

(5) Circles formed of stones surrounding a small mound with a flat top. Circle "P."



MAP OF THE DISTRICT.

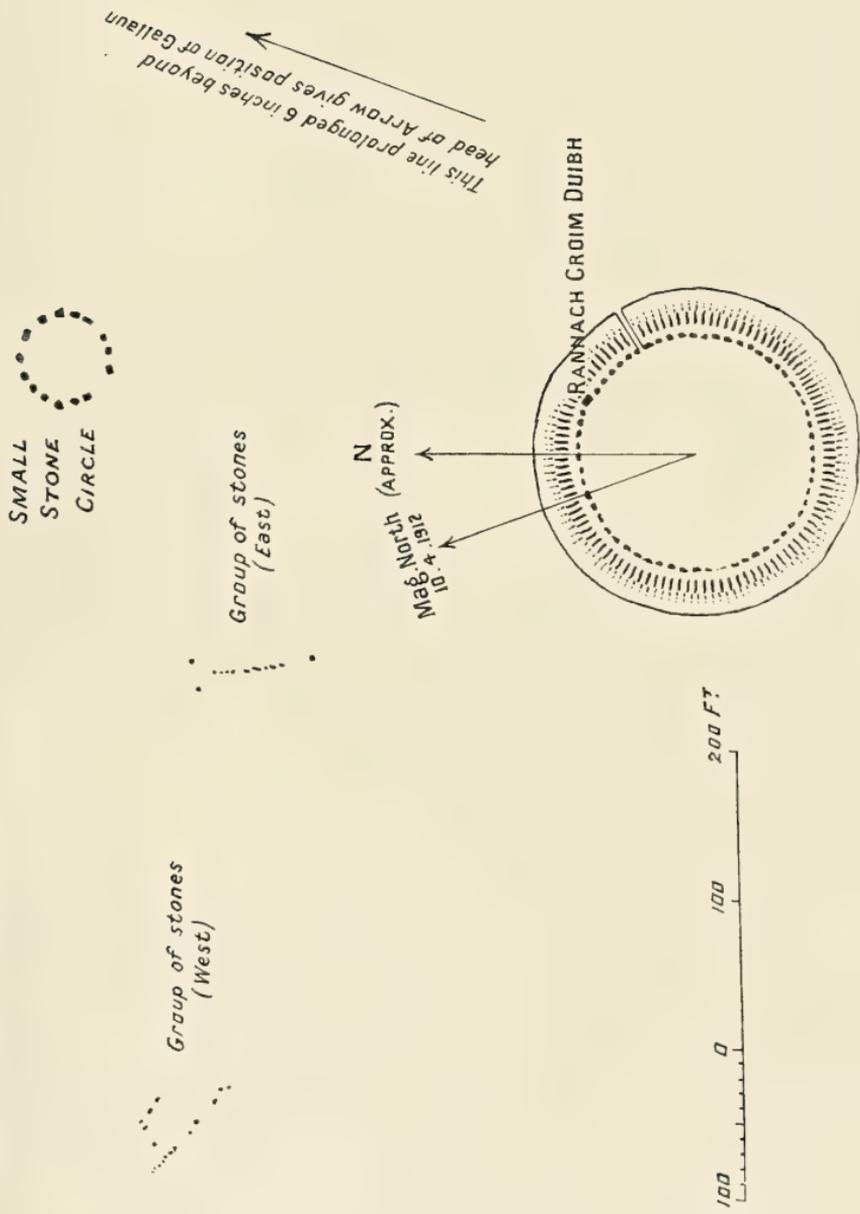


Fig. 1.—Objects included in Group 1.

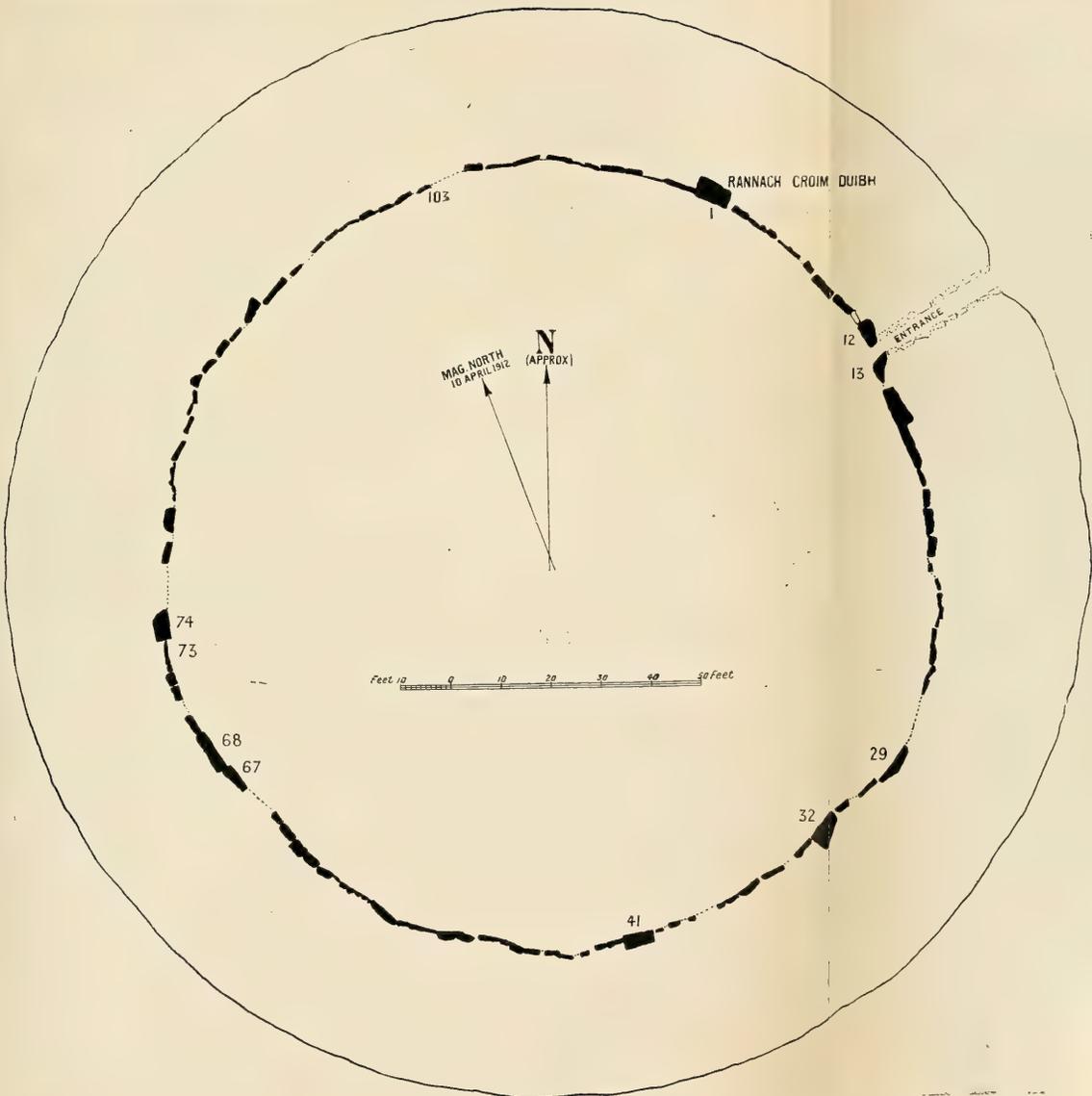


Fig. 2.—Plan of Large Stone Circle "B."

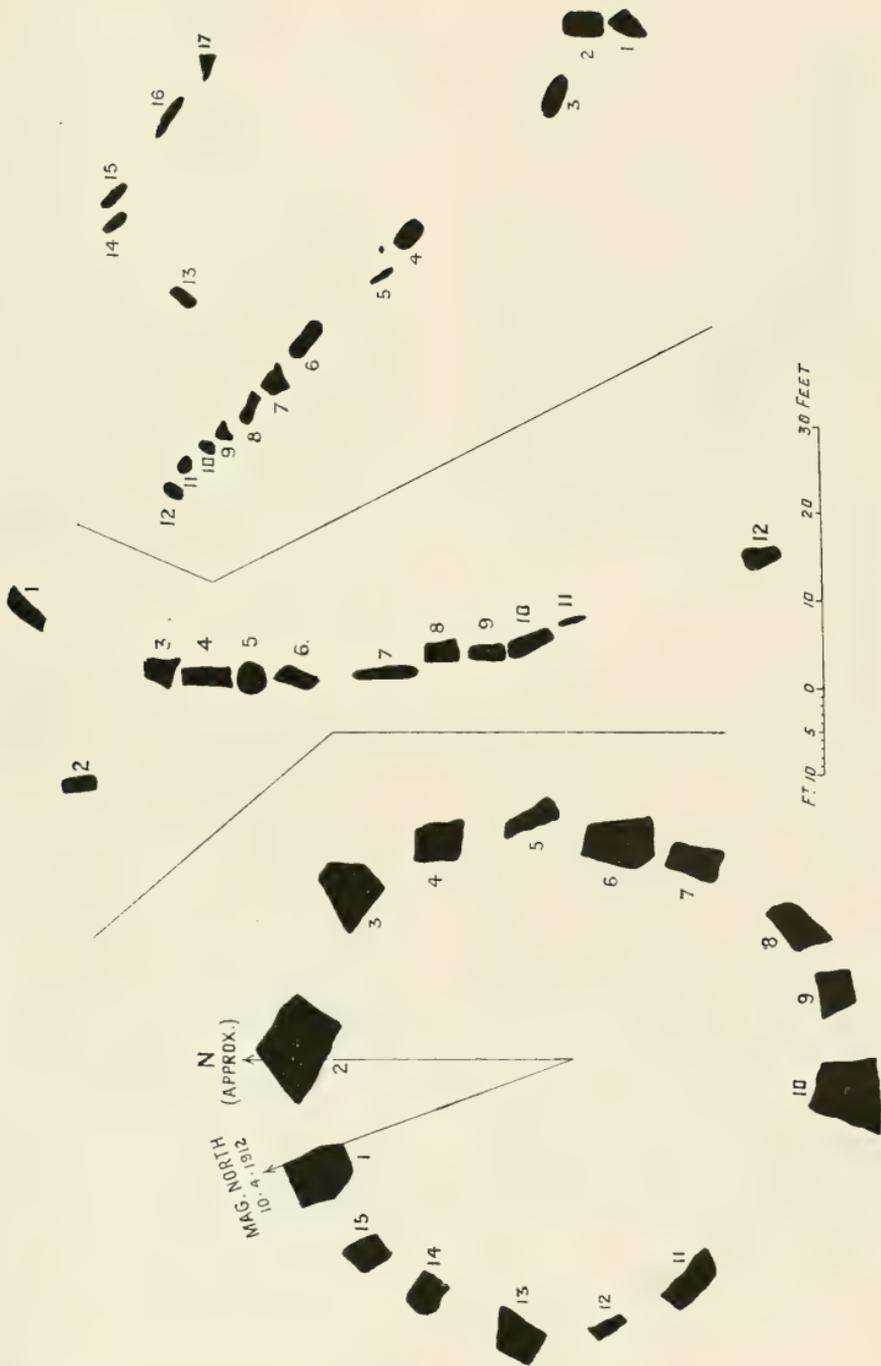


Fig. 3.—Plan of small stone circle "C."

Fig. 4.—Group of stones (East) "D."

Fig. 5.—Group of stones (West) "E."



Fig. 6.—Gallaun "A."



Fig. 7.—"Ronadh Cruim Duibh." No. 1 stone.



Fig. 8.—Entrance stones within circle "B."



Fig. 9.—Stones opposite entrance, circle "B." with "notch."



Fig. 10.—Circle "C."



Fig. 11.—Eccentric stone, circle "B."



Fig. 12.—Avenue "E."



Fig. 13.—Leaba na Muice.

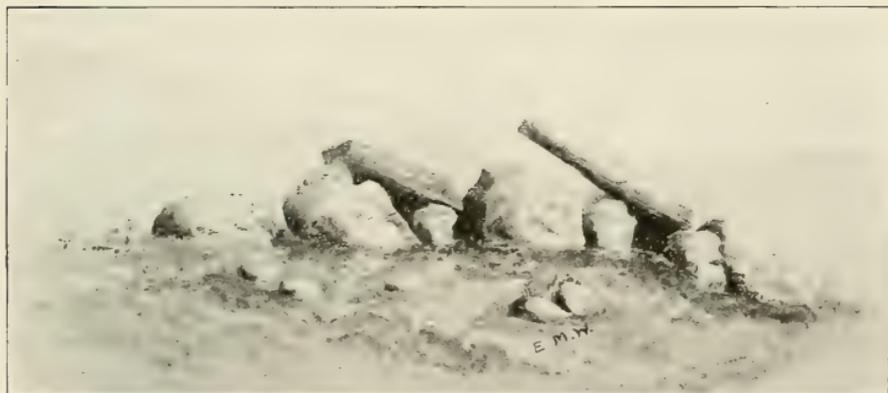


Fig. 14.—Giants' Graves.



Fig. 15.—Outcrop and Galtee.
a, Outcrop. *b*, Galtee. *c*, Gallanus "I."



Fig. 16.—Circle "O." Complete view.

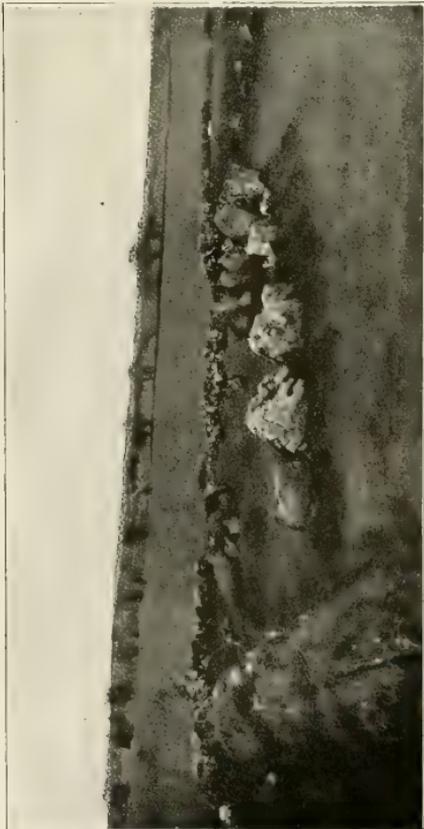


Fig. 17.—Circle "O." Central circle of group.



Fig. 18.—Gallaun "S."

WINDLE.—MEGALITHIC REMAINS NEAR LOUGH GUR.

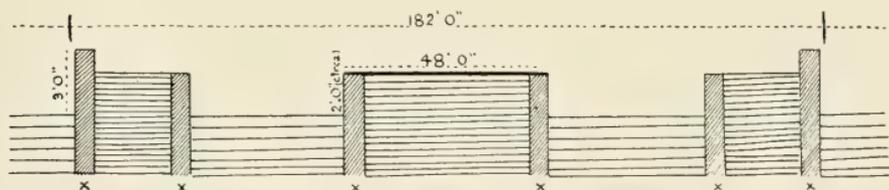


Fig. 19.—Diagrammatic section of circle "O"

x x = stones.

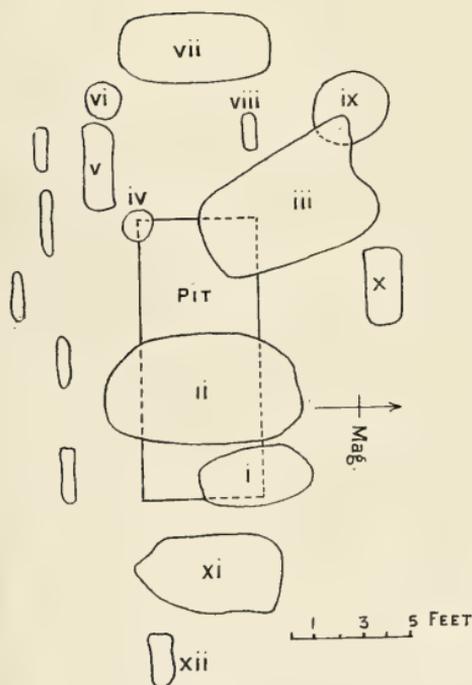


Fig. 20.—Plan of Giants' Graves.

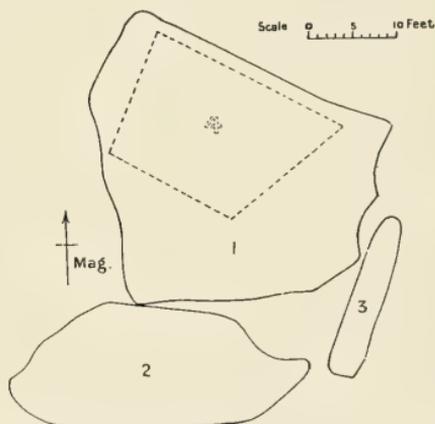


Fig. 21.—Plan of Leaba na Muice.

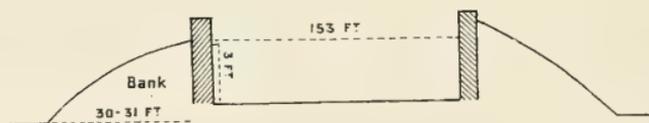


Fig. 22.—Diagrammatic section of circle "B."

XI.

ON THE EARLIEST LATIN LIFE OF ST. BRIGID OF KILDARE.

BY MARIO ESPOSITO, B.A.

PLATES XXXII-XXXV.

Read JUNE 24. Published SEPTEMBER 12, 1912.

SOME two years ago I conceived the idea of re-editing the most ancient Latin document dealing with St. Brigid of Kildare—the Life by Cogitosus¹—which has not been independently edited since 1658. For this purpose I collated thoroughly two MSS., one at London, the other at Oxford; but I soon found that a host of other MSS. of this Vita existed in many continental libraries; and as no opportunity of seeing them turned up, I was obliged to renounce my design. It has, however, occurred to me that the publication of the notes I had collected might serve to draw the attention of other more fortunately placed scholars to this subject.

I.—THE EDITIONS.

(1.) A paraphrased abridgment of Cogitosus' *Vita Sanctae Brigidae* was first printed without the author's name at Milan, before the year 1480, by Boninus Mombritius in his *Sanctuarium*.² This work, which is excessively rare,³ was reprinted at Paris in 1910.⁴ It is not now possible to ascertain from what MS. Mombritius prepared his abridgment.⁵

(2.) The first edition of the complete text of Cogitosus was given by Canisius in 1604.⁶ His edition was reprinted, with a few additional remarks,

¹ Cf. Hermathena, 1909, xv, p. 353; 1910, xvi, p. 62; 1911, xvi, p. 329.

² Sanctuarium seu Vitae Sanctorum [Mediolani, c. 1480], fol. t. i, ff. 144-146 v^o.

³ There is no copy in any Dublin library.

⁴ Bonini Mombritii Sanctuarium seu Vitae Sanctorum. Novam editionem curaverunt duo Monachi Solesmenses, Parisiis, 1910, t. i, pp. 257-261, cf. pp. x, 633.

⁵ The brief lives of St. Brigid given by John of Tynemouth (Nova Legenda Anglie, ed. Horstman, 1901, t. i, pp. 153-160) and by Surius (De probatis Sanctorum historiis, Coloniae Agrippinae, fol. 1576, t. i, pp. 806-809) are not abridged from the Vita by Cogitosus, but from the first Vita in the edition of the Bollandists (Acta Sanctorum, Feb. t. i, pp. 118-134). The Vita given in the fourth edition of Surius (Coloniae Agrippinae, 1618, tom. ii, pp. 21-25) is, however, that of Cogitosus.

⁶ Canisius. Antiquae Lectiones, 4to. Ingolstadii, 1604, t. v, pars 2, pp. 623-641.

by Basnage in 1725,¹ and the latter's edition was in turn reproduced by Migne.² Canisius employed a MS. of little value then preserved in the Dominican monastery at Eichstätt in Bavaria.³ I have not succeeded in tracing this MS. The Canisian text was also reprinted in 1624 by Messingham.⁴

(3.) A better text was given in 1647 by Colgan,⁵ who employed MSS. which he found in the Benedictine monasteries of Saint-Hubert⁶ and Saint-Amand.⁷ The Saint-Hubert MS. has not apparently survived,⁸ but that from Saint-Amand I believe to be the now mutilated Paris MS. lat. No. 2999, which will be described further on.

(4.) In every way the best edition that has yet appeared is that published by the Bollandists in 1658,⁹ who say: "Secundam [vitam] descriperat Rosweyodus e vetustissimo codice D. Preudhomii Canonici Atrebatensis, quam contulimus cum MSS. monasteriorum S. Maximini Treuiris, Wiblingensis in Sueuia, Bodecensis in Westphalia, cumque editionibus Henrici Canisii e MS. Aistadiano, et Ioannis Colgani ex MSS. S. Huberti ac S. Amandi."¹⁰ The first of the above MSS., that formerly belonging to Pierre Preudhomme, is now No. 865 in the Public Library at Cambrai. I have not been able to trace the others.¹¹

II.—THE MANUSCRIPTS.

The following list of the MSS. does not pretend to be complete. As the splendid cataloguing work of the Bollandists of Brussels proceeds, no doubt others will come to light.

¹ Basnage, *Thesaurus Monumentorum Ecclesiasticorum et Historicorum*, fol. Amstelædanæ, 1725, t. i, pp. 413-424.

² *Patrologia Latina*, t. 72, cols. 775-790.

³ This monastery was founded in 1279 and secularized in 1802. Only two of its MSS. appear to have found their way to Munich (cf. *Catalogus codicum Latinorum Bibliothecæ Regiæ Monacensis*, t. i, pars 3, 1873, p. 70).

⁴ Messingham, *Florilegium Insulæ Sanctorum*, fol. Parisiis, 1624, pp. 189-200.

⁵ Colgan, *Acta Sanctorum Hiberniæ*, t. ii, Trias Thaumaturga, fol. Lovanii, 1647, pp. 518-526.

⁶ Saint-Hubert in the province of Luxemburg, Belgium.

⁷ Saint-Amand-Les-Eaux (Dép. du Nord).

⁸ The catalogue of the Saint-Hubert MSS. published in 1644 by Sanderus (*Bibliotheca Belgica Manuscripta*, 4to. Insulis, 1644, pars 2, p. 177, mentions three volumes of Lives and Passions of Saints. The Public Library at Namur possesses four hagiographical MSS. from Saint-Hubert cf. *Analecta Bollandiana*, i, 1882, pp. 485-505), but the Vita S. Brigidæ is not among them. Cf. Bethmann (Pertz, *Archiv*, 8, 1843, p. 26) on the history of the Saint-Hubert MSS.

⁹ *Acta Sanctorum*, Februarii tomus i, fol. Antverpiæ, 1658, pp. 135-141.

¹⁰ *loc. cit.*, p. 101.

¹¹ The Benedictine Abbey of St. Maximinus near Trèves flourished till 1802. On its MSS. cf. Gottlieb, *Ueber mittelalterliche Bibliotheken*, Leipzig 1890, pp. 78, 344-348. There was a Benedictine monastery of St. Martin at Wiblingen in Wurtemberg. Of its MSS. I know nothing (cf. Jacobs, *Zentralblatt für Bibliothekswesen*, 28, 1911, p. 36). H. Moretus has made a very exhaustive study of the history of the ancient monastery of Böödeken in the diocese of Paderborn (*Analecta Bollandiana*, 27, 1908, pp. 257-358). He did not succeed in tracing the MS. which contained the Vita S. Brigidæ. Cf. also Bömer (*Zentralblatt für Bibliothekswesen*, 26, 1909, p. 347).

Admont, Bibliothek der Benediktinerabtei.

MS. No. 25. Membr. saec. xiii, fols. 116b-118. A volume of *Vitae Sanctorum* (cf. *Analecta Bollandiana*, 17, 1898, pp. 31, 44). Admont is in Styria.

Auxerre, Bibliothèque Municipale.

MS. No. 27. Membr. saec. xii. From the ancient Cistercian abbey of Pontigny.¹ A collection of *Vitae Sanctorum*.² The *Vita S. Brigidae of Cogitosus* occupies fols. 1-5b.

Brussels, Bibliothèque Royale.

MS. II. 1181 (Phillipps, No. 12461). Membr. saec. xii^m, fols. 81a-87b. From the Benedictine abbey of Stabulum, now Stavelot, in Belgium. The prologue is missing in this ms.³ [See *Addendum* to this paper.]

Cambrai, Bibliothèque Communale.

MS. No. 865. Membr. saec. x/xi, fols. 115b-123. A volume of *Vitae Sanctorum*.⁴ It was formerly No. 358 in the Cathedral Library at Cambrai, to which it was given by Pierre Preudhomme, a canon of Arras, who died in 1628.⁵ As mentioned above, this is one of the MSS. employed by the Bollandists for their edition.

Cambridge, Trinity College.

MS. No. 316. Membr. saec. xv, fols. 207b-211b. *Historia de beata Brigida. Sancta itaque Brigida, etc.*⁶

Douai, Bibliothèque Communale.

MS. No. 840. Membr. saec. xii, fols. 85b-89b. From the Benedictine abbey of Marchiennes (dép. du Nord). The prologue and last few chapters are missing.⁷

Heiligenkreuz-Bei-Baden, Stiftsbibliothek.

MS. No. 11. Membr. saec. xii^{ex}, fols. 93a-96b. A volume of *Vitae Sanctorum*.⁸ The Cistercian monastery of Heiligenkreuz is situated in Lower Austria.

¹ Dép. de l'Yonne. Cf. Gottlieb, loc. cit., p. 136.

² The ms. has been fully described by Molinier (*Catalogue général des manuscrits des bibliothèques publiques de France, Départements*, t. 6, 1887, p. 50).

³ This ms. came into the Brussels Library in 1888 from the collection of Sir Thomas Phillipps, cf. *Catalogus Codicum Hagiographicorum Bibl. Reg. Bruxellensis*, Pars i, t. 2, 1889, p. 521, and Van Den Gheyn, *Catalogue des Manuscrits de la Bibliothèque Royale de Belgique*, t. v, 1905, pp. 287-292.

⁴ Cf. Molinier, *Catal. gén. des MSS. des Bibl. Publ. de France, Dép.*, t. 17, 1891, p. 352.

⁵ Cf. Molinier, loc. cit., p. vi.

⁶ Cf. James, *Catalogue of MSS. in the Library of Trinity College, Cambridge*, i, 1900, p. 430.

⁷ Cf. *Analecta Bollandiana*, 20, 1901, p. 395.

⁸ Cf. *Analecta Bollandiana*, 17, 1898, pp. 27, 44; Krusch, *Mon. Germ. Hist., Script. Rer. Meroving.*, t. iv, 1902, p. 431.

Lilienfeld, Stiftsbibliothek.

MS. No. 58. Membr. saec. xiii, fols. 108 b–112 b. A volume of *Vitae Sanctorum*.¹ The Cistercian monastery of Lilienfeld is also situated in Lower Austria.

London, British Museum.

MS. Cotton Nero, E. i. A folio parchment ms., dating probably from the first half of the eleventh century. It contains Lives and Passions of the Saints, a list of which has been given by Planta,² and was clearly written in England, probably in the west, perhaps at Worcester. Charters relating to Worcester are added in a later hand, and the Life of St. Egwin of Worcester is the second in the collection, yielding precedence only to that of St. Oswald of York. This ms. contains on fols. 167 b–173 a the *Confessio* and *Epistola* of St. Patrick, which have been collated by Newport White, who, however, wrongly assigns the ms. to the twelfth century.³ The *Vita S. Brigidae* occupies fols. 134 b–140 a, of which I have made a careful collation. The text is carelessly written, and is inferior to that printed by the Bollandists. Besides a very considerable number of minor omissions, there is a large gap in section 34 according to the edition of the Bollandists, or chapter 32 according to the Index, which I shall publish further on from a Paris ms. The same gap occurs in the Oxford ms., Fell. 4, to be described presently, the text of which agrees very closely with that of Nero, E. i, but the Oxford ms. was not copied directly from the London one. Both were undoubtedly derived from the same original. The London ms. may be assigned to the first half of saec. xi,⁴ the Oxford ms. to the beginning of saec. xii or extreme end of saec. xi. The palaeographer will be able to judge from the facsimiles appended to this paper. The *Vita S. Brigidae* commences on fol. 134 b, col. 2 of the London ms.; *Incipit uita S̄c̄e brigide uirginis quod est kl̄. Februarii. De^o Cogitis Fr̄s Vt S̄c̄e ac beate memorie BRIGIDE uirginis uirtutes et opera doctorum memorie litterisque tradere adgrediar.* The text then runs on continuously without any headings or division into chapters. It ends on fol. 140 a, col. 2: *Orate pro me cogitos ne inputetis culpabili et ut audacie meę indulgeatis atque orationum urarum pio d̄no me comedetis⁵ et d̄s om̄*

¹ Cf. *Analecta Bollandiana*, 17, 1898, pp. 28, 44.

² *Catalogue of the MSS. in the Cottonian Library*, 1802, pp. 239–241.

³ *Proc. R. I. Acad.*, 1905, vol. xxv, Section C, pp. 205, 212. Krusch, who has collated the *Vita S. Fursei* contained on fols. 93 a–97 b of this ms., assigns it to saec. x/xi (*Mon. Germ. Hist., Script. Ber. Meroving.*, t. iv, 1902, p. 429).

⁴ I am indebted to Mr. R. W. Flower of the British Museum for some information regarding this ms.

⁵ *Sic cod. pro Me.*

⁶ *Sic cod.*

pacem exoro euangēlicam sectantibus exaudiat. Explic̄ uita scē Brigide. The text is written in double columns, with forty-three lines to the column. The dimensions of each column of writing are 33 cms. by 9·5 cms.

Melk, Stiftsbibliothek.

MS. F. 8. Membr. saec. xiii^{ex.}, ff. 212 b–217 b. A volume of *Vitae Sanctorum*.¹ The Benedictine monastery of Melk is situated in Lower Austria.

Metz, Stadtbibliothek.

MS. No. 523. Membr. saec. xi^{ex.}, fols. 194–205. A volume of *Vitae et Passiones Sanctorum* obtained from the ancient monastery of Saint-Arnoul at Metz (cf. Delisle, *Le Cabinet*, etc., ii, p. 401). The prologue is missing in this MS. The closing phrase reads, *atque orationum uestrarum pio domino me commendetis et deus uobis pacem ex ore euangelica sectantibus exaudiat adiuuante domino nostro*, etc. This MS. also contains the *Vita S. Columbani* by Jonas (fols. 19–51), and (fols. 51–65 b) an unpublished life of St. Columba of Hy, an abridgment of Adamnan's work (cf. *Catal. gén. des MSS. des Bibl. Publ.*, 4to series, t. v, 1879, p. 195; Lawlor, *Trans. R. I. Acad.*, 1902, vol. xxxii, Section C, pp. 14–15; Krusch, *Script. Rer. Meroving.*, t. iv, 1902, p. 42, and Jonas, ed. 1905, p. 97; *Bibliotheca Hagiographica Latina*, ed. Bolland., No. 1889).

Munich, K. Hof- u. Staats-Bibliothek.

This Library possesses two MSS. of the *Vita S. Brigidae*.

(1.) Cod. Lat. No. 18854. Membr. saec. xi, fols. 85 a–112 a. A volume of *Vitae Sanctorum*.² It was formerly No. 854 in the Benedictine monastery of Tegernsee³ in Bavaria.

(2.) Cod. Lat. No. 22240. Membr. c. 1150–1200, fols. 154 a–161 a. A volume of *Vitae Sanctorum*.⁴ Formerly No. 40 in the Premonstratensian convent of St. Mary at Windberg in the diocese of Ratisbon.

Naples, R. Biblioteca Nazionale.

Cod. viii. B. 3. Membr. saec. xi, fols. 379 a–388 b, written in a Beneventine hand. Provenance not known.⁵

¹ Cf. *Analecta Bollandiana*, 17, 1898, pp. 32, 44; Krusch, *Mon. Germ. Hist., Script. Rer. Meroving.*, t. iv, 1902, p. 431.

² Cf. *Catalogus Codicum Latinorum Bibliothecae Regiae Monacensis*, tomi ii, pars 3, 1878, p. 213.

³ Cf. Gottlieb, *Ueber mittelalterliche Bibliotheken*, Leipzig, 1890, pp. 77, 388.

⁴ *Catal. Cod. Lat. Bibl. Reg. Monacensis*, tomi ii, pars 4, 1881, p. 33; *Analecta Bollandiana*, 17, 1898, pp. 97, 104.

⁵ Poncelet, *Analecta Bollandiana*, 30, 1911, p. 157.

Nivelles,¹ Bibliothèque d'Alphonse Wins.

MS. No. 4. Membr. saec. xi, fols. 25 r^o–26 r^o. A mere fragment of the Vita.² Formerly a leaf of the MS. marked LLL in the library of the Benedictine monastery of Cella at Saint-Ghislain in Belgium. This is undoubtedly the MS. mentioned by Hardy.³

Oxford, Bodleian Library.

MS. Fell 4 (formerly Fell 3). Membr. saec. xi/xii, fols. 108 a–116 b. The contents of this MS., which contains Lives of Saints, have never been fully enumerated. That portion containing the Confessio and Epistola of St. Patrick has been collated by Newport White,⁴ and I have collated the Vita S. Brigidae. As already remarked, this MS. agrees very closely with the British Museum one, both apparently having been copied from the same original. There is the same gap in section 34, and the same minor omissions and careless grammatical errors throughout. This MS. is part of a set of four volumes of Vitae Sanctorum.⁵

A.	Saints commemorated	January to June.	
B.	„	„	July to October.
C.	„	„	January to June.
D.	„	„	November to December.

Of these B and C are parts of the same MS. (MSS. Fell 1 and Fell 4). A is a relic of another MS., and D is a relic of another MS. written at St. Augustine's, Canterbury. The set is thus all that remains of three collections of Vitae Sanctorum. They were all once in Salisbury Cathedral Library.⁶

Fell 4 is a folio volume written in single columns with thirty-six lines to the page. The Vita S. Brigidae commences on fol. 108a: *In̄c Vita Sc̄e Brigide Vir̄g. Q̄d̄ E K̄t̄ Febr̄. Me cogitis fr̄s ut sc̄e ac beat̄e memorīe brigide vir̄ginis uirtutes et opa doctorum memorīe litterisque tradere aggrediar.* The text runs on continuously without any headings or division into chapters. It ends on fol. 116 b: *Orate pro me cogitos ne in̄puteis⁷ culpabili et ut audacie mēe indulgeatis atque orationum ur̄arū pio d̄no me cōm̄detis et deus om̄ip̄s pacem exoro euangelicā sectantibus exaudiat. Expt̄ Vita S̄. Brigide.*

¹ Arrondissement de Bruxelles (Prov. de Brabant).

² Cf. *Analecta Bollandiana*, 12, 1893, p. 412.

³ *Descriptive Catalogue of British History*, i, pt. 1, 1862, p. 116.

⁴ *Proc. R. I. Acad.*, 1905, vol. xxv, Section C, pp. 205, 212.

⁵ On the later history of these volumes cf. Lawlor, *Trans. R. I. Acad.*, 1902, vol. xxxii, Section C, pp. 36–37.

⁶ I have to thank Mr. Falconer Madan for an interesting communication relative to these MSS. Mr. Madan assigns Fell 4 to the first half of saec. xii.

⁷ Sic cod.

Paris, Bibliothèque Mazarine.

This Library possesses two MSS. of the *Vita S. Brigidae*.

(1.) MS. No. 1711. Membr. saec. xi, fols. 237 b–247 b; *Incipit prologus de vita et virtutibus sanctae Brigidae virginis. Mc cogitis, fratres*, etc. On fol. 238 b after the prologue there is an index to the chapters of the *Vita*. A volume of *Vitae Sanctorum*.¹

(2.) MS. No. 1736. Membr. saec. xv, fols. 54 a–55 a, contains *Vita sanctae Brigide virginis. S. Brigida quam deus prescivit per omnia saecula saeculorum. Amen*. Apparently a few extracts from the *Vita* by Cogitosus.²

Paris, Bibliothèque Nationale.

The Bibliothèque Nationale possesses no less than fourteen MSS. of the *Vita S. Brigidae*.³

(1.) MS. lat. No. 2999. Membr. saec. xi. Formerly P. 188, and later T. 251, in the Benedictine monastery of Saint-Amand.⁴ One of the MSS. employed by Colgan for his edition. At that time (1647) it had not yet been mutilated and its full contents were: (a) *Poenitentiale Halitgarii*. (b) *Fragmenta de poenitentia*. (c) *Vita S. Brigidae*. (d) *Liber qui nominatur Paradisus*.⁵ *De conuersatione Sanctorum Patrum*.⁶ Subsequently this volume, along with a number of others, was removed from its home by Le Tellier, archbishop of Reims (1671–1710), and transported to the latter place, where it became No. 267 in the archbishop's library. Finally these MSS. came into the Bibliothèque Nationale.⁷

At what period the mutilation occurred is not known. The MS. now consists of 40 folios. The *Vita S. Brigidae* commences on fol. 36 r°. After the prologue occurs on fols. 38 v°–39 v° an index to the chapters of the *Vita*; then follows a fragment of the latter down to the words *largitate divini muneris sicut est adiutor* in the middle of section 4 according to the edition of the Bollandists. The rest of the MS. after fol. 40 is lost.⁸ As the Index of the chapters has been omitted in all the editions, I have thought it well to

¹ Cf. Molinier, *Catalogue général des Manuscrits des Bibliothèques Publiques de France*, Paris, Bibliothèque Mazarine, t. 2, 1886, p. 184.

² Molinier, loc. cit., p. 214.

³ My best thanks are due to M. Henri Omont for supplementing my information with regard to some of these MSS.

⁴ Cf. Delisle, *Le Cabinet des Manuscrits de la Bibliothèque Nationale*, t. i, 1868, pp. 307–19; Gottlieb, *Ueber mittelalterliche Bibliotheken*, 1890, pp. 142–143; Desilve, *De schola Elnonensi S. Amandi, Lovanii*, 1890; Molinier, *Catal. gén. des MSS. des bibl. publ. de France, Départements*, t. 25, 1894, pp. 189–191.

⁵ On this work cf. Esposito, *Hermathena*, xvi, 1910, pp. 98–99.

⁶ Sanderus, *Bibliotheca Belgica Manuscripta, Insulis*, 1641, Pars 1, p. 55.

⁷ Cf. Delisle, *Le Cabinet*, etc., i, pp. 302–305; Molinier, *Catal*, etc., t. 25, p. 190.

⁸ *Catalogus codicum manuscritorum Bibliothecae Regiae*, t. iii, 1744, p. 362; *Catalogus codicum hagiographicorum latinorum Bibliothecae Nationalis Parisiensis*. *Ediderunt Hagiographi Bollandiani*, t. i, 1889, p. 228.

reproduce it here. I owe a transcript of it to the kindness of M. Henri Omont. As will be seen, the Bollandist editors have divided the work up in an arbitrary manner.¹ This Index appears to occur only in this MS. and in Mazarine No. 1711, already described. [It is also in Brussels II. 1181 f. 81a.]

Fols. 38 v^o-39 v^o.

- De Sanctae Brigittae virtutibus.
 De coaglo et butiro hospitibus et pauperibus erogato.
 De fundamine pedali viridi et altaris.
 De cocta larda cani tradita et integra postea reperta.
 De messura arida in die pluvii.
 De vacca ter mulgata in una die.
 De veste iacta² super solarem umbram.
 De septem veryicibus donatis filio nequam.
 De aqua benedicta et in cervisam mutata.
 De pregnante benedicta sine dolore.
 De lapide in salem mutato.
 De oculis aperti[s] ceci nati.
 De filia muta cui reddit loquelam.
 De larda cum cane dimissa.
 De parte carnis iacta in suo mantile.
 De vacca donata optima cum optimo vitulo alicuius vacce, quem vitulum in curru positum secuta est vacca.
 De bubus raptis ac reversis.
 De uno equo sub iugo territo altero et de iugo siliente.
 De porco fero manente cum suo grege.
 De suibus minatis a lupis trans campum Feae usque ad montem Gabrae.
 De vulpe indomita regi reddita.
 De ave benedicta et postea manu capta.
 De novem scelestissimis viris voventibus effusionem sanguinis.
 De gula dempta Lugdeemaim nec virtute.
 De arbori³ grandi transmutata de suo loco.
 De sente argentea iacta in mare.
 De telaribus lignis ustis et reparatis, et vitulo occiso et postea cum sua matre sano reperto.⁴
 De calice argenteo in tres partes equaliter diviso.
 De vestimento episcopi Conleath.
 De melle⁵ in pavimento reperto domus.

¹ Cf. Esposito, Proc. R. I. Acad., 1910, vol. xxviii, Section C, p. 202.

² iacta cod.

³ arbori^e cod.

⁴ reperto cod.

⁵ melle^e cod.

De flumine mutato de suo ad alterum locum.

De lapide molari.

De valva ecclesiae. Explicit.

The division of the chapters in Colgan's edition appears to correspond with this Index.

(2.) MS. lat. No. 3788. Membr. saec. xii, fols. 130b-132b. Formerly Colbertinus 801.¹ An incomplete copy missing sections 11-13, 18-22, 24, 25, 27 to the end, except the first sentence of 34 and the last part of 39.²

(3.) MS. lat. No. 3800 A. Membr. saec. xiii, fols. 31a-34a. Formerly belonged to the Counts of Bethune.³ Only a few chapters of the Vita.⁴

(4.) MS. lat. No. 5269. Membr. saec. xiii, fols. 98b-105b. Formerly No. 120 in the Library of Antoine Faure.⁵ The prologue is missing.⁶ The closing phrase runs thus, *Orate pro me Cogitoso nepote culpabili*, etc.⁷

(5.) MS. lat. No. 5278. Membr. saec. xiii, fol. 54a. A mere fragment of the Vita, sections 3-6. Formerly Colbertinus 11.⁸

(6.) MS. lat. No. 5292. Membr. saec. xiii, fols. 222a-223b. Also a fragment, sections 3-9 and 34. Formerly Colbertinus 401.⁹

(7.) MS. lat. No. 5318. Membr. saec. xii, fols. 166a-169b.¹⁰ Formerly Bigotianus 171.¹¹ The name Cogitosus is omitted in the closing phrase.

(8.) MS. lat. No. 5352. Membr. saec. xiii, fols. 1a-5b. Formerly Colbertinus 137. Manifestly a copy of MS. 5318.¹²

(9.) MS. lat. No. 10862. Membr. saec. x, fols. 1a-24a. A volume of Vitae Sanctorum consisting of 226 folios, measuring 22.5 cms. by 16 cms., written in single columns. Section 40 is missing.¹³ Formerly in the Benedictine Abbey of Echternach,¹⁴ (Grand Duchy of Luxemburg).

(10.) MS. lat. No. 12612. Membr. saec. xiii, fols. 205b-215a. Formerly in the Benedictine Abbey of Corbie¹⁵ (dép. de la Somme). The closing phrase reads, *Orate pro me Cogitoto nepote culpabili*, etc.¹⁶

¹ Cf. Delisle, *Le Cabinet*, etc., i, pp. 439-486.

² Cf. *Catal. cod. hagiograph. lat. Bibl. Nat. Paris.*, i, p. 281.

³ Cf. Delisle, *loc. cit.*, i, pp. 322-329.

⁴ *Catal.*, etc., i, p. 327.

⁵ Cf. Delisle, *loc. cit.*, i, pp. 304, 320.

⁶ *Catal.*, etc., i, p. 408.

⁷ It is thus also in the printed editions. The London and Oxford mss. have *Orate pro me Cogitoso ne inputetis culpabili*, etc. The Vallicellan ms. No. xxi has *Orate pro me Cogitoso nepote culpabili haedo*, etc.

⁸ *Catal.*, etc., i, p. 465.

⁹ *Catal.*, etc., i, p. 559.

¹⁰ *Catal.*, etc., ii, 1890, p. 178.

¹¹ Cf. Delisle, *loc. cit.*, i, pp. 322-329.

¹² *Catal.*, etc., ii, p. 301.

¹³ *Catal.*, etc., ii, p. 607.

¹⁴ Cf. Delisle, *loc. cit.*, ii, 1874, p. 361.

¹⁵ Cf. Delisle, *loc. cit.*, ii, pp. 104-141; Gottlieb, *Ueber mittelalterliche Bibliotheken*, 1890, pp. 103-104.

¹⁶ *Catal.*, etc., iii, 1893, p. 167.

(11.) MS. lat. No. 16732. Membr. saec. xii, fols. 1a-5a.¹ From the Priory of Saint-Martin-des-Champs² (Paris). The name Cogitosus is omitted.

(12.) MS. lat. No. 17004. Membr. saec. xiii^m, fols. 2a-6a.³ Formerly No. 58.2 in the library of the Feuillants⁴ (Paris). The closing phrase omits the name Cogitosus.

(13.) MS. lat. No. 18308. Membr. saec. xiv, fols. 18b-28a.⁵ Formerly in the Cistercian abbey of St. Edme at Pontigny,⁶ afterwards No. 61 in the library of the Feuillants. This MS. omits the prologue, and the name Cogitosus in the closing phrase.

(14.) MS. lat. No. 791. Membr. saec. xii, fols. 121a-123a. Only a few fragments of the Vita.⁷ From the monastery of St. John de Brembio in the diocese of Lodi.

Reims, Bibliothèque Publique.

There are three MSS. of the Vita S. Brigidae at Reims.

(1.) MS. No. 296 (E. 381). Membr. saec. x, fols. 101a-113a. '*Incipit prefatio in vita sancte Brigide virginis. Me cogitis fratres,*' etc.⁸ This MS. was obtained from the ancient Benedictine abbey of Saint-Thierry (dép. de la Marne) near Reims, to which it had been given by a certain Odelricus presbiter.⁹

(2.) MS. No. 1410 (K. 786). Membr. saec. xii, fols. 70b-76b. *Incipit prefacio in vita beatissime Brigide virginis Christi. Me cogitis fratres ut sancte ac beate, etc., . . . Incipit Vita. Sancta itaque Brigida quam deus prescivit, etc., . . . euangelicam pacem sectantes exaudiat, donante Ihesu Christo, etc.*¹⁰ Formerly No. 110 in the monastery of Saint-Thierry.

(3.) MS. No. 1411 (K. 792). Membr. saec. xiii^m, fols. 44b-51b.¹¹ From the ancient abbey of Saint-Nicaise at Châlons-sur-Marne.¹²

Rome, Biblioteca Alessandrina della R. Università.

MS. No. 91. Chart. saec. xvii, fols. 490 a-501 a.¹³ Copied by Constantinus Caietanus "ex MS. monasterii Rom. S. Caeciliae et P. Emilii Sanctorii." The

¹ Catal., etc., iii, p. 340.

² Cf. Delisle, loc. cit., ii, pp. 235-241; Gottlieb, loc. cit., p. 135.

³ Catal., etc., iii, p. 389.

⁴ Cf. Delisle, loc. cit., ii, p. 251.

⁵ Catal., etc., iii, p. 440.

⁶ Cf. Delisle, loc. cit., ii, p. 393.

⁷ Catal., etc., iii, p. 575.

⁸ Catal. gén. des MSS. des Bibl. Publ. de France, Départements, t. 38, 1904, p. 302. Excellent description by M. H. Loriquet.

⁹ Cf. Delisle, Le Cabinet, etc., ii, p. 412.

¹⁰ Loriquet, loc. cit., t. 39, 1^{re} partie, 1904, p. 636.

¹¹ Loriquet, loc. cit., p. 644.

¹² Cf. Delisle, loc. cit., ii, p. 351.

¹³ Poncet, Catalogus codicum hagiographicorum latinorum Bibliothecarum Romanarum praeter quam Vaticanæ, Bruxellæ, 1909, p. 140.

Vita is followed by the hymn in fourteen lines, commencing *Brigida nomen habet*, etc.¹ Three other copies of this hymn occur in mss. at Rome.² They will be mentioned below. The ancient St. Cecilia ms. is now apparently lost. According to Cardinal Baronius the Vita was divided into twenty-four chapters, and the closing phrase contained the name Cogitosus. The hymn came at the end of the Vita.³ In addition to Alexandrinus 91 there are two other copies of the text of the Vita made from the St. Cecilia ms. They are Vallicellanus H. 25 and Vaticanus 6075, both of which will be described presently.

Rome, Biblioteca Corsiniana.

MS. No. 777. Membr. saec. xiii, fols. 40 a–51 a. Written in a Beneventine hand. From the ancient monastery of St. Severinus near Naples. In this copy the prologue and Vita proper are separated in a different fashion from that adopted in the other mss. and in the printed editions.⁴ The prologue ends with the words, *quod non valet ingenium ferre dictantis* (section 1, last line, according to the edition of the Bollandists). The Vita begins, *Haec sancta et Deo dicata virgo Brigida egregiis crescens virtutibus*, etc. (section 2, line 1). A similar mode of separation is found in the two Vatican mss., Nos. 5772 and 6075, to be described presently. In the usual text the Vita proper begins with section 3, *Sancta itaque Brigida quam Deus prescivit*, etc. At the end of the Vita the Corsini ms. has the hymn *Brigida nomen habet* already mentioned. It is thus apparently the most ancient extant copy of this hymn.

Rome, R. Biblioteca Vallicelliana.

This Library possesses three copies of the Vita S. Brigidae.

(1.) MS. Tomus xxi. Membr. saec. xi/xii, fols. 203 a–207 b. Written in a Beneventine hand. Some folios have been lost at the beginning, and the Vita commences with the words, *ut cum ipsa non posset reddere* (section 28). The closing phrase reads, *Orate pro me Cogitoso nepote culpabili haedo, et ut audaciae meae indulgetis atque orationum vestrarum clypeo me Domino commendetis exoro*.⁵ This was followed by sixteen verses which have been erased.⁶

¹ First published by Colgan (*Acta Sanctorum Hiberniae*, t. ii, Trias Thaumaturga, 1647, p. 542); reprinted by Kelly (*Calendar of Irish Saints, the Martyrology of Tallagh*, Dublin [1857], pp. 188–189); cf. Chevalier, *Repertorium Hymnologicum*, i, 1892, p. 147, No. 2512.

² Colgan printed the hymn from a ms. in the monastery of St. Aubertus at Cambrai. His attribution to St. Ultan (*loc. cit.*, p. 545 n. 82) is more than doubtful. [His ms. is now Cambrai, No. 857.]

³ Baronius alludes to this ms. in his edition of the *Martyrologium Romanum* (Antverpiae, fol. 1613, p. 62).

⁴ Poncelet, *Catalogus cod. hag. lat. Bibl. Rom.*, etc., p. 279.

⁵ Cf. Hardy, *Descriptive Catalogue*, etc., i, pt. I, 1862, p. 108.

⁶ Poncelet, *Catal. cod. hag. lat. Bibl. Rom.*, etc., p. 360.

(2.) MS. H. 25. Chartaceus, saec. xvi/xvii, fols. 43 a-50 b. Copied by Antonius Bosius (d. 1629), "ex primo codice monasterii S. Caeciliae." At the end occurs the hymn *Brigida nomen habet*.¹

(3.) MS. H. 28. Chartaceus, saec. xvi/xvii, fols. 177 a-180 a. Incomplete at the beginning. Transcribed from Tomus xxi just described.²

Rome, Biblioteca Vaticana.

There are four MSS. of this Vita in the Vatican.

(1.) Cod. Vaticanus lat. No. 5772. Membr. saec. xiii, fols. 74 a-76 b. From the monastery of St. Columbanus at Bobbio in Piedmont.³ The prologue and Vita proper are separated as in the Corsini ms. No. 777. Some folios are lost between fols. 75 and 76, that portion of the Vita from the middle of section 9 (*arborem fuisse transversam*) down to the middle of section 29 (*de receptione et refectioe sanctae Brigidae*) being missed out. Some more folios are gone at the end, and the Vita breaks off abruptly towards the end of section 33 (*infirmiores se iniuste et durissime operari*).⁴

(2.) Cod. Vaticanus lat. No. 6075. Chartaceus, saec. xvii, fols. 67 a-71 a. Copied in 1601 "ex Passionali postea deperdito ecclesiae Sanctae Caeciliae trans Tiberim." Same separation between prologue and Vita as in the preceding ms. After the Vita comes the hymn *Brigida nomen habet*.⁵

(3.) Cod. Vaticanus lat. No. 9499. Membr. saec. xiv/xv, fols. 204 a-204 b. A very brief epitome of the Vita.⁶

(4.) Cod. Ottobonianus No. 223. Membr. saec. xiv/xv, fols. 280 b-281 a. A mere fragment of the Vita (sections 1-5).⁷

Rouen, Bibliothèque Publique.

This Library possesses two MSS. of the Vita S. Brigidae.

(1.) MS. No. 1384 (U. 26). Membr. saec. xi, fols. 230 b-240 b. Obtained from the ancient Benedictine abbey of Gemeticum⁸ (Jumièges, dép. de la Seine-Inférieure) near Rouen. A volume of Vitae Sanctorum.⁹

¹ Poncelet, loc. cit., p. 444.

² Poncelet, loc. cit., p. 448.

³ The Benedictine monastery of Bobbio was secularized in 1803. Cf. the Catholic Encyclopedia, art. Bobbio (vol. ii, 1907); Cipolla (L'Arte, 1904, p. 241).

⁴ Poncelet, Catalogus codicum hagiographicorum latinorum Bibliothecae Vaticanae, Bruxellis, 1910, p. 150.

⁵ Poncelet, loc. cit., p. 171.

⁶ Poncelet, loc. cit., p. 238.

⁷ Poncelet, loc. cit., p. 420.

⁸ Cf. Gottlieb, Ueber mittelalterliche Bibliotheken, 1890, p. 394.

⁹ Omont, Catal. gén. des MSS. des Bibl. Publ. de France, Départements, t. i, 1886, p. 360; Analecta Bollandiana, 23, 1904, p. 172.

(2.) MS. No. 1401 (U. 19). Membr. saec. xiii, fols. 145b–152b. A volume of *Vitae Sanctorum* also from the monastery of Jumièges.¹

Valenciennes, Bibliothèque Municipale.

MS. No. 513 (471 a). Membr. saec. xii, fols. 29b–35 a.

In this copy the *Vita* is attributed to Bede. A volume of *Vitae et Passiones Sanctorum*.² Formerly V. 192 in the library of the monastery of Elno at Saint-Amand.³

Zwettl, Stiftsbibliothek.

MS. No. 13. Membr. saec. xii^{ex}. A volume of *Vitae Sanctorum*.⁴ The Cistercian monastery of Zwettl is situated in Lower Austria.

The above list, together with the eight MSS. described in the *Addendum* to this paper, includes some 56 MSS., of which 43 are complete or practically so.⁵ Five are as early as saec. x, one dates from saec. x/xi, and eight date from saec. xi.

III. NOTE ON THE VITA S. BRIGIDAE.

Of all the extant documents dealing with St. Brigid of Kildare the *Vita* by Cogitosus appears to me to be the most ancient.⁶ It contains the simplest narrative, and, what is specially notable, does not make any mention of St. Patrick, or attempt, as the later Lives do, to bring him into relation with St. Brigid, assuming the incorrect date 493 as the year of his death.⁷

¹ Omout, loc. cit., p. 390; *Analecta Bollandiana*, 23, p. 164.

² Cf. Molinier, *Catal. gén. des MSS. des Bibl. Publ. de France, Départements*, t. 25, 1894, p. 410.

³ Sanderus, *Bibliotheca Belgica Manuscripta*, 1641, Pars 1, p. 48; Delisle, *Le Cabinet des MSS.*, etc., t. ii, p. 448 sq.

⁴ Cf. *Analecta Bollandiana*, 17, 1898, pp. 30, 44.

⁵ Hardy (*Descriptive Catalogue*, etc., i, 1, 1862, p. 113) refers to a ms. at Lincoln containing "*Vita et Miracula S. Brigittae*." The ms. in question is A. 5. 4. in the Cathedral Library. I have, however, ascertained that it contains not a *Life* of St. Brigid of Kildare, but the *Revelationes*, etc., of St. Birgitta or Brigitta of Sweden, who lived in the fourteenth century. Of the following ms. Lives of St. Brigid enumerated by Hardy (loc. cit., pp. 113, 114, 115) I know nothing:—"Vita S. Brigidae Scotice, mutila, ms. Insul. apud Claudium Doresmieux"; "*Vita S. Brigidae*. MS. Clarendon 65 f. 4"; "*Vita Brigidae*. MS. Monast. de Becco 128"; "*Vita S. Brigidae*. MS. Bibl. Monast. S. Audoeni Rothomag. 104." In the Stadtbibliothek at Metz there is a MS., No. 397, saec. xiv^{ms}, containing "*Miracula Beate Brigide*" (cf. *Catalogue général des mss. des Bibl. Publ.*, 4to series, t. v, 1879, p. 164). The description given in the printed catalogue is not sufficient to enable me to identify the work.

⁶ The Bollandists (*Bibliotheca Hagiographica Latina*, No. 1455–56) regard the first *Life* (*Acta Sanctorum*, Feb. t. i, pp. 118–134) as the most ancient. But this is no doubt on the strength of Colgan's attribution to St. Ultan, for which there is no serious foundation in my opinion.

⁷ Cf. on this point Bury, *Life of St. Patrick*, 1905, p. 332.

The author of the Irish hymn in praise of St. Brigid known as the "Hymn of St. Broccan" cannot have lived before the ninth century.¹ Windisch² has pointed out that the order of the incidents in the Life of St. Brigid by Cogitosus is almost exactly their order in this hymn; and it is impossible to doubt that the author drew directly from Cogitosus. Atkinson had a theory that this hymn is a translation of Cogitosus produced by a school of writers.³

I do not think that the Vita of Cogitosus was made use of by the authors of any of the Lives of St. Brigid which bear the numbers 1455-56, 1458, 1460, 1461 in the admirable *Bibliotheca Hagiographica Latina* compiled by the Brussels Bollandists.⁴ John of Tynemouth drew his narrative (BHL. 1462) not from Cogitosus, as has been stated by Hardy⁵ and by O'Hanlon,⁶ but from the Life BHL. 1455-56, and the same origin is to be assigned to the Life given by Surius.⁷ Giraldus Cambrensis⁸ has some account of Kildare and of the miracles of St. Brigid, but, contrary to the statement of O'Hanlon,⁹ he has not taken his information from Cogitosus, and the same is true of the brief account of the Saint found in the Appendix afterwards added to the *Aurea Legenda* of Jacobus de Voragine.¹⁰ On the other hand, the compiler of the *Lectiones de S. Brigida* in the Aberdeen Breviary of 1509 appears to have used Cogitosus.¹¹ But I am not able to say whether his Vita was drawn upon by any of the following authors, all of whom have compiled brief narratives of St. Brigid:—Vincentius Bellovacensis,¹² Petrus de Natalibus,¹³ Johannes de Grandisson,¹⁴ the compiler of the *Hystorie plurimorum sanctorum*,¹⁵ Jacobus

¹ Cf. Atkinson ap. Bernard and Atkinson, *Irish Liber Hymnorum*, 1898, ii, p. lvi. It is well, however, to bear in mind the fantastical nature of much of Dr. Atkinson's metrical speculation, cf. Whitley Stokes, *Revue Celtique*, t. vi, 1885, pp. 298-308, and Gaston Paris, *Romania*, t. v, 1876, pp. 384-389.

² *Irische Texte*, 1880, pp. 26-49.

³ Bernard and Atkinson, loc. cit., ii, p. lv, cf. pp. l-lvi, 189, 195-204.

⁴ 2 vols. Bruxellis, 1898-1901, and Supplementum, 1911. It is now the custom to identify Lives of Saints by quoting the numbers assigned to them in this work. The Vita by Cogitosus bears the number 1457.

⁵ *Descriptive Catalogue*, etc., i, pt. 1, 1862, p. 110.

⁶ *Lives of the Irish Saints*, ii [1877?], p. 15.

⁷ *De probatis sanctorum historiis, Coloniae* (1570, i, 782-785; 1576, i, 806-809; 1613, ii, 19-20); *Augustae Taurinorum* (1875, ii, 42-47).

⁸ *Topographia Hibernica*, cap. 34-39 (Opera, ed. Dimock, Rolls Series, vol. 5, 1867, pp. 120-124).

⁹ *Lives of the Irish Saints*, iv [1886?], p. 233.

¹⁰ *Jacobi a Voragine Legenda Aurea recensuit Graesse*, ed. 2, Lipsiae, 1850, pp. 902-903.

¹¹ *Acta Sanctorum*, Feb. t. i, p. 118.

¹² *Speculum Historiale*, xxii, 29-32.

¹³ *Catalogus Sanctorum*, etc., iii, 69.

¹⁴ *Legenda Sanctorum*, ed. Reynolds, vol. ii, part 3, London, 1880, fol. 22v°.

¹⁵ *Coloniae*, 1483, fol. 241d-242d; ed. Lovanii, 1485, fol. 20v°-21v°.

Philippus Bergomensis,¹ Petrus Calo,² Johannes Gielemans,³ and Bernard Gui.⁴

It may be useful to enumerate briefly here a number of anonymous MS. accounts of St. Brigid, the relation of which to the printed lives remains unknown:—Florence, Laurentian Library, brief *Lectiones de S. Brigida* in a late Lectionarium⁵; London, British Museum, MS. Arundel 198, fol. 19 b, a short lection, *Beata Brigida in Scotia nata migravit ad Dominum*⁶; Munich, Cod. Lat. No. 14565, saec. xiii/xiv, formerly F. 68 in the Benedictine monastery of St. Emmeram at Regensburg,⁷ fol. 2 b, *Legenda de sancta Brigida. Ad sanctissimam beate virginis Brigide vitam*, etc. It breaks off abruptly *exinde reversi sunt ad propria. Quodam*⁸; Naples, Bibl. Nazionale, MS. viii. B. 18, saec. xv, fols. 269 b–270 b, *De S. Brigida*⁹; Paris, Bibl. Nationale, MS. lat. No. 10870, saec. xiii, from the monastery of Echternach, fol. 105r, *Legenda de S. Brigida*¹⁰; MS. lat. No. 755, saec. xiii ex., fols. 155 a–156 a, *Legenda de S. Brigida*¹¹; Rome, Vatican, *Lectiones de S. Brigida*,¹² in three MSS. of saec. xv, Palatinus No. 435, fols. 114–116, 213 b–214 b; Palatinus No. 436, fols. 77 b–80; Palatinus No. 477, fols. 36–36 b.¹³

IV.—NOTE ON COGITOSUS.

In the dedicatory preface to his life of St. Patrick, Muirhu Maccu Machtheni tells us that he is venturing on a novel experiment, which had before been tried in Ireland only by his father Cogitosus or Cogitosus.¹⁴

¹ De claris selectisque plurimis mulieribus, Ferrariae, 1497, cap. 137.

² The *Legendarium* of Petrus Calo has not yet been printed. It has been analysed in the *Analecta Bollandiana* (tom. 29, 1910, cf. p. 58). The account of St. Brigid would not appear to have been derived from Cogitosus. The *Legendarium* also contains a Vita S. Patricii (cf. loc. cit., p. 63).

³ Cf. the analysis of his unpublished *Sanctilogium* in *Analecta Bollandiana* (t. 14, 1895, p. 20). He also has a Vita S. Patricii (cf. loc. cit., p. 34).

⁴ Compiler of a *Speculum Sanctorum* extant in two Paris MSS. of saec. xiv, Nos. 5406 and 5407 (cf. Catal. cod. hag. lat. Bibl. Nat. Parisiensis, t. iii, 1893, p. 555).

⁵ Cf. Bandini, Catal. Cod. Lat. Bibl. Med. Laurent., t. iv, p. 323.

⁶ Cf. Hardy, Descriptive Catalogue, etc., i, pt. 1, 1862, p. 112.

⁷ Cf. Gottlieb, Ueber mittelalterliche Bibliotheken, 1890, pp. 67–68, and 383–384.

⁸ Cf. Catal. cod. lat. Bibl. Regiae Monacensis, tomi ii, pars 2, 1876, p. 193.

⁹ Poncelet, *Analecta Bollandiana*, 30, 1911, p. 179.

¹⁰ Cf. Catal. cod. hag. lat. Bibl. Nat. Parisiensis, ii, 1890, p. 616.

¹¹ Catal., etc., iii, 1893, p. 573.

¹² Poncelet, Catal. cod. hag. lat. Bibliothecae Vaticanae, 1910, pp. 258, 259, 263.

¹³ Cf. also O'Hanlon (*Lives of the Irish Saints*, ii, [1877?], p. 220n. 115). O'Hanlon's account of St. Brigid (loc. cit., pp. 1–224) appears terribly confused. I have not had the courage to read it right through. It is a pity to see so much genuine learning dispensed in such an unmethodical manner. The article on Cogitosus (loc. cit., iv [1886?], pp. 230–235) is equally unreliable. O'Hanlon shows no knowledge of Graves' important paper.

¹⁴ Book of Armagh, fol. 20r, ed. Stokes (*Tripartite Life of St. Patrick*, Rolls series, 1887, ii p. 269). I have also been able to consult Gwynn's long-delayed diplomatic edition of the ms. The passages in question are on p. 39.

Prof. Bury has conjectured with great probability that this novel movement in hagiography was the writing of the lives of Irish saints in Latin. He thinks that previous to their time such documents had been exclusively compiled in Irish.¹

There can be no doubt that the Cogitosus alluded to by Muirchu as his father is none other than the author of the *Vita S. Brigidae*.² Graves³ was the first to demonstrate this by a brilliant emendation of a corrupt phrase in the Book of Armagh, and his correction has been accepted by Hogan,⁴ Whitley Stokes,⁵ and Bury.⁶ On folio 201^o, col. 1, line 18, the MS. reads, "excepto tantum uno patris mei *cognito si* expertum atque occupatum ingenioli mei puerilem remi cymbam deduxi."⁷ Graves altered the meaningless *cognito si* into *coguitosi*. *Coguitosus* is, of course, the same as *Cogitosus*, the insertion of the letter u between g and a vowel being very common in Latin MSS. transcribed by Irishmen. In the Book of Armagh we find *aevangelium*, *anguelus*, *fiugvere*, *longuinquo*. Graves⁸ has further pointed out that the word *cogitosus*, meaning "thoughtful," "pensive," is a Latin translation of *Machtheni* (as connected with the verb *machtuaigim*, "I ponder over," "I wonder at"), the prefix *Maccu* being equivalent to the Latin *filiorum*. This view is accepted by Whitley Stokes.⁹ I may, however, remark that the word *cogitosus*, which is unknown in classical Latinity, appears to occur very rarely in mediaeval writings. It is not recorded in any Latin dictionary,¹⁰ and I only remember to have come across it once, namely in the short Latin tract published in 1910 by H. Suchier¹¹ from the Paris MS., lat. No. 8701, written in 1370.

A personage named *Cogitosus*, a "right" or a "wise man," is noticed at the date April the 18th in the Martyrology compiled about 1170 by Marianus

¹ *Life of St. Patrick*, 1905, pp. 256, 266. It is also possible that previous to the time of *Cogitosus* and Muirchu hagiographical writings in Ireland partook more of the nature of *acta* and *memorabilia* than of regular biographies. The unsatisfactory nature of Irish hagiography has been frequently remarked.

² Muirchu's preface (sup. Stokes, loc. cit., ii, p. 269) shows a remarkable similarity to the prologue and concluding paragraph of *Cogitosus' Vita S. Brigidae*, and F. Duine (*Les Saints de Domnonée*, Rennes, [1912], p. 6) has very recently pointed out a not less remarkable relation between the preface of *Cogitosus* and that of the *Vita S. Samsonis*.

³ *Proc. R. I. Acad.*, 1863, vol. viii, pp. 269-271.

⁴ *Analecta Bollandiana*, t. i, 1882, p. 545.

⁵ *Loc. cit.*, ii, p. 269n.

⁶ *Loc. cit.*, p. 255.

⁷ *Ed. Stokes, loc. cit.*, ii, p. 269; *ed. Gwynn*, p. 39, l. 18.

⁸ *Proc. R. I. Acad.*, 1863, 8, pp. 269-271.

⁹ *Tripartite Life*, etc., ii, p. 269n. 2; cf. also Bury, *Life of St. Patrick*, p. 255.

¹⁰ Those I have consulted include Forcellini, *Du Cange-Henschel*, and the great *Thesaurus Linguae Latinae*, now in course of publication in Germany.

¹¹ *Romania*, 39, 1910, p. 76.

Gorman,¹ and also in the Martyrology of Tallagh,² but whether he has any connexion with our author it is impossible to say.

We may then regard it as demonstrated that our Cogitosus was the father of Muirchu Maccu Machtheni. Now the latter is known to have written his biography of St. Patrick in or about the year 699.³ Furthermore, Muirchu's son, Colman, Abbot of Movice, died, according to the Annals of Ulster,⁴ in 736. We may therefore place Muirchu's "floruit" about 650-710, and that of his father will approximate to 620-680.

From external evidence, then, we are justified in assigning Cogitosus to the period 620 to 680, and there is no internal evidence in the Vita itself to contradict this view. The Latinity and style are exactly what we might expect from an Irish writer of the seventh century.⁵ It has been argued that Cogitosus must have lived between the years 800 and 833 or 836. In sections 37, 38, and 39 of the Vita he speaks in glowing terms of St. Brigid's church at Kildare, and of the splendour of its decoration. The town he describes as "ciuitas refugii tutissima." Manifestly this could not have been written after the plundering of Kildare in 833 and 836. On the other hand, the opening phrases of section 37 are taken to refer to the ceremony mentioned in the Annals of Ulster at the year 800, of the placing of the relics of St. Conlaedh, Bishop of Kildare, in a shrine of gold and silver. But anyone who reads over attentively the passages in Cogitosus will realize that the translation of the relics of St. Conlaedh in 800 was an occurrence different from his burial under a monument described in the Vita S. Brigidae.⁶

The use of the word *nepos* in the closing phrase of the Vita (section 40), "Orate pro me Cogitoso *nepote* culpabili," has sometimes been taken as evidence of relationship between Cogitosus and St. Brigid, but *nepos* is clearly to be taken in the sense of "prodigal," "spendthrift," in which

¹ Ed. Whitley Stokes [Henry Bradshaw Society], 1895, p. 78.

² Calendar of Irish Saints, edited by M. Kelly, 12mo, Dublin [1857], p. xxi. This very poor edition was made from the Brussels ms. No. 5100-04. The account of Cogitosus given by the Bollandists (*Acta Sanctorum*, Febr. t. i, pp. 101-102) is now, of course, quite out of date.

³ Cf. Bury, *Life of St. Patrick*, 1905, p. 256.

⁴ Cf. vol. iv, 1901, Index, edited by Mac Carthy, who has revised the chronology of the preceding volumes.

⁵ As already remarked, the style shows much resemblance to that of Muirchu. Victor Tournour (*Bibliothèque de la Faculté de Philosophie et des Lettres de l'Université de Liège*, Fasc. 15, 1905, p. 51) speaks of Cogitosus' Latinity as remarkable for this period. I should prefer to reserve judgment until the publication of a critical edition. The text presented by the London and Oxford mss. collated by me is far more corrupt and inaccurate than the version given by the Bollandists.

⁶ Cf. Annals of Ulster at the corrected dates 800, 833, 836. St. Conlaedh, first bishop of Kildare, died in 520. The date of St. Brigid's death is variously estimated as 524, 526, or 528. Petrie (*Round Towers of Ireland*, Dublin, 1845, p. 200) held that Cogitosus wrote between 799 (800) and 831 (833).

⁷ The mss. show considerable variations in this passage.

sense it is common enough in classical Latinity.¹ The phrase is merely an example of the depreciatory way in which so many ecclesiastical writers liked to refer to themselves.

Similarly it would be incorrect to infer from the words "virtutes quas non solum audiimus, sed etiam oculis nostris uidimus" in section 34, that Cogitosus meant us to understand that he was a contemporary of St. Brigid. He is evidently referring to events which took place long after her death.

It may then be taken that all valid arguments agree in assigning Cogitosus to the period 620 to 680. That he is to be especially connected with Kildare cannot be doubted.² His son Muirchu is closely associated with Co. Wicklow,³ and Cogitosus refers several times (sections 1, 2, 40) apparently to the monks of Kildare as "fratres." In section 2 he greatly exaggerates the influence and importance of the bishop and monastic church there,⁴ though the double monastery which he mentions appears to have really existed in his time. It may be doubted whether such institutions were to be found in Ireland as early as St. Brigid's time.⁵ In sections 37-39 he gives us a minute description of the monastic church at Kildare.

The value of Cogitosus' Vita from the historical point of view is naturally small. The greater portion consists of an enumeration of various miracles performed by St. Brigid or at her intervention. Names of persons or descriptions of customs or local topography, which constitute the most interesting features of these kinds of documents, are very uncommon here. The most remarkable thing in the work is perhaps the detailed account of the monastic church at Kildare (sections 37-39), from which Petrie and Dom Louis Gougaud have extracted some useful information.⁶

The compilation of the present memoir has necessitated the consultation of a great many catalogues and books of a somewhat unusual nature,⁷ and it is my pleasant duty to offer here my sincere thanks to all those friends and

¹ Cf. Cicero, In Catil. 2, 4, 7; De Lege Agr. 1, 1, 2; Pro Quint. 12, 40; Horace, Epist. 1, 15, 36; 2, 2, 193; Epod. 1, 34; Sat. 1, 4, 49; 1, 8, 11; 2, 1, 53; 2, 3, 225.

² This may fairly be inferred from his having written a Life of St. Brigid of Kildare.

³ Cf. Bury, Life of St. Patrick, 1905, p. 255.

⁴ Cf. Gougaud, Les Chrétientés Celtiques, 1911, p. 218.

⁵ Cf. Gougaud, Revue Bénédictine, 25, 1908, p. 172; Les Chrétientés Celtiques, p. 93.

⁶ Petrie, Round Towers of Ireland, 1845, pp. 194-205. Petrie pointed out that in Colgan's text (Acta Sanctorum Hiberniæ, t. ii, Trias Thaumaturga, p. 523, col. 2, last line) for *Orientali* we should read *Occidentali*. It is interesting to note that the edition of the Bollandists (section 37 end) and the London and Oxford mss. all have the correct *Occidentali*. Petrie (loc. cit., p. 197) asserts that there were stone churches in Ireland in the time of Cogitosus. This appears to be very doubtful; cf. Dom Gougaud's discussion of the texts dealing with this subject (Dictionnaire d'Archéologie Chrétienne et de Liturgie, fasc., 22, 1910, art. Celtiques (liturgies), cols. 2993-2996; Les Chrétientés Celtiques, 1911, pp. 317, 318).

⁷ Very many more than are actually cited in this paper.

scholars at home and abroad whose sympathetic assistance has been so liberally extended to me. Messrs. Lyster, Best, and Magee of the National Library, Dublin;¹ Mr. O. J. Sutton, formerly my colleague on the Staff of the John Rylands Library at Manchester; Mr. De Burgh of Trinity College, and the officials of the Royal Irish Academy, have spared no pains to assist me to the best of their abilities. M. Henri Omont of Paris, Dr. von Kauffungen of Metz, F. Madan of Oxford, R. W. Flower of London, and the late Canon Maddison of Lincoln, have very kindly supplied me with information relative to MSS. preserved in these towns.

ADDENDUM.

To the list of forty-eight MSS. given above (pp. 308–19) I am now (July, 1912) able to add eight more, thus bringing the total up to fifty-six.

Angers, Bibliothèque de la Ville.

This Library possesses two MSS. of the Vita S. Brigidae.

(1.) MS. No. 123. Membr. saec. xiii, from the Benedictine monastery of Saint-Aubin at Angers.² A Lectionarium containing a few extracts from Cogitosus.³

(2.) MS. No. 807. Membr. saec. xii, fols. 6 b–15 a. A volume of Vitae Sanctorum. Provenance unknown.⁴

Berlin, Königliche Bibliothek.

There are at least two MSS. of the Vita at Berlin.

(1.) MS. lat. No. 123 (formerly Phillipps⁵ No. 1839). Membr. saec. xiii, fols. 86 a–91 a. A volume of Vitae Sanctorum from the Benedictine monastery of St. Vincentius near Metz.⁶ This copy omits the prologue, and the closing phrase reads, *Orate pro me et ne imputetis culpabili*,⁷ etc.

(2.) MS. lat. No. 791. Membr. saec. x, fols. 73 a–85 a. A volume of Vitae Sanctorum copied by a scribe named Walthard.⁸ It was formerly

¹ I should like to draw especial attention to the enlightened manner in which the heads of this Library do everything in their power to assist all those engaged in scholarly research. Had it not been for the sympathy shown me by these gentlemen, much of my mediaeval work would have been given up through sheer discouragement experienced elsewhere.

² Cf. Delisle, *Le Cabinet des mss. etc.*, t. ii, 1874, pp. 485–487.

³ Molinier, *Catalogue général des Manuscrits des Bibliothèques Publiques de France, Départements*, t. 31, 1898, p. 224.

⁴ Molinier, *loc. cit.*, p. 453.

⁵ Cf. on the history of the Phillipps mss. now at Berlin Jacobs, *Zentralblatt für Bibliothekswesen*, 28, 1911, pp. 23–39.

⁶ Cf. Dom Pitra, *Spicilegium Solesmense*, t. ii, 1855, p. xxxv.

⁷ Val. Rose, *Die Handschriften-Verzeichnisse der K. Bibliothek zu Berlin*, Bd. 12, 1893, p. 263.

⁸ Rose, *loc. cit.*, Bd. 13, Abt. 2, 1903, p. 839.

preserved in the Benedictine monastery of S. Liudgerus at Werden,¹ and is no doubt the MS. referred to many years ago by C. P. Cooper.² The prologue is omitted.

Brussels, Bibliothèque Royale.

This Library possesses two MSS. of the Vita.

(1.) MS. II. 1181 briefly described above (p. 309).

(2.) MS. II. 2568. Membr. saec. x, fols. 48 b-59 a. From the Abbey of Stavelot.³ Both these MSS. were recently examined by me at Brussels. A more detailed account of them will be given in a future communication on *Hiberno-Latin Manuscripts in the Libraries of Belgium*.

Orleans, Bibliothèque Publique.

MS. No. 331. Membr. saec. x, pages 266-278. A volume of Vitae Sanctorum.⁴ From the celebrated Benedictine monastery of Fleury or Saint-Benoît-sur-Loire.⁵

Paris, Bibliothèque de l'Arsenal.

MS. No. 153. Membr. saec. xiv, fols. 233 b-238 a. A volume of Vitae Sanctorum. Provenance unknown.⁶

Paris, Bibliothèque Sainte-Geneviève.

MS. No. 553. Membr. saec. xii, fols. 205 a-208 b. A volume of Vitae Sanctorum.⁷ From the Church of St. Mary of Gâtines (*liber sancte Marie Gastinensis ecclesie*).

¹ Rhine Province, Prussia.

² Appendix A, Supplement, p. 80.

³ In this MS. the prologue and name Cogitosus in the closing phrase are omitted.

⁴ Cuissard, Catalogue général des Manuscrits des Bibliothèques Publiques de France, Départements, t. 12, 1889, p. 176.

⁵ Cf. Cuissard, loc. cit., pp. iii-xxv.

⁶ Martin, Catalogue général des Manuscrits des Bibliothèques Publiques de France, Paris, Bibliothèque de l'Arsenal, t. i, 1885, p. 79.

⁷ Kohler, Catal. gén. des MSS. des Bibl. Publ. de France, Paris, Bibliothèque Sainte-Geneviève, t. i, 1893, p. 283.

PASSIO SECUNDE LUCI. T. S. I. T. G. A. L. I. M. I. C.

quia demones & dñs. Tulsol
 multa curare effugisti beatissimum
 certum sedimbi hodie adrogant. ut
 ego emulcem qd ipse mihi signum aut
 tale dedit. Peripm qui medicatus est
 uiuol & met tuofuerox galemicus
 mense cadul desolio tuo. Nec mora
 dum adhuc stupidi tortores definos
 sumunt. immarvrem auabus & liquecon
 ca. nulli marpbroc tabescunt. Alepius
 audens desoliosuo munitatem conhuic
 ut se fundat. loci & dum in hie are
 dom. Oox curruces parca rapuunt
 sem. Quid nobis aure osceleret festi
 & cuncta ianua uent indubium non
 sufficiebat. tua mors solus nisi & nrm
 tabuella adiungere sanguinem. Et
 lacrimis commingentia uenit sibi alteri
 locul carere. Quid facionus omi con
 milcoonef. Quo. urn alienus apicete
 est. nrm intermat membrum. Oox
 hordium uiderimus tuos terra. suscipue
 frugam. gressu. clernus. cludio uidece
 nris ppetuar. lare. ost sine iusti liers
 uemotio. te singuli lamberemus. Oox
 redolentia. sunt. ita. in anno. non sine
 clac uenico. amulicium. galemicus iustit
 apud pcedi. Quimugent submucrone
 uoce. delacata. dñ. Promissu me bea
 istime. tñse. seque. cito. u. amob
 incipit. uenit. regna. celorum.
 Torsum. autem. baudul. ut. sic. in. co. clea
 in. formo. & p. d. u. l. s. r. m. a. l. u. d. u. d. i.
 p. a. r. a. t. a. l. a. & s. i. b. i. n. o. s. e. c. a. c. i. b. u. s. N. o.
 u. o. n. p. a. n. t. e. s. u. s. t. e. h. o. r. u. s. & n. e. c. a. p. i. l. l. u. q. d. e.
 u. a. r. i. o. n. i. s. s. e. r. a. d. u. n. t. e. T. o. r. t. u. s. i. n. e. d. u. m.
 u. a. u. o. l. f. i. g. e. n. t. a. n. t. i. c. a. m. i. m. m. e. p. a. c. e. r. d. i. e.
 u. i. d. e. r. e. h. u. i. s. e. c. o. m. p. l. e. x. u. m. q. u. i. a. d. e. c. a. p. i. e.
 u. i. p. s. i. n. e. t. u. a. u. o. l. u. n. t. a. t. e. n. o. n. & d. e. c. i. s. u.
 u. i. l. l. a. n. t. e. s. u. i. r. e. u. m. u. m. & l. a. b. o. r. s. e. c. e. c. a. r.
 r. e. d. d. i. d. e. r. e. u. a. l. i. u. s. s. a. b. i. n. o. d. i. c. e. b. a. r.
 Q. u. e. s. e. r. a. s. a. b. i. n. e. e. m. p. a. u. s. & d. i. e. s. & i. n.
 u. a. l. i. u. m. e. x. e. r. c. i. t. u. s. l. a. b. o. r. e. m. S. a. b. i. n. u. s.

ualio respondebat. Sine non dedit te
 dery labo sine fructu ostenderem tibi
 lurchamie. Interca. ban. som. debita. sub
 sequitur poena. Na. que. u. n. q. u. i. m. e. r. i. t. a.
 alul. t. a. f. l. a. g. r. a. p. m. e. m. b. r. i. b. u. s. d. i. n. s. u. s. e. o. m. i. a.
 que. i. m. m. a. r. e. r. e. m. u. a. l. i. a. n. t. p. p. e. t. s. u. s. g. e. n. t. a.
 u. r. i. m. e. n. a. r. i. u. m. t. a. l. e. s. c. o. n. c. l. a. m. a. r. u. o. c. e. s.
 D. u. c. u. r. a. t. u. a. e. l. e. m. e. n. t. a. d. s. s. i. m. a. r. e. r. e. m.
 e. o. g. n. o. s. c. e. r. e. n. o. l. i. m. s. u. s. p. e. n. d. e. r. e. m. m. a. n. u. s.
 s. e. c. t. e. c. d. e. l. a. r. s. u. p. i. s. t. & f. a. c. i. a. m. f. a. c. i. s. A. u. t.
 s. i. n. e. h. o. e. m. e. r. i. t. u. m. e. o. q. u. a. m. e. i. a. u. s. a. r. t. a.
 s. u. s. c. i. p. i. a. r. n. e. l. u. d. i. b. r. i. o. s. u. s. h. a. b. e. a. r. u. i. u. s.
 I. n. e. h. a. s. l. a. c. r. i. m. o. s. a. s. u. o. c. e. s. a. n. t. e. u. n. a. c. a. r. u. t.
 q. u. a. m. p. e. l. l. e. m. c. o. n. t. i. n. u. o. m. i. s. c. e. a. r. m. a. r.
 u. n. t. e. c. e. l. u. m. & u. o. x. d. e. u. i. b. e. f. a. c. i. a. & d. e. n. s.
 I. n. t. e. t. y. r. e. i. n. g. a. u. d. i. u. m. d. n. i. n. u. s. f. o. r. t. e. m.
 a. t. h. l. e. a. r. u. m. p. a. l. m. a. m. s. e. q. u. i. t. a. r. u. i. c. e. n. t. e.
 d. e. d. u. h. o. l. o. t. r. i. u. m. p. h. a. t. o. m. e. u. m. e. r. i. s.
 h. o. d. i. e. i. n. p. a. n. d. y. s. o. C. e. n. t. i. n. u. o. m. a. r. t. y. r.
 e. x. u. l. t. t. r. e. n. a. c. o. m. p. o. s. u. i. t. e. s. t. i. n. l. u. b. a. t. u. m.
 d. o. t. r. a. d. i. d. i. t. s. p. i. m. O. o. x. e. s. t. i. m. c. o. r. p. u. s.
 l. a. m. m. a. r. i. b. u. s. p. a. u. c. i. b. u. s. & o. m. n. i. a. s. o. l. l. e. p. i. t.
 i. n. d. e. d. u. c. a. t. i. o. n. e. m. u. l. t. y. r. i. s. c. a. e. l. e. b. r. i. t. a. a. d.
 u. e. r. u. e. n. t. e. c. e. l. i. n. o. e. p. i. o. & l. a. u. d. a. c. i. o. n. i. s. p. r. o.
 f. e. r. a. r. u. m. c. o. m. i. t. a. t. o. b. i. s. p. a. u. l. e. h. r. i. a. c. e. p. i. t.
 u. b. i. m. a. g. n. e. f. i. u. n. t. u. i. r. t. u. e. s. & o. m. n. i. u. m.
 c. o. n. t. e. n. t. u. r. a. e. g. r. i. t. u. d. i. n. e. s. C. u. i. u. s. e. m. e. r. i. s.
 a. p. u. d. g. r. e. c. i. a. l. a. t. e. r. e. & u. b. i. q. u. i. b. e. n. e. f. i. c. i. a.
 p. a. t. e. n. t. I. l. l. u. m. a. u. t. e. m. a. n. t. a. s. n. o. n. s. o. f. e. r.
 c. u. i. u. s. f. i. d. e. s. n. u. l. l. a. p. e. c. t. s. e. r. e. C. u. i. u. s. a. u. t. e. m.
 i. n. p. l. e. n. o. r. e. p. t. i. f. u. e. r. i. t. h. i. d. e. s. r. e. p. o. r. a. t. p.
 m. i. u. m. a. u. l. a. u. d. e. a. u. d. i. e. n. t. d. n. i. m. b. e. n. e.
 d. i. c. i. s. c. u. i. h. o. n. o. r. e. g. l. a. i. n. s. e. l. a. s. o. l. a. m. e.
 i. n. c. o. p. i. l. i. m. a. s. e. b. e. n. e. f. i. c. i. t. u. r. i. s. u. s.

D E COGITIS FRIS UTSC
 Debeare mentione BRIGIDE
 uirginit. uirgines ceopa. doctos. memorie
 lacerisq. tradere adgndiar. Quod op
 inpositum & eddicate maren. indium
 parua. Gignozantia. moe. & lingue
 minimo. omneue. sedporentia. demitit
 magna. tacere. ualde. exquo. ola. & claris.

London, British Museum, MS. Cotton Nero, E. i, fol. 134b.

possit. predicat doctor seroniam punit
 araticum hibernicum prudens loca
 tus: consilio in hac supuentura nocte
 onere dnm uera brigida fidelit debent
 uepta nobis demant que in hac ope acan
 sanus fideat. Et sic totis uera monumta
 psonit gloriosam nocte tntisogr. selem
 tie post ipsam stregat nocte omne me
 misse uuliam antiquam acponit in suo
 cantine uiam condidit roam. Nec aliquid
 desit deca splentidine nec in illa tnt
 magnitudine supflua pntisqta est. Et sic
 illa brigida. cam excedit malitiam in
 uiam: uerota post illa sic abea condidit
 nec inatillat locustate factus uis dnr
 nis circumla terto rruatur. aut pecta
 ingratia: Et hoc uuliam domine
 miraculora omium oculis uidentem illa
 uiam uiam manifeste parca. Et quis
 sermone explicare potest maximum de
 eorum huius secte & innumere ciuitas
 quoniam uuliam miracula sicut e. dicuntur
 dam nulla inuorati ambitu circundat.
 caroum uuliam tam inea popli sinuata
 bilib: dicitur in ea sicut pua. et uuliam
 nonen accepit maxima. Hec ciuitas & me
 tropoli tnta est. meatus suburbani que
 sca cerco limite designauit brigida: nul
 lus carnalis saluatiarol: nec concursus u
 mecur phostum sed uuliam e. refugit
 sima omnia somnib: desunt suburbani
 inuero socrorum tnt omib: fugitiu.
 In qua thesauri seruatiur regum. & deo
 nra culum excellens sima. & uidet.
 Et quis diuinitate possit diuersas
 turis & innumere biles popli decem
 punitat hibernie confluat: alii prop
 depulurum abundantiara. alii ad exp
 ractum carbarum. alii prop sua san
 tate desunt languomb: alii cum magnis
 donis & munerb: conuenient ad solle p
 nra tntem nuntiat sic brigide quem
 die kalendarum februari mensis do
 mienit scate sactam dicitur dicitur
 & uuliam in glib: mantionem
 scate. Uerum pua afrib: hec leg
 imo cridatib: quicquid obalem
 coactos nulla progatua scitena sus
 hilat pelagum inuente inuam beate
 BRIGIDE & uuliam pualitima formidanda
 in his pauca rustico sermone dicitur ur
 tuab: demaximis & innumere bibus
 parus hinc uiam. Onere pnt cogat
 nempureas culpabili: & uuliam audacie in
 indulgias acy: oracomm uuliam pio
 dno me & uuliam & uuliam pntem pntem
 euangliam scateab: exaudia. Explic uuliam
 & BRIGIDE P U R S I C A T I O N E
 BEATE ALBERTI STEPHANO B. S. A. T. I.
 A U E U S I T A L E P I S C O P I

EXULIENT IUR
 que ungo popi xpm. nihil ma
 yd uuliam pntem eximacul: ma
 uuliam post pualiam. Exultate uidet
 in uuliam xpm uuliam anna cognouit
 exultate conuigite uuliam xpm
 elisabeth nupta p p b e a u e N u l l u s g r a t i
 par in uuliam est de uuliam habens: tnt
 monum: nuquid enim sole uuliam
 de regnum celorum pueniunt: perue
 niunt & uidet. Sca Anna uuliam
 sua septem annis pntem cu uuliam
 Quod euliam uuliam: ad uuliam acarem
 pueniunt: & uuliam sca expeclat
 in uuliam saluacul: uuliam uuliam
 annosa & pntem cognosce: Annula
 uuliam in mundum saluacul
 uidet: uuliam & in uuliam seu tra
 ipa genera commendata sunt: Ipse xpm
 puer natus est: exultate pueni uuliam
 uuliam puer: Ipse uuliam uuliam
 puerie consecrat: quicquid uuliam
 non ab uuliam: Symeon ille sctus diuinitate
 uuliam uuliam uuliam uuliam

London, British Museum, MS. Cotton Nero, E. i, fol. 140a.

Vnde p[er]c[us]s[us] ab i[st]is: h[ic] legentib[us] immo c[on]d[em]natis, qui causa
 obedienciae eo acut[us] nulla p[ro]rogativa scientia sustinuit pelagi
 immente uirtutu[m] beate brigide & uicis p[ro]ficient[is] formidauit
 dum nihil paucis rustico sermone dicit uirtutib[us] demer
 uis & innumerabilib[us] paruo lineae euenit; Quare p[ro]p[ter]
 ex[em]p[lo]s: ne in paucis culpabilib[us] & uo audaciae meo indulge
 ant utq[ue] orationu[m] uirtu[m] pio d[omi]no me comident. & deul
 tant[is] p[ro]p[ter] ex[em]p[lo]s cu[m] uerba secantib[us] exaudiat; Testat[ur]
 u[er]o: Lucina p[ro]p[ter] s[an]c[t]i trisonis. Quod e[st] m[er]it[us]
Ses dei trisonis erat in summa doctrine. non. h[ic] u[er]o
 ubi a corona cultu[m] seruauit; Castre aut[em] instrue
 batur a matre sua eucharistia nutritu[m] ab ip[s]o s[an]c[t]o & ab
 angeli uulno ihu xpo; Et hec faciebant cotidie. ut con
 pleret[ur] infans sp[iritu] s[an]c[t]o. & fieret quod dicit[ur]. Du[m] aut[em] ludet
 cum ceteris infantib[us]: unus capiti aserpente percussus
 ita ut p[er]iclitaret[ur] usq[ue] ad morte[m]; Cucurrit aut[em] unus ex
 infantib[us]: & narrauit patri & matri ei; Qui cu[m] audissent
 plorauerit; Et s[an]c[t]u[m] ad eum uenissent. graue iugiter;
 Cumq[ue] or[atione] transissent. tres sup[er] luctu[m] pariter; cepit q[ui] fuerat
 aserpente uulnerat[us]. inuocare & dicere: Infans trison
 p[ro]p[ter] quod tangere me. & saluus ero. & moriar; Et cum dedit
 deul[us] g[ra]m suauit[er]; Et cum hec infans diceret. conuertit
 se populul[us] & inpuerit qui percussus fuerat ad infantem trisonem
 dicentib[us] q[uod] uox que ab infante audita e[st] manifestatio e[st]
 dei; Eleuans aut[em] s[an]c[t]u[m] infans uoce magna dixit; Lani ueni
 t[er]re exende manu[m] tua[m] sup[er] uulneratu[m] & salua eum. ut uirg[us]
 caput serpentis seruitu[m] calcaneo conterat; Et straminis
 est puer. & glificauerit om[n]i d[omi]no sup[er] sacro h[ic]o; Erat aut[em]
 uenerat[us] infans trison ab om[n]ib[us]; cu[m] hec fecisset miraculum
 miratur d[omi]n[u]m; multa p[ro]p[ter] p[er] eum mirabilia operat[us] e[st]
 que quia innumerabilia sunt breuiter explicatum
 pauca demittat; Cum iter ageret in antione p[ro]p[ter]
 docum quenda[m] pondocul[us] n[on] iacebat febricitans; Et m[er]it[us]
 gressus trison ad eum dicit ei; homo h[ic] q[ui] audita
 d[omi]ne tua & da g[ra]m deo; Et stram suu[m] uenit ab infirm
 tate sua. & cepit glificare d[omi]n[u]m; vespe aut[em] or[atione] facta

Oxford, Bodleian Library, MS. Fell 4, fol. 116b.

XII.

A DUBLIN ALMANACK OF 1612.

BY E. R. McCLINTOCK DIX.

PLATES XXXVI, XXXVII.

Read DECEMBER 9, 1912. Published JANUARY 15, 1913.

I HAVE pleasure in submitting for the inspection of the Academy a recently acquired bibliographical treasure, namely, an Almanack composed by William Farmer, and printed in Dublin in the year 1612 by John Francton, King's Printer in Dublin at that time. The items extant of Francton's printing are sufficiently rare to make any additional extant item of great interest, but this Almanack is specially interesting. I had known of its existence for several years past from a MS. list in my possession; this list gave no clue where a copy of the work was to be found, but the account was so minute in its collation as to satisfy me that the person who made the list had actually a copy before him at the time. So far as I know at present no extant copy exists but this one, which I have recently purchased at a book auction in Cork. The Almanack is not in its original cover, but was evidently rebound by a former owner in modern times; and unfortunately it has been cut down by the binder, though not so as to interfere with the print too much, only in some places. We may describe it as a small quarto, though the probability is it was originally of full quarto size.

The author, William Farmer, describes himself as "Chirurgion and Practitioner in the Mathematical Arts." He calls the work his "Prognostical Almanack," and it contains a three-fold Calendar, to which I shall refer later on. He states it to be calculated for use in Ireland, but would serve as well for all the north and north-west of England, and refers particularly to the meridian and latitude of the ancient city of Dublin. A large portion of the Almanack is printed in black-letter, and on the title-page there is some printing in red ink. The leaf immediately preceding the title-page has on the recto the Royal arms, and on the verso the arms of Sir Arthur Chichester, who appears to have been Farmer's patron. The verso of the title-page consists of the contents of the Almanack, and a note from the printer to the reader, which reads quaintly:—

"Gentle Reader—I have taken paines and charges in venturing the

printing of this Almanacke in hope it will be accepted of: It falleth out to be much bigger than the common Kalendar, by reason of many necessarie notes in it for this Kingdome worthy of remembrance, much more than hath bene hitherto ever printed. And although I have not printed it with red letters altogether yet have I set a diversitie of Characters that you might know the daies of note from other daies. The reason partly was that printing so small a number of them it would not countervaille the charges, neither could I have it readie in due time printed. But if this now be accepted of, I shall hereafter be the more willinger to be at greater charges."

The Almanack is not paged, but signature A 2 contains an address from Farmer to "the Honourable State and Whole Body of the Commonwealth of this Kingdome of Ireland."

The year 1612 was a bissextile year, as Farmer points out. He refers to his having already calculated other Almanacks with two-fold Calendars, and then mentions one, which was printed in London in 1587, wherein he was the "only first man that ever invented to couple the new reformed Gregorian Kalendar," &c., "together with our old and usual Kalendar." This allegation is very important, as it seems to dispose for ever of the allegation that Farmer's Almanack of 1587 was printed in Dublin, as alleged. Only two or three copies of this very early Calendar of 1587 are extant, one in the British Museum, and another, that I know of, in a private collection in England, but, from such information as I procured years ago about it, I was always doubtful if it were printed in Dublin, particularly as I am strongly inclined to believe that there was no printer in Dublin in that year (1587).

In this epistle in his Almanack Farmer continues to explain the nature of the three Calendars, and contends that the third Calendar, apparently compiled by himself, is the most true and accurate of the three.

The next three leaves contain "a brief computation of times and memorable things done in this Kingdome of Ireland" since the first inhabitation thereof. This "computation" is certainly worthy of careful examination. It gives some events happening in Dublin which may be confirmatory of other sources of information. I might mention here that Farmer makes no allusion to the introduction of printing into Ireland; but he does state that in 1601 the New Testament was printed in the Irish tongue at the charges of Sir Wm. Usher, Knt., by John Francton, then the King's Printer. This statement, if correct, differs from the year which is given in the title-page of the New Testament in Irish, which is usually 1602. The final note in this computation is one referring to the translation of the Book of Common Prayer into the Irish tongue, and that it was caused to be printed and distributed through the kingdom. Then follows a list of

British Sovereigns, a list of all the Lords-Deputy and Lords-Lieutenant from the year 1501 to 1604; then a table and some general notes, showing the movable feasts for the year 1612; and next comes the Calendar. The first Calendar he called "our Common Kallender," beginning at the 1st January, the date of the Circumcision of Christ. Then beside that he places the new "Kallender," which makes the date of the Feast of the Circumcision the 11th of January; and then follows what Farmer calls "the true Kallender," which makes the Feast of Circumcision fall on the 14th January. On the opposite page are particulars of the signs of the Zodiac, Sun rising, &c., and this is continued through the whole year.

Following the Almanack, which is in calendar form, comes the Prognostication, which is similar to those well known in later Almanacks, and with advice for health, &c., and it covers seven and a half pages.

Lastly, there is a list of the various ways to travel from Dublin to the principal cities in Ireland, given (as Farmer states) for the use of those "which doe daily repair hither as strangers to inhabit," referring to the new plantation. The distances between each town are given: for example, Dublin to Bray, 10 miles; Bray to Newcastle, 8 miles, &c.

Then comes a list of the principal fairs held each month throughout Ireland, and on the verso of the last page there is an epilogue or conclusion which Farmer addresses to the readers, avowing the object for which he had published this prognostical pamphlet and the promise that if it was encouraged he would proceed further for the benefit of the public.

It is now exactly 300 years since the Almanack was printed in Dublin. It is rather interesting that it should be brought back to the place of its birth after that lapse of time.

Farmer, it should be mentioned, wrote the Chronicle of Chichester's "Government of Ireland," 1612-15, which appears in Lodge's "*Desiderata Curiosa Hibernica*," published in Dublin, 1772, two vols. The Chronicle occupies 172 pp. of Vol. I.

Another thing of some interest is that a few weeks ago, thanks to my friend, Mr. James Buckley, lately Chairman of the Irish Texts Society, I learnt the date of the death of John Francton, which I had never been able to trace before. Mr. Buckley was searching in the British Museum, as is his wont, when he came across an extract, in contemporary handwriting apparently, from one of the books of Funeral Entries now in Dublin Castle. Looking through this he found mention of the date of the death of John Francton, and he informed me of the fact. I communicated with the Office of Arms here, and was shown the original book of Funeral Entries, and obtained an extract from it with a copy of Francton's coat-of-arms, and I

have much pleasure also in exhibiting this for the information of the Academy. Now, persons who were admitted to a place among the Funeral Entries were mostly peers, bishops, and dignitaries of high degree. Therefore, that Francton's death should be recorded there shows that his position was a high one. Of course he was the King's Printer, and he also, as the entry states, was at one time Sheriff of Dublin. The fact that he had a coat-of-arms is also interesting. It would appear that there was some uncertainty as to the exact date of his death, as it is stated to have occurred on either the 7th or 8th October. The name is spelled in two ways. It does not state where Francton died.

I hope some of our members who are specially studying the history of Ireland about the year 1612 will examine this Almanack, which I will leave in the Academy for some time for that purpose.

Farmer. 1612.

His Prognosticall Almanacke

for this Bissextile yeere, composed with a Three-
fold Kalendar, calculated for the generall vse
of this Kingdome of Ireland, which may also
serue as wel for al the North & Northwest parts
of Eng: Diligently collected and gathered by
William Farmer Chirurgical, Practitioner in the
Mathematicall Artes, referred particularly
to the Laterude and meridian of the
Ancient Citie of Dublin

Latitude 53. 10.

Longitude 19. 30.

*The beautie of the Heavens are the glorious Starres,
and the ornaments that shine in the high places of
the Lord*

*By the commandment of the Holy one, they continue in
their order, and faile not in their watch. Eccle.
42. 9 10.*

Hereunto is added a briefe Computation of
times, and things done since the first inhabita-
tion of this Kingdome.

Also a briefe Register of all the principall
Highwaies of Ireland, with the distances and
number of Miles from Dublin to any principal
remote place of the Kingdome: With the chiefest
Faires and Parts as they are usually holden or
kept within this Realme.

DUBLIN,

Printed by John Franckson,

Printer and Stationer to the
Kings Gate.



John Francke or Francton, printer and
sometime shryfe of Dublin, deceased about
the 7. or 8. of October 1620. V2.

XIII.

THE DIARY OF BONNIVERT, 1690.

EDITED BY ROBERT H. MURRAY.

Read DECEMBER 9, 1912. Published JANUARY 11, 1913.

AMONG the published material it is difficult to find detailed accounts of the Jacobite War. Works like Dumont de Bostaquet's "Mémoires inédits," Berwick's "Mémoires," Schomberg's "Diary," the "Journal of Mullenaux," and Parker's "Memoirs," give on the whole scanty detail. The signal exception to this statement is the remarkably important "Journal of John Stevens," which has been published by the Clarendon Press. The few unpublished records resemble the published, in the lack of precise information. Thus Ensign Cramond's "Diary" (Add. 29878, Brit. Mus.) gives no details of importance. It has no title, but begins "The Route of Colonel Wauchope's Regiment beginning the 15th of October, 1688." Cramond served in the Low Countries and in Ireland from 1688 to 1691, but was clearly a man of action and nothing else. His diary follows immediately after the details of the number of miles marched each day; and at the end of the slim volume there are money accounts. There are thirty-seven written leaves in it, besides almost the same number that are blank. Bonnivert's "Journal" (1033, Sloane MSS., Brit. Mus.) is somewhat more satisfactory, though it is also deficient in detail. It occupies only twelve written leaves, besides one leaf of drawings and two of medical receipts: it has no title. Both these diaries were obviously kept in the pockets of their owners. Cramond's diary measures $6\frac{1}{4} \times 3$ inches, and Bonnivert's $5\frac{7}{8} \times 3\frac{1}{2}$ inches.

Gédéon Bonnivert was the son of Paschall and Judith Bonnivert of Sedan, in Champagne.¹ He was probably a Huguenot, and on the revocation of the Edict of Nantes in 1685 he succeeded in coming to England. Some of his papers, in prose and verse, are preserved in the British Museum. It is evident that he was an enthusiastic scientist. Among the Sloane manuscripts there are a treatise on the elements of geometry and fortification, with

¹ 1000, f. 170, Brit. Mus.: The Rev. T. H. Falkiner was good enough to transcribe all the letters for me.

diagrams (993), a notice of the comets of 1680 and 1682 (1030, f. 123), and curious receipts for several diseases (1001, ff. 32-57). From 1673 to 1683 he kept a series of commonplace-books. One is in French (1028), one is in English and French (1036), while two are in Latin (1030 and 1031). These are really rough note-books, especially 1036, which is scarcely decipherable. At the beginning of 1028 there is a quotation over the signature Gédéon Bonnivert, "Quidquid agas, prudenter agas et respice finem." There are other quotations, extracts, and short stories in this manuscript. Some of them are *De l'âme humaine*, *homicide*, *De Libertate*, *Agamemnon*, *Bath*, "ville fort ancienne dans le province de Somerset." Another paper is entitled "L'A. B. C. du Monde" (1009, f. 199): it seems to be a catalogue of the names of places with short descriptive matter. The first name given is Aarak in Persia, while the last is Cagliari in Sardinia.

The letters, preserved in mss. 4036, 4039, and 4058, he wrote show how great was his love of botany. Unlike the people of his day, he cared much for the beauties of nature, though this feeling is seldom to be noticed in English literature till the days of Thomas Gray. Spenser and Shakespeare are not the poets of outward nature in the sense that Wordsworth is. Both Jonson and Fletcher have written much that is beautiful in the way of nature-poetry, and in this connexion Milton cannot be forgotten. William Browne, the Puritan Wither, Robert Herrick, Andrew Marvell, and Sir John Denham sing of "brooks, of blossoms, birds and bowers." Speaking of Thomson, Wordsworth says that "it is remarkable that, excepting the 'Nocturnal Reverie' of Lady Winchelsea, and a passage or two in the 'Windsor Forest' of Pope, the poetry of the period between the publication of the 'Paradise Lost' and the 'Seasons' does not contain a single new image of external nature, and scarcely presents a familiar one from which it can be inferred that the eye of the poet had been steadily fixed upon his object, much less that his feelings had urged him to work upon it in the spirit of genuine imagination."

Bonnivert was an eager botanist, as well as a lover of nature. To an unknown correspondent he writes: "I must own the plant which did so long puzzle me is *Gramen Parnassi*; but who the devil is the man that knows no more simples than I, (how) could (he) have looked for that plant amongst the *Gramina*."¹ This illegibly dated letter gives an interesting account of his botanical rambles in Oxfordshire. As a soldier he marched from place to place; and in the course of his walks about Dorchester he found rare plants.

¹ 4058, f. 45.

Here he suffered from gout, "and the last blood that was taken away from me had no serum at all, and was in a manner burnt to ashes." Many of his letters are written to the famous Hans Sloane, and there is one letter, dated October 15th, 1696, from the latter to Bonnivert. Sloane's botanical zeal was not disinterested, for he begs his correspondent to remember "where this (plant) was found by you, for it was a true truffle such as makes the delicious dishes."¹ On the 23rd—no month is given—1696, Bonnivert tells Sloane, "I found² here in a bog at the left-hand, going to Kate Sutton, a plant I never saw before, and I cannot find it described in Mr. Ray's synopsis"; and then follows a careful description.³ From a letter of September 4th, 1702, it is evident that his regiment had been suddenly ordered to Dublin. It goes on to speak of some money he owes Dr. Sloane, then describes his journey across the channel, telling how they were driven in to the Isle of Man. He speaks of a creeper growing on the walls of the houses in Ramsey.⁴

A letter of June 24, 1703, records his transfer to Cork.⁵ In it he urges his friend Dr. Sloane to "be so kind as to go to my Lord Dorset to whom I write to-night about this matter, and press him to go immediately to the Queen and get that post for me, for fear any other goes before. Nobody hardly knows of it but I and another. Don't mention nothing to my Coll. of it by reason he hath so many hangers about him it would spoil all. I leave to your discretion and often-tried friendship to manage the matter." On August 3, 1703, he again writes from Cork to Sloane, but there is no reference to the post he sought.⁶ He mentions the fact that the Duke of Ormonde was very civil to him. He observes a curious piece of architecture in Limerick, speaks of the silver mines there, and finds a pretty geranium growing on the walls of that city. He also talks of the Giant's Steps about six miles from Cork,⁷ and alludes to his probable departure for Portugal. From his letter to Sloane on September 29, 1703, his destination was changed to Limerick, and in it he discusses his father-in-law's business affairs.⁸

One point in the diary calls for comment. According to Bonnivert the bad weather caused the raising of the first siege of Limerick. On the other hand, the Duke of Berwick writes, "I can affirm that not a single drop of rain fell for above a month before or for three weeks after."⁹ Thus, according to

¹ 4068, f. 14. On February 16th, 1693, Bonnivert received a lieutenant's commission in Colonel Edward Lee's regiment of dragoons: it was disbanded in 1697.

² The name is illegible.

³ 4036, f. 264.

⁴ 4039, f. 21.

⁵ 4039, f. 153.

⁶ 4039, f. 167.

⁷ The Giant's Steps are at Monkstown, six miles from Cork.

⁸ 4039, f. 192.

⁹ *Mémoires*, p. 331 (1839 edition). It is amazing to find that Mr. Boulger, in "The Battle of the Boyne," pp. 196-7, supports Berwick.

this authority, no rain fell for over ten weeks. Though Corporal Trim was not an exact historian, there is no reason for disbelieving his recollection of the state of the weather. His description of the siege seems to have been taken by Sterne from an old soldier who had been present: "We were scarce able to crawl out of our tents at the time the siege of Limerick was raised, and had it not been for the quantity of brandy we set fire to every night, and the claret and cinnamon and Geneva with which we plied ourselves, we had both left our lives in the trenches. The city of Limerick, the siege of which was begun under His Majesty King William himself, lies in the midst of a devilish wet, swampy country; it is surrounded with the Shannon, and is, by its situation, one of the strongest fortified places in Ireland; it is all cut through with drains and bogs; and besides, there was such a quantity of rain fell during the siege, the whole country was like a puddle. Now, there was no such thing after the first ten days, as for a soldier to lie dry in his tent, without cutting a ditch round it to draw off the water; nor was that enough for those who could afford it without setting fire every night to a pewter dish full of brandy, which took off the damp of the air and made the inside of the tent as warm as a stove."

The Duke of Berwick's statement is flatly contradicted by John Stevens, who was a Jacobite officer serving in the besieged town. On the 29th of August he writes: "The night was extreme cold, dark and rainy."¹ The 3rd of September "was appointed a general day of review for the garrison in the King's Island, but the weather proving extreme foul, it was put off."² The entry of the 29th shows in what sense he uses the word "foul," for there he writes that "the weather began to grow foul with extreme rain." Story records that "a storm of rain and other bad weather began to threaten us, which fell out on Friday the 29th in good earnest, upon which his Majesty calling a Council of War, it was concluded the safest way was to quit the siege."³ Dumont de Bostaquet, an eye-witness like Story, says that before the siege was raised, because "la pluie avoit tombé en telle abondance que je ne doutai pas que j'aurois de la peine à la passer or du moins au retour"⁴ from one side of the Shannon to the other. Captain Maupas informed Dumont "son guide craignoit que la rivière ne grossit et qu'elle ne fût plus guéable. . . . La pluie continuant violemment nous fit une peine extrême, le terrain étoit gras, les chevaux ne pouvoient tenir pied, et les cavaliers aimoient mieux être à cheval que pied à terre: la pluie continua toute la journée."⁵ In the Clarke correspondence⁵ occurs the significant statement:

¹ "The Journal of John Stevens," pp. 182, 184.

² "The Wars of Ireland," p. 39; William to Waldeck, September 22, 1690.

³ "Mémoires Inédits," p. 26.

⁴ *Ibid.*, p. 286.

⁵ Vol. ii, f. 116.

“I wish the inclemency of the weather does not incommode the progress of the siege of Limerick.”

Williamite and Jacobite authorities agree that rain fell. The question that now awaits an answer is, why did Berwick state the contrary? He was so young that he gained no honour at the siege. Moreover, he was jealous of Sarsfield; and had he emphasized the fact that rain had fallen, it would have dimmed the glory of his rival. Berwick married Sarsfield's widow, and his Memoirs attest his devotion to her. Perhaps his love of his wife made him resolve that he would not lower the reputation of her first husband. For there is little doubt that the importance of the capture and destruction of the cannon at Ballyneety has been exaggerated; it is the only outstanding exploit on the Jacobite side.

The perplexing problem then occurs that a person who from the nature of the case must have known the truth does not tell it, even though it favours him. It is not, however, without parallel. When Napoleon occupied Moscow it was burnt. The Governor of Moscow, Count Rostopchin, at the time boasted that he had fired the town. Many years afterwards, when an exile from Russia, he denied that he had ordered the conflagration. Which is to be believed, his early affirmation or his subsequent denial?

THE DIARY OF GÉDÉON BONNIVERT.

I came out of London the 6th of June, 1690, and lay at St. Alban's. We were to guard five carriages loaded with 250 thousand pounds for the pay of the army in Ireland.

Saturday the 7th we went to Newport Pagnell, where a troop of dragoons relieved us. We tarried there till Monday following, then we went to Daventry. Tuesday we went to Coissell. Wednesday to Stafford the party went, but I left 'em by the way and went to meet a friend of mine at Lichfield. About four miles this side of Cosswell there is a stone bridge full of the plant called maiden hair.

Thursday I met the party at Nantwich. Within three miles of that place is a very fine house belonging to Sir Thomas Delf, with a very fine pool full of all wild fowls. You may take notice of a carp that was taken there three quarters of a yard and odd inches long, which is set up as a weather cock at the top of the house. Friday we came to Chester, the chief town of

the county. Generally Cheshire is a very fine county for corn and grass, which, being intermixed with fine woods, render it very pleasant to the eyes, Chester is a very large town of great trade, it being the sea port town,¹ though the ships come no nearer on than sixteen miles at a place called Hoylake, there the river Dee runs by its walls, and it has a pretty strong though small castle.

Sir (John) Morgan² is now Governor of that place. The two main streets of Chester have covered walks where you may walk at the hottest sun free from heat, and in wet weather sheltered from rain; their shops are underneath these walks.³ Round about the walls of the city you may walk upon large stones, and have a prospect of the town and country. Hoylake is the sea port, and has but two houses beside the King's store house. We stayed there from Monday in the evening (of) the 16th, till Tuesday at eight in the morning, then we embarked our horses, and us selves, we hoisted our sail about three in the afternoon, with the tide, but with a contrary wind, which made us ply to and fro all that day. About ten in the night no wind stirring we cast anchor till two in the morning.

All the day after we had no wind, and our ship was only carried by the tide.

Thursday we fished most of the day, and took a great many gurnets and whittings, the sea being in a great calm. That day we left Cumberland behind us, and endeavoured to reach the Isle of Man, but could not. In the night time, the wind arising, and pretty favourable for our voyage, we left the Isle of Man at our left hand, and we discovered the coasts of Scotland at our right hand, which they call Galloway; and Friday being the 19th, we came between three islands and a town called Donaghadee, which is a market town, and seems a pretty good one. We left it at our right, and Copeland Islands at our left. We saw after that, at our left, the village called Bangor, which is but a small one, but very fit for vessels to come to the very sides of it; both sides are very rocky. That small village is famous for Duke Schomberg landing there with the forces under his command.⁴ Upon your right you

¹ The sandbanks of the Dee destroyed its prospects as a port.

² Cf. "C.S.P. Domestic, 1689-90," p. 139. "All good men are very well pleased with our governor, Sir John Morgan."

³ According to Fuller the walks or rows are "galleries wherein passengers go dry without coming into the streets, having shops on both sides and underneath, the fashion whereof is somewhat hard to conceive. It is worth their pains who have money and leisure to make their own eyes the expounder of the manner thereof, the like being said not to be seen in all England; no, nor in all Europe again." According to Camden, "the houses are very fair built, and along the chief are galleries or walking places they call rows."

⁴ He landed on August 13, 1689, with twenty thousand men. He had arrived "avec le plus beau tems et le meilleur vent qu'on eût pu souhaiter." Kazner, *Leben Friedrichs von Schomberg oder Schoenburg*, II, 290.

see the Castle of Carrickfergus, which is a strong place; we took it last year, and lost no great quantity of men. We landed at the White House, where we saw on our arrival great numbers of poor people. The women are not very shy of exposing to men's eyes those parts which are usual for the sex to hide.¹ We went that night to Belfast, which is a large and pretty town, and all along the road you see an arm of the sea upon your left, and on the right great high rocky mountains, which tops are often hidden by the clouds, and at the bottom a very pleasant wood, and very full of simples² of all sorts.

The town is a sea port. There is in it the king's custom house, and you see hard by it a very long stone bridge, which is not yet finished. The town is compassed round about it with hills. The people very civil, and there is also a great house belonging to my Lord Donegal,³ Lord Chief Justice, with very fine gardens, and groves of ash trees. The inhabitants speak very good English. We stayed there two days and three nights, and we went from thence on Tuesday, being the 23rd of June, to Lisburn, where there is a great house and good gardens belonging now to my Lady Mulgrave;⁴ it was left her with the whole estate, which amounts to £14,000 per annum, by my Lord Conway; the house is out of repair. There is a market kept there on that day. Wednesday, the 24th, we set forth betimes in the morning, resolving to join our army, which was then encamped at Loughbrickland. We passed by Hillsborough, a great house belonging to the king, standing on a hill on the lefthand of the road, and from thence we went to Dromore, hard by that place is the Bishop's house. The success answered our expectation, though we had a very hard and troublesome day's work. At our arrival our friends shewed joy in their faces to see us come amongst them, and each of us went to his respective tent.

Thursday, the 28th of June, we marched at two of the clock in the morning, and went over the high hills to Newry. It is not to be imagined how strong naturally many passages are that way; and besides that, many strong though small forts made by King James, which made me admire many

¹ John Stevens records in 1690 that "the women were so suitable to the times that they rather enticed men to lewdness than carried the least face of modesty, in so much that in every corner of the town might be said to be a public stew. In fine, Dublin seemed to be a seminary of vice, an academy of luxury, or rather a sink of corruption and living emblem of Sodom." Cf. Murray's edition of "The Journal of John Stevens," p. 93. The testimony of Fynes Moryson agrees with this account. Le Gouz records that "In this city (i.e., in Limerick) there are great numbers of profligate women; which I could not have believed on account of the climate." *Macariae Excidium*, p. 41. The effects of the Penal Laws were evil, but perhaps the sufferings they involved purified morals.

² Simples are medicinal plants. Cf. Dampier, "Voyages," II, i, 126.

³ In 1661 he was member of parliament for Dungannon, was attained by the parliament of 1689 as an absentee, but sat in the parliament of 1692.

⁴ There are ample references to Lady Mulgrave and Lord Conway in the two volumes of the old series of the Ormonde mss. and in the seven volumes of the new series.

times what should have made him quit those passages,¹ which might have ruined most part of our army with the loss but of few of his own. That day was the first of my seeing the King riding in Irish Land, and he had then on an orange colour sash. We crossed the river at Newry, which was formerly a strong place, but now burnt and destroyed, and encamped upon the side of a hill, where water was very scarce. We left Dundalk on our left hand—it stands by the sea, and we encamped in very rugged ground. There, as soon as we had order to dismount, I left my horse to shift for himself, and I, tired with heat and want of drink, fell fast asleep for the space of four hours. Awaked as I was afterwards, I looked for my horse, but no horse to be found—in short, I went up and down for about four hours longer ere I could hear any tidings of him. Night was approaching; we were nigh the enemy, and were looking every minute to be commanded to horse, but being in this agony, as God would have it, I spied, upon the side of a bank, my saddle all in pieces. I soon after found my gentleman too, but, however, it was not without great trouble. Therefore, I advise all horsemen in such case never to part with his horse, but if he falls asleep tie the reins fast to his arm. The Inniskilling Dragoons came there to us. They are but middle-sized men, but they are, nevertheless, brave fellows. I have seen 'em, like masty dogs, run against bullets.²

Saturday, the 28th, we were taken fifteen men out of each squadron to go with a detachment of 1,200 to Ardagh,³ where we heard the late King's army was; the rest of our army stayed behind till the Sunday following. Just as we came within sight of the town, we saw the dust rise like a cloud upon the highway beyond it. It was the enemy's *arrière garde* scouring away with all speed. Some dragoons were detached to follow them, who brought back two or three prisoners and many heads of cattle. We encamped this side of the town the Saturday, and the Sunday after our army coming to us we marched on the other side of the river, where we encamped by a corn-field by a small ruined village. The town of Ardagh is seated in a very pleasant soil, and has

¹ On the dismay felt by James and his circle on the landing of Schomberg, cf. Klopp's *Der Fall des Hauses Stuart*, v. 51: "There was no means of resisting such a powerful army. All was lost. In a few days Schomberg would enter Dublin"; Clarke, "*Life of James II.*," ii, 372.

² Story says, "They were three regiments in all, and most of the troopers and dragoons had their waiting men mounted on garrons." Kazner, i. 306: "They could not endure orders, but declare that each command that they could do no good if they were not allowed to do as they liked. However strangely they contrasted with Schomberg's strict discipline, he found it good to make an exception with them, and to leave them to their own genius." Mackay observed their promptitude in planning an expedition and their rapidity in executing it. (Add. 33, 264, Brit. Mus.) Captain de Postquet tersely describes them as serving well, "*s'ils n'étaient point si picoureux sur lesquels on pourrait faire fonds.*" Cf. Klopp, v. 30; Kazner, i, 303, ii. 300; Schomberg to William, September 20; Clarke Correspondence, March 16, 1691.

³ This place is obviously Ardee.

been a fine and strong borough, as one may see by the great towers still extant. King James made there very strong works, as if he would have made it a place to withstand our army; and indeed it is a strong-seated town, being in a plain having a river of one side, and boggy of the other. Monday, the last of June, we marched towards Drogheda, where the enemy were, and we came within sight of the town at nine in the morning. There we drew up our horse in three lines, and came in order of battle upon the brow of a long hill. There we saw the enemy, and were so near them we could hear one another speak, there being nothing but the river between us. As we were drawn up we had order to dismount, and every man stand by his horse's head. We had not been there long; but some of the King's Regiment of Dragoons were detached, and sent to line the river side. So they began to shoot at the enemy, and those of King James's army at 'em. They had not been long at that sport when the king, passing by the first troop of Guards, the enemy fired two small guns at him. One of the bullets greased the king's coat;¹ then they played on till three of the clock upon us, and shot often men and horses. One Mr. William, of the Third Troop of Guard, had his arm shot. Some of the Dutch troop were killed and wounded. Indeed 'twas a madness to expose so many good men to the slaughter without need, for we had no artillery yet come to answer theirs, ours not commencing till three in the afternoon. We did retire confusedly behind the hill at the sight of the enemy, when it might have been better managed. King James made that day a review of his army. We had a great mind to force a passage through the river to go to them, but we left it till next morning. At three in the afternoon our artillery came up, and begun to play upon theirs stoutly. Then the enemy showed they had many other batteries besides the first. They played upon one another till night; then we retired about a mile sideways.

Next morning we were up at two of the clock, and we marched to gain a passage two miles of about five in the morning. The passage was a very steep hill, and a shallow river at the bottom that led into a very fine plain.² As we came there we found a party of the enemy with four or five pieces of artillery ready to receive us;³ but that did not daunt our men; they went down briskly, notwithstanding their continual fire upon us. The Grenadiers and Dragoons were first of the other side, and we soon followed them; but the enemy made haste away with their cannon. We drew up in battle as we came in the plain, and marched directly towards the place

¹ The first shot struck one of the holsters of Prince George of Hesse, while the second tore William's coat and grazed his shoulder.

² This was probably Rosnaree Ford.

³ Sir Neill O'Neill commanded the Jacobites.

appointed for the battle.¹ After some hours we saw the enemy coming down a turning between two hills, which we knew by the rising of the dust; and by and by they shew themselves in their best colours, for they drew up upon a line only, and our army was upon three. We looked upon one another who should come first; but at last, we seeing that their foot and baggage was running away, and that the king had engaged their right way, we marched towards them over ditches and trenches. They presently retired upon a mountain behind a little town called Duleek, where they fired three or four pieces at us. We killed abundance of their men, and pursued the rest till nine of the clock, that we overtaking them, and having too hotly pursued them, were almost upon them, when they facing about made as if they had been willing to receive us; but we having left our foot and cannon behind, and considering how late it was, made halt. They fired for an hour and half small shot very thick upon us, for they had hid partly in bushes. At last our cannon came and played smartly upon them, till the night coming they retired, and so did we, we laying in the plow'd lands, and had no tents. That day we lost Duke Schomberg and Dr. Walker, Governor of Londonderry. They were killed in forcing the passage. The king himself passed that way. Next day we stayed encamped in that place, and there was a popish gentleman's house plundered by us.

Thursday being the 3rd of July, we came near a fine house belonging to a papist where we encamped, and where I fell sick of a violent fever and an extreme fit of the gout in the same time. I was sent to Dublin, where I stayed till Saturday, the 12th, that I went in the company of the adjutant-general of the Danish forces to rejoin our army. That day I went to Kilcullen bridge, sixteen long miles from Dublin. I passed through the Naas, a good, big borough. At Kilcullen bridge, I found our army encamped, and there we stayed one night, and the next day we marched but eight mile. There, my sickness continuing, or indeed rather increasing, I was forced to go to Castledermot; it has been the seat of some of the kings of Leinster, but now is a poor beggarly town, though in a very pretty plain. Eight miles beyond it upon the highway is the burying place of the kings of Leinster, and there you may see the vaults still full of bones, and some old inscriptions upon large stones.² Our army went before Waterford and, after the town was surrendered, the king went to lay the siege before Limerick, whilst General Douglas³ was gone to

¹ Bonnivert belonged to the British right wing detached. See the map in "Revolutionary Ireland and its Settlement," p. 154.

² This place is Carman.

³ Douglas was at the battle of the Boyne in the vicinity of Slane Bridge, failed to take Athlone, and was at the first siege of Limerick. His writing is among the worst in the Clarke correspondence.

endeavour with part of our army to take Athlone, but he had no better success there than our men at Limerick, where, through the ill-management of Captain Poultney, who, having had the conduct of eight big pieces of artillery and several other provisions, unadvisedly ordered his detachment to unbridle and turn the horses to grass, for Sarsfield having notice of this fell upon 'em with a very considerable party and cut most of the men to pieces,¹ took the cannon, nailed them, burned the carriages and all the ammunitions, and so caused by so long a delay, and the weather growing bad, to raise the siege. The king, having left that place, with the loss of many men, took shipping for England. Not long after my Lord Marlborough came from England with 8,000 men, and besieged Cork; he was not long before it, for it was soon taken, but we had a great loss by the Duke of Grafton,² who died a few days after of a wound in his side, before Kinsale. After the raising of the siege of Limerick, I came along with our troop, thinking (as the order was then) to have gone for England, but after my staying the matter of three months, I went to Lurgan, in the north of Ireland, and was quartered between Litsenagarry³ and Lurgan in the parish of Ballinderry.

¹ Clarke Correspondence, August 12, 1690, vol. i, f. 90; Theo. Harrison to the Rev. John Strype, August 23 (Ellis Correspondence); Rawdon Papers, No. 143. The causes of Sir John Lanier's delay in going to the assistance of Captain Poultney have never been adequately explained. Cf. Murray's "Revolutionary Ireland and its Settlement," p. 173.

² He was nephew of James II.

³ This is possibly Lisnagarvey, near Lisburn.

XIV.

AN ATTEMPT TO DETERMINE THE CONTENTS OF THE
INSCRIPTION ON THE PHAESTOS DISC.

BY R. A. S. MACALISTER.

PLATE XXXVIII.

Read DECEMBER 9, 1912. Published JANUARY 20, 1913.

THE Phaestos Disc is so well known that I need not do more than remind the Academy that it was found in the excavation of the palace of Phaestos in Crete, and is assigned to the period known as Middle Minoan III. It is a circular tablet of terracotta, 15·8–16·5 cm. in diameter. On each face is a spiral band of four coils, indicated by a roughly drawn meandering line; and an inscription in some form of picture-writing is printed on this band. I use the word 'printed' advisedly; for not the least interesting feature of the disc is the fact that the characters have been impressed, one by one, from dies, probably resembling those used by bookbinders. I suppose it is the oldest example of printing with movable types in the world.

Illustrations of the disc will be found, *inter alia*, in connexion with articles upon it in *Ausonia*, vol. iii, p. 255; the *Revue archéologique*, ser. iv, vol. xv, p. 1; René Dussaud, *Les civilisations préhelléniques*, pp. 292, 293; *Rendiconti della Reale Accademia dei Lincei*, ser. v, vol. xvii, p. 642; vol. xviii, p. 297; Evans, *Scripta Minoa*, vol. i, pp. 22–28, 273–293. On one face of the disc, which I call face I (though in previous publications it is marked B), there are 119 signs; on the other face, here called face II (previously lettered A), there are 123. They are divided into what appear to be word-groups, 30 in number on face I and 31 on face II, by lines cutting across the spiral bands at right-angles. These word-groups contain from two to seven characters each.

There are forty-five different characters employed. It is likely, therefore, from the largeness of this number that we have to deal with a *syllabary* rather than an alphabet; and we must be prepared to find that hovering between sense and sound which is characteristic of syllabaries—just as when a schoolboy jester writes "8 pot8oes," where he employs the symbol 8 in the first case for its *sense*, in the second for its *sound*.

I propose in the following discussion to associate a letter with each of these forty-five characters; it being understood that the letter is purely an algebraical

symbol, for convenience of reference and typography, and that no attempt is made to determine the actual sound which the characters conveyed to those whom the tablet originally concerned. To one character, a head with a plumed head-dress, I give the special distinguishing mark of a capital M (the initial of "man"). The others are called by ordinary small letters till the alphabet is exhausted; then by such Greek letters as possess individuality. The following is a list of the characters, with the letters assigned to them:—

Human Figures and their Parts.

- | | |
|--|----------------------------|
| 1. Head with plumed head-dress, | M (19) ¹ |
| 2. Man wearing loin-cloth, running, left arm raised, | a (11) |
| 3. Man walking, nude, arms bound behind back, | b (1) |
| 4. Small figure clad in shirt reaching to waist, | c (1) |
| 5. Woman with long hair, in skirt and bodice, | d (4) |
| 6. Head, shaved, with ear-ring (‡) on the side, | e (2) |
| 7. Hand clasped holding a <i>cestus</i> (‡), | f (5) |
| 8. Hand open (‡) or a vase (‡), | g (2) |
| 9. A breast (‡) (or a skull-cap with button), | h (18) |
| 10. A dotted triangle, | i (1) |

Animal Figures and their Parts.

- | | |
|---------------------------------------|---------------|
| 11. Bird with wings closed, | j (3) |
| 12. Bird with wings open, | k (5) |
| 13. Fish, | l (6) |
| 14. Insect, | m (3) |
| 15. Cat's head, | n (11) |
| 16. Ram's head, | o (1) |
| 17. Cow's hoof, | p (2) |
| 18. Horn, | q (6) |
| 19. Bone, | r (2) |
| 20. Hide, expanded, | s (15) |

Plants and their Parts.

- | | |
|--|---------------|
| 21. Cypress tree, conventionalized, | t (6) |
| 22. Branch with expanding flower at end and leaves at sides, | u (4) |
| 23. Trunk with two branches, | v (4) |
| 24. Branch with five leaves, | w (11) |
| 25. Flower with triple petal, | x (4) |
| 26. Rosette with eight petals, | y (4) |

Geographical Symbols.

- | | |
|---|--------------|
| 27. Two mountains (more probably fetter or handcuff), | z (2) |
| 28. Water (‡), | β (6) |

¹ These numbers denote the frequency with which the various characters occur.

Buildings and their Parts.

29. Large building resembling Lycian tombs,	δ (6) ¹
30. Pillar with square capital,	ζ (11)

Implements, Weapons, &c.

31. Ship,	η (7)
32. Key,	θ (2)
33. Bow,	κ (1)
34. Feathered arrow,	λ (4)
35. Hatchet,	μ (1)
36. Circular shield with seven knobs,	ξ (17)
37. Adze (?),	π (2)
38. Knife with curving blade,	ρ (2)
39. Mason's square,	σ (12)
40. Plane (?),	τ (3)
41. Leather-cutter's knife,	φ (1)
42. An inverted Y, meaning unknown (lower half of a human body?)	χ (5)
43. A seal-ring,	ψ (1)
44. A vase (?),	ς (6)
45. Segment of a circle, dotted,	ƒ (1)

The direction of reading has been very clearly proved² to be from the periphery of the circle inwards in each case. I may therefore assume this without discussion, and write the inscriptions, using the cipher above set forth, as follows. The stroke underlining some of the characters is explained below.

Face I.

Μξχsh sβhw Μυζc χης Ιδgξ ρζσι taxl μhtaσ
 χuFη ηδsw Μqvς σηya ηδδgw ρzσ nla dwjxl Μπsa
 nvhf nft nβh χnvhf smζη ησw hβh ηζσδ χnvhf
 πoxσh Μdwζh nmζη βh

Face II.

Μξτασ δςξ nβh nmm Μξbsl sβhξ sφf Μξdσ*³ kqw
 Μξrτw arsh Μξjζy xκ Μσηλζσ pa Μξkq Μξsswuθ
 Ιζ Μξkq Μσηλζσ pa Μξkq Μξszjσs dσπτ kqξ Μξτα
 ζτw ley Μξsswuθ ta ley

¹ These numbers denote the frequency with which the various characters occur.

² See Dr. A. della Seta's paper in the *Lincei Rendiconti*, vol. xviii; and M. A. J. Reinach's paper in *Revue archéologique*, both cited above.

³ Illegible character, perhaps φ.

The first thing that strikes us, on looking at these letters, is the very remarkable fact that "M," the "Head with plumed head-dress," the commonest of all the characters, is found at the beginnings of words only. It is highly improbable that a frequent *phonetic* character should be thus restricted in its use: therefore we infer that it is most likely a determinative prefix. This assumed, we note, first, that the form of the character would suggest that it was a determinative for things relating to *men*; and secondly, that no other characters are similarly restricted. From the latter point it follows that the script of the Phaestos disc uses very few determinatives. And if we ask what is more likely than anything else to be indicated by such a determinative, the obvious answer presents itself—a *proper name*. We ourselves still find it convenient, notwithstanding our highly developed script, to use a determinative for proper names, which takes the form of a capital initial. And so I proceed to make the further assumption that words beginning with the initial M are personal names.

This being postulated, the next thing to notice is the large assembly of proper names on face II. It can, indeed, be treated as a list of names and titles, and may be written out in list form thus:—

1. Mξ̄taσ̄ δςξ̄ nβh̄ nnu
2. Mξ̄b̄sl̄ sβh̄ξ̄ sφf̄
3. Mξ̄d̄σ̄(φ̄) kq̄w
4. Mξ̄r̄rw̄ arsh̄
5. Mξ̄j̄ζ̄ȳ xκ̄ Msηλζ̄σ̄ pā Mξ̄k̄q̄
6. Mξ̄sswuθ̄ lζ̄ Mξ̄k̄q̄ Msηλζ̄σ̄ pā Mξ̄k̄q̄
7. Mξ̄szj̄σ̄s̄ dσψ̄τ̄ kq̄ξ̄
8. Mξ̄tā ζ̄τ̄w̄ leȳ
9. Mξ̄sswuθ̄ tā leȳ

Now there is just one type of ancient document which shows such a "sediment," so to speak, of proper names at the end. This is a contract tablet, which ends with a list of witnesses, and I offer the conjecture that the disc is of this nature.

It will be observed, in the foregoing list, first, that all the names begin with ξ̄. This might well be a prefix or preposition, equivalent to the word *pān* "before, in presence of" prefixed to the names of witnesses on the Assyrian contract tablets. The symbol here called ξ̄ is a *shield*, which would obviously be a suitable hieroglyphic for the meaning "before."

Secondly, we notice that two of the supposed witnesses, nos. 6 and 9, have

the same name, which often happens; probably nos. 1 and 8 also have the same name, a character being omitted from the latter, by accident, or to save space.

Thirdly, two of the witnesses occupying adjacent positions on the list, the fifth and sixth, are described as $Ms\eta\lambda\zeta\sigma$ \underline{pa} $\underline{M\xi kq}$. Here we have a name and title *not* preceded by ξ . This would therefore be the name of some person, not himself a witness, but holding a special relation to the two witnesses in question—most likely their father. In this case the prefix s might have a genitive sense. And further, this person is described as \underline{pa} $\underline{M\xi kq}$. As one of his supposed sons is similarly described as $\underline{l\zeta}$ $\underline{M\xi kq}$, we seem to be on the track of some hereditary designation, honorary or official. The words \underline{pa} , $\underline{l\zeta}$, might denote something like 'first' and 'second' respectively; the line $\underline{M\xi sswu\theta}$ $\underline{l\zeta}$ $\underline{M\xi kq}$ $Ms\eta\lambda\zeta\sigma$ \underline{pa} $\underline{M\xi kq}$ would then mean something like "In the presence of ($sswu\theta$) second (officer) before (kq) (i.e. perhaps a king or a god) (son) of ($\eta\lambda\zeta\sigma$) first (officer) before (kq)."⁷ Some such formula seems not unlikely to occur in a list of this nature.

Next, having got from these names the suggestion of a form of declension by means of prefixes, let us see if further traces of it are to be found. We have not to seek long, for fortunately there is one word of which there are several forms. This is $\underline{\beta h}$, the last word on Face I. We find

$s-\underline{\beta h}-w$
 $n-\underline{\beta h}$
 $h-\underline{\beta h}$
 $s-\underline{\beta h}-\xi$

Compare also $s-m\zeta\eta$ and $n-m\zeta\eta$. There is also reason to regard χ as a declensional prefix: thus we have $nvhf$, $\underline{\chi-nvhf}$. The two postfixes w and ξ reappear in $kq-w$, $kq-\xi$.

Other words with similar formatives occur in the text, though as they occur once only we have no full examples of their declension. Thus we have $\chi-\eta s$, $l\zeta g-\xi$, $h-\delta\zeta-w$, $n-\delta\delta g-w$, and one or two others as well. In some cases, of course, these may be accidental, a syllable which is really radical, belonging to the stem of the word, happening to have the same sound as one of the prefixes or suffixes; there is no possibility of discriminating these until some chance in the future shall reveal to us the phonetic meaning of the symbols. However, an important grammatical rule now emerges, which, I venture to think, corroborates the conclusions to which we have come. Just as in Latin, words like *bonus dominus*, *bono domino*, etc., in apposition, terminate with the same suffix, so in the language of the disc, *words in apposition begin with the same prefix*.

Thus, returning to the list of witnesses we have—

n-βh̄ n-nm
s-βh̄-ξ̄ s-φf̄

On the other face we have—

h-σw̄ h-βh̄ h-ζσδ
n-ft̄ n-βh̄

This peculiarity might go far to identify the language of the disc, if more were known about the ancient languages of the Aegean basin.

Notice in passing that, besides the analogy in the two titles of witness 6 and his father, there is distinct analogy between the titles of the first two witnesses; the third and the seventh contain kq-w and kq-ξ respectively in corresponding places, and there is also similarity in form between the titles of the eighth and ninth witnesses.

Turning now to the other face, although not one word of the inscription can be deciphered, it will be found that, applying the clue of the proper names, everything fits exactly into its place, assuming the ordinary formula of a contract such as we find it in cuneiform documents.

The first two words would give us the name and title of the presiding magistrate: "In the presence of (χςh) of (βh-w)," which offers obvious analogy with the title of the second witness; again we see a doublet with the suffixes w and ξ.

Then comes the name of one of the contracting parties, uζc̄ χ-ηs.

Then come six words or word-groups, quite unintelligible, but not improbably stating what this person undertakes to do.

Then follows what would be the name of the other contracting party "qvς̄ of ηya."

Next come some words which ought to give some such essential detail as the *date* of the contract. And we find among these words just what we want, a proper name πsa, denoting the officer who was eponymous of the year.

The last thirteen words we might expect to be a detailed inventory of the transaction, whatever its nature may have been. It is therefore satisfactory to notice that they arrange themselves neatly, just as they stand, in three parallel columns, having obvious mutual relations: thus—

nvhf̄	. . .	n-ft̄	n-βh̄	
χ-nvhf̄	s-mζη̄	h-sw̄	h-βh̄	h-ζσδ
χ-nvhf̄	n-mζη̄		βh̄	

πoxσh̄ Mdwζh̄

which table gives us a further confirmation of the conclusions already arrived at, regarding the declensional prefixes, as well as the rule for their concord.

There remains one important point. At the bottom of certain characters there is a sloping line running to the left. This is always at the end of a word-group: the two apparent exceptions shown in some drawings of the disc, on face II in word-groups 6 and 23, being seemingly cracks in the surface of the disc. The letters marked are underlined in the transcript given above. In determining which letters should be marked, I have had the advantage of consulting a cast, which I owe to the kindness of my friend and colleague, the Rev. Henry Browne, S.J.

These marks have been supposed to be signs of punctuation. If so, all the foregoing discussion is lost labour, for the supposed punctuation divides the text in a way utterly at variance with the sense that it seems to convey. It is, however, open to doubt that there is any precedent for a punctuation so elaborate in a purely hieroglyphic text. It may of course be objected that the elaborate word-division is equally unprecedented; but yet to the latter Egyptian offers some analogy. The pains which the Egyptian scribes took to build up their words into symmetrical squares, even at the expense of sometimes disturbing the proper order of the letters, may fairly be compared with the arrangement of the words on the disc, though the squares are imaginary in the one case, and expressed by lines on the other.¹

I have another suggestion to offer with regard to these marks; namely, that they are meant to express a modification of the phonetic value of the character, too slight to require a different letter to express it, but too marked to allow it to be neglected altogether. And obviously the most likely modification of the kind would be the elision of the vowel of a final open syllable. The mark would thus be exactly like the *virāma* of the Devanāgarī alphabet, or, to come nearer home, something analogous to our own apostrophe.

When we examine the text, we find that it is only in certain definite words that this mark occurs. It is found in βh , however declined, except when the postfixes w , ξ , are present. It is found in the word $nv h f$, however declined. It appears in the two similar words $\mu h t a \sigma^2$ and $M \xi t a \sigma$. It is found in the personal name $k q$ (in the formula $p a M \xi k q$). There are only one or two of the eighteen examples of its use outside these groups; and probably if we had some more examples of the script, or a longer text, these would be found to fit likewise into series. In some cases the "apostrophe" may be grammatical; in others euphonic, to avoid hiatus. In any case I take it that most of these syllabic signs denote a consonant with a vowel, and that this stroke is a

¹ I see that Dr. della Seta has anticipated this observation.

² This is a little doubtful.

device to express a final closed syllable. Thus, if it were desired to write the name of the Philistine god *Dagon*, it would, on this theory, be written, let us say, DA-GO-NA, with a stroke underneath the last symbol to elide its vowel.

Obviously such a recognition of the principle of elision is an important step on the way towards the evolution of a simple alphabet.

And here we are confronted by an interesting question. Can it be that in the script of which the Phaestos disc is so far the sole representative, we are to see the long-sought origin of the so-called Phoenician alphabet? It seems to me not unreasonable to suppose that in process of time the script of the disc would become simplified into just such a linear script as that alphabet: and the principle of elision of the terminal vowel of syllables is just what is wanted to help the process of evolution over that last most difficult fence, which divides a syllabary from a pure alphabet. Suppose that three syllables, *ka*, *ko*, *ku*, represented each by a special symbol, lost their vowel under certain grammatical or euphonic conditions, then all three being simply pronounced *k* might in writing become confused, leading ultimately to the choice of one of the syllabic signs to denote the letter *k*. Thus an alphabet of consonants would develop, which is just what we have in the Phoenician alphabet. The 45 + *x* characters of the original script—for we have no guarantee that we have *all* the characters of the script represented on the disc—could very easily wear down by some such process as this to the twenty-two signs of the Phoenician alphabet.

As to the forms of the letters, in the total absence of intermediate links, and our total ignorance of the phonetic value of the Phaestos signs, it would be premature to institute any elaborate comparisons between the two scripts. The Phaestos disc is dated not later than 1600 B.C., the Phoenician alphabet cannot be traced farther back than about 1000 B.C., and what may have happened in the intervening six hundred years we do not know. But to the most superficial glance over the two forms of writing there are not wanting hopeful indications that with fuller material the comparison may prove fruitful. The symbol which I have called **h** might well in rapid writing develop into the Phoenician sign *aleph*. The little man running (**a**) is not unlike some forms of *trade*. The head (**e**) both in name and shape reminds us of *resh*. The hand with cestus (**f**) could very easily degenerate into *caph*, while the open hand (**g**) in shape and name recalls *yodh*. The dotted triangle (**i**) recalls *daleth* or *teth*, the fish (**l**) in name and to some extent in shape suggests *nun*—it is notable that the fish on the disc always stands upright on its tail—the five-leaved sprig (**w**) is something like *samekh*, the water-sign (**β**) might be *mem* (the three teeth of the Phoenician letter

preserving the three lines of the original sign). The manacles (**z**) resembles *beth*, the nail, pillar, or prop (**z**) resembles *vav* in both shape and meaning, the remarkable key (**θ**) simplifies into *zayin*, the square (**σ**) into *gimel*, and the object (**π**), whatever it may be, into *pe*. The direction of writing is from right to left in each case.

Lastly, there is a possible historical connexion. The man's head **M**, on the disc, bears a prominent feather plume. It has long been recognized that this plume is almost, if not quite, identical with the plumes worn by the Philistines who led the unsuccessful coalition against Egypt in the days of Ramessu III, and who are depicted on the walls of the temple of Medinet Habu, built by the King of Egypt to celebrate his victories. The Philistines and their near kinsmen, the Zakkala, in whom some have tried to identify the Teucrians, were beaten back by the Pharaoh, and settled on the Syrian coast.

The latter people we find shortly afterwards, in the narrative of the Egyptian envoy contained on the important Golénischeff papyrus, settled on the northern Palestine coast, and interpenetrating with the Phoenicians, as the Philistines in southern Palestine interpenetrated with the Hebrews. And it is immediately after this date that the Phoenician alphabet makes its appearance. From what little we know about the Phoenicians it seems incredible that they themselves should actually have been the inventors of the script.

The links of the chain are weak as yet, but I venture to think that this disc seems to point out the direction in which we are to look for the origin of the alphabet. I have put off as irrelevant for the present purpose any remarks on the civilization revealed by the objects depicted in the hieroglyphs, or any comparison with spiral writings found elsewhere in the Mediterranean basin. What relation the Phaestos disc may bear to the Minoan Script on the one hand, and the Hittite on the other, cannot be discussed until the decipherment of all three has been put on a sound basis.



Face I.



Face II.

XV.

ON A BRONZE-AGE INTERMENT WITH ASSOCIATED STANDING-
STONE AND EARTHEN RING, NEAR NAAS, CO. KILDARE.

BY R. A. S. MACALISTER, E. C. R. ARMSTRONG, AND
R. LLOYD PRAEGER.

PLATES XXXIX-XLI.

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1. DESCRIPTION OF THE SITE.

AT the northern extremity of the Wicklow mountains, where the granite of the highlands sinks down towards the limestone of the plains of Dublin and Kildare, foot-hills of Silurian rocks intervene. They project towards the north-west as low cultivated spurs, which form the extreme outposts of the hills, and, standing out into the plain, command wide views over a great extent of fertile country. Lyons Hill is the most conspicuous of these. Round its base all traffic, whether by rail or canal, must pass before it can turn south-westward across the plain. The great south road (in Dublin known as the Naas Road), pursuing a more southerly course, cuts across the back of this ridge and re-enters the curving Liffey valley beyond. Further to the south-west, a couple of miles to the east of Naas, another low Silurian ridge stands out in the townland of Furness. Its summit commands a magnificent view northward and westward; and this was the place selected for the sepulchral monument described in the succeeding pages. The summit of the hill is 560 feet above Ordnance datum, and to the north and west the ground falls sharply. The Silurian slates project here and there through the grassy surface, drift being now almost absent from the site. A few hundred yards down the slope on the north-western side, the limestone comes in, and quarries reveal the beds dipping at 30° to 40° towards the north-west.

The belt of Silurian rocks, on the edge of which the site lies, is some 7 miles wide, stretching north-east and south-west between the limestone and the granite. The nearest point to which the granite approaches lies near

Kilbride, distant about 6 miles east-north-east from Furness. This last point is of importance, as will appear in the sequel.

The excavation at this site, described in the following pages, was made at the charges of the Hon. John Abercromby, LL.D., who is well known for his valuable work in various departments of prehistoric archaeology. For the generous practical interest he has shown in the investigation of this site, most grateful acknowledgments are due.

2. DESCRIPTION OF THE MONUMENT BEFORE EXCAVATION.

The monument, as visible before excavation, consisted of a circular enclosure (known as Longstone Rath) on the summit of the hill described in the preceding section, with a lofty standing-stone at its exact mathematical centre. This stone is probably one of the monuments the recollection of which was in the mind of Sir James Ware when he wrote of the great stones near Naas, in the Co. Kildare.¹

In plan the enclosure is to all intents and purposes a perfect circle. It is a fine example of the type commonly called "ring-forts." A single vallum, with a fosse outside, marks the outline. The surface of the interior is not plane, but rises in the middle like an inverted saucer, the height at the centre being about 3 feet above the height at the sides. Over the surface of the enclosure are scattered a number of trees—Spanish Chestnut, Ash, and Hawthorn—some apparently planted, others self-sown, averaging about 50 to 150 years of age. This fact is worthy of notice, for there are at present two gaps in the surrounding vallum, and the fosse in front of the gaps is filled up, forming gangways which make the enclosure accessible to cattle. Had this been the case when the trees were young, they would probably have been destroyed by the cattle; the inference is that when the trees were growing up, the ring of vallum and fosse was unbroken. The gaps are approximately at the ends of the east-to-west diameter of the circle (Plate XXXIX, fig. 1).

One of the trees—a Hawthorn standing on the southern jamb of the western gap—still preserves supernatural virtues in local tradition. The place, it appears, is visited by girls desiring husbands, who stick a pin in the bark of the tree as a reminder of their visit, or sometimes tie on a rag. There are, however, none of the rags usually to be seen on sacred trees.

The dimensions of the structure are as follows:—Radius of circle to top of vallum, 106–108 ft.; height of vallum above interior ground-level, about

¹ De Hibernia et Antiquitatibus ejus, 1654, pp. 103, 104. The imposing monoliths at Punchestown are probably referred to also.

8 ft. 6 in.; above exterior ground-level, about 10 ft. 6 in.; depth of fosse, 5 ft.; breadth of vallum-base, about 33 ft.; width of fosse, about 26 ft. These dimensions naturally vary considerably according to the state of preservation of different portions of the structure.

The stone in the centre of the enclosure is a needle of granite, four-sided, but of slightly irregular shape. It stood about 17 ft. 6 in. above ground before the excavation began; the girth at the ground-line is 9 ft., which is suddenly reduced to 6 ft. at a shoulder 5 ft. 6 in. from the top. The monolith did not stand upright, but was leaning toward the north-west, the oversail amounting to 2 ft. 6 in. Careful examination failed to reveal any artificial dressing, ornament, or other marking on its surface, apart from the scribblings of modern idlers.

Inside the enclosure there were no traces of buried structures to be discerned, or any surface indications whatever that afforded a clue for the guidance of the excavators. A few hollows and mounds, all slight and insignificant, were noted, and tested by excavation in every case; but they all proved to be mere casual surface irregularities.

3. ACCOUNT OF THE EXCAVATION AND OF THE STRUCTURES DISCOVERED.

Excavation began on the morning of Tuesday, 4th June, 1912, and lasted till the afternoon of the following Saturday. Our first care was to shore up the standing-stone with large props, so as to make it possible to excavate around its foot without disturbing it. A wooden frame was securely bolted as a collar around it, just below the shoulder mentioned; and three large timber struts were erected against this. Meanwhile a trench 20 ft. long and about 3 ft. 6 in. wide, running north and south, was marked out on the eastern side of the stone, and gradually extended in all directions. In the absence of any satisfactory surface indication it was necessary to dig over an extensive area in order to increase the chance of concealed structures or objects coming to light. The area excavated is shown in fig. 1 as a quadrilateral enclosing the cist, &c.

We very soon observed that we were dealing not with a natural land-surface but with made earth, as indicated by its looseness and by the irregular disposition of stones within it; and the presence of this layer of made earth presented at the outset a problem by no means easy to solve. The earth was very dry under the surface, and was interspersed with small Silurian stones and pebbles.

At a depth of 1 ft. 6 in. to 2 ft. an old surface was found, extending, as afterwards appeared, over the whole area excavated in the centre of the enclosure. This was marked in places by flat flagstones—the largest of them

about 2 ft. by 1 ft. 6 in., and 6 in. thick—but especially by evidence of an extensive fire or fires. A layer of charcoal, almost continuous, but of very irregular thickness and intensity, was found over the entire surface; it was sometimes jet-black and solid; and sometimes showed as a dark chocolate stratum on the yellow-brown surface of the earth. On the east and south-east of the standing-stone the layer was fairly uniform, and small pieces of charcoal were frequent; elsewhere around the stone it occurred in patches as though caused by small separate fires. Nowhere was more than one layer of burning observed. In the trial-pits dug here and there near the circumference of the enclosure (the positions of which are marked on the plan), no burnt layer was found; it may be said that the fire was confined to approximately a radius of 50 ft. around the stone.

Besides this layer of burnt wood-ash, other evidences, such as fragments of Carboniferous Sandstone, with marks of fire, bore witness to the extent and intensity of the conflagration. In spite of careful watching, no trace of human or animal remains, bone or shell, nor any scrap of pottery was found in this burnt stratum. This clearly proved that we had not to deal with camp- or cooking-fires. And indeed it may be said, once for all, that there was no indication of any kind to suggest that the enclosure had ever been used as a temporary or permanent habitation.

On first coming to the ground we expected to find that the standing-stone was set at least 6 feet to 8 feet deep in the ground, owing to its great size and weight, and its conspicuously oblique position. It was a surprise to discover that it was not buried more than 4 ft.; and still more unexpected to find that a socket had been prepared for it in the surface of the rock. This was an irregular hole about 1 ft. 6 in. deep; the edges were ragged, as though picked, not crushed as though pounded; and it is impossible to guess by what means or with what tools the socket had been quarried. The stone had been dropped into the pit, and then wedged up with boulders. (See fig. 12.)

The total length of the standing-stone was thus about 21 feet, and its weight was roughly estimated as 12 tons. There was a shoulder near the base similar to that already mentioned at the top. Over the whole of the excavations the rock-surface was reached at a depth ranging from 3 feet to 4 feet.

The most important discovery was made in erecting the props at the western side of the standing-stone. A large flat flagstone on edge, its top just concealed beneath the surface of the earth, was found. Extending the excavation in this neighbourhood the slab proved to be one of the side-stones of a large cist, which displayed some interesting features. It was formed of

unusually massive slabs, and was of dimensions larger than is common in such structures. There was no cover slab, and evidently never had been. The floor of the cist, which was composed of rounded field-stones, was divided longitudinally by a small slab set on edge, 2 feet long, by about 1 foot high, and 3 inches thick. There were two large and fine side-slabs on the western side, but the eastern side was lined with comparatively insignificant blocks. The slabs at either end had fallen prostrate inwards, that at the northern end having apparently smashed in its fall an urn which presumably stood on the top of the débris. The fragments of this urn are described in the following section.

The length of the cist as restored is 8 feet; its breadth ranges from 2 feet 6 inches to 4 feet; the depth is 3 feet 8 inches. The dimensions of the principal component stones are figured on the accompanying plan (Plate XL). The compass-bearing of the long axis is 52° (about N.E. to S.W.).

Inside the cist was a confused mass of bone débris, ashes, fragments of pottery, mud (apparently the degenerate remains of pottery vessels), and the scanty grave-deposits described in the following section. There was no order of any kind observed in the disposition of the remains. The bodies had been burnt *in situ*, as the floor of the cist, especially at its southern end, showed marks of a very hot fire, the stones and earth being discoloured by severe burning; but no smoke-blackening on the side-stones of the cist or on the adjacent standing-stone could now be seen.

The only other discovery made was that of animal bones under the roots of a large ash-tree which grew on the north-east side of the standing-stone, and which, with the owner's permission, we were obliged to cut down to get it out of the way.

4. DESCRIPTION OF THE OBJECTS FOUND.

The grave furniture was very scanty. The only objects found in the cist among the burnt bones were three small pieces of coarse pottery (Plate XXXIX, figs. 6–8), a small arrow-head or knife (fig. 5), a rough bead or toggle with a counter-sunk perforation (fig. 3), and three broken pieces of a polished object, two of the pieces being likewise pierced with counter-sunk perforations. We were at first uncertain what this object was; but two pieces of it were found to fit together, and Mr. Reginald A. Smith, who saw it, suggested that it might be a stone wrist-bracer. We had no hesitation in agreeing with him in this; and the drawing shows it, with dotted lines supplying the missing portions (fig. 2). The object was presumably split by fire. We came to the conclusion that the grave had not been previously disturbed.

The objects found were submitted to the Hon. John Abercromby, who

wrote: "The two pieces of coarse pottery may have been parts of a cinerary urn, but, as they are plain, one can say nothing definite about them." He also stated that in Aberdeenshire burials somewhat similar to the one at Funness are found under or near standing pillar-stones, and that these interments probably belong to the third period of the Bronze Age.¹

Near the pillar-stone, on the opposite side from the cist, a small bronze ring was found (fig. 4). It is of the type generally called harness-rings, and may be of Iron Age date. It is in any case probably later than the contents of the grave. A much-worn Irish halfpenny of George III was also found in the enclosure. Its date appears to be 1801; but it is so much worn that it is impossible to be certain of this. A piece of slag (fig. 9) was found in the black layer previously mentioned, but its presence appears to be accidental.

All the objects in the cist were found mixed up, and in some cases stuck in lumps of comminuted bone débris, and it was quite impossible to determine their original position in the cist or relation to one another. The date of the burial is difficult to determine, as the pottery fragments are so small and unornamented. Stone wrist-guards or bracers are usually found associated with interments belonging to the early Bronze Age; and it is rather surprising to find one in a cremated burial. The bead or toggle does not show any very definite characteristics, and the flint knife or arrow-head belongs to a somewhat colourless type met with in Bronze-age burials.

Therefore, while the interment undoubtedly belongs to the Bronze Age, we hesitate for the present to date it more precisely. Interments in earth-works have been found in England, of which the well-known example called Arbor Low, in Derbyshire, may be mentioned.² In this case the fosse is within the vallum, and there is a stone circle within the enclosure. An interment was discovered near the centre of this ring. The earth-work of this monument was considered to be of late Neolithic date, and not intended for habitation. The use of it as a place of sepulture was thought to be later than the period of its construction.

Mr. T. Hallissy, of the Geological Survey of Ireland, kindly examined the stone objects, and states the bead or toggle to be composed of ferruginous shale, the bracer of trachyte.

Professor Alexander Macalister, of Cambridge, kindly examined the bones found in the cist, and reports as follows:—

"There are the remains of at least two skeletons, one a fairly large male.

¹ See Report on Stone Circles in Aberdeenshire, Proc. Soc. of Antiqs. of Scotland, 1901-2, p. 488. (The stones standing alone appear to be the remains of stone circles.)

² *Archæologia*, vol. lviii, p. 461.

one smaller—possibly a female. There are three parietal bones, and two portions of occipital bone, each with the mid-internal occipital protuberance. There are remains of at least two femora recognizable, and of at least two ulnas. From the number of fragments it is probable that the whole of the two skeletons were represented in the series. Almost all the bones are well burnt.”

The crown of one tooth only was found; Mr. G. Sterling, of Dublin, informs us that it is an upper wisdom tooth of abnormal shape, being unusually long and narrow. In the course of his practice as a dentist he has occasionally come across similar examples, but so extreme a specimen as this is very rare.

A number of bones found at the roots of the large Ash-tree on the opposite side of the standing-stone were examined by Dr. R. F. Scharff, of the National Museum, who reports that they consist of the bones of a large dog of the terrier type, the radius of a large dog of the wolf-hound type, and two small bones of a hare.

Mr. A. C. Forbes, Chief Forestry Inspector of the Department of Agriculture and Technical Instruction, kindly examined several of the larger fragments of charcoal obtained from the grave. He reports as follows:—

“The larger fragments of wood consisted of two species, the majority being pieces of slowly grown Oak, probably from the main stem or butt of an old tree, as the annual rings were very narrow, and contained little autumn wood. In addition to the Oak, there were two short pieces of charred twig or small branch about an inch in diameter, and made up of three annual rings. The structure of the wood resembled that of Hazel more closely than the wood of any other common European species, having a small but distinct circular pith, fairly marked rings, fairly large and numerous medullary rays, and vessels arranged in radial lines. Compared with freshly cut specimens of Hazel, the charred wood appeared to have slightly larger vessels, and less distinct rings, suggestive of badly ripened wood, grown in a damp climate. A number of other fragments of charcoal embedded in clay could not be distinctly identified, but were probably Birch or Hazel.”

5. CONCLUSIONS.

In endeavouring to interpret the details observed, we have to consider the following questions:—

(1) The relation to one another of (*a*) the cist and its contents, (*b*) the stone, and (*c*) the enclosure.

- (2) The meaning of the extensive layer of charcoal.
 (3) The manner of formation of the stratum of made earth covering the layer of charcoal.
 (4) The purpose of the enclosure.

(1) *Is the association of the cist, the stone, and the enclosure intentional or fortuitous?* To this question there can be but one answer. No one would doubt that the stone was meant to mark the site of the cist: that the cist should be placed where it was found without disturbing a previously existing standing-stone, or that the stone should be set up (a process involving, in this case, the quarrying of a socket for it in the rock), without disturbing a previously existing cist, is, to say the least, improbable, unless the two formed one scheme, designed at one time.

That the stone-and-cist group is independent of the enclosure is a less inadmissible hypothesis. The enclosure in all respects resembles the common ring-forts, some of which are known to be as late in date as the early Middle Ages; and it is possible to suppose that such an enclosure had been drawn at some later date around a spot which happened to contain a Bronze-Age burial. But two things render this unlikely. In the first place, such a structure would presumably have been erected (on this hypothesis) for some defensive purpose, and would in that case be almost sure to contain evidences of human occupation: we have seen that the contrary is the case. In the second place, it is not likely that the builders would have taken the trouble to get the centre of the enclosure exactly coincident with the standing-stone if the latter had nothing to do with the former. For these reasons we adopt what, in any case, is the more inherently probable hypothesis, that the cist, the stone, and the enclosure form a single group of mutually dependent details. The cist is the burial-chamber; the stone marks the position of the grave; and the ring encloses both. The wishing-tree may be the last vestige of a sacred character which at one time attached to the enclosure.

What, then, was the order in which the various structures were erected?

We take it that the order was as follows:—

- (a) The construction of the cist and the burning of the bodies.¹

¹ As an alternative to this, the process (a) may be divided into two, thus (a¹) laying down the floor of the cist and burning the bodies, (a²) erecting the side-stones of the cist. The total absence of smoke-blackening on the side-stones, remembering the remarkable permanence of smoke-stains and the intensity of the fire as testified to by the state of the cist-floor, favours this theory of the course of events. On the other hand, it would have been difficult to manipulate the heavy side-stones of the cist without trampling to dust any objects that had been deposited on its floor.

- (b) The erection of the standing-stone on a site previously chosen and prepared by quarrying the socket in the rock.
- (c) The marking-out of the circular enclosure, using the stone as a centre.

That the tracing out of the enclosing wall was the *last* operation is in itself most likely; and the probability is increased by two considerations. In the first place, it is obvious that so exact a circle could be most easily drawn by tying a cord of the required length round the foot of the stone, and using it as a radius. In the second place, the erection of the great standing-stone presumably required an inclined plane of earth with a long and gentle slope, up which it would be run by means of rollers, and over the edge of which it would be tilted into the socket prepared for it. This inclined plane would most likely extend beyond the limits marked by the vallum; and even if it did not do so, the manipulation of this gigantic stone would clearly be seriously hampered if the vallum and fosse stood in the way.

The only possibility of ambiguity lies in the relative dates of the side-stones of the cist and the standing-stone. We incline to believe that the cist was finished first, partly because it is more probable that the protection of the burnt bones would be the first care of the survivors, especially as this was the easier work; and partly because it is more likely that the stone would be erected in such a way as not to interfere with the cist, than that the cist would be erected in a way which would involve dangerous tampering with the foundation and stability of the stone. It is, however, probable that the quarrying of the socket for the stone took place after the burning of the bodies (which in any case would obviously be the first stage in the actual interment).

(2) *What is the meaning of the layer of burning that extends over so large an area of the enclosure?* A great fire of brush-wood has been made, in which nothing has been burnt or cooked. Taking into account the commanding position of the hill, from which, though small, a very considerable part of Counties Kildare and Wicklow is to be seen, we can hardly avoid the conclusion that a great beacon-fire was burnt on the hill-top. It may have been a signal to assemble the clan; it may simply have been an imposing part of the burial-ritual. The fact that the lighting of this fire must have at least preceded the erection of the standing-stone, as shown by the details discussed in the following paragraphs, perhaps makes the former suggestion slightly more probable.

(3) *How does the burnt layer come to be covered with eighteen inches of made earth?* To this question we have only one reasonable answer to offer, namely, that the made earth is the spread-out material of the inclined plane up which

the standing-stone was rolled. Most of the material would be in the neighbourhood of the stone, where the plain was highest; and hence the earth rises in the centre of the enclosure. This last fact is also to be partly accounted for by the outer edge of the enclosure being to some extent scooped away to supply material for the inner face of the vallum.

(4) *What is the purpose of the enclosure?* It is not residential: it marks a burial: it contains nothing but the burial. On the other hand, it is not a common cemetery. We suggested it is probably a sanctuary, marking the place which was sacred to the shade of some man of importance.

Thus, the excavation of Longstone Rath has proved—

- (1) That certain of the Irish ring-forts are sepulchral, not residential:
- (2) That some of them belong to the Bronze Age:
- (3) That the Bronze-age burial-ritual, as practised on this occasion, included (a) the lighting of a great fire, to be seen over a wide area—a possible reason for the frequently observed burials on hill-tops; (b) the burning of the body; (c) the building of a cist; (d) the erection of a pillar-stone; and (e) the drawing of an enclosure round it:

(4) That some modern superstitions may have their roots in the Bronze Age.

The pillar-stone, which forms the most striking feature of the monument, we believe to have been a glacial erratic, although its slenderness relative to its length is unusual in erratic blocks. All its edges are much rounded, and its faces equally weathered. The site of the monument was perhaps chosen owing to the proximity of the beautiful stranded block to the crest of a commanding eminence. Erratic blocks of granite appear to be rare in the neighbourhood; but two pillar-stones of similar dimensions, also of granite, stand only a few miles away, in the neighbourhood of Punchestown.

Of the history of the district there is not much known relevant to our present purpose. The name "Furness" is a quite modern corruption of *Fornochta*, a name better preserved by the adjacent townland of "Forenaughts." Here there seems to have been a royal residence in early times, as a personage called Dúnlán, of Fornochta, "a generous prince who routed battles against the sons of Niall," is referred to in the old Irish poem recently edited by Professor Kuno Meyer under the title "Hail Brigid." A "Fornocht" is referred to in the *Rennes Dinnsenchas* (*Revue Celtique*, xv. 327).

In closing, we have to express our gratitude to Mr. Nicholas Synnott, the owner of the property on which this interesting monument is situated, for allowing us to undertake the excavation; and both to him and to Mrs. Synnott, for the valuable assistance and many kindnesses which they rendered to us during the work.

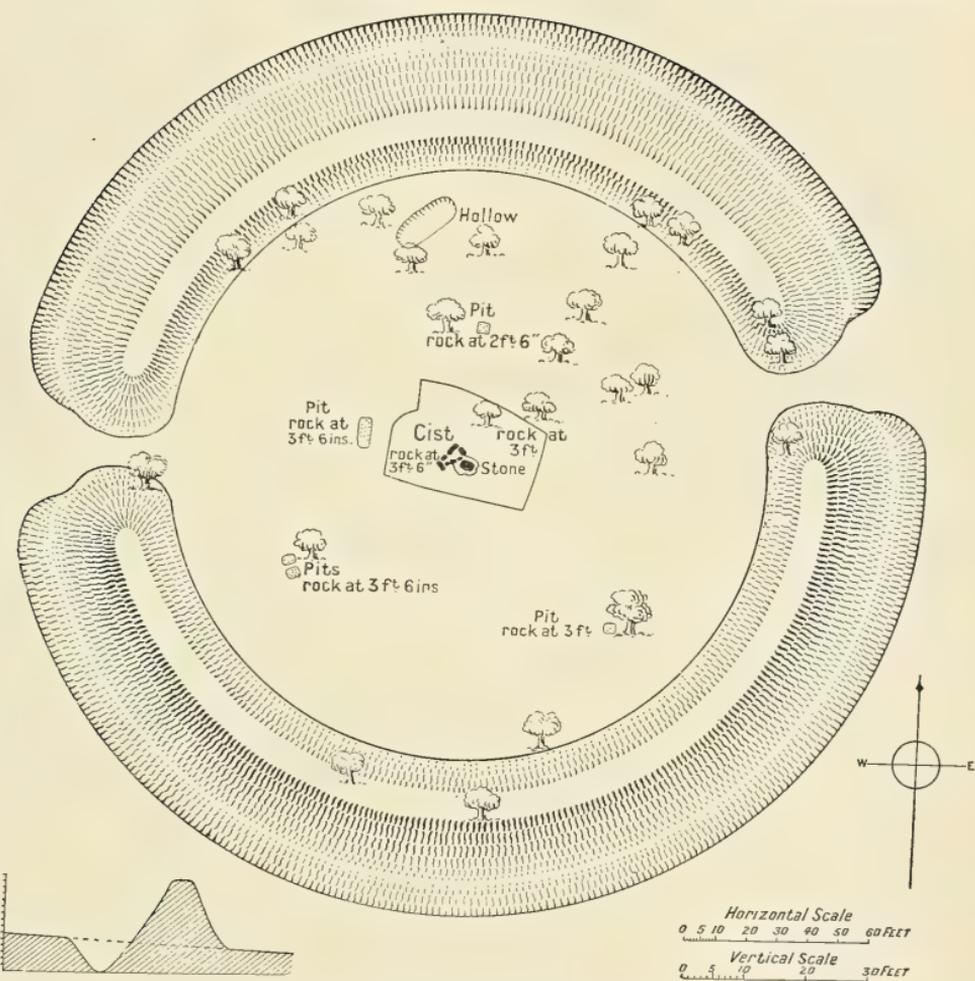
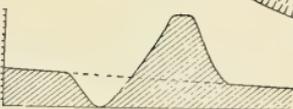


Fig. 1.



Horizontal Scale
0 5 10 20 30 40 50 60 FEET

Vertical Scale
0 5 10 20 30 FEET

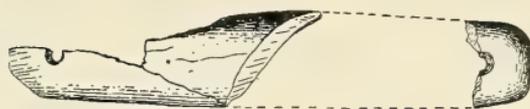


Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.



Fig. 6.



Fig. 7.



Fig. 8.



Fig. 9.

(Figs. 2 to 9 $\times \frac{2}{3}$.)

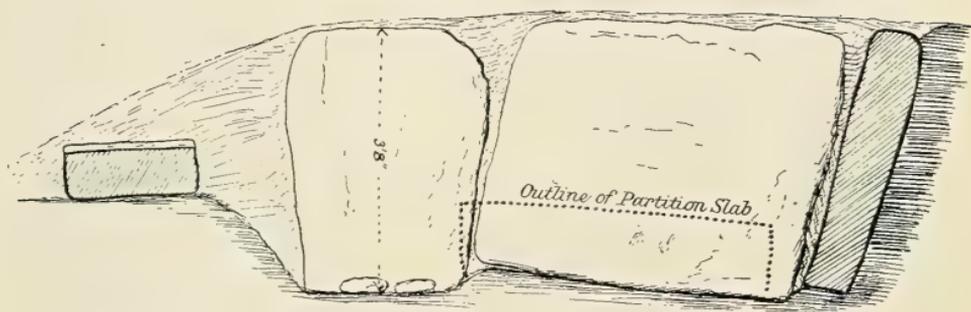


Fig. 10.

Longitudinal Section of Cist. Block at right-hand end re-erected.

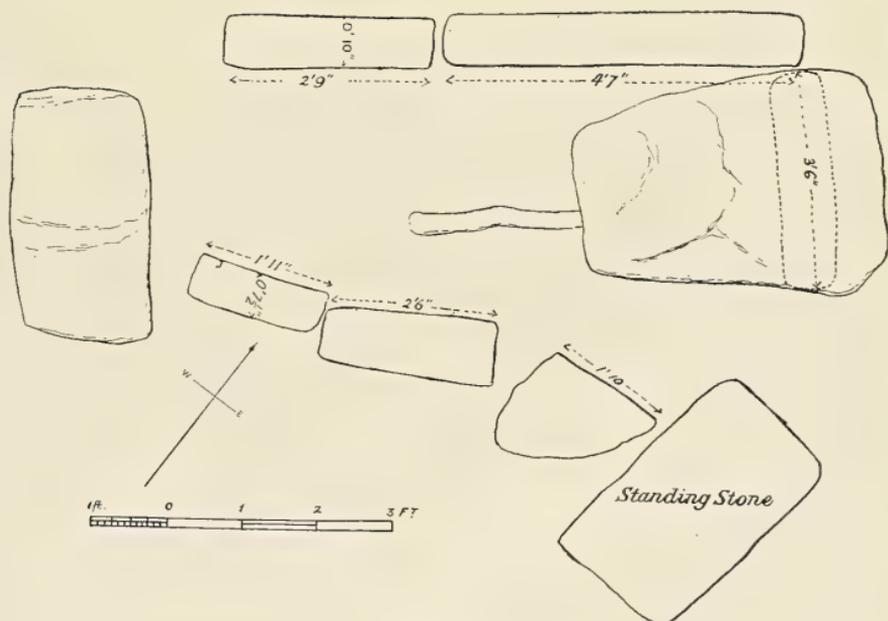


Fig. 11.

Plan of Cist. Block at right-hand end as re-erected shown by dotted lines.



Fig. 12.—Base of standing-stone, showing quarried socket.

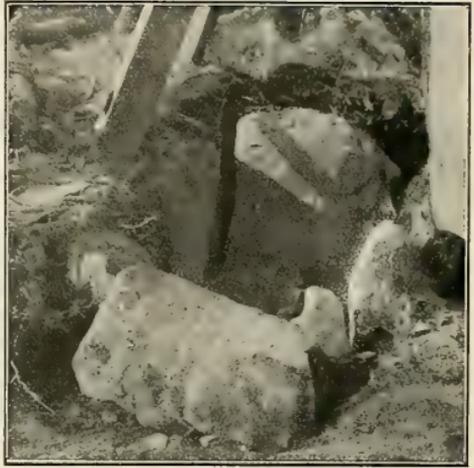


Fig. 13.—The Cist from the S. W. after the fallen slabs had been raised.



Fig. 14.—The standing-stone.



Fig. 15.—The standing-stone and cist from the east.

XVI.

EARLY ITALIAN MAPS OF IRELAND FROM 1300 TO 1600, WITH
NOTES ON FOREIGN SETTLERS AND TRADE.

By THOMAS JOHNSON WESTROPP, M.A.

PLATES XLII-XLV.

Read DECEMBER 9, 1912. Published FEBRUARY 26, 1913.

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It is a noteworthy fact that in or about the beginning of the fourteenth century a series of practical maps began to appear in Italy.¹ They were in many respects far from accurate, probably formed by building up small sketch-maps like the "skipper maps" of the late thirteenth century (some of which remain, showing portions of the shores of the Mediterranean); but they form the most important contribution to detailed geography since the great work of Ptolemy appeared in the middle of the second century. They made a bold departure from all that had gone before. Compared with the maps of Beatus² in the eighth century, of Edrisi about 1154, or of Richard of Haldingham³ about 1280

¹ While using any published editions of these maps, I rely especially on the great Atlases of Count A. E. Nordenskiöld; "Periplus: an essay on the early history of Charts, &c.," translated by G. A. Bather, 1897; and "Facsimile Atlas: the early history of Cartography," translated by A. Ekelop and C. R. Markham, 1889; and F. Ongania, "Verz. einer Sammlung von Welt- und Seekarten des xiii, xiv, und xv Jahrhunderts."

² The so-called "St. Severus" version of the late eighth-century map of Beatus (dating 1050) shows an oval continent, with long, angular, and curved isles: Tile, Trithe, Britannia, Hibernia, Gades and Insulae Fortunatarum, the last off Africa. There were several early maps that ignored the British Isles altogether—e.g., that in the Liber Guidonis (No. 3898, Burgundian Library, Brussels), dated 1119.

³ Outlines in previous paper, Proc. R.I.A., vol. xxx (C), pp. 238, 240.

they show a wonderful knowledge of the coasts outside the Mediterranean, and are truly harbingers of the dawn of that great revival of learning, discovery, and commerce by which our modern states and life arose. In these, from a very early period, Ireland was not neglected; and I attempt in this paper (even if crudely and imperfectly) to try to attract Irish scholars to the large, fascinating, and almost unexplored fields, of which I only cross the border-land. It is a subject on whose issues it is easy to say too much or too little; I think it better to risk the first danger, and trust to the reader's tolerance.

If we take the Haldingham map at Hereford Cathedral and compare it with one of the "Portolan maps," a generation later, the contrast is most striking. The earlier map is a marvel of erudition and such geographical knowledge as men could acquire in a cloister; it is marked by a considerable knowledge of the Bible, the classics, and writers down to Orosius. We see in its centre Jerusalem, with the Crucifixion, the central point of the world in all the minds of mediæval Europe. We see Eden at the top, in the land of sunrise; the Tower of Babel, the Labyrinth of Crete, the shell-like whirlpool of Charybdis, the conspicuous Red Sea (painted scarlet), and a crowd of strange men, monsters, and animals. Now let us turn to the Pisan map of 1300 to 1306, or those of Carignano, Vesconte, or Dulcert, all falling within the same thirty years. The outline of Europe is mainly correct; where the earlier map attaches importance to irrelevant matters, the later ones are strictly practical. The cartographers attached little importance to monsters, Scripture events, or "the anthropophagi, and men whose heads do grow beneath their shoulders"; but, while sometimes showing them, they regarded as all-important the close-packed fringe of names along the coasts. These were derived from seafarers, and compiled for seafarers, showing the way from port to port, as the epithet *portolano* implied,¹ not by monks, to amuse the aimless studies of the learned; although the draughtsmen were usually monks like Carignano, Bianco, and Fra Mauro. Pilgrims going to the Holy Land through France and Italy may have helped; but it is doubtful, and there seems to be no evidence.

The "original map" is unknown;² so far as Ireland is concerned, the series of names is so closely similar in the lesser (as well as in the more obvious)

¹ *Portolano* is also used for a sailing directory or book of courses; it is here used (as by Nordenskiöld) for a coasting-map. These maps are very numerous: some 400 are mentioned in "Studi biografici della Geografia in Italia" (Uzielli and Amat. di S. Filippo Roma, 1882, vol. ii); "Mappamundi, Portolani," &c.; "Facsimile Atlas," p. 46; also Kretschmer's "Italian Portolans" and Fischer's lists.

² Nordenskiöld adopts the name "Normal Portolan" for it. The fourteenth-century maps are from one original. The knowledge of Greenland points to an early date before communication ceased between it and Scandinavia; the name-indications point to about 1290.

features that we can hardly doubt their derivation from the same exemplar. The Pisan Map and that of Petrus Vesconte do not give Ireland; and the first has a very inaccurate figure of England; but it and Ireland in Carignano's map, though nearly illegible from stains, are recognizable in outline, more so even than in Dulcert. I have been unable to find any attempt at proportion in the early maps of Ireland, though scales and measuring slips appear in some. The chief ports, as well as towns and islands, are shown up the east coast and round to the Bann, and round the south and west coasts up to Teelin, with considerable fullness and correct succession; but Donegal seems to be almost unknown, as if trade barely reached its opposite borders from opposite directions. Outside all lie the mythical Brasil and Dathuli, which learned men denied to be real, but which the foreign trader (like the Irish coast-dweller) held in firm belief till the time foretold by Seneca came, and "the ocean relaxed its bonds, and a vast continent lay open." The men who made these maps should be gratefully remembered in our nation (that has so far ignored them) as the "unsung heroes" of commerce and peace. They, or their informants, faced the vast dangers of the sea without compass or science, in little coasting vessels; and the dangers were all the greater for being unknown. The traders from 1200 broke down more and more the walls of prejudice between nation and nation, and were the true founders of new colonies and empires greater than those of Greece, Carthage, and Rome. It is only by close study that we can even begin to appraise their worth, and the extent of our debt of gratitude to these men.

1. THE PORTOLAN MAPS: THEIR PROBLEMS.

A number of problems arise in connexion with the study of the Portolan Maps; each deserves specialist study; none can be adequately treated here. I merely give enough to show their extent and bearing on the main subject. Of these, the most important are the rise and extension of the foreign trade with Ireland; the question whether the Italians derived their information directly from their own mariners, or whether the native Irish, the Norse, the Flemings, or the Normans supplied it; why some of the greater ports, like Galway, are passed over, while little insignificant harbours appear; why certain islands assume such importance and others (larger and, to our ideas, of equal importance) are omitted; why Limerick and New Ross, alone of the inland towns, were given; and a number of other problems which I need not enumerate, but will endeavour to solve in the course of the paper.

The first question we must study at some length, for all turns upon it. The second can be more briefly dealt with as being partly answered by our

notes on the first. There was certainly direct communication, apart from churchmen,¹ between Florence and Ireland, while the Venetian map-makers can be shown to have worked in and for the city of Dante. On the other hand, most of the places marked were well known to the Anglo-Normans; but distinctive Irish and Norman names are unrecorded, though such forms as *le deng* (Dingle), *le bano* (Bannow), *l'ecocolo* (Youghal, Eechoill, Eochla), *le ban* (The Bann), show a "French" (? Anglo-Norman) influence. On the other hand, why do the early maps never give such characteristic Norman forms as Kinsale (till 1450), Dungarvan (till 1450), Limerick (till 1385), Weiseford, Wykinglo, and Drogheda? The omission of certain names is explicable. Galway was not a trading centre of much importance till too late to affect the early maps, nor was Kinsale, though its harbour of Endelford was too important a shelter for the traders to omit. Similarly, though Ullerford was most important, Larne on its shore never became a seat of trade. After 1450 both appear on the maps. It is clear that the traders up the west coast went direct from Dingle to Aran, on to Bofin, and thence to Achill Sound or Clew Bay, passing the mouth of Galway Bay, and not going up to its head.² The islands were evidently regarded (so to say) as buoys to mark the channel and keep ships from wandering into the dreaded outer sea. Dorsey, Skellig, Blasket, Aran, and Bofin (pre-eminently suitable for this purpose) appear from the beginning on all the maps.

The customs returns from New Ross and the wine trade with Limerick account for the marking of these towns on the fourteenth-century maps; places like Cashel, Kilkenny, Athlone, and Armagh were disregarded by the seafarers. It is only on a clerical map like Haldingham's that we find Armagh, "Arthmacho, civitas S. Patr.;" Bangor, "civitas bencurr;" and Kildare, "Celdara, civitas S^{ce} brigide." The appearance of Dublin, "civitas de uelin," is probably due to its archbishopric, while the rivers *Schene* and *Bande* and the *Welabri* and *Luceni* are from Orosius.³ Ulster, "Ulvest," is alone unexplained. Deeper study into local history should account for the additions and omissions of the later (fifteenth-century) maps. The dates of building of churches, monasteries, and bridges in places omitted in the earlier maps show the rise of the town's prosperity, and (as in the case of Galway and Kinsale) account for their later insertion. When we read of Henry IV

¹ I have thought it better to pass by this other very important line of communication. Those practically interested in the maps were sailors and merchants. The learned classes rarely did more than play with the subject.

² Galway may have brought goods from Aran according to legend.

³ Orosius, A.D. 417, "ubi Scenae ostium est," "ubi Velabri, Lucenique consistunt." The first may be Inbher Scene, not the Shannon. See Mr. Goddard Orpen's paper on Ptolemy's Map, *Journal Roy. Soc. Antq. Ir.*, xxiv, p. 115.

establishing a trading company at Ardglas, and see the remains of its extensive fortified "factory,"¹ we no longer wonder at the appearance of the other-time obscure little place on the maps after 1450.

I am but too well aware how scantily I can deal with such details. Being (I believe) the first of its kind in Ireland, I lay this before the Academy, hoping the result, though imperfect, may induce younger men to specialize in the subjects passed over so slightly here, and sure that it will at least add a helpful aid to the study of topography and Irish names in the text of the portolans.

2. TYPES OF THE MAPS.

Of course the old maps of Ireland are very defective save as a list of harbours.² What their predecessors were we do not know. The portions relating to the Mediterranean and the outer coasts of France, Spain, the Low Countries, and even southern England were far more advanced. The Mediterranean part is fairly accurate in Edrisi's maps; and St. Louis is said to have used a portolan in his crusade in 1270; but the earliest dated portolan known to us is that of Petrus Vesconte in 1311, though those of Carignano and the anonymous Pisan cartographer are at least five to ten years earlier. As we noted, Haldingham shows little or no acquaintance with our island comparable with his successors fifteen years later. His predecessors were, if possible, less helpful: take for example, the map possibly eighty years earlier in an early "edition" of Giraldus Cambrensis, where we find a carrot-shaped Britannia and a somewhat hour-glass-shaped Hibernia with no names, even of the chief towns or features. Such maps were only valuable as marking a vague desire for maps and topographical information. It was evidently in the reign of Edward II that the foreign knowledge of Ireland began, and (we may say) ended, till about 1450. None of the early maps are more than diagrams, save in one particular—Clew Bay. They omitted the great bays of Galway, the Shannon's mouth, Dingle, Kenmare, Cork Harbour, Carlingford, Strangford, Belfast Lough, and the Foyle. They placed the "corners" of Ireland at the Isle of Ticonnell (? Torry), Rachrin, the Saltees, and Dorsey. Misled by the sharp trend of the coast northward from

¹ "The Making of Ireland and its Undoing," Mrs. A. Stopford Green (ed. 1909), p. 15. Dalkey also seems a case in point.

² For all this see Nordenskiöld's *Periplus*, p. 16; Jomard's *Monuments de la Géographie and Choix des documents géographiques* (Paris, 1883); and *Les origines de la cartographie de l'Europe septentrionale* (Paris, 1888); Joseph Fischer, s.j., *The Discoveries of the Norsemen* (transl. B. H. Soulsby, 1903), gives a long catalogue of extant portolans and bibliography; and Ferdinand Ongania gives photographs of seventeen of these maps. See also Konrad Kretschmer, *The Italian Portolans of the Middle Ages*.

Dundubhain (the Tower of Hook), they made that point the end of the east coast, bringing Bannow, Fethard, and Tuskar into its line. The scales, we saw, are not applicable to Ireland; even proportion is not attempted. Perhaps the long distances between the fewer chief points on the west coast "balanced" the numerous short ones on the east. If we compare a portolan with a modern map, we find some curious "equations." A reach of 15 miles equals 100; a distance of 60 actual miles equals 80, 90, or 100 in the 1339 map; 40, 90, and 140 are equal in that of 1384; 40, 70, 80, and 105 are equal in the 1450 portolan. This compels one to neglect any reference to scales in the identifications. This early type continued to be recopied, with added errors, but few additions of fact, down to 1600; we have even Arabic portolans of the later date, similar in outline to those of Carignano and Dulcert.

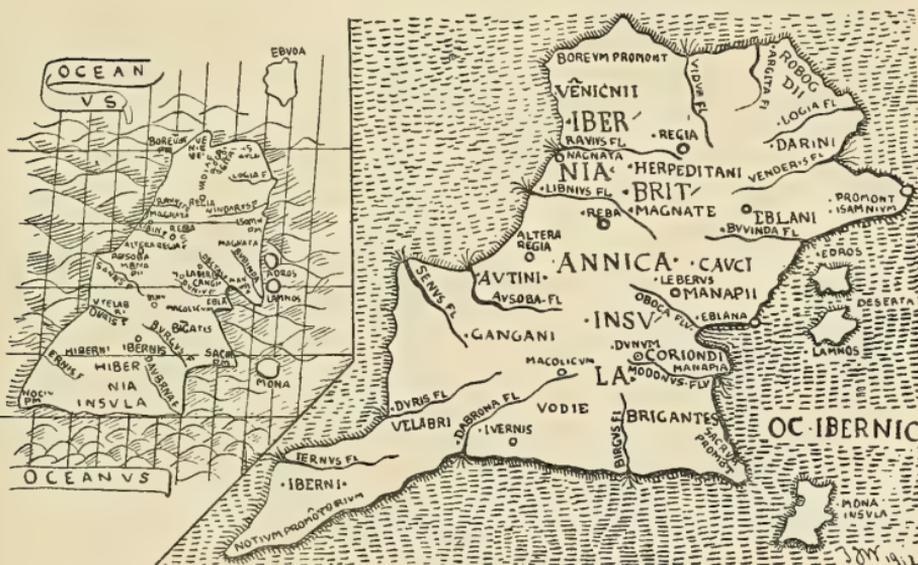
A second type arose about 1430, perhaps originating from the brilliant brief reign of Henry V. It shows that it comes from an independent source. "Guinsala" (Kinsale) now replaces Andeliorda, and "Langra," or Larne, Ulleriord. Galway, Erris, the Stags, Sligo, Teelin (if not the *comitatus* of the early school), Iniskea, "Anifrona," Black Head, Ventry, The Bull, Baltimore, Corcaia, the Seven Castles, Dalkey, Howth, and Ardglas now appear; while the once important Bannow, Arklow, Timoleague, and Knockfergus are ignored. I give as examples the Upsal map, not later than 1450; De la Cosa, 1500, and Agnesi, 1544; but the type is widespread. The west coast is now fairly accurate as a sketch-map; but this superficial accuracy was far more dangerous than the crudeness of the first type. It was the second type of map, for example, that, failing to show the bold projection of Connacht, led Medina-Sidonia to lay down a line of retreat for the Armada in 1588 so close to the coast that many of the huge ships got embayed from Sligo to Cape Clear.¹

From about 1480 onward a disturbing element is felt, indicating interference of the learned classes, and the revival of the Ptolemaic geography.² "Ptolemy, pure and simple," was hardly known; names from his maps got into the sea-maps, while many names (even the mythic Brasil) are seen on the supposed Ptolemy maps of the sixteenth century—maps with such titles as

¹ See the appalling accounts of the English officials in Connacht, and of Captain Cuellar. Fenton tells of 1100 dead bodies on one beach; and the peasantry said the like was to be seen in other places. The sandhills are full of human remains.

² Of course Ptolemy was "remembered at intervals" down the ages. A fine copy of the twelfth century, for example, was preserved in the Monastery of Vatopési in Athos, but Ireland is not mapped in "*Geographia de Ptolemaeo*," Paris, 1867. Victor Langlois, also "*Science and Art in the Middle Ages*," p. 266. His popularity dates from the translated edition of his book into Latin about 1410. After that numerous manuscript copies were made, though it was not printed till after 1472; but the earliest edition (possibly by accident) is dated mcccclxii.

“Ptolemaeus improved” or “augmented.” From these arose awkward fancy maps, Ireland becoming pear- or spindle-shaped, and the names corrupted almost past recognition. The long spindle-shape is found in the maps by Marino Sanudo (supposed early fourteenth century),¹ Ptolemaeus Uimae, 1482; Ruysch “Ptolemy,” 1508; Sylvani “Ptolemy,” 1511; Cracow “Ptolemy,” 1512; Jacob Zeigler, 1532; Pedro de Medina, 1548 to 1566; and Sigurd Stephani, 1570.



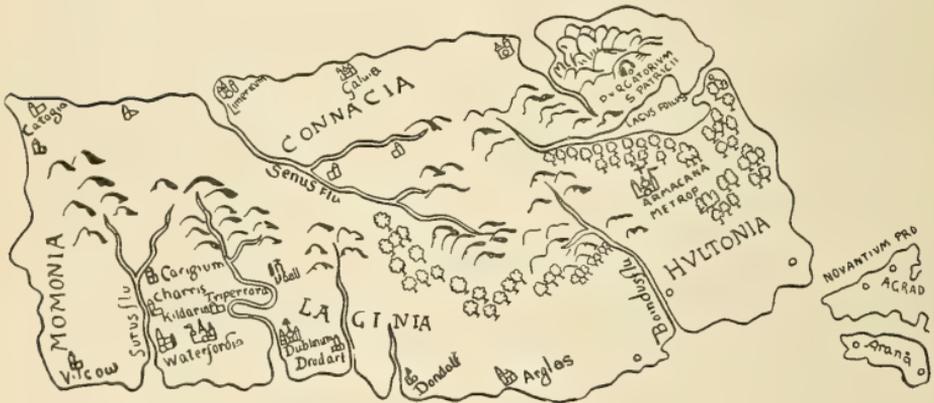
Early Ptolemy Maps. Bologna, “1472,” and Rome, 1490.

A very curious and unusual map was supervised by Michael Servetus (“Villanovus”) in a “Ptolemy,” edited 1525, and published ten years later at Lyons. This atlas, it is believed, aided not a little the heresy of its unfortunate editor to secure his cruel doom. It is full of unnecessary offence—e.g. “Germania producit—Hungaria, boves; Bavaria, sues; Svecia, meretrices; Boemia, hereticos; Vestfalia, falaces; tota denique Germania et totus Septentrio, gulones et portatores.”² Ireland, though shown, is fortunately

¹ “Facsimile Atlas,” p. 51.

² “Facsimile Atlas,” p. 23. The excuse was a passage on the sterility and worthlessness of the Holy Land, which had only been copied from other maps (1522 and 1535), where it had caused no scandal.

not described. Lafreri,¹ in 1588, gave his impression of "Hibernia, in oceano, inter Britanniam et Hispaniam sita." He gives the provinces, Momonia, Conacia, Ultonia, and Lagenia. The west is to the top, Catagia (Corcagia, Cork) to the S.W.; Vileow (Wicklow), S.E.; Surus Flu; Waterfordia; Charrus Cahir (?), Carigium (Carrick-on-Suir). Kildarra; Triperara (on the S. Bank of the Liffey !); Dublinum; Vball; Dodalt (Drogheda); Dondaff (Dundalk); Arglas; Bandus Flu; Lacus Foilus; Purgatorium S. Patricii; Limerick (at Loop Head !); and Galuia. He was assisted by Jacob Gastaldus; but if the latter drew the above map, Irishmen will scarcely endorse his contemporaries' estimate, "Eccellentissimo cosmografo Piamontese." I give these merely to show the numerous types and their inaccuracy when compared with the two earlier forms, but make no further use of them.



Map of Lafreri, 1588.

A new school arose in England soon after 1560. It was constantly reinforced by new original maps, and is for the first time equally concerned with the coast and with inland names. It was a map for statesmen and generals, adapted for military expeditions, not (like its predecessors) peaceful in intention, and made for scholars and commerce. Its maps are only used by me to help to identify names on the older maps. Closely akin to it are the Ortelius and other maps of the same period. They evidently reacted on each other about 1580 to 1600; some of them resemble the second type,

¹ Lafreri's map. *Ibid.*, p. 123. An earlier map (of the fifteenth century), "Christopher Ensenius, Buondelmonte," shows some of the inland towns. It is given in *Periplus*, plate xxxiii. Unfortunately it is small, and somewhat out of focus; but it is of the "normal portolan" type. The Ptolemaic names Regia, Regia (altera), and Reba can be seen on it; and portolan names like dunsobrin, porto-rosso, monesi, chenog-fud, Rigara, and fedit,

possibly by accident. This fourth type continued till the Down Survey maps brought in a more accurate variety, though far less rich—at least in sea-coast names. The new school may be said to commence for Ireland in the issue of Sir W. Petty's *Hibernia Delineata* in 1683, the maps on which it is founded dating 1652-1657.¹

The errors of the early maps suggest how beset with doubt, fear, and danger must have been the approach of ships to our coasts with only such charts to guide them. It may be well to select a few actual cases from the vivid records of the Armada in 1588.

Juan de Saavedra wrote² to King Philip from the great galeass, *Zuniga* (which through countless dangers had reached Havre). He tells how they had got into good anchorage at Tue (probably the *Bue*, i.e. Bire, Berehaven of the maps), twelve leagues from the Cape (Clear), the inhabitants being "all rustic savages,"³ and attached to the English. The crew, though the helm was broken, accordingly put out to sea, got lost, and found themselves in an uninhabited creek near a tower held by the enemy, they never knew where; thence they escaped with difficulty. It is only from the letters of the Sheriff of Thomond⁴ that we learn that it was at Coolrone Bay, near Liscannor Castle, in Co. Clare, far to the northward of their starting-point for the south.

Marcos de Aramburo⁵ tells how the *San Juan Bautista* sighted land two hours before daylight. Some thought it was the Drosey Islands, others the Quelles;⁶ the pilot thought "the Ox and Cow," eight leagues from the Cape. None of these guesses proved correct; they came into the Blasket Sound. Of course the trading-vessels once they reached Ireland could creep along a friendly coast from harbour to harbour, as they found them marked on their portolans, and met help and information at every point.

None of the maps given in this paper show the northern Cape Clear,⁷ so often referred to by the Spaniards, unless it be the *Oligra* of some maps, the Cap Seligra in the older maps. This corresponds to Cap Cleara, which was passed by Alonzo de Leyva in his ill-starred voyage from Killybegs to his doom at the Giant's Causeway, and so far is suitable to the Seligra of the

¹ The splendid collection in the Fagel Library, Trinity College, Dublin, shows how strongly the Continental maps were affected by Speed from 1620, and by Petty from 1690.

² Calendar Spanish State Papers, Oct., 1588.

³ This unflattering term is also applied to the Scotch, e.g. "a savage who spoke Latin," *ibid.*, p. 506. Cuellar speaks of "a bishop dressed like a savage." Our own term "outlandish" belongs to the same narrow thought.

⁴ Cal. State Papers Ireland, 1588. See my notes in Journal of the Limerick Field Club, iii, p. 194.

⁵ See Rev. W. S. Green's paper, Proc. R.I.A. xxvii (C), p. 264.

⁶ See *infra* in next section, p. 37.

⁷ Froude, "Spanish Story of the Armada" (ed. 1892), p. 76, identifies it with Clare Island.

portolans. Froude is evidently wrong in identifying it with Cliara, or Clare Island, which is not one of the salient points of the coast lying far back within Achill Head, the Cap d'Aquilla of the maps.

3. THE TEXT OF THE PORTOLANS.

In attempting to identify the names on the maps, I tabulated all my material into columns. This immediately excluded many plausible identifications, by showing that the doubtful name lay farther along the coast, and sometimes tied it down to a space a few miles long between two known points. This also obviated the results of badly copied names in the old maps which appear even in the earliest copies. The majority of the names identify themselves at the first glance, and others on even the slightest study of the Irish names—so Draueri is seen to be Dairbhre, or Valentia Island; Glenbaron (or Glenbaton) to be Glenberchon (or Glenbarron), i.e. Castlehaven; leocolo, Eochail (or Youghal); Dondiab (or Dondub), Dundubhain (Rindubhain), or Hook. Knowledge of local pronunciation also helps us, as, e.g., Corran for Carn, Corborg for Carbery. On the other hand, a number of most corrupt names¹ give but little trouble when the maps are compared:—Laionel, Riscon, Araxas, Mocora, Brotin, Dimeri, and Drassert equate with Terconel, Rachrin, Estacas, Leocolo, Arani, Limeric, and Draueri on other maps, and these are easily identified with Tirconnell, Rathlin, the Stags, Youghal, Aran, Limerick and Valentia, or Dairbhre. Ferestin is found to be Belcotin, or Ballycottin, and Risalt, Tiscalt or Tuskar. Drogheda (its name then, as ever since, a stumbling-block to non-Irish men) yields such forms as Drogai and Drigodella; Waterford, Gataforda or Zataford; Wexford, Achefort, Arifod, Ocsola, Ogorda, and even Cossard; Wicklow hardly less corruptly as Ayello, Vizello, and Uidibla. Rarely, however, is a name equivocal, as “Califord,” which is Carlingford in the Dulcert and most other maps, but is Strangford in Homen’s map, which makes Carlingford “Carlefor.” The name for Carrickfergus (or Knockfergus) is interesting, “Chenockfirg,” showing that it was pronounced fully, as at the present time the modern map-name “Nicker” is locally K-nicker, i.e., Conigar. “Ulrford” in Freducci’s map closely follows the correct form Ullerford *Ullarba* in Irish, and now Larne Lough. Larne itself is “Langra.” Only by comparison when we find the old “momer” (or “moneri”) represented by “mono-arger” do we recognize Bonamargy. Acquaintance with the Irish Chancery Rolls shows that Andelforda is the Endilforth or harbour of Kinsale. There are,

¹ Similarly in the English names, after the first shock, we easily identify *Gingalaxco* with Winchelsea, *Hwic*, with Wight, *Chaastra* with Exeter, or *Sentusoi* with Sandwich.

however, puzzling names, where neither natural feature nor ancient place name, or town, remains to suggest a local habitation for the map-name.

Arceon, Arelcito, and Ardroun lie between Wicklow and Bray; the latter may be some "high ridge"—Ard-drom, perhaps even Bray Head. Confrenchellan¹ and Condarca are in the featureless district between Clew Bay and Killery. When all is done, plenty of unanswered riddles remain over. I commend to students the certain identification of "Cap Seligra" (perhaps Knockafola or Bloody Foreland), "Comucidella" (perhaps cauo de tellin or Teeling Head), "Cap Stronbere" (perhaps Carcorbre, Cahercarbery, or Kerry Head), and Lespor d'Irlanda, which seems to be most probably Bolus Head. I have failed to satisfy myself about the Quelles, Quelmes, or Quelbeg, Island or Islands. They only appear on later maps after 1500. Olives and Homen separate them from the Skelligs (Steile and Quelles, 1568; Scuella and Qualbos, 1569); these map-makers, Pierre Descelliers, 1546, and Voltius, 1593, agree in putting them north-west from the Bull and Cow; De la Cosa, 1500, gives great Skellig, "S. Michel," as well as "Quelmes." Ortelius in 1589 shows them as the three spiked rocks (Skelligs and Lemon Rock, or Puffin Island); Lawrence Nowell, Dean of Lichfield, about 1570, puts the "Skelms" so near the coast between Valencia and Ballinskelligs as to suggest Long Island and Puffin Island. The Voyage to the Azores, in 1588 names the "S. Kelmes" as south from Ventry. On the other hand, the State Papers call the Skelligs, "Skellig Michael," "the Skyllinges," and "the Skelankes, called S. Michael." The Quelles may be Little Skellig and Puffin Island, which fulfil the known conditions best.

On the south coast, Olarcos and Godelfreda are not (so far) identified, but the latter is between Youghal and Cork Harbour, and so may be Oyster Haven or Ringabella. Up the east coast, besides the names near Bray, "tenal," "Dairhe" (north from Dundalk), "Cape Stet," "Canutor," and "Zibiri"; on the north "Idora" (perhaps I Torei or Torry Island) need identification. The more northern "Logeo" or "losco" is probably Lusk, near Dublin, placed too far up the coast, as Ireland's Eye is on one map.

The verbal forms are changed by no fixed rules. The initial gets omitted or obliterated by a coloured border,² as (L)ameri(c), (K)anisala,

¹ Could this be a shelter under Frehill Islet, once (and evidently recently) two or three times its present size, *quasi* "Cauo Frehillan"?

² The colours are conventional; gold and purple are said to imply riches, but the islets round Ireland are golden in Agnesi's map, 1545, and Ireland is purple-bordered in Calapoda's map, 1552; the Red Sea is red, Rhodes red with a white cross. Having usually worked on photographs or facsimiles, I cannot state why certain names are in red in Agnesi's map. Where names meet across Ireland, it sometimes obviates confusion.

(S)ordes, (T)ussalt (ch)anifro, &c. Common errors in modern proofs (such as *b* for *l*, *d* for *t*, *m* for *ni*, *r* for *n*, or *i* for *r*, and *e* for *c*) frequently occur. A curious *c* with a long up-curl gets mistaken for *d*, or the reverse, in later maps (Ardill, Archill, i.e. Achill, Dondiab, and Condiab, Donborg and Corborg). The changes or mistakes of *c* and *l*, or *r* and *l*, are common in the maps, as in the State Records of the same period; *x*, *f*, and *s* are confused in the names of Bofin, *d* and *r* in "disalt" and "rasalt." The frequency of the various errors depends largely on the type of writing in the exemplar, as the short "t" in one yields *c*, the long crossed "t" in another *l* in the copies.

4. FOREIGNERS IN IRELAND AND THE WINE TRADE BEFORE 1170.

It becomes necessary to show the possible communication between Ireland and Italy, whether direct or indirect, which explains the detailed knowledge of its coasts shown by the portolan maps. Of course, one might naturally look for this in the clergy; but (as I endeavoured to show) the clerical maps differ unmistakably from the others, which are clearly derived from business men. Indirect lines, such as the wine trade and the trade in wool and hides, might be pressed to explain this, while pilgrims and foreigners in the Church (especially under the Angevin Kings) might have taken their share, but we have evidence of direct business relations between Florentines and the Irish, and of the former with Venice, the centre of early cartography which best explains the fact. It may be well to go at some length into the evidence for widespread trade in Ireland in the period preceding the making of the first portolan map. This again necessitates a preface as to commerce before the Norman invasion; but, this being only remotely connected with our subject-matter, I shall condense greatly.

The Romans of the first century before Christ¹ seem to have known little more than the name of Ireland; it was a place inconceivably remote from the great western nursery of civilization round the eastern end of the Mediterranean, like Britain, "cut off from the whole world" as they knew it. Even the Spaniards knew little about Britain, and Strabo, noticing this, about A.D. 25, adds that Ireland is at the very skirt of the habitable world, was scarcely suitable for human settlement, and added strange tales of its

¹ I need not collect the few earlier notices of "Ierne" or "Albion," in Himilco (B.C. 500); "the Holy Island (Hieron), it is inhabited by the people of Hierne" (if Avienus in a fourth-century poem quotes him aright); in Aristotle, a century later, or Pytheas, about B.C. 330, quoted by Strabo, Pliny, and other writers, or the still more doubtful Argonautic poem where the Argo approaches the dangerous "Ieruian Islands."

barbarism, confessedly, "without competent authority."¹ To him Britain was triangular, one side parallel to Celtica, while Ireland lay parallel to its northern face.² The Romans in Britain tell us little more. Agricola, after meeting the first recorded malcontent Irishman, an expelled "petty king," contemplated its invasion,³ and (if Juvenal's burning lines are not mere rhetoric) the Romans moved their arms on to the shores of Juverna.⁴ Finds of Roman coins and statuettes are not uncommon in Ireland; still I think there is not a trace of recorded mercantile communication in the first century between the two races, though their outposts were in sight of each other.

Things seem different immediately after the close of the century. Tacitus says of Ireland, "melius aditus portusque per commercia et negotiatores cogniti." It is doubtful whether the comparison be with the ports of Britain, or between those of the eastern or western coasts of Ireland, or with the customs. Some, indeed, read the passage, "a Britannia differunt, nec in melius," commencing a new sentence with "Aditus." But the fact is unshaken that commerce and trading ships had got in touch with our island by that time. A generation later Ptolemy, after A.D. 144,⁵ gives us the position of fifteen river-mouths, five promontories,⁶ nine "islands," and several towns—perhaps great forts like Emania (? Regia) and Dunrigh (? Dunum). The great harbour of the Foyle is shown by him, though even the portolans omit it, and the Lagau⁷ (Logia, Logan), the Bann (Argita, cf. Moyarget, Co. Antrim), perhaps Carlingford (? Ouenderios), the Boyne (Bououinda), the "Oboka," the Slaney (Modonnos), the Barrow (Birgos, Berbha), Cork Harbour (Dabrona, Sabrona, Sabhrann), Iernos and the Dour (perhaps Kenmare and Tralee), the Shannon (Senos), the Ausoba (perhaps Oirbsen (Galway River), the Libnios (Clew Bay or one of the Mayo havens),

¹ Even still the inhabitants of the mainland tell unfounded stories to the discredit of islanders. I have heard evil tales of Iniskea, from people in the Mullet, of Aran in the Co. Clare, and of Blasket in Co. Kerry; and O'Donovan over seventy years ago heard of the paganism and wrecking proclivities of the people of Torry from the inhabitants of Tiroconnell, which on the first item were altogether false, the second being unproven.

² Julius Caesar (B.C. 55-45) was better informed; he knew that Hibernia lay to the west of Britain, with Mona and other islands between them, but the Britons gave him little information.

³ "Agrippa," c. 24. Pomponius Mela, a Spaniard, about A.D. 43, heard that Ivernia could not ripen corn, but had such rich pasturage that if cattle were not checked they ate till they burst.

⁴ "Arma quidem ultra litora Iuvernae promovimus," Sat. 2, v. 159.

⁵ His work, often dated A.D. 120, has observations down to the later year. Two helpful Iris papers should be read, one by Mr. G. H. Orpen, *Journal Roy. Soc. Antt. Ir.*, xxiv, and one Mr. J. Mac Neill, *New Ireland Review*, xxvi (1906-7), p. 6.

⁶ He includes, as all know, "Edros" (Ben Edar) or Howth among the islands, but it may have been actually an island before the sea heaped up the low sandy neck behind it.

⁷ Or perhaps Belfast Lough, Loch *Laoigh* ("stagnum vituli" in *Adamnan*).

and the Raouios, which Mr. Orpen inclines to identify as the Eas Ruaith, or Erne, the later *Eas Aedha Ruaidh* or Asheroe.

Turning to native tradition, full of sea expeditions and invasions, we may record the raids of the great King Niall of the Nine Hostages, who, on the border-line of legend and history (379 to 405), invaded Britain. His bold attempt put its mark even on late Roman literature. Claudian, in 396, sang how "the Scot" lashed the northern waves with daring oars, how he "moved all Ierne, and the deep foamed with hostile oar."¹ The invasion was repelled, and "Icy Erin wept the heaps" (or tumuli) of her slain sons.² Whatever lies behind the legend of Niall's successor, Dathi, and his raid into Gaul, it is evident that the Irish (like the Veneti in Caesar's day) had a powerful fleet.

Patrick, one of Niall's British captives at the close of the fourth century, revolutionized Ireland, and in so doing brought her into closer touch with Gaul. He himself, in his escape from slavery, found a ship with a crew of heathens,³ presumably Irish from that fact, bringing Irish hounds to Gaul. In A.D. 433 (if his earliest Life be accurate) he found the High King Loegaire (Niall's son), his sub-kings, and druids, drinking wine at Tara.⁴ If so, trade with Gaul was already established. The early laws, probably as early as or earlier than St. Patrick's time, at least in their main features, made full provision for the protection and treatment of foreigners. "Parties from the sea" were cared and watched in a fort after their arrival, their food was to be provided, and the owner of the *port* was to preserve the vessel, and divide its cargo, as the case might be. Should they be cast on the shore, the owner of the port had also to protect, feed, and make general provision for them. Foreign mercenaries, quaintly described as "headless persons," having no chief or natural head, were also protected; there was also an eric fine for a free foreigner, though the lowest of such fines.

The section embodied in the Book of Aicill, about A.D. 640, dealt with trading ships.⁵ "Sed" of 6 "serepalls" due from a ship running aground, "where she (the ship) came consigned to a certain person, and it was not unto *his* land they happened to be driven." If she be foreign, the owner of

¹ Claudian, "de tertio consulatu Honorii Augusti," 396; "de quarto cons. Honorii," 398, and "in primum cons. Stilichonis," 400, Lib. II, v. 247. The legion that guarded Britain against the Scoti enjoyed such high repute that it was summoned by Stilicho to defend Rome against the Goths.

² Journal Roy. Soc. Antt. Ir. xxiv, p. 118.

³ St. Patrick's "Confession" and "Lebar Breac Homily." The latter says plainly "a crew of heathens," which is implied in the older document, where they address Patrick as "Christian," and challenge him to pray to his great God, half in contempt.

⁴ Tirechan's Annotations (Tripartite Life, Rolls Series, ed. W. Stokes, vol. ii, p. 282, "bibentibus vinum in palatio Temoriae.")

⁵ "Book of Aicill" (Ancient Laws of Ireland Commission, vol. ii, p. 427).

the land on which she stranded is entitled to a share of “foreign nuts, goblets, and to an *escup* vessel of wine or of honey.” The body of the code was revised or compiled by Cennfaeladh, son of Oilell,¹ wounded in the Battle of Magh Rath, A.D. 642.

I need not go into the many early allusions to wine; history and romance are full of them. “A cask of wine from the land of the Franks” was brought to Clonmacnois, in the heart of Ireland, in St. Kieran’s lifetime, *ante* 548,³ and his contemporary, Diarmait mac Cerbaile, is called “a king with whom wine used to be dealt out in splendour.” The authorities in Southern Gaul, about A.D. 610, deported St. Columbanus from Nantes to Erin in a ship “engaged in the commerce of the Scots.”⁴ Domnall, the High King (627–641), provided wine, as well as ale and mead, for his guests, if the wild Saga of “Magh Rath” be correct here. Indeed, the mere need of wine for the Sacrament, especially before the cup was withdrawn from the laity, in about 900, implies a certain amount of trade in wine, and also in foreign fabrics for the vestments of the clergy and the robes of the chiefs.⁵

In the Norse period we frequently hear of wine; Cormac, King-Bishop of Cashel (slain 902), gives in his *Glossary*—“*escopfina*, a vessel used for measuring wine among the Norsemen and Franks.”⁶ This well defines the route of the wine trade from France through the Norse and Danish seaports. The latter foreigners paid a large wine tribute to the High King Brian (1000–1014) at Kincora near Killaloe. It is said by contemporary writers⁷ to have amounted to a cask of 32 gallons each day from Limerick, and 150 casks per annum from Dublin. In the pathetic elegy on the great king by his bard, Mac Liac, we hear, “where are the nobles and sons of kings with whom we drank wine in thy halls?” William of Malmesbury, in the following century, mentions a considerable trade between Bristol and Ireland⁸ before

¹ *Senchus Mór*, vol. i, p. 129; vol. iv, p. 75.

² *Ibid.*, p. 311.

³ *Life of St. Kieran*.

⁴ Jonas’ “*Life of St. Columbanus*,” cap. xxii, “*quae Scottorum commercia vexerat*”: see Reeves’ “*Adamnan’s Life of St. Columba*.”

⁵ The Irish, too, had far advanced in cosmography; note how the Bishop of Salzburg, an Irishman, taught that the earth was round, and “that there were (inhabitants in the) Antipodes.” He was condemned by Pope Boniface, 722. (See, *inter alia*, “*Historical and Chronological Deductions of the Origin of Commerce*,” p. 65.)

⁶ Cormac’s “*Glossary*” ed. Whitley Stokes.

⁷ *Poems of Mac Liac*; see “*Manners and Customs of the Ancient Irish*,” vol. ii, pp. 118–121.

⁸ “*De Gestis Pontificum*,” Book iv, “*Bristowe nomine, in quo est nauium portus ab Hibernia et Norvegia et caeteris*.” It was a centre of the slave trade to Ireland in the time of Wulstan, Bishop of Worcester, who died in 1095; and Earl Robert, after his marriage, in 1119, to the daughter of Robert FitzHamon, raided the surrounding districts, and sold his slaves to the Irish. Nearly a hundred years later the Irish regarded the Norman invasion as a punishment for this vile traffic “in the bodies and souls of men.”

1142, in which year Henry, Duke of Normandy, granted to the burgesses of Rouen the right that ships trading with Ireland should only go from and to that port. The imposts on the Irish trade were a "tymbrium" of marten skins from each ship, or (if the owners swore that they had none on board) £20 to the *Viconte* of Rouen and a hawk, or 16 shillings¹ to the chamberlain.² The same prince, Henry II, renewed this grant some twenty-four years later after his invasion of Ireland.³

In the closing years of the twelfth century Giraldus de Barri "Cambrensis," about 1185, found that the Irish had abundance of wine from Poitou, for which they paid in hides "not ungratefully." He reproached the Irish clergy in 1186 for drinking wine and other beverages after their fasts, but denies that the Irish had any trade—"non aliquis mercemoniorum genere nec ulla mechanicarum artium specie vitam producant."⁴

5. COMMERCE AND FOREIGN MERCHANTS AFTER 1170.

With the fuller information after the Norman settlement in Ireland we get minute information as to the foreign trade.⁵ Previous writers have little to say. I purpose giving it at some length from 1170 to 1320, or about the time that the early portolan maps begin to appear. Foreign merchants came from Lucca and Louvain to Ireland so early as 1171. The citizens of Dublin sent wine to King John in 1211, and five years later the prices were—for Rochelle wine, 20s. a tun; for Anjou wine, 24s.; and for the best French wine, 26s. 6d. to 28s. a tun.⁶ Judging from the *prise* of wines, £2 a tun and upwards was not considered excessive at the close of the century.

Waterford established a tax on wines in 1222; Drogheda, in 1228; and Limerick in 1237. The *prise* of wines in Dublin was 9 tuns in 1235, that of Drogheda in 1282 was 64 tuns, valued about £2 5s. 2d. a tun.

As to the foreign merchants, those of Lucca and Flanders were trading with Cork in 1172-1173, and (as we shall see in detail) Ireland had commercial relations with France, Flanders, and the Italian towns,

¹ In Ireland a hawk cost 6/8 in 1229. (Pipe Roll xiii, Hen. III, App. 35, Report Dep. Keeper Records, p. 30, for Dalkey Island). The Blaskets, Valentia, and other islands were held by presenting a hawk. (Plea Rolls, Ed. I.)

² "Calendar of Documents, France," vol. i, p. 33.

³ *Ibid.*, p. 35. A charter of 1172 alludes to King Henry's absence "pacificante Iberniam."

⁴ *Topographia Hiberniae* (Rolls Series, vol. v, pp. 28, 150, 151), dist. iii, cap. 10.

⁵ John Yeates, "Growth and Viscissitudes of Commerce," p. 137, barely mentions the trade in hides, skins, wool, and fish from Dublin, Waterford, Cork, and Drogheda.

⁶ "Historical and Chronological Deductions of the Origin of Commerce," A. Anderson (1789), p. 26.

especially Lucca and Florence, steadily increasing through the century. When the Magna Charta was granted to Ireland for Henry III in the first year of his reign, possibly in 1216, the clause protecting the foreign merchants was retained—"All merchants, except publicly prohibited," had safe and secure conduct to come to, tarry in, or depart from Ireland; to buy and sell without evil extortion by old and righteous customs. In time of war they were to be attached without harm to bodies or goods until the Chief Justice should know how the merchants of our land were treated by the enemy if they were safe, the others shall be safe here.¹ Henry borrowed money from a vintner in Ardglas in 1260.²

The imports and exports of Ireland in 1172 include wine, spices, wax, and almonds; red, scarlet, and green cloth; coverlids and clothing; axes, nails, and spades; canvas, ropes, and timber. As we shall see, a most important class of records, the dues granted for murage, i.e., to enable the towns to build or repair their fortifications, remain from 1233 down. Abstracting those before 1295 we find that they include rates on wine, spices, pepper, almonds, raisins, and figs; wheat, oats, pease, onions, garlic, flour, tallow, cheese, honey, butter, fish (herrings, salmon, lampreys, and conger); furs, wool, and hides (including skins of the squirrel,³ marten, badger, mountain cat, sheep, lamb, cattle, horses, deer, goats, hares, rabbits, wolves, and foxes); salt, alum, copperas, woad, pitch, soap, coal, millstones, lead, iron, nails, horse-shoes, caldrons, and other kitchen utensils; cloth, linen, silk, gold embroidery, canvas, and cordwain leather. Comfort and even luxury must have been very possible in our towns in the thirteenth century. Kilkenny (a place given on no portolan map known to me) had a rich spice trade in 1282–3; wine, pepper, saffron, ginger, almonds, cummin, figs, and raisins were rated for murage. The Pipe Rolls give many cases of *prise* of wines, from which we can ascertain the cost per hogshead, usually £2 to 50s.; Dublin (Castle, 1235), at £2 10s. per tun, from 1267 to 1283; Waterford at £2, as also at Drogheda, Dungarvan, Limerick, and Dublin; in all the *prise* amounted to £1798; 1301–1302, £1 was paid the merchant on each tun: the Crown sold each for £3; Cork, 1301, £2 a tun; Dublin, 1303, £2, sold for £3; Drogheda, £2 7s. In the reign of Edward II—Drogheda, 1310, £2 3s. 9d.; Waterford, 1319–1322,

¹ "Early Statutes of Ireland" (ed. Dr. H. F. Berry), p. 77; "Facsimiles of National Manuscripts of Ireland" (ed. J. T. Gilbert), vol. ii, No. lxiii.

² This and the subsequent entries from "Calendar of Documents relating to Ireland" (Sweetman) under dates.

³ For the oft-controverted Irish "squirrel," see Journal Roy. Soc. Antt., Ir., xl, p. 245; besides the murage rates (Waterford, 1244, 1291; Dublin, 1250; Drogheda, 1278; Cork, 1284; Fethard, 1292; Trayli and Moyal, 1286). Nicholas Arthur, 1428; Hakluyt's copy of *Libel of English Policy*, 1416 to 1436; and R. O'Flaherty, 1684, name the animal and distinguish it from the marten.

£2 2s. 2½*d.* in 1322, £3 10s. 9*d.*, and £2 1s. on different occasions; two men were paid to guard the wine for the war in Scotland. The *prise* of wine in Wexford in 1333 and 1336 gives no detail.¹ In our present knowledge several of the above transactions are inexplicable. Freight for wine from Dublin to Skymburneys was 5s. per tun and 2s. 6*d.* per pipe in 1333. Kilmallock, a small inland town, imported 40 hogsheads of wine in 1293; Ardart (the small cathedral town of Ardfert in Kerry), 44 hogsheads and 1 pipe; even in the little port of Dengyn or Dingle (le deng on the earliest maps), the Custom raised a sum of £121 in 1278, and *prise* of wines is recorded at Dungarvan and elsewhere. In 1321, we find in the Plea Rolls questions as to the account of Henry Cod, who was vendor of wines in Cloyne, Co. Cork, for one Theobald.²

The Italian firms of merchants, bankers, and moneyers held much of the Irish trade till after 1340, and most of the banking and money-lending and tax-collecting, as well as the mints, was in their hands.³ Sheriffs, knights abbots of the great Cistercian and other religious houses, and the nobility were frequently in debt, and not infrequently involved in trouble and litigation with the Italian firms. A little later the "mighty victor" of Crecy largely financed his French wars by aid of the Italian merchants; how he broke faith with the latter is one of the bad blots on his reign.

It is, however, more instructive to give details, which I will collect under the cities—and, where that cannot be done, under the countries—of the foreign bankers and traders. The list will show how much intercourse between Ireland, France, Flanders, and Italy took place in the generations by whom the maps were prepared and used.

Bayonne.—In 1296 the "Snake" of Rosponde brought oats and beans from New Ross to the King's army in Gascony. In 1303 the Bayonne merchants were granted the customs on wool and hides in Ireland.⁴

Bordeaux.—In 1235 the wines of certain merchants of Bordeaux were seized at sea and brought to Ireland. Simon de Aqua Mortua of Bordeaux

¹ Pipe Rolls of Ireland under dates; also "A Treatise on the Exchequer and Revenue of Ireland" (Gorges & Howard), Dublin, 1776, Chapter vi. The Irish *prisage* was 1 tun out of 9 to 18, and over that 2 tuns. In England £1 was paid to the merchant for freight. Howard says that this was not done in Ireland, but the instance in 1301-2 seems to fall under that head (pp. 74, 75).

² See Cal. Documents, Ireland, for Dublin, 1233 No. (2405), 1250 (3057), 1295 (260), Waterford 1234 (2133); Cork, 1284 (2248); Drogheda, 1288 (2134); Youghal, 1275 (1164); Kilkenny, 1282-3 (2136); Kilmallock, 1293 (P. 2). See also innumerable entries of *prise* of wines in the Irish Pipe Rolls (App. Rep. Deputy Keeper Records, Ireland, Nos. 36-41). The last entry is in Plea Roll 99, Edw. II, anno v, mem. 17. There was a lawsuit of the Prior of the Hospital of St. John of Jerusalem against John de Harcourt for breaking into the house and cellar of the hospital at Any, Co. Limerick, and seizing bread, wine (I think ale, *c'vis*) and other provisions (Plea Roll 101, Ed. II, mem. 4*d.*).

³ Cal. Doc., Plea Rolls, Pipe Rolls, &c.

⁴ Cal. Doc. 1303 (204).

was permitted to trade in wine with Ireland in 1267, with no *prise* other than the ancient custom of one hogshead from before and one from behind the mast. Gayland de Cette, another Bordeaux merchant, traded with Ireland in 1283. In 1312 Richard Chevalier, a citizen and native of the same town, traded here. It may be recalled that in 1255 Prince Edward was in Bordeaux when he got the grant of the profits of Ireland before starting for Spain. I find an Arnald de Burdeux near Kilmallock in Co. Limerick in 1314.¹

BRABANT.—The wool seized from the Ricardi merchants in Ireland in September, 1295, was shipped to it.²

BRYGGERIAK.—Wine was brought to Dublin from it that same year.³

DORDOGNE and LIBOURNE.—In 1289 the new custom of wine in Dublin was levied from Emericus de Tharys for wines laden at Libourne; and in 1292 and 1293 Dordogne wines were taxed in Limerick and Drogheda for the same custom.⁴

FLANDERS.—The “Annals of Lough Cé” state that a force of Flemings, under Grisine, aided the Danes at Clontarf, 1014. There was a large colony of Flemings in South Wales before the first invasion of Ireland by the Anglo-Normans, and Flemings are often named in Irish Records. It must suffice to give a few examples. In the original roll of Dublin citizens (about 1175) appear Simon Flandrensis, Isaac Flandrensis, and Gilbert the Fleming. The epithet (rather than surname) is very common. I may add a few cases from the farther counties of Ireland. In the “Black Book of Limerick” are several early charters of one Richard of Flanders, probably of the opening half of the reign of Henry III, as the Bishop, Hubert de Burgh, died in 1250; they relate to the patronage of Magrany Church.⁵ Others are of William, Henry, and John of Flanders, in the time of Bishop Robert, who died in 1272, and relate to Kilmallock, Offargus, Dysertenegus, and Cathyrasse, near Croom.⁶ Henry, according to the Plea Rolls, held lands at Hedyrgowel in the same county in 1289. Stephen and Laurence the Fleming are also named in the same place. In 1261 Adam “the Flemeng” was there. In County Cork I may note Walter, at Fermoy, in 1260 and 1281; in Tipperary, Nicholas, in Natherlach the same year. In Kerry, we find William at Ardart in 1280–1289. Walter the Fleming, in Waterford city, was called to warrant Robert of

¹ *Ibid.* 1235 (2229), 1267 (816), 1283 (p. 492), Gilbert’s “Anglo-Norman Documents,” p. 297; Plea Roll 105 Ed. II, 1314, mem. 14.

² C. D. I., 1295.

³ C. D. I., 1295, pp. 90–99.

⁴ C. D. I., 1289 (p. 232), 1292 (p. 28).

⁵ See “Ancient Churches in Co. Limerick,” Proc. R. I. Acad. xxv (C), p. 414. Mayryne or Kilteany lay near Clonelty.

⁶ *Ibid.*, pp. 419, 397, 384 and 385.

Argentine in 1264. Laurence was at Ardgonel in Connacht in 1280, and the title is very common in Leinster.'

Nordenskiöld attributes the knowledge of the North of Europe in the portolans to the notes gathered by Mediterranean skippers in Flanders. He states that the trade began in 1262,¹ but the "Calendar of Documents relating to Ireland" shows Flemish merchants in our island so early as 1234, when the French merchants were arrested, and the Flemings ordered to be left unmolested. In 1293, Edward I gave safe conduct to the merchants of Flanders in Ireland and elsewhere. Two years later Giles de Courtray of Bruges was accused of having hides and wool laid up in the houses of various Irish merchants at Thomastown, Kilkenny, and Dublin, while Dedrich Tobyn, John Tobyn, and Roger Bongre of Bruges had similar deposits in Dublin, Rospointe, and Kilkenny. Another Fleming, Terry de Edlingham, was buying up wool so far inland as Cashel; and John la Mer of Flanders had deposited his goods with Robert le Kyteler (a member of a family that produced the famous witch) in Kilkenny. Next year, however (1296), the king gave full leave to them to trade in Ireland; this was only fair reciprocity, as his Irish subjects (even in 1252) brought hides called "Ulvesters" to Flanders, and also wool.² In 1273 Irish wool was taxed at Bruges, and in 1300. At the time when some of the Flemings were driving their surreptitious trade in wool and hides in Leinster and Munster, others, like Reginald de Bark of Flanders, kept the wines of the foreign merchants in Dublin. John de Coudraye of Bruges complained in 1297 that Hugelin Pere and Hugelin Teste of Lucca detained a debt, so the Government, consistent in its favours, ordered that all persons in Ireland owing debts to the merchants of the Count of Flanders should be distrained to pay them.³ Far later, about 1420, the markets of Brabant were attended by Irish merchants, who brought quantities of salt hides thither.⁴ This may have affected the second type of maps, but their origin is far less obvious than that of the earlier portolans.

FLORENCE.—We feel that we have a full explanation for the minute knowledge of the Irish coasts shown by the early fourteenth-century map-makers, if we can only establish the existence of Florentines in Ireland. The lovely city of the Arno, in commerce, as in literature and art, exhibited great progressiveness. It employed Venetian map-makers; and its archives

¹ Nordenskiöld, *Periplus*, p. 85 (citing Anderson, "Origin of Commerce," 1787, vol. i, pp. 225-278).

² "Making of Ireland" (citing *Cart. Bruges*, vol. i, p. 87, and Rudolph Haphe's *Bruges Entwicklung*, p. 72).

³ Generally see Cal. Doc. Ir., Pat., Judiciary, Plea, and Pipe Rolls, Black Book of Limerick, Registers of Dublin Abbeys; but all Anglo-Irish records afford evidence of the ubiquity of the Flemings in every walk of life in the thirteenth and fourteenth centuries.

⁴ "The Libel of English Policy," Hakluyt's "Principal Navigations."

contain many of their works. I need only give such names as those of the Vesconti of Venice and Genoa in 1311-20, Giroldis in 1420, and Fra Mauro in 1450, to confirm this side of the statement, for all were employed by the Florentines, and worked in that city.¹ When we turn to Irish records our only difficulty is a great one—how to select from a mass of material that could supply matter for a long independent paper on the Florentines in Ireland. The name “Florentine” is found at New Ross so early as 1217; and Sir John Gilbert shows that in November, 1266, there were several Florentines trading in Dublin. We find the names of Cynus, son of Jacobus de Mancino,² merchant and citizen of Florence, a member of the “Riki” Society (as the *Ricardi* of Lucca were called in Dublin), Philip Rodulphi, Matthew Bonfiloli, and Robert Amenati. For the first three, Fulk, Archbishop of Dublin, advanced £100; the deed is sealed with the seal of Master Angelus de Frusinon, a canon of Ferns. King Edward appointed Bonausius Bonaudi and his fellow-merchants of Florence to receive the Customs of Ireland, along with the Lucca merchants, in 1275. The year 1256 saw Hispanellus Simonetti, John Baymund, and Remucius Jacobi, Florentine merchants, trading in Leinster; Fulk Masner and his two associates of Florence were granted duties on wool that same year. Cambinus del Pape, a native of Florence, got licence to stay in Ireland the next year. The Irish Plea Rolls show that Reyner of Florence had a lawsuit in 1295. In April, 1292, Hubert de Passo, merchant of Florence, held letters obligatory of Theobald le Botiller. Toraldus del Pape, a Florentine merchant, appears down to 1310 as having business in Ireland. Others of the same name and place were in England, Hugh Pape being one of those appointed to collect the duty on wool and hides, one-half mark on each sack of 42 stone, or on 300 woollfells, and one mark on each *last* of hides in 1282; and Donettus del Pape in 1275, who was at Newcastle, and with Hugh were associated Hugh del Post and “Torsian” Donato.³

There was one Florentine company of outstanding importance who had Irish branches, the *Friscobaldi*. They appear in Ireland, at any rate, in 1282, James and Toresian “Donat” accounted for £2000 from that year to

¹ For some information and illustrations of the bankers and money-lenders of the city, see “The Guilds of Florence” (Edgcombe Stanley, ed. 2, chap. vi, p. 170). The *Friscobaldi* first appeared as bankers about 1260; the *Bardi* in 1244. It is noteworthy that religious feeling regarded usurers as only a shade less black than actual heretics. Edward I accordingly paid a lump sum to “compensate” the *Friscobaldi* for the money lent for the crusade instead of paying interest. The rules of the Guild of Bankers seem to date from 1280; the original book being lost, the revised statutes date 1299, and an improved code in 1334. Strangers and ecclesiastics were not allowed to be members of the banking firms.

² See also “*Crede Mihi*,” 126.

³ Calendar of Fines, i, p. 169.

1284, for they held the New Custom at £1,000 a year; they were agents of "Hugh, of the merchants of Florence." Jacobus and Turesianus of the Donati held the dues of Youghal, Cork, Waterford, and Dublin in the latter year: Hugh Pape and Hugh le Poste (as we saw in 1275) were colleagues. In 1296 the Donati¹ complained to the Treasurer of unjust treatment; and two years later "Thoresan," in a petition, tells how he had been Keeper of the Exchange in Dublin. He was a very prominent merchant, and is frequently named in the fiscal records of the closing century. Another leading Florentine, Theobald de Castellyon, lent money in Counties Limerick and Tipperary, resulting in various lawsuits with Sir Hugh Purcell of Croagh, Co. Limerick, Sheriff of Tipperary, and with Peter le Botiller in the latter county.

Even after his death his affairs appear more than once in the Plea Rolls in suits of his executors. His name appeared in a very curious case given by Mr. Mills, the Deputy-Keeper of the Records, who, with his usual considerate kindness, gave me the reference before the record was published in the second volume of the Calendar of Justiciary Rolls. Briefly, a controversy arose in 1305 between Hugh del Poste and² William del Monte, merchants of Florence, concerning the goods of Theobald de Castellown, formerly a merchant of their company. They appointed each two arbitrators, who chose a fifth, one Guido de Vieuo, "who was of great discretion." This quality, however, appeared in no praiseworthy form; for when William tried to get his friendship he would only grant it for a bond, first of £10, and then of £20. He next extorted similar bonds from Hugh to act in his favour. However, he could not conceal his double-dealing, and, once it got known, the injured party brought it into court, claiming damages to 500 marks. Guido set up an ingenious plea, endeavouring to clear himself of malice or corruption. A jury of twelve Italian merchants was sworn, and they found against the accused. Guido was found "to be at mercy" for £10; the bonds for £20 were cancelled, and he was about to be imprisoned (as he so richly deserved), but some "magnates," friendly to him, interceded, and he was "let make fine," and bidden to be distrained of the deeds. "Brother" Bartholomew Malizard was one of his pledges.³ I have not traced the Ricardi and Bettori later than 1335; but the record should be of interest if anyone were to follow their history to the end.

The same chief company, the *Friscobaldi*, paid £1,100 for the use of

¹ A family prominent as members of the *Friscobaldi*.

² See also some entries in the Pipe Rolls viii, Edward III of the Ricardi firm of Lucca, Mem. Roll, an. v and vi, Edw. III.

³ Justiciary Rolls, mem. 35, of 1305.

Edward I (to clear the debts of his war in Palestine), in 1299; accordingly, the "Hammer of Scotland" granted to Coppus Joseph, Coppus Cotenué, and Taldus Janian (who, with the ubiquitous "Tholosianus" Donati, formed the Irish branch of the Friscobaldi), the Irish Customs on wine and hides which were held by the Gascon merchants. The latter being naturally aggrieved, were indemnified out of the lands of the Earl of Cornwall in a sum of £3,370 13s. 1½*d.* for wine supplied to the King's household. The financial practice of the day seems very complex to us. The Friscobaldi also trespassed on the interests of the *Ricardi* of Lucca, being given the wool held by the latter company in England, Ireland, and Scotland in 1301. In the next two years Beatus Panuchi, Scoldus de Friscobaldi, Coppus Cotenué,¹ and others of the company, were regranted the Custom on wool and hides in Ireland. They were on friendly terms with the Donati, whom they sometimes attorned in their lawsuits with others. The *Mozzi* of Florence also traded with Ireland in 1309.²

A third Florentine firm, the *Bettieli*, are named in the Justiciary Rolls. Hugelin Pere and Hugelin Teste were among its members and traded in Ireland. Several other firms are recorded in Ireland. The *Gherardini* commenced business in England under Otto degli Gherardini in 1199. The *Bardi* were bankers in Florence in 1244, and appointed legal representatives in Ireland, May 29th, 1311.³ The *Spini*, like the Gherardini had occasional Irish connexion. Gerald de Nerly of the Spini was paid £100 by the Government for good service, 1214, and in 1302, King Edward being in debt to Philip Gerardinus and Gerardinus Gottis of Nerlis, assigned to them the *tenth* allowed him in Ireland by Pope Boniface VIII.⁴

One cannot but suspect that it was those merchants who originated in later days the popular belief in the Florentine origin of the Geraldine nobles in Ireland. Gamurrini's "History of the Gherardini" (in 1671) expresses doubt as to whether he should include the Irish lines; but he yields on the authority (to modern antiquaries unsatisfactory) of a late document which told how, in 1413, one of the Irish family, Maurice Fitz Gerald, a priest of Ardfert, when "seeking for some one in Florence," stated that his ancestors

¹ He is also mentioned in the Calendar of Fines, i, p. 439, where there is much about the Friscobaldi, pp. 466, 471-472, 475, 481. The Friscobaldi collected at Kingston-on-Hull, Newcastle-on-Tyne, and Exeter in 1300; Coppe Cotenué appears there. (Red Book of Exchequer, Rolls series, III, p. 988.)

² Papal Register Cal., 1309.

³ "Guilds of Florence," p. 171, p. 182.

⁴ Florentines—See "Guilds of Florence," E. Stanley, chap. vi. There are endless entries in the Cal. Doc. Ir. under dates Plea, Pipe, Judiciary Rolls, Reports D. K. R. Ir. 36-41. The monastic and other Registers, Gilbert's "Documents of the Anglo-Normans," Pat. Rolls, "Liber Rubens de Scaccario," iii, pp. 977 and 988.

were of the Gherardini, on which statement a certain merchant, Nicola de Luca de Feo, introduced him to two of these nobles. What authority Maurice had for making a statement so much to his own interest we do not know; he cited an unknown "Red Book of the City of Emerlic" (Limerick), unnamed by others. At most, till some more convincing evidence is produced, it must be put with such thirteenth- to sixteenth-century genealogies as the Stuart descent from Banquo, the Berkeley descent from the King of Denmark, or the Mac Namara and Mac Mahon descents from the Mortimers and Fitz Urses. It was rife in the following century in the reign of Henry VIII.¹

GASCONY.—In 1223 the merchants of Gascony were not permitted to stay in Dublin. The "Annals of Inisfallen" have an entry important as bearing on the Gascon trade in Corcalaidhe, the Corcala of the portolans. In 1234 Amlaibh o hEidersceoil (O'Driscoll), named "Gascunagh," the Gascon, fell in battle with the Normans at Tralee. His descendants, called the Clann an Gascunaigh, stated he got his name from being given as a pledge for the value of a cargo of wine brought by a Gascon ship to Corcalaidh. He returned to Gascony and learned wine culture and other matters, being eventually redeemed and elected chief of the O'Driscolls. The Cork Gascoynes are reputed to be his descendants. In 1260 Morgan the Welshman and Isolde his wife had a lawsuit against Garfye the Gascon for rent in Limerick city. Domingun le Fraunceys, a Gascon wine merchant, is named as in Dublin and trading with Galway in 1281. This may help to account for the unimportance of Galway to the early map-makers if the city got its wine from Dublin, Limerick, or Aran. Fortesius de Besondon and Peter Troyles, other Gascons, transferred certain sums owing to them to William Rici and the Lucca merchants, 1282. Menard Morond, Arnold de Ambiadores, Domaion le Gascon, William Seleiys, Arnold de Romayn, and Echran appear in various Irish documents between 1278 and 1299. In 1293 the Irish seafaring men complained about the Gascon merchants, who, as they alleged, manipulated and removed cargoes from the wine-vessels at various ports. Again, in 1296, the rules laid down for ships coming to Gascony with supplies from Ireland compelled the masters to swear to keep the open sea, not approaching the coasts of either France or Brittany. Dublin, Limerick, Waterford, Ross, and Drogheda exported corn to Gascony in 1296. Lastly, I may note that certain Dublin Gascons sent white wine to Youghal in 1358.²

¹ See *Journal Roy. Soc. Antt. Ir.*, vol. xiv, conseq. (vol. iv, ser. 4, 1877), p. 246.

² GASCONS.—See, for O'Driscoll, "*Miscellany Celtic Soc.*" (corca laidhe), p. 15. Generally, *Cal. Doc. Ir.*, under dates. Pat. R. 21, Ed. I, m. 13, Pipe Rolls, notably xxiv, Ed. I (38 Rep., pp. 32-34). Wheat and oats are sent to Plommothe and Bayon in Gascony. Lape Tynnache, who died in 1296, organized the impost.

GENOA.—This is also, like Florence, important to the question of the maps ; but the answer is less satisfactory. The Irish had a hospital at Genoa, before the Norman Invasion of Ireland, about 1160, and in 1252 Henry Mancell, of Ireland, was ransomed from the Saracens by the Genoese. Though Ireland seems to have had no recorded direct trade with the Genoese, the ships of the latter were no strangers on the English coast and across the track of Irish commerce with Flanders. In 1306 two Genoan galleys were impressed to load wool in London, Sanuis, and Antona (Sandwich and Southampton), and a certain Leonardo of Genoa was commissioned to borrow five more in 1317 for the war of Edward II against Bruce. There was frequent communication with Flanders,¹ and the French fleets contained many Genoan vessels.

LUCCA.—The Lucca merchants, like those of Florence, played an important part in the early commercial history of Ireland. So early as in 1171 we find a Richard of Lucca and Franc of Louvain following the Norman invaders into Ireland. Richard made payments to the Jews in the Irish Accounts of 1178 and 1179. In 1260 Cynus de Mancino of the "Riky" company, son of Master Jacobus de Rickobardi, was in Dublin. In 1275 King Edward issued a writ to the Bailiffs of Ireland in favour of Luke de Luk and his fellows, merchants of Lucca, having appointed these as warders and bailiffs to receive the customs of Ireland along with the merchants of Florence.² In 1279 Percival of Lucca, of the Associated Merchants, and Leonard Teste, of Lucca, were found to be clipping the Irish coinage. Percival of Lucca traded in wool and hides in 1280 ; and in the following year Alexander, a Lucca merchant, succeeded Orlandinus of Podium in the custody of the Dublin mint, and its profits were shared by Bandinus "Paunsy" and Reymund of Lucca.³ The merchants made a loan "for the service of Conewy." The name⁴ is elsewhere used for Cuiuche or Quin in Co. Clare, where a fine monastery stands on the remains of a large castle. The *Cathreim Thoirdehalbhaigh* and Annals of Inisfallen tell how, while the fortress was being built in 1280, Prince Donchad O'Brien came to buy wine there and was murdered beneath its walls. Baruncinus Walter and his associates exported 600 sacks of wool in 1282-3 ; and £200 is mentioned as then owing by Bendinus "Panick" and "Reyner

¹ GENOESE.—For the hospital, see "Making of Ireland" (citing Schulze, "Geschichte mittelalterlichen handels"), p. 85. For general notes, see Cal. Doc. Ir. under dates ; Close Rolls, Just. Rolls ; Close Roll, 37 Hen. III, m. 3.

² "Calendar of Fines," vol. i, p. 60.

³ All, of the *Ricardi*. I omitted Reyner Broccholi.

⁴ If not Conway.

Brokeley" of Lucca. The former (also called "Paunsy") with William Ricci and Waruncius Walter of Lucca traded in Leinster, and the Gascon debts were assigned to him. The Dublin mint was under the charge of its "faithful master," Alex. Normanni of Lucca in 1283, and the London one was also managed by Lucca merchants a little later.

We are overloaded with material from which a monograph on the *Ricardi* Company might be written. In connexion with the new custom we find Bouruncinus Franciscus, of Lucca in 1286, Francis Malisard and Gerald Chimbord¹ in 1292, among the collectors. The second of these constantly appears in the records. In 1284 the *Ricardi* included Baruncius Galteri (named above), Ronaldus of Podio (Orlandinus of Podium), the above Panichi (in 1301), and "Reyner Broccholi," the names being frequently misspelled. They and Peregrinus the Lombard sold wine; so did Nicholas and Hugh of Lucca in 1278 to 1284. In 1283 "Bendyn" the Lombard paid seven hogsheads of wine to the king's use from Dublin, and Eliseus of Lucca paid for the service of Malahide. The king in 1285 ordered the controllers to give the custody of the Irish wool trade to the *Ricardi*. We have already noted the curious arbitration case of this firm.

The firm also lent money all over southern Ireland. The Plea Rolls give a suit in which a mortgage of Peter, son of Meiler de Brymyngham, dated 23 Jan., 1291, was registered in Court, being charged on Cnockgraffyn, Kylleness, and Karryk, besides the Manor of Athenry in Connacht, securing a sum of money lent by Gerard "Chimbard" and Reymund "Rapundi" of the *Ricardi*.² In 1293 the "Black Book of Limerick" records the acquittance of the Dean and Chapter of a debt to Geste the Lombard; in 1295 Hubert, Abbot of Wethney, in Co. Limerick, borrowed a sum from Chimbard Malesard and Rapundi; and in 1297 Maurice de Carreu was acquitted of £30 debt to them. The Abbot of Wethney granted them the church of Thurles and the chapels of Codach and Caprach as security for £1000; while the abbot of the other great Cistercian House of Co. Limerick, "De Magio" or Monasternenagh, was a borrower from them in 1301; and the Prior of Athassell, Co. Tipperary, in 1309. The lands of Robert Purcell, of Ballycathlan, Co. Limerick, were assigned to Bartholomew Malizard for a debt in 1310; and at the same time Gerard "Grymbard" ("Chimbord" or "Sinbaldi") found that the goods of Sir Hugh Purcell (on which he had a claim) were held by Thomas Purcell of Croagh in the same county, and so proceeded against him.

¹ *Recte* Sinbaldi.

² For these debts and suits see Bermingham, 1291, Plea R., No. 15, m. 2d.; Wethney, 1295, *ibid.*, No. 25, m. 4; W. Uncle, *ibid.*, m. 9 and m. 10; Athassell, Archdall's "Monasticon Hib."

On the other hand, the road was not smooth for the Luccans,¹ and, despite the favour of the Crown and certain leading men, the Irish officials treated them with severity whenever they had an excuse. Sir William de Clere, the Deputy Treasurer in 1291, attacked the company, going with William de Bristowe, the Mayor of Dublin, to the house of Hugh the Lombard in that city and other associates of the *Ricardi*, forcibly seizing their money, £2,014, and sealing their chests. At the same time the associates of the branches in Ross, Kilkenny, Limerick, Youghal, and Cork were treated in the same way. The company petitioned the King; and he directed the Viceroy to inquire into their complaint. The Viceroy impanelled a jury, whose finding, with the seals (among others of Walter the Lombard), is extant. I do not find how far the *Ricardi* got tangible redress. Eight years later the company got into debt to the Crown (1299); they were suddenly seized and imprisoned, their goods seized, and their business in Tipperary stopped. A certain Lape Tinache in Katherlach (Carlow) paid off part of their debt in 1295; but he died 1298, and the trouble continued till the company was nearly ruined. At last (as a forlorn hope) the *Ricardi* petitioned the Parliament of 1305, praying the King and Parliament to pity their poor estate, and to order the Treasurer and Barons of the Exchequer to receive their account of the goods paid to the King in part payment of their debt. The above-named officers were directed to audit the account accordingly.² It is a subject worthy of further study as a most instructive chapter in Irish history, too exclusively concerned (as hostile critics say) with slaughter and cattle-spoil. I have not followed it past 1335. From 1322–1333 to that year, I find persons appointed to sue for the King's debts owing by the *Ricardi* and the "*Bettori Sons*" of Luka, usually petty sums like 13s. 4d. The collection seems to have cost the government more than they gained. The only definite fact stands out—William de Combe had an allowance for his trouble about the papers (*papyria*) of the merchants of the *Ricardi* and *Betturi* in the King's hand, and for examining into their debts. In 1339 the King ordered suspension of payment, and by 1345 the Bardi of Florence, the Peruzzi, and other creditors³ of the State went bankrupt. All banking and trade felt the

¹ LUCCA.—An enormous mass of material in Cal. Doc. Ir. (especially vol. iii), under dates; Pipe Rolls (App. Rep. D.K.R.); Plea R. and Justic. R. (Cal. ed. James Mills); Plea Rolls, No. 15 (1291), m. 2d.; No. 25 (1295) m. 4; No 96, m. 20d; Black Book of Limerick and other Registers; Calendar of Fines, National MSS. of Ireland, vol. ii, No. lxxxi. The company foreclosed on the mortgage of the Abbot of Wethney, and actually leased him the churches at eighty marks per annum in 1294.

² See "*Memoranda de Parlamento, 1305*" (3 W. Maitlaw, Rolls Ser.), p. 165. The petition, in Norman-French, is curious; they appeal piteously, "*de lour povre estat.*"

³ Readers of *Romola* will recall the allusion to the collapse of the Bardi.

shock to the north of the Mediterranean. I have to leave to others the task of recording the "winding up" of the two companies: these scattered records sufficiently show their enterprise and ceaseless energy in the days of their prosperity. It is to be hoped that some specially qualified archivist (like Mr. Herbert Wood, who commenced, but has not as yet published, a history of these traders) may supply this desideratum for the study of Irish social life in the thirteenth and fourteenth centuries.

The *Beccor*, *Bettor* or "Associates of Bettori of Lucca," were also money-lenders. The Abbot of Wethney in 1299 borrowed a sum of 7 marks from William Fantel, of the company, which led to litigation. I have found occasional mention of the firm in Irish Records down at least to 1335.¹

PARMA.—The tomb of John Lumbard of the county of Parma and his wife, Dame Rame Parys of St. Saviour of Esturia, an interesting late fourteenth-century monument, remains in Christ Church Cathedral, Dublin. A John Lumbard was a collector of the small custom in Dublin after 1335.²

PICARDY.—In 1295 Warinde Meys of Amiens in Picardy had goods at the house of Henri de Marshall in Dublin.³

PISA.—Walter le Pismoen was at Dungarvan in 1260.⁴

POITOU.—Giraldus Cambrensis, as we noted, attests an extensive trade between Ireland and Poitou, in wine, hides, and furs, before 1183.⁵ The Pictavian merchants in 1223 complained that they were only allowed to stay forty days at a time in Dublin. A few years later, however, Reimund of Poitou was given the custody of St. Patrick's Gate in Dublin for life with the use of its cellars.⁶

PROVENCE.—It made its presence felt (as Rev. H. Chaytor points out) by the large number of Provençal words in English maritime speech, e.g., coladre or cullender, funnel, puncheon, rack, spigot, and noose.⁷ These were probably introduced directly through the Bordeaux ships, which tallies with the records of Irish commerce with Bordeaux as given above, from 1235 to 1312.

ST. EMILIAN.—William Chatuel, in 1293, brought forty-one hogsheads of St. Emilian wine to Wexford.⁸

¹ Plea R., No. 46, xxvii Ed. I, Pipe Rolls, 1335; App. 44*m*, Rep. D.K.R., pp. 48–52.

² I absolutely dissent from the romantic version based on the supposed usage of "Lombard" for "Master Mason." For John Lumbard, see Pipe Rolls, viii and ix Edw. III, No 59. He appears in other documents down to about 1350. The lettering of the tablet seems to belong to this period.

³ Cal. Doc. Ir., p. 109.

⁴ Plea R., xlv Hen. III, m. 8.

⁵ Topog. Hib. (vol. v, Rolls Ser., p. 28). "Vina tamen transmarina, ratione commercii, tam abunde terram replent. . . Pictavia namque, de plenitudine sua, ei copiose vina transmittit, cui et animalium coria, &c., Hibernia, non ingrata, remittit."

⁶ Gilbert's "Cal., Charters and Government Grants to the City of Dublin," p. 90.

⁷ "The Troubadours."

⁸ Cal. Doc. Ir., p. 27.

SIENA.—Marsilius of Siena was a “moneyer” in Ireland with his other associates in 1297. The firm of Bonsignori Bernadini, and Jacobi of Siena had also dealings in Ireland.¹

SPAIN.—There is little evidence for Spanish settlers in Ireland known to me in records of the thirteenth and early fourteenth centuries. The “Black Book of Archbishop Alan” (p. 66) mentions William of Spain holding lands at Okonagh, on the borders of Counties Limerick and Tipperary, in the time of William de Marisco, *circa* 1230 to 1240. Aderic in Youghal at the close of the century also has the epithet “de Spain.”

VENICE.—I have so far found no direct communication between Venice and Ireland. Indirect communication at Bruges, London, Southampton, and in Provence must have been common.²

Having examined the evidence for frequent communication between so many parts of Ireland and the Continent, it becomes evident that the masters of foreign trading vessels visiting and settling in Ireland must have had abundant means for getting information. The constant influx of new-comers also must have rendered detailed maps of Ireland more and more sought after. Unfortunately none of the early maps seem to have been preserved in the British Isles. The compass, too, was coming into use³ and was well known to the learned by 1220; but the superstition of the sailors long refused to allow it on board ship as containing “an infernal spirit.” By the dawn of the fourteenth century we find networks of compass-bearings on the maps, and soon prejudice against the use of the compass changed to blind faith in its infallible trustworthiness, only shaken by its variation on the first voyage of Columbus. Raymund Lull, about 1300, mentions charts with a compass, point, and star, “habent chartam, compassum, acum et stellam maris.” Soon the cartographers, who had made no allowance for the rotundity of the Earth, found that the distances did not “close in,” and adopted a crude sort of projection, somewhat like Mercator’s, and (as cross-sea voyages got more frequent and daring) errors were detected and removed. It was long, however, before the influence of the early editions of Ptolemy ceased to misplace Ireland with regard to Great Britain, and the prejudice that Ireland lay towards Spain left a quaint trace down to the eighteenth-century tradition that a place at the Shannon’s mouth was described as “Carrigaholt next Spain.” How this belief arose from the “later classic” writers is easily seen

¹ Mr. Herbert Wood in reading over this section kindly gave me this last record.

² See Calendar of Venetian Papers, pp. 3–7, 1319 to 1333.

³ Proc. R.I.A., vol. xxx (C), p. 241. For details and authorities see *Periplus*, pp. 48–51, p. 85; Lull, “*Arbor Scientiæ*” (ed. Lyons, 1515, f. cxcii); and “*Coup d’œil historique sur la projection des cartes*” (Paris, 1863), p. 38. The diagrams and circular calendars of Franciscus Piziganus in 1373 are very curious (*Periplus*, p. 55).

by many of the later maps¹ but not in the common-sense portolans), which "slew round" Ireland till it appears between England and Spain, sometimes close to the latter country; no sailor could have originated such maps.

So far as I can judge (but I write with hesitation), the trade routes lay across Provence—say, broadly from Italy to Bordeaux. With the latter there was constant traffic from Ireland. The next line was from Italy to Flanders by sea; with this again Ireland came in contact, notably at Bruges. The third, and in my judgment the most important, as bearing on the early maps, was the constant communication of the large mass of Italian bankers, merchants, money-lenders, mint-officials, and tax-collectors, and the great companies of Florence and Lucca resident in Ireland. These constantly passed to and from Flanders, France, and Italy. By all these methods the knowledge of the place-names of Ireland is only to be expected, and though the prominence of the coast-names shows that it was the mariners rather than the bankers or merchants (whose field of business covered the inland towns) for whom the earliest maps were specially intended.

I regret that I cannot farther pursue this most important subject. If I can lead others to give it special study, then this paper may fulfil an important duty to the history of Irish industry.

6. THE IRISH PORTS ON THE MAPS.

The rise of the chief ports in Ireland can be only imperfectly traced here; but it has a bearing on the maps here studied, and compels us to examine it as briefly as can be done. Probably from the earliest times the bays and creeks, especially of the west and south coasts, attracted foreigners. We must free our minds from the conditions of modern shipping to see what ideal harbours were Bannow, Wicklow (where probably ships could lie behind the Murrough sand-spit), Dublin, Malahide, and other places, with their sandy shores and shallow estuaries. The well-known account of the "fair" of Carman,² and "the great mart of the foreign Greeks, where gold and noble clothes are wont to be" there, is not improbably based on fact apart from the nationality of the traders; and we saw that the Irish were not without commerce in Roman times, whether Rome "moved her arms beyond the shores of Iuverna" or not. The "fair" has usually been located on Loch

¹ For example, an early map at Turin puts Scotia (Ireland) opposite Spain.

² For Loch Garman see the poem in the "Dind Senchas"; for the prose see *Revue Celtique*, xv, pp. 311-315. For the actual fair of Carman see O'Curry's "Manners and Customs of the Irish," vol. iii, p. 547.

Garmain or Wexford, but was certainly inland. There is, however, no evidence for trading-ports before the Norse times; the Irish did not incline towards cities; and the largest towns were monastic (endless scattered huts in the fields round a monastery, itself not a claustral building, but a slightly walled group of other houses and churches, with perhaps a round tower). Such was Cork. The existence of Dublin as a city in the fifth century is a figment of hagiographers, culminating in Jocelin, and repeated in many modern popular books. Luimneach was not a town, but a bare islet, with a church of St. Mainchin, and a long tidal estuary. Portlairge, or Loch Dachaoch, was not a town, but an ill-defined reach of Waterford Harbour, and of the outer estuary; Ollarba (Larne) was only a bay. The Vikings founded settlements,¹ at first for plunder, then for trade, or both; and in later days imported wine freely, and traded with the Irish princes, or paid them a wine-tribute. The chief harbours and the towns bore Norse names (some re-cast from an Irish original, such as Dublin, Limerick, Cork, and Ulfricksfjördr,² Ullerford (Ollarba); others pure "Scandinavian"—Strangford, Carlingford, Wexford (Weiseford), Waterford (Vedrifordr), Godelford, and Endelford, on their *fords*; others, like Wicklow (Vikinglo) and Smerwick (Smörwick). Inland Norse names like Leixlip, Howth, Ostmanstown, or the Laxweir, lay close to the large towns. Dublin was a ford and pool (not a town) till the foreigners settled at it. The "Norse" names outside these are chiefly islands—Skerries, Holmpatrick, Ireland's Eye, Lambay (Irish *Rechra* preserved in Portrane), and Dalkey, the latter an adaptation of the sound and meaning of the Irish Dealg-inis, or Thorn Isle. The bold Cape of Ben Edar became "*the Head*," Howth.³ When the Anglo-Normans invaded Ireland all the chief coast-towns were well established, and some centuries old, their harbours full of shipping, like that of Waterford on the day of its first English assault.

DUBLIN.—The convenient creeks at the old "hurdle-ford" (Ath Cliath) and "Black pool" (Dubh linn) led the Norse (Finn Gall) to establish a town on them about 836, when sixty ships full of the foreigners landed.⁴ It was

¹ Mr. Herbert Hore aptly compares the later status of the Norse towns to Calcutta, Madras, and Bombay in the eighteenth century; the Ardrioh to the Great Mogul, and the sub-kings and provincial kings to the Rajahs.

² About 1020; see "Orkneyinga Saga" (ed. Rolls Series), iii, p. 19.

³ Worsaae gives the components as fjord, ey, stadr (e.g. Ulaztiri, Ulster; laighin-stadr, Leinster), leix (salmon) and ör, cape, as at Greenore and Carnsore. Some add Torry, Thor-ey, Thor's Island, as Thor was the god of stormy places! (Ulster Journal of Archaeology, vol. i, p. 107, and Caesar Otway's "Sketches in Erris," p. 11.)

⁴ The Thingmote and Lang Stein (pillar) of the assembly place of the Norsemen, remained to either side of the present front square of Trinity College. Several tumuli lay there. The Danes were said to have had vaults for storage of merchandise where Christchurch (the Cathedral of the Trinity) now stands. They gave their name to "Ostmanstown," the "Oustmans old quarry, 1236," "Ostman's Bridge," and "Ostman's Green" (Cal. Anct. Rec., Dublin, vol. i, the *Liber Albus*, pp. 81, 96): and in early days to "Tomar's Wood," near Rutland Square.

taken by the Irish in 845. In 853, Amlaibh brought a stronger reinforcement: and the town at one time had 200 ships. Despite its two surrenders about 980 to King Maelsechnaill and King Brian, and the tremendous check to the Danish power before its walls in the so-called Battle of Clontarf in 1014, it continued in the hands of its founders. Sigtrygg, in 1038, built its "Christchurch,"¹ for the result of "Clontarf" had discredited the religion of Asgard. Its ruler, Aseulf, son of Thorkill, fled on the approach of the English, returning to attack them in great force in 1170; but Milo de Cogan held it, and it became and continued the Anglo-Norman capital after the visit of Henry II in 1172, who planted there a colony from Bristol, and gave them, by an extant charter, all the liberties, rights, and customs of their native city.² We are only concerned with lights on its commercial history before 1330.³ By Prince John's charter no foreign merchant could keep a wine-shop in it save on ship-board, and two butts of wine (one from before and one behind the mast) were reserved. It was customary law that no foreign trader should stay in it over forty days. Henry III had to rebuke its citizens for unjust exactions on the foreigners. Its murage-grant shows that in 1233 it dealt in wine, wheat, oats, horses, cows, hogs, sheep, hides, wool, lead, cloth, salt, wood, tallow, cheese, honey, butter, herrings, and salmon. In 1241 it sent a porpoise to Chester. In 1252 it was compelled to adopt a uniform standard of weights and measures. That same year the murage-grant, besides the former items, includes rates on pepper, wax, alum, millstones, squirrel-skins, &c. In 1284 it taxed wine and French millstones. In 1295⁴ (besides the above) linen, canvas, samite, diaper from Ypres, baudekin, silk, and other choice fabrics, and cordwain are named. Henry III, in his charter, 1221,⁵ allowed a toll of two pence on each butt of wine for the city. The Pipe Rolls

¹ The correspondence of the plans of the cathedrals of Dublin and Waterford cannot be attributed to the Danes, for the remains are Gothic, or at earliest in Christ Church Norman transition. It is more than doubtful whether any trace of Danish work remains in either. Save the Ring-Tower at Waterford, Norse Ireland seems to have left no building or carved stone—a fact that minimizes the deductions from the non-existence of such in America, where the Norse barely landed. Only two runic inscriptions on swords have been found in Ireland.

² Facsimile in Gilbert's "Cal. of Ancient Records of Dublin," i, and "National MSS. of Ireland."

³ Apart from the numerous annals and histories of this (as of the other ports), I refer to the Patent, Close, Pipe, Memoranda, and Plea Rolls, the Monastic and Cathedral Registers, and Sir J. Gilbert's "Calendars, &c., Charters, and Documents of the Anglo-Normans," and of course the Cal. Doc. Ir.

⁴ In this year a cow was sold at 6s. 6d., but worth 2s. (Justic. R. Cal., m. 17). Other murage-grants (rather too late for this paper) date 1328-30, 1345-6, and 1386. The first two include skins of the hare, rabbit, cat, wolf, and squirrel. The last grant gives gold, satin, d'Ypres (diaper), and *audelys* (cloth of gold or silver with silk, French linen, and English cloth, and cloth of assise of Flanders, Normandy, and Brabant, also Spanish iron) (Cal. Anc. Rec., Dublin).

⁵ The reason of the grants to Dublin, Limerick, Cork, &c., of the liberties of Bristol seems to be that John (when Earl of Mortmain) granted a charter to the latter, in which they were carefully specified; and it was a common practice to copy an older charter when a new one was needed. Henry II had given a charter to Bristol the very year of his visit to Dublin, 1172.

are rich in particulars of its wine trade. Among the customary laws of "Diueline" no foreigner could witness against a citizen till other evidence failed. In 1312 it imported brasilwood,¹ figs, raisins, ginger, and spices. Dublin was closely bound to Bristol, from which many of its citizens had migrated in 1171–2, and enjoyed all the privileges of the English city.² The prices of provisions in Dublin at the beginning of the fourteenth century were fixed by the Common Council as follows:—A good goose, 2 pence; two good rabbits, 3 pence; two middle-sized ones, 1 penny; three chickens, or a good hen, two good plovers, or two good snipe, or three middle-sized ones were also sold for a penny.³

LIMERICK.—The Norse and Danes plundered the Luimneach, and founded a city on Inis Uibhthonn, about 812. It is frequently called "Luimneach of the ships" in Irish histories of the tenth and later centuries. King Mathgamhain took it and expelled its lord, Amlaibh, in 968, slaying its "governor," Muris, at the battle of Sulchoid. "Hrafn, the Hlimrek merchant," was in touch with Ari, who made voyages from Iceland to America (Winland) about 1000. Limerick then paid a wine-tribute to King Brian. The Normans first captured it in 1175; and Prince John granted a charter, 1194 to 1199. It possesses a list (though doubtful in its first century),³ of mayors and bailiffs from that time. It was a walled town before the Norman attack, and its foreign trade seems very small. The Ostmen and Danes had been planted near it in the "cantred of the Ostmen," but many of its families—Harolds, Thurkells, Thursteyns, Herewards, Siwards, &c.—derived from them, whence the modern Harolds and Tristrams. They used to form a third of certain juries of Normans, Ostmen, and Irish. The murage-grant of 1237 includes a tax on wine, and *prise* of wines is recorded from 1267. In 1283 it paid £140 worth of wine as 70 tuns. John's charter (as exemplified in the later one of Edward in 1291) permits no foreigners to purchase corn, wool, or hides in Limerick, except from a citizen. No stranger could retail wine (save on shipboard), or sell cloth, or stay more than 40 days in the town; and the Prince reserved 2 hogsheads of wine from each ship—one before and one behind the mast. The custom-records name Dordogne wine in 1292–3. In 1295 the prices of provisions in Limerick were:—10 acres of oats, 2½

¹ Interesting as bearing on the question of the name of the mythical Island. See *supra*, xxx, p. 255. Professor MacNeill regards "Brasil" as a non-Gaelic name.

² Gilbert's "Calendar of Records of Dublin," i, p. 219.

³ It is striking to find the succession corresponding in names and order for several consecutive years, with the names and order of witnesses to certain early deeds, in the "Black Book of Limerick" (e.g. the names, 1210 to 1213, and Black Book, p. 95). It is easier to discredit the early entries than to find where the authentic ones begin. The independent mention of mayors and sheriffs of Limerick in contemporary records does not correspond with the names at the same dates in the lists, e.g. at 1295.

marks; 1 acre of beans, 40 pence; 6 acres of oats, 20s.; 2 acres of wheat, half a mark; cows were worth 5s. each; sheep, 6 pence; lambs, 3 pence; goats, 6 pence; kids, 2 pence, and hogs, 6 pence. At Moyero (Croagh), Co. Limerick, Hugh Purcell had oxen worth each 3s.; sheep, 6 pence; cows, 3s.; hogs, 6*d.* Horses were each 5 marks, and mares, 10s.; foals, 2s.; and cloth 6*d.* an ell in Limerick and Kerry in 1299; and a he-goat in Kerry was worth 8 pence.¹ In one more instance, at Lough Gur, in 1314, Robert de Dundonald gave Thomas Perpont 8 cows worth $\frac{1}{2}$ a mark each; 2 "affers," 5s.; 1 horse, 10s. and 20 acres of corn, £4, besides other grain.¹ Limerick, like Dublin, had close ties with Bristol, which continued as late as 1401. Thomas Balbeyn, by his will, left Thom Cor Castle, in the suburbs, to the commonalty, should his brother Henry, living at Bristol, not choose to remove to Limerick.² The city charters date: John, 1199; Edward I, 1291 and 1303; Henry IV, 1400; Henry V, 1413; Henry VI, 1423, 1429; Henry VII, 1489; Edward VI, 1551; Elizabeth, 1577, 1582; and James I, 1609.

WATERFORD.—A Norse colony, under Sitric, settled here in 853, naming it "Vedrisfiordr." It was walled, but so poorly that when Cellachan, king of Cashel, attacked it (936-952) his men "leaped over it." The ring-tower is alleged to date from 1003. Waterford was a great resort of ships, and, when besieged in 1137 by Diarmait, king of Leinster, and Conchobar, king of Thomond, the Danes of Wexford and Dublin came to its relief in 200 ships. The ring tower is attributed to 1003. The town was taken by the Anglo-Normans in 1171. The Ostmen seem to have been transplanted to the neighbouring *Villa Oustmannorum* under curious circumstances if we can credit the finding of a jury in 1311: It appears that about 1171 one Reginald Mac Gillemory, a very rich and powerful man, dwelt at Renaudes castel near the port of Waterford, where a mote, ancient and deserted, remained in 1310. King Henry fitz Empress was expected to land for the conquest of Ireland, so Reginald had long iron chains made which he stretched from the said mote across to the Dunbrody bank in the liberties of Weyseford. When Henry took the city, he and his supporters were tried and hanged, the rest of the "Oustmen" in Waterford were expelled and lands given to them in

¹ See C.D.I., 1295 and 1299, pp. 8, 246 (under 1301, p. 255, we get a valuable price-list of trees. 200 apple-trees, £20; 100 pear-trees, £10; 30,000 great ash-trees, £200; 1000 great alders worth £60); and Plea Roll No. 105 of Henry II, 134, mem. 19; Plea Roll No. 116, mem. 47 (1318). The prior of St. Mary's, Rathkeale, "vi et armis," took on Thomas Purcell's lands, of Croagh, Co. Limerick, 30 pigs, each 4s.; four others at half a mark; also grain, &c., worth 46s. *Ibid.*, mem. 51, Richard de Clare and others, when opposing the Bruce's army in Co. Limerick, took 90 cows, worth 20s. each, on the lands of Any.

² Arthur mss. in M. Lenihan's "Limerick," and "Journal Roy. Soc. Ant. Ir." xxvii, p. 38.

³ Besides the general authorities, see "Black Book of Limerick" (ed. Rev. J. MacCaffrey), and Histories of Fitzgerald, Lenihan, Begley, &c.

the suburb. Some time afterwards they treacherously attacked the burgesses when playing in the fields, slaying many and carrying off their wives. Now, a certain loyal "Oustman" named Gerald Mac Gillemory lived in a certain tower, which is very old and ruined, opposite the church of the Friars Preachers. He defended it against his relatives, and was rewarded by being granted English law. This does not support the identity of the Ring tower with Reginald's tower. The foreigners' territory was called Gaultiere.¹ In 1220 its citizens complained to Henry III that ships unloaded wines, &c., at other ports, so the King forbade merchants to bring their ships to (New) Ross, its dangerous rival. He also in 1223 gave it a murage grant, and in 1232 forbade (as at Limerick) any stranger to buy hides and wool in it save from a citizen. He reserved the usual 2 hogsheads of wine (from before and behind the mast), and forbade strangers to stay more than forty days in the town. It got murage rates in 1234 on ships of 100 hogsheads of wine or more, wine, honey, timber, hides, skins, furs (of hares, squirrels, foxes and martens), wool, cloth, canvas, sendal, wax, pepper, cummin, alum, wood, coals, corn, salt, iron, lead, lard, suet, butter, cheese, salmon, and congers. Another grant, in 1243,² added skins of wolves, tippets, dyed cloth, woad from Vermandeis and Kaam, soap, hake, mullet, herrings, plates, caldrons, and cattle. In short, King Henry's government favoured it excessively.

King Edward reversed his father's policy; he bade all ships to go on to Ross in 1277. In 1282 its customs were granted to the Donati of Florence. Its Bishop was found guilty of monopolizing the sale of corn and wine there, selling bad corn to the King's manors and castles. In 1293 a document foreshadows Shakespeare, and shows us a John Fastolf concerned with (but selling than rather buying) the King's wines at Waterford. In 1295 John Bokerel of Waterford was accused falsely of breaking into the chest of a Fleming. It possessed so valued a merchant from Bruges that his tombstone in the cathedral recorded that "Bruges crie et lamente Après sa cidadin, Waterford s'en augmente."³ In 1301 the Owstmen there accounted for 10 marks fine. As for the prices of provisions: 2 goats, worth 11 pence, were stolen for hunger, not for evil-doing, by a John Martyn in 1295; he was acquitted for the benefit of the king's soul. A cow worth 5s., and a "pork" worth 16 pence were stolen by others at the same place. The prices were closely similar to those in Limerick, above given, and to those in Tipperary, where (near the great mote and castle of Dounhochil)

¹ Plea Roll No. 108 Ed. II, anno iv, mem. 15. Gilbert gives a facsimile in "National MSS. of Ireland," vol. iii, No. 17.

² Just before this time Sir Hugh Purcell founded the Franciscans' house in 1240.

³ Dr. C. Smith's "History of Waterford," p. 176.

sim an Erecdekle in 1295 had 48 oxen worth half a mark each; 1500 sheep worth 10 pence each; 400 lambs, 4 pence each; 215 pigs at a shilling each; 150 goats at 8 pence, and 80 kids worth 2 pence that same year. These were distrained with 186 "afers" (horses), each $\frac{1}{2}$ a mark; 48 stud mares worth 20s. each. In the same year we find another seizure by Sir Gefiry Keating, giving 6 afers as worth 2s. each, and 60 acres of oats and wheat at 3 pence an acre.¹ Waterford exported corn to Gascony that same year.²

CORK.—Corcagh mór (the great marsh) arose from a monastery founded by St. Finn-Barr, 606, 623. The Norse ravaged it in 820; and the foreign hosts from the port of Corcagh are named in 866³ as Danes and Dubh-geinnte. In 1089 it was attacked by the Danes of Dublin, Waterford, and Wicklow, being then evidently held by the Irish, who beat off the Vikings. It sent a fleet of thirty-five Danish ships to attack Richard Earl of Strigul at Dungarvan. Henry II, in 1177, confirmed to Robert Fitz Stephen and Milo de Cogan the government of Cork, save the Ostmen's cantred, with power over the shipping "towards the Cape of St. Brandon and Limerick, and as far as the water of Lismore." Prince John, *ante* 1199, granted Cork a charter.

Foreign merchants had already settled there. We find records of Richard of Lucca in Cork, 1172-1178, and "chattels of Flanders returned as in Corch," 1172-3. A *prise* of wines was taken 1234; but I found unusually little about its trade till 1284. It had then a grant of murage on ships of 100 hogsheads of wine, honey, timber, hides, skins of rabbits, squirrels, foxes, martens, wool, Irish cloth, linen, sendel, wax, pepper, almonds, rice, cummin, alum, woad, plates, caldrons, English and French cloth, mercery, kitchen utensils, and various provisions. In 1284 its new custom on wool and hides was granted to the Donati; and in 1295 Giles de Coutrey, a Flemish merchant, is mentioned. It exported corn to Gascony, 1297, and in the next year a burgess sent 15 hogsheads of wine to the king for leave to cut the city-wall, and bring his new ship to the water. The king remitted the wine if he rebuilt the gap. Cork, like its sister cities, had close relations with Bristol, and (like Dublin), its first charter granted it the laws, franchises, and customs of that city. Its other charters date 1242, 1291, 1442, 1500, and others from Charles I and George II. Its mint was established by Edward I, and the coins bear the words "Civitas Corcagie."⁴

¹ Cal. Justiciary Rolls (1295 mem. 6, 13, & 16 dorso).

² Besides the general authorities, see Histories by Smith, Ryland, &c., Annals Loch Cé; Charter Rolls, Hen. II. There is a curious suit in 1318 (Pea Rolls No. 117, mem. 4 d), Ade de Conwey, mercator, and Ric. de Barry, the mayor, as to certain *homines extraneos* Adam and Philip Col.

³ "Three Fragments of Annals," J. O'Donovan, p. 160.

⁴ Besides general authorities, Histories by Smith and Caulfield, "Council Book for later times.

WEXFORD.—The mythical account of the bursting of the *loch* from Garman's grave¹ calls it a "branching broad haven of ships, assembly plain of the light boats." The foreigners of Loch Garmain were grievously defeated by the Irish in 1088. Its fleet joined that of Dublin to relieve Waterford in 1137. Weiseford was granted by Dermot, King of Leinster, to Robert FitzStephen in 1169, and the latter was besieged in the promontory fort of Carrick near it, and deceived into a surrender to the Danes. Giraldus says that the place imported wine from Brittany in 1183; herrings were bought there for the king's army in 1234; and fishermen from it were slain in the Isle of Man in 1217.² In 1283 the "Oustmen of Weiseford" had dwindled to some fifty-two men. Its customs, 1292–3, include dues on 41 hogsheads from St. Emilian. Gerard Chymbard of Lucca held the new custom there in 1295. The Pipe Rolls often record *prise* of wines down to the reign of Edward III. It imported spices, and the prior paid a pound of pepper or its value, 3 pence, in 1323. The name is said to be Waesfiordr, Wash-fiord like the *Wash* in Lincolnshire or in Cambridgeshire.³

ROSS.—Near the monastery, founded by St. Abban, who died 630, a place *Ros mic triuin*, "washed by the tide," is named in his "Lives." The later English absurdly derived its name from "Crume, King of Denmark," and "Lady Rose Mac Crume,"⁴ whom some alleged to have been a sister of Strongbow, 1170, who had walled it in 1265, or even in 1315! Earl William, the Marshal of England (son-in-law of "Strongbow"), made an oaken bridge there, whence the name *Rosponte*, as distinct from *Old Ross*, the monastery. A small town at once sprang up at it, where King John stayed in 1210, dating several letters from "Ross de Novo Ponte." Henry III was hostile to it, and strove to divert its trade to Waterford in 1222; and a foreign ship was arrested there in 1235. Richard, Earl Marshal, granted a charter of deforestation to Old Ross (Rosberchon), near the New Bridge, in 1232. A remarkable contemporary poem⁵ describes the walling of New Ross in 1265: among the various sections working on its walls are the

¹ Dind Seanehus, *Journal Roy. Soc. Antt. Ir.* (1872), vol. ii, ser. iv, p. 29.

² *Annals Loch Cé.* The Isle of Man was only gradually drifting from Norse to English allegiance. The Irish Government sent corn and wine to the King of Man, 1220. In 1235 the King guarded the sea towards Ireland (*Close Rolls*, xix Hen. III, i, m. 7). In the former year the King of Norway threatened him for doing homage to Henry III (*ib.*). There was also a slaughter of Irishmen in Anglesea in 1248 (*C. D. I.*, No. 2952 and 2962).

³ Besides general authorities, "County and City of Wexford," Herbert Hore, one of a series of works containing a mine of helpful material for Irish history.

⁴ Comparable to the English derivations of Dublin from "Double Inn," Fethard from "Fighthard," Smerwick from "St. Mary's Wick," Teelin from "St. Helen," and Owey from "St. Anthony"!

⁵ See "National Manuscripts of Ireland," iii, Appendix ii.

mariners, their banner showing a ship; they were 600 in number on successive days, and if all had worked at the same time 1100 men from the ships and barks should have been there. The vintners and merchants laboured on Mondays, and even the ladies assisted by singing and harping to cheer the workmen of "New Pont de Ross." The citizens had enlightened views on the subject of commerce; they claimed (doubtless with truth) to have built the first recorded Irish lighthouse at Rindubhain (or Dundubhain), which, from a literal translation of *dubhan*, got known as the "Tower of Hook." It stood before 1247 "a tower and a beacon for ships to have out of the issues of lands and a maintenance in money or otherwise."¹ King Edward favoured it, and discouraged its rival, 1277. Of its foreign merchants we read of Bandinus "Panick" of Lucca in 1281, the Donati of Florence, 1284, and the Flemish merchants, John Tobyn and Roger Bougre, in 1295. Its trade exceeded that of every other Irish port (see customs below); and it is the only inland town (save Limerick) on the portolan maps of Ireland. An interesting inquiry about Rospointe is embodied in the Plea Rolls, 1297, also noting the "acqua riparia villae illius" and Rosbargen.² The "Snake" of Rospointe was ordered at that time (under the Common Seal) to carry oats to Bayonne for the king's army in Gascony. Other ships, "The Mary of Rospointe" and "The Snake of St. Laurence" (perhaps the first-named), are sent on similar errands. It was ravaged by Art "mac Murrough" in 1333, had grants from Edward III in 1374, and a charter from Richard II to enable it to repair its walls in 1377.³

DROGHEDA.—The town developed from a ford, and, later on, a wooden bridge. As Monasterboice is frequently called the "Monastery of Drogheda," it is hard to select the actual early records. It seems to be mentioned at 861 and 1084 under the name *Drochet atha*. King John, in 1213, granted the burgesses "de Ponte" to have the liberties and customs of Bristol. The Castle of Blathac stood on the Meath side. So early as 1211 Peter Blunt, of Drogheda, had ships trading through the king's realm. In 1228 Drogheda (which was a double town "towards Uriel" and "towards Meath") was granted rates on hides, wool, and wine to build a bridge, and in 1234 for

¹ Patent Rolls, Hen. III, 1245-6, as to custodium of Rendeuan, 1247, and mem. 6, as to maintenance of beacon. The local saint's name, Dubhan, is, of course, *Nigellus*. See Mr. Herbert Hore's "New Ross," p. 219.

² Plea R. No. 29, xxv Ed. I, m. 25, at Limerick. See also Cal. Justiciary Rolls, vol. i. The Plea Roll, 1320, No. 128, m. 8, gives the king's grant of the previous year to Thomas, Earl Marshal, holding Rospointe of our gift as in the time of his predecessor, Roger Bygod. It mentions the water from Rendeuan to the vill of Rospointe, dated at York, June 4th, anno xii.

³ Besides general authorities, "New Ross," &c., H. Hore.

murage; the last rates were on wine, corn, flour, honey, wood, and hides; Irish, English, and foreign cloths; salt, iron, herrings, and other fish; sheep, oxen, pigs, cheese, butter, and lard. King Henry again gave a grant of rates for murage and repairing the castle and bridge, the quays, and ports; additional dues on skins of hares, rabbits, foxes, cats, and squirrels are named. He further granted a charter to Drogheda "in Meath"; it forbids anyone to prevent merchandize coming to the borough, or a foreigner to sell wine without permission of the burgesses. In 1250 Drogheda "next Uriel" joined Dublin and other towns to protect their mutual liberties. Other murage grants remain of Edward I in 1278 and 1295; the first includes ships of 100 hogsheads of wine or more, cloth, linen, and the other usual taxable goods. The 1296 grant had unusual items, such as dues on apples, pimpernel or chickweed, Irish jackets, rosin, basil, tin, stockfish, oil, and coloured glass, but did not include wine. In 1281 five hogsheads of wine were taken from the burgesses by writ; the dues were granted to the Donati of Florence, 1284. Drogheda imported Dordogne wine in 1292, and exported corn to Gascony in 1297, and Scotland (with wine for the king's army in the latter country), 1306. "Drogheda borough on the side next Uriel" sent wine to Athlone, and made galleys for the king's service. The new custom brought in large sums on both sides of the river.¹

GALWAY.—The place was an early resort for ships, perhaps even being the *Ausōba* of Ptolemy. Five years after its destruction by Torlogh O'Brien, King of Munster, we hear of the ships of Dun Gaillimh in 1154.² In 1161 strange ships were seen in its harbour, and the fort took fire. It was a fishing-village in 1170, but was fortified by the O'Flaherties in 1230. The de Burghs, two years later, took, destroyed, and rebuilt it, making a castle, 1232. It was walled under Edward I in 1278,³ murage dues being granted, 4*d.* a tun on wine, and dues on cloth, leather, salt, &c. It paid 12 tuns of wine yearly (a little earlier) to Tadgh O'Brien of Tromra, Co. Clare, to keep its bay free from pirates. It purchased wine from a Gascon, Domengun le Fraunceys, in 1281. The town rapidly prospered; its customs (£20 to £40 about 1276) rose to £200 by 1386. In 1282 the castle in the town of Galevy was repaired.⁴ In 1306 Galway took 2*s.* on each hogshead of wine; but its trade was seriously affected by the wars of Richard de Clare with the O'Briens of Thomond, 1310–1318. The Church of St. Nicholas was commenced in

¹ Besides general authorities, Gilbert's Documents of the Anglo-Normans, Dalton's "History of Drogheda," "Growth and Vicissitudes of Commerce" (John Yeates), p. 137.

² Annals Loch Cé.

³ Galway murage, 36 Rep. D.K.R.Ir., p. 47. Walls towards the sea, and a tower beyond the great gate, Pipe R.

⁴ *Ibid.*, p. 65.

1320, and the bridge built in 1342. Edward III gave it a charter, and rates for murage on hides, skins lamb, goat, hare, wolf, cat, and squirrel, silk, baudekin, cordwain, and 4*d.* a tun on wine. In 1361 Galway ships traded with Lisbon and Lubeck.¹ The well-known legend of its mayor, Lynch, hanging his criminal son, presupposes direct trade with Spain. It was a fiercely English town; no citizen was allowed to bring in an Irishman "to boast," nor was any Irishman to be permitted to "strut or swagger" in the streets. Over one of its gates was a prayer for deliverance from the O'Flaherties. It is unmarked on the early maps; evidently (as seen above) its prosperity began from about 1320, when the first type of portolan had already come into being. It only appears on the second type of maps from about 1450.²

YOUGHAL.—The Irish *Eochail*, yew wood. It was a Norse port in 850, when the Deisi defeated the fleet at Eocail, and destroyed its fort. Le Hyeochil, in the reign of Edward I, was granted (as held by the tenants of Sir Thomas de Clare, and at his instance), in 1275, rates on grain, fish, vegetables, live-stock, hides, cordovan, cloth, canvas, ropes, and food items; besides dues on ships of 100 hogsheads of wine, and on skins of lambs, rabbits, squirrels, and badgers. The foreigners mentioned at it are: in 1274, the Donati of Florence; in 1284, the Ricardi of Lucca; 1296, Percival Gerarduci and Bandinus "Paniky" of Lucca; 1294, Peter of Paris; the latter shipped provisions and wine to Wales for the King's army, and was granted a ship, confiscated from the Abbot of St. Mary in Dublin, for the misconduct of a *conversus* of that abbey; he had, however, the misfortune to lose the king's wine in 1300. In 1297, Reginald le Bark answered for the wine of the foreign merchants in Youghal. In 1321, its ferry brought in 62*s.* 2*d.* yearly. In 1358 Edward III gave it another murage grant, including "white wine of Gascony, Irish cloth, salewyche, worsted, silk, baudekine, fine linen, olive oil, coloured glass, and cordovan." In 1485 Youghal kept the coast from Ardmore Head, and Cappull Island to Forreign Island. There is a list of its foreign merchants in 1572 (but outside our scope), which shows trade with Lisbon, Roan (Rouen), Evera, Villa Nova, and Italy.³

KINSALE (*Cinn saill*, head of brine) was granted a weekly market in 1226. Despite its fine harbour (Endelford or Edilwerth), the village had little trade. The Plea Rolls⁴ give in 1318 an interesting suit. Certain unknown mariners

¹ "Making of Ireland," pp. 21-23. For the later Galway trade see Cal. S.P.I., 1587; and Hardiman's "Galway" App. xviii-xx, 58-208, with Canary, Levant, Spain, Toulouse, and Picardy.

² Besides general authorities, see Hardiman's "History of Galway."

³ Besides general authorities, see Caulfield's "Council Book of Youghal."

⁴ No. 123, mem. 54*d.*

took a ship with 150 butts of wine, besides iron and other goods, on the coast of Brittany, slaying its owners and sailors. They brought her to Kinsale, where the story got known; so the Sheriff of Cork sent Milo de Courcy to take the ship for the Crown. Philip de Barri of Carrydoogan and others armed and took the ship, removed its cargo, held it against de Courcy, and got it away, giving his supporters 3 butts (*dolia*) and 1 pipe of wine for their assistance. Kinsale only rose to importance too late to affect the early maps, perhaps not long before 1374, when it first returned members to Parliament. It was walled 1381, and was granted Endelford and a rate on goods by Richard II in 1395, and by Henry IV in 1409.¹ It appears as Guinsala from the Upsal Map (*ante* 1450) down. Edward IV granted its sovereign and burgesses control of the coast from the Bullman rock to the Durzees in 1482.

LESSER PORTS.—The smaller ports named on the early maps throw little light on foreign intercourse. Henry III borrowed money from a vintner in ARDLAS. A *prise* of wines at DUNGARVAN in 1276 gives £16 for 8 tuns.

DALKEY.—In 1282 it shipped red wine to Are (Ayr) in Scotland for the king's army.

LEDENGYN.—Dingle, or Daingean Uichuis, in Kerry,² paid a substantial sum of £121 to the New Custom in 1282. In 1293 a Custom of £8 on 40 hogsheads of Leybourne wine was paid there by Stephen Cruys. The king in 1295³ bade the sheriff of Kerry to forbid any victuals or goods likely to be of advantage to the Scots to be taken by merchants out of Kerry "at risk of their bodies and goods."

WYKINGLO, or Wicklow, a Norse settlement at an early promontory fort, though its ancient enclosures are very small, appears in early Norman records, and was a small town in 1225.

There is bare mention of several of the other ports and coast towns. CARLINGFORD sent two galleys on messages for King John. The following are mentioned, but no details of trade or shipping at the various dates:—Crackfergus, 1210; Luske, 1207;⁴ Suerdes, 1279; Crocum (Crook, Waterford), Henry II landed there; it appears in the Calendar from 1199; Clere Island, Co. Cork, 1199; Ban, or Bannum, the Bann, 1215; and Rachrun, or Rathlin in the same year.

Of inland places (though not relating to the maps) I must note the wine

¹ Cal. Chancery Rolls, Ir.

² There was a slab in Dingle of the Rice family, 1563, with two roses, and the words—"At the Rose is the best wine." See also Justiciary Rolls, and App. D.K.R.Ir., No. 36, Journal R.S.A.I., vol. ii, 1852, p. 134.

³ App. Rep. D.K.R., No. 37, p. 38; and C.D.I., 1293, p. 2.

⁴ King John confirmed J., Archbishop of Dublin, in Lambeya, Irelandeseya, et Dalkeya, Suerd Porahelin (Portraine), Lusca, and other lands. Cal. Charter Rolls, p. 120.

trade. We have already met foreign trade at KILMALLOCK, CASHEL, TIPPERARY, QUIN, in Co. Clare, and other inland towns. KILKENNY; its murage rates from 1214 include dues on wine, pepper, saffron, ginger, spices, almonds, cummin, figs, and raisins. It is probable that this important place, with much of central Leinster, was supplied from New Ross, and so possessed no significance for foreign mariners. Wine was sent to TRISTLEDERMOT (Dysert-dermot, or Castledermot), Co. Kildare, for the Lords Justices in 1280.

ARDART.—In 1292 Ardferit, in Kerry, paid dues on 40 hogsheads of wine, and on 44 more later in that year. There was a market at Ardart, “in the square,” in 1324, which was equally on the grounds of the Bishop and on those of the Prior of the Hospital of St. John of Jerusalem. Their predecessors had put up a wooden cross “as the sign of a market with a stocks.” Nicholas, Bishop of Artfert; Michael O’Colmeny, the Dean; Thomas Fitz Gerald, and others, without the Prior’s knowledge, carried off the cross and stocks, and set them up further on within the Bishop’s lands, to the detriment of the Prior. The case was tried that year, with various postponements.¹ In 1302 foreign merchants were forbidden to retail cloth at MOEN,² or Moon, Co. Kildare.

7. THE CUSTOMS.

In this subject expert study is greatly needed; to this I make no pretence, so will merely tabulate the *farm* of certain cities and towns, the *prise* of wines and the new customs, so far as preserved, in the reigns of Henry III and Edward I, and (in the last item) of Edward II. Even on the surface these figures give an idea of the comparative wealth of the Irish towns and the fluctuations of trade; could the matter be exhaustively studied, we might see in the records (like the rings in a tree-trunk) a correspondence with external conditions. Certainly the effect of Thomas de Clare’s fierce war in Thomond, of King Torlogh O’Brien’s terrible raid down eastern Co. Limerick, of Richard de Clare’s war, and of the Bruce’s war is apparent on slight examination. The drain too of King Edward’s Scottish war and its interference with shipping, sailors, and supplies are discernible. The lesser ports had less to lose (“cantat vacuus”), but it is striking to find Limerick (a near neighbour, however, to perennial wars) falling to be a peer of Dingle and Wexford in commerce, despite its political and corporate importance.

As we had to note more than once, a usual impost on wine was one cask

¹ Plea Rolls, Edw. II, No. 147, mem. 11, No. 154, mem. 2.

² For all the lesser ports see App. Rep. D.K.R.; Cal. Doc. Ir.; Pat., Pipe and Plea R.; Cal. Justice. Rolls.

from before, and one from behind, the mast. The frequency of dues on ropes and canvas late in the thirteenth century is probably as much due to Edward's expeditions as to any increase in trade.

CUSTOMS AND DUES, 1274-1326.

Years.	Dublin.	Cork.	Limerick.	Waterford.	Ross.	Drogheda.	Galway.	Youghal.	Dingle.	Ulster Ports.	Wexford.	Report D.K.R. Ir.
1274-5	—	400	10	—	—	—	19	42	—	—	10	No. 36
1275-6	181	69	11	440	743	133	21	92	—	23	181	
1277-8	145	189	7	592	771	168	24	71	—	51	69	
1278-9	147	442	7	16	564	—	7	—	12	39	102	
1280-82	143	442	21	452	488	146	53	89	—	—	76	
1282-3	181	237	—	249	{ 532 424	174	—	100	—	—	5	No. 37
1286-7	117	219	10	314	361	165	38	39	38	27	—	
1287-8	157	244	—	—	45	362	18	38	4	28	25	
1289-91	164	321	3	434	493	194	16	38	10	28	3	
1292-3	82	277	8	426	369	196	20	39	14	25	4	
1293-4	59	208	2	226	259	126	23	26	4	17	3	No. 38
1294-5 ¹	76	128	17	600	89	161	—	—	—	—	—	
1296-7	187	362	35	—	289	85	—	—	—	—	—	
1295-9	—	116	4	142	120	—	68	68½	—	38	142	
1301-2	120	210	18	194	189	142	20	26	6	35	2	
1303-4	76	116	—	127	120	102	—	—	3	31	2	No. 39
1303-8	259	139	—	—	—	84	48	—	—	—	—	
1304-5	57	122	10	81	167	80	—	3	—	5	—	
1311-14	254	—	—	227	334	229	60	32	20	—	6	
1322-3	160	239	1	—	141	213	36	31	—	60	—	
1326	—	157	—	170	83	127	—	7	—	—	6	No. 41 ²

It is evident that the New Custom on wool and hides found little of such trade in Limerick. In 1287-8, the return for Limerick is 18*d.*; strange to

¹ Hides and wool could not be exported owing to French war. Rep. 38, p. 30.

² No Calendar in No. 40.

say, in 1224 that was the value of the King's goods in Limerick Castle!¹ The accounts of 1299-1300 are quite defaced; the other missing years have no accounts. I only give pounds in this table:—

"FARM" OF CITIES. DUBLIN.—(200 marks)—1229, 1271, 1278-81, 1283, 1284, 200 marks; 1275, £204; 1276, £218; 1282, £265; 1287, £267; 1288, £319; 1293, £332; 1301, £111; 1302, £139; 1305, £221; 1307, £240; 1308-1308, £262; 1813, £260; 1314, £200; 1316, £120; 1317, £142; 1323, £200.

LIMERICK.—1231, £563; 1262, £283; 1272, £44; 1273-6, £517; 1279-80, £237; 1281, £183; 1282 and 1284, £73; 1284, £302 and £50; 1288, £138; 1296, £882; 1319, £437.

DROGHEDA (£40, (Uriel).—123, 1262 to 1325 paid £40 a year, and Drogheda (Meath), 40 marks. I also found Drogheda (Uriel), 1231, £20; 1281, £45; 1283, £50; 1289, £99; 1290, £42; 1293, £120; 1301, £180; 1317, £60; 1322, £80; and (Meath side) 40 marks, 1301, £145; 1317, £74; 1322, £26.

WATERFORD (100 marks yearly)—1236, £113; 1261, £66; 1272, £101; 1273, £146; 1274, £40; 1281, £200; 1282-6, £407; 1289, £526; 1290, £356; 1302, £436; 1315, £486; 1324, £160; 1325, £100.

CORK (80 marks).—1275, 80 marks; 1277-1279, £160; 1282-3, 160 m.; 1290-92, £165; 1302, £266; 1303, £133; 1306-7, £312; 1307-8, £224; 1307-9, £213; 1310, £53; 1314, £108; 1317, £169; 1319, £129; 1323, £67. "Kilsale," 1282-3, paid £39; Youghal, 1306-8, £48.

These sums are so complicated by other items and by arrears that they are only valuable as showing the comparative wealth of the cities.

There is, however, a direct list of great value, that in the "Early Statutes of Ireland" (by Dr. H. F. Berry), dating 1300. The Justiciar, before Parliament met, went round the chief towns to stimulate their generosity to the Crown. Selecting the towns on the early maps, we find the amounts contributed were—Drogheda (Uriel), 200 marks; Drogheda (Meath), 60 m.; Dublin, 200 m.; community of the Earl of Norfolk's borough of Ros, £40; Waterford, 100 m.; Dungarvan, £15, paid with 1,500 fish; Limerick, 40 m.; Cork, 260 m.; Fethard, 10 m.; and Gilbert, son of Thomas de Clare, of Yoghel, £40, and five hundred weight of fish, worth 100 marks.²

Edward III, in 1353, established the staple, appointing Dublin, Waterford, Cork, and Drogheda as *staple* towns. Foreign merchants could sell all their

¹ In 1663-9, the proportion of the Custom (taken at 100, was—Dublin, 40; Cork, 10; Waterford and Galway, 7; Limerick, Kilsale, and Youghal, 5; Drogheda, Derry, and Carrickfergus, 3; Westford, Dundalk, and others, 1. (W. Pinkerton, *Ulster Journal of Archaeology*, vol. iii, p. 192.)

² From *Justiciary Roll*, 28 Ed. I, mem. 2, p. 231, Cal.

own imported goods at these without being charged imposts by the King's purveyors and others. The Irish had liberty to frequent the English staples.¹

8. IRISH SHIPPING.

A few particulars about the cost of shipping and sailors may be noted. The hire of ships between England and Ireland from the very beginning of the Anglo-Norman settlement in our island is frequently recorded. I select—1172. £4 for a ship bringing supplies to Ireland; 1184–5. 23s. for one bringing huntsmen, hounds, and horses; 1215. ten marks for two galleys with messages for King John from Carlingford to England; the same was again paid in that year to the mariners on a “cog” of Emulf de Colonia going to Ireland. The government frequently over-rode private shipping interests. In February, 1209, John ordered all the sailors on the coast of Wales, “as they valued their lives and chattels,” not to cross to Ireland, but reserve themselves for his service in transporting his army from Aufredyncombe (Ilfracombe) at mid-Lent, “otherwise the King will hang them and the owners.” In 1308 the “postage” of urgent letters from Ayr and Kireudbright to Dublin cost from £1 6s. 8d. to £1 13s. 4d. The names of many Irish ships are recorded. The *Portenuvel* galley, 1210; the *Gundewyn* at Cork, 1235; the *Damaysell*, which came from Ireland to Wales in 1245. In 1296 many are named—the *Godeyere*, the *Strethetaill*, and the *Sauneye* from Dublin; the *Garland* of Ross; the *Mariot*, the *Nicholas*, and the *Ave Maria* of Drogheda; the *Catherine* of Lusk; the *Holy Cross*; the *Godship* and the *Margaret* at Youghal; the *Snake*, the *Nicholas*, the *Gaudyn*; and the *Grace Dieu* of Cork; and the *Skydie*, the *Holy Ghost*, the *Blessed Mary*, and the *Holy Cross* of Waterford.²

9. THE CARTOGRAPHERS.

Having (at perhaps too great a length) studied the causes that led to the knowledge of Ireland among the natives of Italy, and necessitated the making of maps of our shores, and having established records of direct communication with Florence, Lucca, and Pisa, and less direct ones with Venice and Genoa, we now must study the question of the map-makers.

For convenience of reference, I largely confine myself to the splendid atlases of Jomard (*Monuments de la Géographie*), Ongania, and Nordenskiöld (*The Periplus* and the *Facsimile Atlas*); several of these maps are reproduced in

¹ W. Pinkerton, *Ulster Journal of Archaeology*, iii, p. 184.

² *Cal. Docts. Ir.*

other works, but to cite these would confuse rather than widen our knowledge. I use the large reproductions of Haldingham in 1280, of Fra Mauro, 1459, and Ribero, 1529, copies of which Dublin readers can find in the Library of Trinity College. The later maps (after 1570) I use, but only to elucidate the older maps; but the crowd of coast-names on the Elizabethan maps might be studied in a separate paper to the great advantage of Irish topography. Besides these, I use a few originals not found in the facsimiles, such as the important one of Baptist Agnesi, so similar to the Upsal map. In my copies herewith, I omit the networks of compass-lines and the wind-roses, and merely give careful enlarged outlines and the names. The British maps are (apart from printed ones of the period) chiefly from the Hardiman collection in Trinity College, Dublin, with two of Laurence Nowell, Dean of Lichfield, who died in 1576.¹

I will only very briefly give a few notes on the makers of the early portolans here used.²—GIOVANNI DE CARIGNANO was rector of St. Mark's, Genoa, 1306–1344; his maps date apparently a few years later, about 1310.³ He stands alone in not exaggerating Clew Bay or eliminating Dublin Bay, but he makes Scotland lean over to the west (as the Ptolemy maps make it bend to the east) at right angles to England. PERRINUS VESCONTE, a Venetian, was making maps at Florence about 1327. PETRUS VESCONTE, a Genoese, who also resided in Venice (perhaps the same person), has left us the earliest dated map, which contains his only record—"Petrus Vesconte, of Janua, at Florence, 1311"; it is in the state archives of the latter city. The map has "Ybernia," but no legible coast-names. (*Periplus*, p. 17, fig. 6.) ANGELINO DULCERT, Dulceti or Dalaorto. His personality seems doubtful; some think him a Majorcan or Catalanian. The Dulceti were Genoese.⁴ His map, dated 1339, is remarkable as one of the three earliest legible records, with full details of Ireland. GUGLIELMO SOLERI, of Majorca, left

¹ British Museum, Donation A 18, f. 97, and ff. 101, 103.

² Kretschmer gives a bibliography and full particulars about the map-makers in "Die Italienischen Portolane des Mittelalters" (1902, Inst. f. Meereskund Univ. Berlin), pp. 104–148, for 75 portolans.

³ The inscription runs—"Presbyter Johannes, rector sancti Marci de portu Janue, me fecit" Giovanne de Carignano, Rector of St. Mark's, Genoa, in 1306, died 1344.

⁴ "La mappemonde d'Angelino Dulcert" (E. T. Hamy, *Bulletin de Géog. hist. et descrip.* Paris, 1886, 1887, and "Les origines de la cartographie de l'Europe," *ibid.*, 1888), also, "In Northern Mists," Nansen (transl. A. Chater), vol. ii., p. 226. There are outlines of his work in Proc. R.I.A., xxx (C), Plate XX. The maps are inscribed, "Hoc opus fecit Angellinus de Dalaorto ano domini mcccxxxv (or xxx) de mense martii composuit hoc," and "Hoc opus fecit Angelino Dulcert ano mcccxxxviii de mense augusti in civitate maioricarum." Besides the better-known map of 1339, there is the map of 1325, outlines of which have been published in several works (e.g., "In Northern Mists," ii., p. 226). Its date is indistinct, being either mcccxxv, or mcccxxx. The later map is Majorcan; some have supposed it to be a copy of an original by Dalaorto. See also Konrad Kretschmer, "Die Italienischen Portolane," pp. 117–118.

ten maps, dating about 1380; one is at Paris, and ten are in the Florentine archives.¹ JACOBUS GIROLDIS was a Venetian; two of his maps, dated 1422 and 1446, are in the Bibliotheca Marciana, in his native city; others at Paris and Florence; the name (like Dulcert's) varies as Giroldis, Ziroidis, Zeroldus, and Ziredis;² but F. Ongania gives it as Giacomo Girardi de Venesia. ANDREA BIANCO.—If (as is probable) he is the monk and geographer of 1300, the Venetian map,³ bearing his name, but dated 1436, is a copy. GRATIOSUS BENINCASA, of Ancona, has left twenty-five maps, dating between 1435 and 1482. There are five in the British Museum, three at Paris and two at Venice, the rest at Florence, Palermo, Milan, Rome, Murano, Bologna, and Ancona. FRA MAURO CAMALDONUS, about 1450, executed the famous planisphere in the "Bibliotheca Marciana."³ It has been frequently copied, as on the wall of a palace in Florence, and for Alphonso of Portugal, who died 1481.⁴ ANDREA BENINCASA (whose map of 1469 I use) made other maps, now at Geneva, 1476, Ancona, 1490, and Rome, 1508. JUAN DE LA COSA was a companion of Columbus on his second voyage; he is also named "Bizzanio."⁵ BAPTISTO AGNESI was not an original cartographer, but a neat and prolific copyist: his maps date 1529 to 1562, three at Venice, two at Paris, and others at Florence, Munich, Dresden, Gotha, Catania, Dublin,⁶ and Stockholm. The last and latest is reproduced by Nordenskiöld. The Dublin atlas in Trinity College closely resembles the anonymous Upsal map of *circa* 1450. GEORGIO CALAPODA, of Crete, lived between 1537 and 1565; his beautiful and gorgeous map of 1552 can be studied in *Periplus*.

I have now only to give the tabulated results from some three dozen early maps, which I hope may help Irish topographers, who have, I think, never gone behind the Elizabethan maps. The outlines will, I hope, make

¹ Of the other superscriptions I may select, "Guillelmo Soleri ciuis maiorcaru me fecit Ano natiuitatis dni 1385"; "1380, Guillmo Soleri ciuis maiorcaru me fecit"; "1367, hoc opus composuit franciscus piziganus Veneciar et domnus piziganus in Venexio meffecit marcus die, 12 decembris."

² Nordenskiöld only gives an outline and list of names from one of the maps. Some twenty-five of his maps are preserved. The 1422 map has the signature "mcccexxii mense Junii die primo Jachobus de Giroldis Veneciis me fecit"; the 1426 map, "Jachobus de Giroldis (or Ziraldis) de Veneciis me fecit Anno domin mcccexxvi."

³ He painted a mappemonde on the wall of a room in the Monastery on the Isle of Murano near Venice ("Science and Art in the Middle Ages," ed. 1878, Paul Lacroix, curator of the Library of the Arsenal, Paris, p. 286).

⁴ Also for the British Museum. See also "Commerce and Navigation of the Ancients" (W. Vincent, London, 1807).

⁵ See Alexander von Humboldt, in Dr. F. W. Ghillany's "Geschichte des Seefahrers Ritter Martin Behaim," &c., Nürnberg, 1853. There is a facsimile in Jomard's "Monuments."

⁶ It has been said that the Dublin copy is unsigned and not Agnesi's. On the map of the Euxine, however, may be seen the inscription, "Baptista agnesi ianuensis fecit uenetiis, 1544, die 22 Octob." On the front page is "Leonardi Marinorii est liber iste Ancona." (See "Catalogue of Manuscripts, Library of Trinity College, Dublin," p. 158, No. 17.) It has eleven maps.

the subject more accessible to students away from the great libraries, especially in this country.

10. LIST OF MAPS AND PORTOLANS USED.

(The asterisk marks those illustrated here; the references are given by the dates.)

I may note that I do not give any names from Carignano and Petrus Vesconte, 1300-1320. Some early maps of which I have seen photographs or facsimiles do not give many names. The great fishing-banks off the Irish coast are sometimes shown. Dulcert, 1339, shows the three off Arklow; De la Cosa, 1500, the same; the Kish Bank, off Dublin, and two towards Ardglas. They are indicated by dots in Agnesi's map, 1544, and by small apparent islands in the maps of Freducci, 1497, and Calapoda, 1552. The Upsal map alone of the first two centuries gives correctly, but, as usual, without names, the Mayo Islands—the Iniskeas, Davillaun, Achill, Achillbeg, Cliara, Turk, Caher, and Shark, as well as Bofin. The map made for Henry II of France is nearly worthless, as the copyist could not decipher most of the names on his exemplar. The Voltius map is also careless. I give one of the Ptolemy maps to show their character; the last is non-Ptolemaic, a mere badly copied portolan.¹

1300 Giovanni da Carignano (*Periplus* v), at Florence, Archives.

1327 Perrinus Vesconte, Venice (*Perip.* vii). Florence, Bibliotheca Laurenziana.

1325, *1339 Angelino Dulcert, Genoa? (*Perip.* viii). The first in the collection of Prince Tommaso Corsini; the second from the collection of M. Lesouef in Bibliothèque Nationale, Paris.

1351 Carta Navigationis auctoris incerti, called "Portolano Laurenziano Gaddiano," or "Atlante Mediceo" (*Perip.* x). Florence. B.L. Ongania "Sammlung von Welt- und Seekarten," v, No. 7.

1360 Anonymous (*Perip.* Table of names only, p. 43).

1367² Franciscus Pizigano and Marcus Pizigano (Jomard, *Monuments*, pp. 44, 45). Parma, Bibl. Nat.

¹ For the convenience of students using the Dublin Libraries, I may note that they may find the *Periplus*, Ongania's photographs of early maps (Verzeich, Einer Sammlung von Welt- und Seekarten), The Athos Ptolemy (Géographie de Ptolémée, Victor Langlois, Paris, 1867); Waldseemüller's maps, 1507-1516; the oldest map with the name America, Martin Waldseemüller (Ilacomilus), ed. Fischer and Weiser, and many others in the National Library. The Facsimile Atlas of Nordenskiöld, and the maps of Fischer, Alonzo de Santa Cruz (ed. Dahlgren), 1892; Fra Mauro, De la Cosa, and Haldingham (facsimiles), and others, are to be found in the Library of Trinity College. I owe my best thanks to Mr. T. W. Lyster and Mr. A. C. De Burgh for assistance in finding the resources of the respective Libraries.

² His map of 1373 in Ongania's map, Pl. vi, No. 7.

- 1375 Catalan Atlas (*Perip.* xi), from Library of Charles V (1364–1380). Paris, Bibl. Nat.
- *1380 "Portolano Pinelli-Walckenaar (*ibid.* xi). France, collection of Baron Walckenaar.
- 1385 Guglielmo Soleri of Majorca (*ibid.* xviii). Florence, Archives.
- *1426 Jacobus Giroldis (Ongania, map viii, No. 3 *Perip.*, table of names only, p. 43). Venice, Bibl. Marciana.
- 1436 Andrea Bianco, *circa* 1300 (*Perip.* xx; also Cal. Venetian State Papers, vol. i, and Ongania ix, Nos. 7 and 8).
- 1448 Gratosius Benincasa, Ancona (*Perip.* xxxiii), in the Municipal Archives, Ancona.
- *"1450" Charta Navigatoria auctoris incerti, Upsal (*ibid.* xix). The University, Upsal.
- 1459 Fra Mauro Camaldolese, Venice; (*Facsimile*; Ongania xv, No. 1). Venice, Bibl. Marc.
- 1467 Andrea Benincasa (*Perip.* xxxiii). Geneva, Bibl. Municipale, 2 Ancona.
- 1490 Bernardino Rizo (Kretschmer, It. port, p. 429).¹
- 1497 Conte Freducci, Contes Hectomanusius Fredutius, Ancona (*Perip.* xxii). Fourteen of his maps are known. Wolfenbüttel, Ducal Library.
- *1500 Juan de la Cosa (*ibid.* xlii and *Monuments*, pp. 19, 20).
- *1513 The Argentine Ptolemy (*Facsimile Atlas*, p. 11, Plate xxiv).
- 1516 "Cogniti orbis terre, maris," &c., M. Waldseemüller.
- 1529 Diego Ribero (*Facsimile* and *Perip.* xlviiii).
- *1544 Baptisto Agnesi (original, T.C.D. mss. K. 3, 15. Similar to the Upsal Map and Homen's Map, *Perip.*). Dublin.
- 1546 Pierre Descelliers (*Perip.* lii).
- "1550" Map made for Henry II of France (Jomard *Monuments*, pp. 25, 26).
- *1552 Georgio Calapoda, Crete (*Perip.* xxvi). Stockholm, State Archives.
- 1568 Domingo Olives, Majorca (*ibid.* xxix).
- 1569 Diego Homen, Portugal, 1557–1575 (*ibid.* xxviii). Paris, Bibl. Nationale.
- "1570" Laurence Nowell, Dean of Lichfield, died 1576. (Two maps, the larger "A.")
- 1572 Armagh, copper-plate map.
- 1589 Ortelius, "Theatrum Orbis Terrarum."
- 1590 H. Late Elizabethan maps, Hardiman Collection, Trinity College, Dublin.

¹ This is a book of sailing directions, but helpful in the names.

1593 Vincentius Demetrius Voltius, 1593-1607 (*Perip.* xxx). Nordenskiöld collection.

1609 Maps of the Escheated Counties in Ulster.

1610 Speed's maps of Ireland.

In that most valuable work "Die italienischen Portolane des Mittelalters," by Konrad Kretschmer (1909, pp. 568-570), a list of identifications is given of the Irish place-names. With most of these (as may be seen) I am in full agreement. I, however, owe it to antiquaries to state my reasons where I differ from such an authority.¹

Insula de Tirconnell is identified with Inishmurray, Co. Sligo, and C. Seligra with Sligo. That is impossible, as all the maps put them north from Aran (*Abraam*), and Inishmurray was not in Tirconnell. *Borderali*, or *Bordeali*, is given as Broadhaven, but many of the maps mark it unequivocally on the north shore of Clew Bay, where the second name corresponds to "Borg uaile" or Borrishoole, a small ancient village and abbey. *Le deng* is *The Dingle*, the town, not the Bay, as identified; the name "Dingle Bay" is not found in old records. *Drauert* (*Draueri* *Draveri*) is clearly the Irish *Dairbhre*, or Valencia, not "Ardeannagat." *Borela* is hardly Berehaven (usually *Bire* on the maps).² *Gräbaron* is not Glandore, but Glenbaron, or Castle Haven. *Domborg* is far more likely "Corborg" or Ros-Corbry (an important early harbour and cathedral town) than the obscure Dunbeacon. *Minart* is evidently the Irish *Min ard*, one of "the Ards," at Ardmore (which corresponds to the early map-place) rather than "Mine Head," a late English name, probably not earlier than the Earl of Cork's mines there. *Doniduab* (*Donduabon* elsewhere) is Dun (Rath or Rinn) Dubhain, or Hook, not "Duncannon"; it was the Beacon tower of New Ross. *Arecom* is not "Harristown," but (as in some early maps *Ardroin*) *Ard drom*, 'high ridge,' perhaps Bray Head, which its position suits. *Dondazo* is certainly Dundalk, but *Darche* is a different place, perhaps Greenore. *Monessi* (or *Momeri*, given in later maps as *Momoarger*, is evidently Bonamargy. *Dunsobrim* is the ancient and important *Dun sobhairche* or Dunseverick, not "Dunborrow Head." The author's hesitation as to *Fredit* being Fetherd seems unnecessary, as in name, situation, and port requirements it is fully suitable.

The suggestions that *Comicidella* is Killala, and *Ertamor*, *Tramore* (formerly *Stramore*), are plausible, but the former is doubtful, and the latter a probable corruption of Ardmore. The author is certainly right as to *C. Stronber* being a headland near Tralee Bay. I think it is evidently Kerry

¹ He gives 67 Irish names.

² Almost certainly *Ui brathach* or *Iveragh*; *Ibarcai*, *Iborcal*, *borela* on map.

Head, but the name is unrecognizable, unless Ca-stronbere be Cahercorbere or Cahercarbery. The book not being in the public libraries of Dublin, and my having had difficulty and delay in getting it, must excuse my having made comparatively little use of it.

I may here add an explanation, as an entire misapprehension appears to have arisen (outside Ireland) as to my paper on "Brasil," that it, like my present paper, is *not* an attempt at a wide treatment of the whole subject, but an application of the broad results to Ireland. As in the first I did not feel justified in bringing forward the vast mass of Asiatic and African myths (of which I was fully aware), so here it is not the European history of trade or the minute history of cartography¹ that is aimed at, but the connexion between Irish and Italian commerce, and the source of the minute knowledge of so remote an island shown in the Italian portolans.

11. THE PLACE-NAMES, 1300–1600.²

THE WEST COAST FROM THE NORTH.

CAP. SELIGRA, 1339; cap seligni, 1351; cauo sligra, 1367; seniba, 1373;³ cauo sligra, 1375; selibla caro, 1384; c. senigla, 1426; cabo seligno, 1436; Cligra, 1497, 1513;⁴ cauo libra, 1552. A cape north from Aran and next Tirconnell, perhaps the Bloody Foreland.

ABRAM, 1339, 1351, 1367, 1375, 1513; abrini, 1373; abroain, 1384; abraam, 1373; abinam, 1426; absan, 1436; abraim, 1497; abone, 1500; araim (misplaced after bordlai), 1552; North Isles of Aran, 1590 H 1. Aran, Donegal.

TARNDÉ, tarndo (?) (between abroain and brasta), 1384.

ANSTONA (north from Teelin), 1500.

COMINCIDELA, comiadela, 1339; comincidela, 1375; cominadela, 1367; comincidela, 1375; corit, 1384; comicidella, 1426; comidela, 1436; comiatella, 1448; indolla, 1497; corinadella, 1513; comiadlla, 1552. Probably cauo de tela (Teelin) of other maps; see next name.

TEELIN, c. de telin, 1450; c. telin, 1500; c. de telli, 1516; c. de telini, 1544; c. de telin, 1568; Tillyng, 1589; S. Heleynes Head, 1570 b; S. He Laynes heade, 1570 a; Broad hauen of Tellen, 1590 H 1. *Irish*, Telionn; Teeling, Donegal.

¹ So criticism as to omission of certain maps is hardly to the point where, confessedly, only certain groups most pertinent to Ireland were studied.

² They are about 153 in number.

³ 1373 Pisigano map, Ongania, vii, No. 1.

⁴ Probably this name Cligra is "the Cape Clear in the north of Ireland" so frequently mentioned by the Spanish in the Armada records; it certainly lay north from Killybegs, as is shown in the account of Alonso de Leyva, Cal. Spanish Papers, 1558, p. 509, and is not Clare Island, as suggested by Froude.

- KILLYBEGS, calbei, 1559; calbeg, 1570; calbege, 1589; calebeg, 1590 H 1; *Irish*, na cealla beaga; Killybegs, Donegal.
- TIRIQC, 1500, between c. telin and abadia. Probably Tirioe. Tir Aodha or Tirhugh in Donegal.
- ABADIA, 1500. Perhaps the district of Ui (or Tir) Baghaine; Bannagh, Donegal.
- LESINGOR,¹ 1450; lesyngor, 1544; to the east of Teelin, probably in Co. Donegal.
- SLIGO, Slagoi, 1450; Singai, 516; Slago, 1544; Sligo, 1589; *Irish*, Sligeach; Sligo town.
- BRASCA, brasta or brafca, 1384; bsan, 1436; perhaps "brasta," if so, the prominent rock of Dun-briste, Downpatrick, Mayo.
- STAGS OF BROADHAVEN, sach, 1351; staciar, 1373; estacas, 1450²; 1500; 1516; 1529; 1544; c. stacas, 1559; stakky; 1589; usually "Estacas" on later maps. The Stags of Broadhaven, Mayo.
- ERRIS HEAD, c. deres, 1450, 1500; c. deros, 1544. *Irish*, Iorrus Domhonn, Erris Head, Mayo.
- INISGLORA, not named, but the 1369 map gives the usual description "ibi semper p̄maner, incorrupta." Inisglora, Mayo.
- ZIBERIA, 1544; shown at the Mullet opposite last, perhaps Inis caorach or Iniskeeragh, Mayo.
- INISKEA, Inisquei and Inesquei, 1450, 1516, 1544; Iusquei, 1500. *Irish*, Inis geidh;³ Iniskea, Mayo.
- ACHILL, archil,⁴ 1339; arcill, 1384; ardrioll (archoill), 1351; ardam, 1373; aculia, 1500; ardeille, 1436; ardoin, 1448; arclon, 1497; ardoim, 1552; esquesidas (?), 1526; Alkyll and Akkyll, 1572, 1589. *Irish*, Eccuil,⁵ Achill, Mayo.
- ACHILL HEAD, c. d'aquilla, 1450; c. d'aquil, 1500; c. d. agulla, 1516; c. d'aquila, 1544; c. dacilla, 1568, can akyll, 1590 H; c. d'equilla, 1593. *Irish*, ceann eccuil, Achill Head, Mayo.
- C. DOLEGO, 1450; c. dolago, 1544; y. dellagh, 1516; y lago, 1593; An Island (?) south from Achill; perhaps in Clew Bay.

¹ Lesingor, perhaps Lesaimer (Saimer, River Erne), or possibly some name like Lissangower, or Liesanure; or L'esserou, Asheroe.

² Several names are duplicated on these maps, probably for convenience, as they are read in opposite directions.

³ "Wonders of Eri," from the "Book of Glendalough"; in the "Book of Ballymote," p. 140; see "The Irish Nennius," p. 231; also *Insula Sanctae Gedhiae*.

⁴ The *ch* is easily confused with *z*.

⁵ The name is probably akin to the district Aigle or Oigle round Clew Bay. The popular derivation Achill, Aquila, 'eagle,' is unlikely, as in all place-names round the north and west coasts of Mayo the eagle-constituent is uller, illra.

- C. DANGLA, c. dangl, 1436; c. dangra, 1450; c. dangla, 1544. A headland between Achill Head and Clew Bay. Probably The Dangan, a headland, at Dun Kilmore, Achillbeg, Mayo.
- UMHALL,¹ Omallos, 1351; lunium, 1426; omayle, 1589; *Irish*, umhall, or the Baronies of Burrishoole and Murrisk, on Clew Bay, Mayo.
- BURRISHOOLE, boraculi, 1339; boraib, 1351; bordali, 1367; borderali, 1375; bordeali (burg uali), 1373, 1384, 1385; bordellus, 1426; burdelai, 1436; burdlas, 1436; bordelli, 1448; bordella, 1497; brotani, 1500; bordlai, 1552;² borace, 1593 H. *Irish*, Burgeis umhaille, Burrishoole, on Clew Bay, Mayo.
- CLEW BAY ISLANDS, Isole ccclviii, 1327,³ lacus fortunatus, 1325, 1375; Y. lagar, 1373; Insule lacaris (? laçaris), 1339; lacharis, 1351; Isole lacaris, 1367; ye lacari, 1436; larg, 1500; lacaris, 1497, 1513, 1552; y lacari, 1592; "lacus fortunatus ubi sunt insule que dicuntur insule sante benem(?), ccclviii." 1497,⁴ y laganis, y 368, 1373, 1384; y laçeris ye ccclviii, 1426; y lago, 1593. The Clew Bay Islands; *Irish*, Insi modh; at present said to be 366 in number, Mayo.
- Y. FORTUNATE, 1373, 1384, 1426, Insule fortunate, 1497. Y LUNERT, 1373; Y. LANMNEE, 1384, y lanmne, 1426. Y. LEABR, 1384; y. leatr, 1373, 1426 Islands of the group—The second is possibly Illanmay, the last Inishraher, or Inishlyre, in Clew Bay, Mayo; one may be Inisraithin.⁵
- ILLIADA, illisada, 1450; illiada, 1544. If not one of the Clew Bay Islands, perhaps *Irish* cliara;⁶ ("I. cliara"), Clare Island, Mayo.
- TRIASANTA, 1373; perhaps same as next.
- ILLA SCA, 1450; ye Sa, 1546; y santa, 1569. If not the last and one of Clew Bay Islands, it may be the pre-eminently "Holy Island" of Cahir Island. *Irish*, cathair na naomh (city of the saints), Mayo.
- CONFRENCHLAN, 1339; constachelin, 1351; g. frelan, 1367; congefornan, 1373; confrenchellan, 1375; congefrelan, 1384; confrealen, 1436; confrenchlem, 1497; confrendlam, 1513. An unknown place on the southern shore of Clew Bay; no modern name resembles it.⁷

¹ Though so much alike, Umhal is a far older name than Ui Mhaille or O Maille.

² The Ptolemaic name, "alteregia" (Rigia hetera), appeared at N.E. corner of Clew Bay, 1552.

³ Perrinus Vesconte (*Perip.* vii) seems to read in full "gulfo de issule ccclvii beate et fortunate."

⁴ "Lacus Fortunatus, ubi sunt insule que dicuntur Insule Fortunata, ccclvij" (366 and 368, as in other maps), 1467.

⁵ In 1217 Donchad Ua Dubhda, with 56 ships from the Hebrides, sailed to Inis Raithin, one of the Insi Modh (in Clew Bay), in Umhall, and wrested his own land free of tribute from Cathal Croibhdhearg Ua Conchobhair (*Hy Fiachrach*).

⁶ Though at the inner end of Clew Bay, it probably refers to one of the two islands (Cliara and Turk) at its mouth, between Achill and Bofin.

⁷ Unless it be a very corrupt version of "Frehill Island," once far larger and more sheltering than at present. Cauo frehill illan, confrenchillan.

CONTODARCA, 1384; Contularea, 1373, 1426: . . . torim, 1436; bontustinca, 1475.

Shown near last at south shore of Clew Bay; perhaps cauo daquilla or c. dangra, as above.

BOFIN: 1327, 1339, 1375, 1384, 1385; boxin, 1373; boffin, 1351, 1426, 1497; I poñin, 1450; boffus, 1448; escafin, 1516; boffim, 1552; bofay, 1436; Ipafin, 1544; Inspuffyn, 1572, 1589; Enys bophen, 1590, *H. Irish*, Inis bofinde, 667, 674. The refuge of St. Colman of Lindisfarne, "Insula vitulae albae"; Inis Bofin, Mayo.

ARELEM, 1384; arlon, 1500; probably High Island. *Irish*, Ard Oileán, Galway.

SLYNE Head, C. leme, 1450; C. de leme, 1500, 1593; c. de lema, 1516; leme, 1544; C de lome, 1559. *Irish*, ceann leime, Slyne Head, Galway.

GALWAY. galuei, 1450, 1544, 1596; Gallua, 1516; galbe, 1500; Galwey, 1589. *Irish*, Gallimh, Galway city.

ARAN, Zarina, 1327, 1339, 1375, 1384, 1426, 1436, 1448, 1497, 1552; arein 1373; illas de arenas, 1500; doren, 1516; atenes, 1546; y d' arena 1450, 1544, 1593. Aran Isles, Galway Bay.

ST. GREGORY. S. Grigori, 1450; S. Gregorio, 1516; San Grigorio, 1544 (at y d' arena); S. grigorio, 1593. St. Gregory's Sound, Aran.⁴

ORAN, orotin, 1351; orart, 1497; orlon (oreon), 1500; oram, 1513, 1552;⁵ Oran, 1531. Oranmore, Galway.

ORORUM, oibrim, 1339; ororin, 1367; ororum, or ororum lacus, 1448; otorum, 1513; ororim, 1552; ororan, 1597. A place near Galway Bay, "oibrim" is clearly placed in Co. Clare, 1339; but it is given elsewhere as north of the Bay. Perhaps Oughterard, Co. Galway; Lough Oirbsen or Corrib; or Burren, Co. Clare.

ANCIO, and ancis, 1544. Places to east of Galway Bay. Perhaps "Anri," or Athenry.

BLACKHEAD, m. negri, 1450; m. neig, 1516; montes negros, 1593. Probably Black Head, *Irish*, ceann boirne, Co. Clare.

CONOGOR, or CONAGAR, 1450, 1544, 1593; Kil conic, 1589. Clearly Kilcoridon, or Kilcredane; Clare.

MAGAM, 1568. An unknown place in Clare.

¹ Perhaps Cahernamart, near the present town of Westport, at the end of Clew Bay.

² Inesbofyn with Inisearka, named 1251 in the Plea Rolls, No. 7. Anno ix Edw. I. m. 4 dorso.

³ Point is given to the south in this map, and nearly opposite Aran. Galway Bay is entirely omitted, as is usual in the fourteenth century.

⁴ Can the puzzling dry-stone round-tower of the Sound (saluted by fishermen as "St. Gregory's Grave") be an old beacon-tower?

⁵ It gives the Ptolemaic "Regise," inland from Oram and Behi farther north.

- "Y. S. SAMA ZINQUI," 1544. Apparently St. Senan's Isle or Iniscatha; but on 1367 and 1544 maps it seems a half obliterated "Limeriqui," a misplaced "Limerick,"¹ and on the 1450 map is represented by a duplicate "lamariq."
- LIMERICK, laymerich, 1339, 1351, 1375; lamerecht, 1367; lymerich, 1385; lanera, 1426; lemeri, 1436; limerish, 1448; lamarich, 1450, 1513; americh, 1497; lomeri, 1500; lamerie,² 1500, 1552; laneray, 1516; lamariq, 1544; lameri, 1552; lambrick, 1570; lamarqui, 1593. Limerick city.
- CAPSTUNBREA, 1339; cauo strimbla, 1367; strambr, 1373; c. stronbere, 1375; c. stronber, 1426; c. astronbre, c. astrombre, and c. astronbre, 1497, 1513; casliumbros, 1448; astrobre, 1552. Perhaps carocorbere, Cahercarbree³ or Cahercarbery, Kerry Head.
- ARDIA, 1568, probably Ardart, 1590 H and Elizabethan maps. Ardfert, Kerry.
- BRAZILL, "Insula de moutoniis sive de brazill," 1325; insula de brazil, 1339; insule de brazil, 1351; "isola de motonus sive de braçill,"⁴ and a second "ysula de braçir" farther south, 1367; y. a. de brazil, 1375; y. a. de braçill, 1426; isola de brasill, 1445; y a de berzil, 1436; brazill, 1450; ".i. del berzil, son dite fortunato," 1452; montoni, 1497; brazil, 1513; brasil, 1529; y^a. de brazill montonu, 1552; illa de brazill (double island), 1558; not on the British maps temp. Elizabeth. The mythical isle of Brasil, or, in modern books only, Hy Brazil.⁴
- MOUNT BRANDON, Mons San brandani, 1300, 1445, 1513; La monta bña de Sci brandan, 1373;⁵ San brandan, 1339; San brandani, 1351; mont. sce. branda, 1367, 1384; San brandon, Mont S. branda, 1375; monte S^{co} brandan, 1373, 1384; S^{co} brandag, 1426; S. brodan, 1497; San branda, 1552; S. berondon, 1497; S. branda, 1558. Mount Brandon, Kerry.⁶
- ST. MARY'S HEAD, c. de S. Maria, 1593; near dingles. Probably Smerwick,⁷ the absurd "St. Mary's wick," Kerry.

¹ The map doubles several of the names in different handwriting to read from either side.

² So before 1750, Dr. C. Smith's "Kerry."

³ This has been also read "y soli de mayotas sen de Bracis" (Birachi), "n cotus sur de Bracis" (Jomard). Konrad Kretschmer failed to decipher it (*Die Entdeckung Amerikas*, 1892).

⁴ Several foreign and British antiquaries derive the name from the red wood *brazil*. While my paper on Brasil was in the press, I found an overlooked note that 'brasil wood' was taxed in a grant of murage rates to Dublin, 1312. "De qualibet centena de brasile venali." (Patent Roll, v Ed. II, part 2, m. 7).

⁵ So in the 1373 Pizigano map in Ongania viii.

⁶ "Brendanicis montibus," Topog. Hib., Giraldus Cambrensis, cap. 2.

⁷ The Elizabethan maps and papers derived Smerwick from "St. Mary'a wick." It is really Norse "Smjor" butter or rich pasture; vik, creek—like Smör tue, Smör berg, and Smör, and Smör klepp in Norway; Smerrin (Smör vin), Smer meadow, and Smerwell Park in Shetland, &c. ("In Northern Mists," Nansen, trans., A. G. Chater, 1911, vol. i, p. 374, chapter ix.)

- BLASKETS, br . . . q . . . r, 1327; brascher, 1339, 1351, 1375, 1448, 1513; Blasct, 1373; brasch, 1450; blast, 1384; braschet, 1385; braser, 1426; blaxar, 1436; brasquer, 1500; brasquei, 1513, 1544; Piaquei, 1516; brascier, 1552; brasquet, 1559; blaches, 1546; brasisney, 1529; Blaskey Iles, 1589. Blasquet or Blasket Islands, Kerry.
- VENTRY, uentri, 1450, 1544; Ventre, 1589. *Irish*, Finn-tragh. Ventry Harbour, Kerry.
- DINGLE, le ding, 1339; eleng (deng), 1351; le dinge, 1367; lelem, 1373; leleim, 1384; le deng, 1375, 1426, 1497, 1513; le deg, 1436; llendeg, 1552; le lein, 1384; le teng, 1448; dingli, 1450; 1544; ongh, 1516; danile, 1559. *Irish*, Daingean ui chuis. Dingle, Kerry.
- IBARCAI, 1339; barchi, 1448; borela, 1375; boreal, 1513; boreall, 1552; iorcai (Iborcai), 1351; le borcal, 1367; loco Iorcal, 1373; raturch, 1436. *Irish*, Ui ratha, or Ui bratha. Iveragh Barony, Kerry.
- LAMENE, 1500. The Maine River, Kerry.
- VALENTIA (DARRERY), drauer, 1339; drauerit, 1367; drauer, 1373; drauert, 1375, 1384, 1426, 1513, 1552; derio (?), 1450; dalierat, 1497; Valence, 1570; Balentyn, 1572, 1589; cornet, 1593, Darrery; *Irish*, Dairbhre. Valentia Island, Kerry.¹
- LESPOR D'IRLANDA, loye d'irlanda, 1351; loyg, 1373; l'esper d'irlanda, 1375; loco loscal and loyg, 1384; losse dirlanda, 1385; lesp•dirlanda, 1426; lespor dirlanda, 1436, 1497; lellosques, 1450; lespere dirlanda, 1445, 1552. It lies opposite the Skelligs, and is probably Bolus Head; canboles, 1590. Kerry.
- S. MICHEL, 1500. Probably Sceilig mhichil, St. Michael's Rock, Kerry.
- SKELLIG ROCKS. estelles, 1327; scalis, 1339, 1373, 1375, 1384, 1385; escallis, 1426, 1436, 1442; estella, 1450; stella, 1544; cocali (lescali), 1497; S. michel, 1500; Salilqui, 1516; escalis, 1552; stuella, 1568; steile, 1569; skillighes, 1590 H. The Skellig Rocks, or Skellig Michael, Kerry.
- QUELLES. quelmes, 1500; esquebes, 1516; quelbes, 1546; qualbos, 1568; quelles, 1559; quelbeg, 1593; skelmes, 1570, 1572, 1589. The name is difficult; the 1568 and 1569 maps separate them from Skellig. Nowell, 1570, puts them on coast between Valentia and Ballinskellig. Ortelius, 1589, shows the three spikes (of the Skelligs and Lemon Rock) at the name. They may be Puffin Island, or even Scariff and Deenish, Kerry.

¹ The island is Dairbhre (Darfry, 1295, Plea Roll), the Sound, Beal innsi, Bealinch or Valentia. It is not a Spanish term, as stated in the County Histories and the Encyclopaedia Britannica.

THE BULL, bori (boui), 1450; boij, 1529, 1544; bæuf, 1546; bos, 1593; toro, 1559. *Irish*, Inis Bui,¹ The Bull Rock, Kerry.

THE COW, uaca, 1450, 1529, 1544; vache, 1546; uaco, 1569. The Cow (Nowell adds, "The Calf," 1570), Kerry.

SOUTH COAST FROM THE WEST.²

DORSEY ISLAND, dorrosej, 1339; drocata, 1351; drorox, 1367; Idrosej, 1373; drorosej, 1375; doroxei, 1384; droso, 1385; drossi, 1497; Drossi, 1426; dro . . ., 1436; drosey, 1445, 1513, 1552; drusei, 1450, 1544; Dorsey, 1570, 1589; Dorsey Island, at the mouth of Bere Haven, Cork.

LOSE, 1373, 1384, between dorrosej and bric.

BEREHAVEN, bire, 1339, 1367, 1375; bric, 1351, 1373; brir, 1384; leri, 1426; biri, 1436; caur, 1552; brerel, 1559; Bere haven, 1570, 1589, biara, 1593, 1590, H 1. Bere hor, H 2. *Irish*, Oilean baoi beirre, and Beirre (Annals, 794, 865, and 1498). Bere Haven, Cork.

NARIR, 1384, between bric and caueno.³

CAO. CAUENA, 1339, 1375; cauo cova, 1367; cauena, 1373, 1384; cabena, 1426; "arair" (avena), 1500; caruena, 1513; clocheni (?), 1351; cave, 1552; c. dema, 1593. Perhaps the "C. Tauena," beside the "Haven of Balentinemore," 1590, H 2; but this seems too far eastward. If not, probably Killaconenagh, Berehaven, Cork.⁴

CLEAR ISLAND, Cap d'Clar, 1339; cauo de Clara, 1375, 1426; caurno, 1384; clarros, 1436; c. de clara, 1500; c. de claro and clara,⁵ 1450; c. d'clara, 1552; c. de creara, 1559; Cape Clear, 1589; c. cleare, 1590, H; Cape Clear, and Clear Island, Cork.

¹ A legend said that when the Milesians invaded Ireland, Donn was wrecked on this rock, thence named his house, "Teach dhoinn." ("Irish Names of Places," Dr. P. W. Joyce, ed. 1895, Ser. i., chap. iv, p. 165). Another legend tells how Cairbre Muc had two sons by Duben, his mother. Nature avenged the outrage, the crops failed everywhere, so the nobles ordered the children to be burned. A druid saved one, whom he washed and put on a red cow's back. After a year the sin entered into the cow, and she swam out to sea and became the rock called from her Bo-bui (Leabhar na huidhre, 54 a, and Book of Leinster). See note in O'Curry's "Magh Leana," p. 28. The name *bui* in the maps is interesting as a pure Irish form, most of the others being recast.

² A list of the creeks, rivers, and coast towns of southern Ireland was made by Edmond Sexton for Henry VIII (Egerton ms, 19, 865); it gives—Ballinskellig, Birehaven, Bantry, Bancy, Omalins, near Crookhaven, Baltymo, Odrisol, Clondors (Glandore), Inishtortane (Sherkin), Bay of Ross O Gardy (Roscarbery), Kinsale, and Cork (Council Book of Kinsale).

³ Pizagano, 1373, shows another "narir" between Osforde, rasal, and fredid, i.e., near Carnsore.

⁴ The 1450 Upsal map duplicates several names turned in opposite directions for convenience in reading: estacas, inisque (inesquei), lamerich (lamariiq), &c., de Claro (clara) are so treated.

⁵ Irish Cler. o hEidirscoil assumed possession over the harbour of Cler (O Huidhrin, *circa* 1420, p. 105). Fintracht Clere, the birthplace of St. Ciaran of Saigher, A.D. 352-400; he preceded St. Patrick as a missionary in southern Munster, Clere, and Corca laidhe. Chauo de Chlaram, 1490.

- FASTNET ROCKS, fres, 1384; ftistanai (fastanai), 1500; fastanai, 1516, 1544; ffastanai, 1552. The Fastnets, near Clear, Co. Cork.
- C. DAMALA, 1544; c. dema, 1593. A long cape to the West of Baltimore, perhaps cao cavena, Cape Tauena.
- CORCA LAIDHE, corcala, 1450; corcala, 1544, 1559; O Hidriscoll, 1570; dorcola, 1593. Corcalaidhe; Corcalee, O Driscoll's country, Cork.¹
- BALTIMORE, beltario, 1450; balontum, 1500; boltamor, 1544; bellemor, 1559; balatimore, 1570; baletymore, 1539; Ballamore, 1590 H 1; Balentinemore Haven, 1590 H 2; beltromore, 1593. Baltimore, Cork.
- CASTLEHAVEN (GLENBERON), Glenbaton, 1339; girbarim, 1367; glenberon, 1375; glenbarom, 1360; greabaron, 1373, 1384; greneron, 1426; greabaron, 1436, "bao," 1500; glanato, 1513; gravarem, 1552; galueram, 1593. *Irish*, Gleann berchon; Glenbaraghan Parish, Castlehaven, Cork.²
- SCETAN, 1450, east from Clear, perhaps scelan, Scullane Point, near Castlehaven, Cork.
- GLANARO, 1513, between Caruena and domborg.
- C. MUACER, 1497; between stackiar and comborg.
- NARIR, 1384, between Bere and Clear; anigro (near Corcala and Clara), 1450.
- STACKS, Stackia, 1497; aga, 1544 (between corcala and fastnai); araxr, 1500, near Clear; perhaps Stagas. The Stags of Castlehaven, Cork.
- DONBORG,³ 1339, 1375; donbur, 1373; Comborg, 1351, 1497; donborgo, 1367; donbor, 1384, 1426; donborgos, 1436; domborg, 1360, 1513. It is probably coriborg, Carbery, Ross Carbery, or perhaps Glandore (conedore, 1576; condore, 1589, near Ross), Cork.
- OLARCOS, and olarcus, 1339, 1360, 1367, 1373, 1375, 1384, 1513; ollarcos, 1426; ollra . . . 1436; oborcoc, 1497, 1596; olarco, 1552; dorcola, 1593; between Baltimore and Seven Heads. There was a family of Ua doirc (now O Durk) in Corcalee, and others, Ua Bairr (now O Barr) and Ua Laoghaire (O Leary).⁴
- SEVEN CASTLES,⁵ 7 casteles, 1450; c. sauena, 1513; vij castellos, 1500; 7 castyles, 1544; 7 castelle, 1552; seva castillas, 1559 "Five castles," 1590 H. The Seven Heads, Cork.

¹ See above for the history of Gascon wine trade with Corcalaidhe before 1234.

² *Eclia de Selenbercan*, 1302, Papal Taxation, Exchequer Rolls. The editor wrongly identifies it with "Skibercean." See also *Miscellany of Celtic Soc.* "Corcalaidhe," pp. 88, 99.

Possibly comborg (as in other maps), the c with the long up-curl resembling d, e.g., Arcill, Ardill.

³ *Miscellany*, p. 53, Uí Laoghaire (Iveleary), or less probably Ua Doirc, p. 51.

⁵ Shown as seven sea rocks on one Elizabethan map. Hardiman 1, *circa* 1590-1610.

- TAMELAT¹ and camelat, 1339, 1375, 1497, 1513, 1552; ormelac, 1367; tammallut, 1426; thamerat, 1436; camala, 1569; comela, 1351; Tymolay, 1589; ymelag, 1570; Tomalech, 1590 H2. *Irish*, Teach molaga, Timoleague, Cork.
- OLD HEAD, cap veio, 1339, 1450; c. veco, 1360; c. pucis, 1367; cauo veyo, 1375; c. vento, 1497; c. vicio, 1500; c. antiquo, 1513; c. rachio, 1544; c. vechio, 1552; c. bechi, 1559; ye olde Head, 1570; old Heade, 1590 H.² Old Head of Kinsale, Cork.
- KINSALE (Port), adelfronda,³ 1339; adelforda, 1360, 1497; adelfrud, 1367; arfor, 1373; andelfronda, 1375; arifor, 1384; andelitadi, 1513; cantelfrona, 1361; andefronda, 1426; fronda, 1552; c. deforda, 1593; Endelford, 1395 (Patent Roll); guisalla, 1436; quizala, 1450; quinsal, 1500; quisala, 1516, 1544; quinsala, 1559; Kynsale, 1589. *Irish*, ceann tsaile; *Anglo-Norman*, Kinsale de d'Endilvorth. Kinsale town and harbour, Cork.
- GODELFORD, godelfronda, 1339; godeforda, 1360; c. defrid, 1367; godelfronda, 1375; godefronda, 1426; godenforda, 1497; godelfida, 1513. A creek near the last, probably Oysterhaven, Cork.
- CORK, corch, 1339, 1375, 1436; corh, 1384; corco, 1367; arcofida (?), 1426; corca, 1351, 1450, 1544, 1569; corkë, 1570; "for" (cor), 1360; corcha, 1513, 1551; Ercofidi, 1593. *Irish*, corcach mór.⁴ Cork city.⁵
- HORLES, 1513 (between cork "and minart"), near Youghal.
- BALLYCOTTIN, bailicoti, 1375; balicotis, 1426; balicoti, 1436; balcotini, 1544 belcotrin, 1559; ualicot, or ualicet, 1497, 1552. Ballycottin Bay, Cork.
- YOUGHAL, liocla,⁶ 1339, 1426, 1593; liache, 1351; lioc, 1360; liocle, 1367; uocla, 1436; liocles, 1375, 1497, 1513; oland, 1384; mocola, 1450, 1516, 1544; mocora, 1569; yougholde, 1570; Ioughhull, 1589. *Irish*, Eochoill, eochla; Youghal, Cork.
- MINARD, 1360; minart, 1375, 1497, 1513, 1593; minar, 1426; minard, 1436. East of Youghal (serve 1360 map), and near Ardmore. *Irish*, Min-ard (high cliff-flat); Ardigna, or Ardoginna Head, Waterford.

¹ Thamolagi (Papal Taxation), 1302. Tamelag, 1323 (Plea Rolls).

² *Chavo vecchio*, 1490. *Cabo de Velho* in Spanish documents. See Caulfield's "Council Book of Kinsale," p. iii.

³ The old seal of Kinsale bears "sigillum commune Kinsale de d'Endilvorth." Professor George Stevens, of Copenhagen, writing to R. Caulfield ("Council Book of Kinsale," p. 2), says the name means 'outer ford,' like Endilure, 'outer lake.' It is Endelford in two Patents, 1395 and 1408.

⁴ Smith's "History of Cork" wrongly gives the name as Corca bhascinn; the latter is really in Co. Clare.

⁵ Rizo in 1490 names "The City of Corchora, which is a good city, large and merchantile." He speaks of its cloaks such as are worn in winter by the Portuguese and Castilians.

⁶ "The Youghal" is common in early Anglo-Norman documents.

- ARDMORE, arimor, 1426; armari, 1497; ortimar, 1552; ardmore, 1590. *Irish*, Ard mór.¹ Ardmore, Waterford.
- GROSEBAR, 1436, east of Ardmore. The name suggests Crossford, near Ardmore.
- DUNGARVAN, gava, 1339; garuein, 1351; grava, 1360; ganar, 1367; carani, 1436; dungalvani, 1450; granani, 1513; in galuan, 1544; den galuan, 1569; "car," 1593; Dūgarvā, 1589. Dungarvan, Waterford.
- OBEBA, 1384; ibàb, 1373.
- ERTAMOR, ertani, 1513; ertano, 1532. Between Youghal and Crook. Perhaps (as Kretschmer thinks) Tramore; or else Ardmore (Artimor).
- CROC, 1375; "c.," 1384, 1426, 1436; croc, 1552; croke, 1570. Crook, Waterford.²
- WATERFORD, uataforda, 1327; gataforda, 1339, 1375, 1426, 1450, 1544, 1593; aniforda, 1367; garaforda, 1360; gariford, 1351; gatafreda, 1373; gatiforda, 1384; charaforda, 1436; garafonda, 1459; gatafor, 1500; ganfot, 1516; ganaforda, 1513; gatafforda, 1552; gateford, 1559; Waterford, 1570, 1589. *Norse*, vedraford, weatherfiord. *Early Norman*, vadraford, waterford. Waterford city.
- LEFLUMI, 1373, 1384; the confluence between Waterford and Ross.
- ROSS, rois, 1339, 1351, 1375, 1552; roxi and rofin, 1360; roxin, 1384; roi, 1450, 1544; roxa, 1373; rox, 1426; roye, 1513; aros, 1593. *Irish*, Ros mic treoin. New Ross, Wexford.
- ARDART, 1436; ardamna, 1367, after gataforda, before dondoabo.
- DONDUBON, donduban, 1327; dondub, 1339, 1436; dondiab, 1351; dondab, 1373; dōdab, 1426; donibab, 1384; condali, 1467; conciab, 1497; dontal, 1513; candab, 1552; Thoure of Heekel, 1572, 1589. *Irish*, Dun dubhain, Rath dubhain, ceann dubhain, Rin dubhain, Tower of Hook, Wexford.³
- FETHARD, frith, 1327; fredit, 1339, 1360, 1367, 1375, 1384, 1426; fredid, 1373; fedis, 1436; indit, 1467; frerit, 1497; fredit, 1513; ffredit, 1552;

¹ So in "Life of St. Deglan."

² Krok, 'a creek or winding bay'; cf. Kroksfiordr in Iceland, not from *Cruach* (R.S.A.I., vol. xxi, p. 479). Here Henry II first landed in Ireland, 1172.

³ Named from Dubhan aillthir, priest and pilgrim, 492 (Colgan, Ac. SS., Feb. 11); Dubhan, literally 'fishhook.' It is called "le Hoke" in a grant of message to Henry fitz Philipo "corkensis" in 1370, hence Hook, and Ortelius, 1589, "Thour of Heekel." It is Hekel in another map. Old Anglo-Norman forms are Ryndoune, Rendeuan in 1245-6, Randouan, downe, deuan, and doyan (Pat. Rolls, Henry III). It was a beacon tower, built before 1247, probably by citizens of Ross who claimed it (see R. Soc. Antt. Ir., vol. iii, pp. 194-199; vol. xii, p. 559, Patent Rolls, Hen. III, m. 7). "Cauo Dombal ala bocha de Roxa," 1490. See also "Accuratissima orbis delineatio sive Geographia vetus," 1677. TORRE DE BELLOC, 1490, is distinguished from Dondab. Kretschmer thinks it Carnsore, Wexford.

- freda, 1551, 1593; bay of fidert, 1589. *Irish*, Fiodh ard. *Norman*, Fytharid (deed, 1192–1205, at Canterbury). Fethard, Wexford.¹
- BANNOW, elleibano, 1327; clelane, 1351; leban, 1360; elebano, 1367; and ellebano, 1384, 1426, 1436, 1467, 1552; elebani, 1513; banno, 1570; Bonoughe, 1590 H 1; Bannogh, 1590 H 2. Bannow,² Wexford.
- CARN, 1384. Carn Parish and Carnsore, Wexford.
- SALTEES, saltis, 1327, 1339; ganf (salis), 1367; saliez, 1426; saltei, 1450, 1544, 1552; y de sallos, 1500. The Saltees, Wexford.
- TUSCAR,³ tisalt, or risalt, 1327, 1339, 1375, 1552; tasal, 1384; rasal, 1373; rixalt, 1360, 1593; risal, 1367; tasart, 1436; risata, 1497; tissalt, 1426; risati, 1513; ussalt (risalt), 1467. Tuskard, 1570, 1590 H 2. Tuskart and Tusart, 1580. The Tuscar Rocks, or perhaps even Rosslare, Wexford.

EAST COAST FROM THE SOUTH.

- RIOSIA (?), 1384. Perhaps Ross(lare).
- WEXFORD, Oxfordo, 1351; Ocordo, 1360; ofordoo, 1367, 1467, 1552; Osforde, 1373; ocsorda, 1375, 1497; auforit, 1384; cossard, 1426; casorda, 1436; arforda, 1450; orfordo, 1513; ariforda, 1544; achefort, 1559; Weshford and Washford, 1570. Wexford⁴ town.
- RESNAL, (1) rexna, 1360; rexnas, 1367; resnax, 1375; resnas, 1426; ressnas, 1436; renal, 1497, 1552; remes, 1593. (Form 2), teynos, 1339; tenab, 1513. Given after Wexford, either Rosslare, or Courtown Harbour, on bounds of Kiltennal, Wexford.
- ARKLOW, archo, 1227; archelo, 1339, 1375; arelo, 1351; arcelo, 1360; achelo, 1367; argelo, 1373, 1384; arcello, 1426; arcelo, 1436; adicarlo, 1450; arceslo, 1497; arcello, 1513, 1552; archo, 1559; Arklo, 1570; Arklowe, 1589; Arkelo, 1590, H 1. Arklow, Co. Wicklow.

¹ For a good account of Fethard and Bannow, see Mr. Herbert Hore's *Histories of Wexford*. Section Fethard, p. 307.

² Banua, *Insula Banuenis*, Giraldus, *Expug. Hib.*, cap. iii; "le banne" in the "Song of Dermot." The Irish name Banbh (apparently "young pig") is said to be the name of a Firbolg chieftain, brother to Slainge, from whom the Slaney is alleged to be named.

³ Earl Thorkill held "all the way from Tuskar Skerry, down to Dyflin; hosts obeyed him, royal Torkill, raven-feeder," *circa* 1064. *Orkneyinga Saga* (Rolls Series), vol. iii, p. 59.

⁴ It is strange that neither the Irish nor the Anglo-Norman forms of the twelfth and thirteenth centuries affect the maps. The name is Weisefordia (Giraldus, *Expug. Hib.*, cap. 2); Weseford and Lochgarman (in the "Song of Dermot"); and "Loch Carman and its foreigners" in *Annals*, 1141–1170. Most usually Weyseford, but no foreign map gives any approximation to this form.

- WICKLOW, Uichello, 1327; (O)chelo, (?) 1339; Uicelo, 1360, 1569; Vechlo, 1367; augelo, 1384; quello, 1426; e. dicailo, 1450, 1544; Wachllo, 1467; Uicaillo, 1497; guello, 1426; Vitello, 1436; Vicello, 1513; Uizello, 1373, 1552; Wickloye, 1570; Wykelo, 1589. *Norse*, Wykinglo. Wicklow town¹ and Head.
- ARELCITO, 1467; ARECOM, 1339, 1360, 1375, 1426; ar, 1327; arcum, 1367; arcion, 1351; arclon, 1467; arerom, 1497; ardroid, 1513; arecom, 1552; and LANDEI, 1593. Unknown places between Wicklow and Bray. Only Newcastle and Delgany are of any note.² The form ardroid is like Ard drom, 'high ridge,' and might be Bray Head.
- BRAY,³ bri, 1327; bre, 1339, 1360, 1367, 1373, 1375, 1384, 1426, 1497, 1513, 1552, 1590 H 2; Braye, 1570; Brey, 1589. Bray, Wicklow.
- DALKEY,⁴ dalquei, 1450, 1544; Dacey, 1590 H 2. *Irish*, Dealgh inis. *Norse*, Dalkey. Dalkey, Co. Dublin.
- DUBLIN, dunuelin, 1327, 1497; denuelin, 1339, 1384; donuelim or donueli, 1351, 1367, 1373, 1426, 1490; deuelin and devellin, 1436, 1450, 1544; doneli, 1516; domuelin, 1360; du . . . elim, 1384; deolin, 1500; denvelim, 1513; douelim, 1552; dobelin, 1559; donalui, 1593. *Irish*, Ath Cliath, dubh linne. Dublin city.⁵
- ARTAINE (?), arata, 1469; between [Dublin and Howth. Probably Artaine Castle, Dublin.
- HOWTH, hou, 1450, 1513, 1544; hout, 1559; hothe, 1589; Hoth hede, 1570; *Norse*, Hovd, Hofed. Howth, Dublin.⁶
- IRELAND'S EYE, irlandeyse, 1327; irlan . . . ei, 1339; irlandesa, 1351; irlandaxea, 1360; irllandaxia, 1426; irlandess, 1436; irlandasy, 1430; irlandia, 1513; la . . . ais . . . , 1450; le . . . ais . . . , 1544; irlandesei

¹ Wikingelo. Giraldus, Topog. Hib. Hist. 2, cap. xxi. The name is common in early English records, e.g., deeds of Thomas, Abbot of Glindelac, who held Wikinglo, Wikinkelow, and Wikingelo (Reg. Abbot of St. Thomas, Dublin). Here again the Anglo-Norman form Wikinglo is not represented on the early maps. It is Wikinglo and Kylmantan in the "Song of Dermot"; Cil Mantain, in the Annals; Wykylou, in the Papal Taxation, 1302. The castle was commenced by Maurice FitzGerald before 1176; his sons were compelled to accept Ferns in exchange; the place was of little importance. It was destroyed by the Irish in 1301.

² There is a district name *O Briado* for this district in Nowell's map, 1580; perhaps the Ardroid of the maps.

³ Bree deanery, Papal Taxation, 1302; Brai, Bree, Bre, in early Norman deeds. See Reg. Ab. St. Thomas, Dublin, Rolls Series, pp. 149, 170, 171.

⁴ *Irish*, Dealg Inis, Thorn Isle; *Norse*, Dalkcey, with same meaning.

⁵ Anglo-Norman, Duvelina, Diuelinum (Register of St. Thomas' Abbey), Dublinum, and Dublinia.

⁶ Edros heremos, island in Ptolemy; Ben Edair, in Irish; Inis MacNessain (sons of Nessan, seventh century) in Irish; Irland's Ey in Norse from Irish alternative, Inis Ereann (Dind Seachas) (Eire, not Ireland, but a woman's name).

(misplaced after Drogheda), 1450, 1544;¹ irlan occla, 1497; Irlandesey, 1589; ulancosa, 1593. Ireland's Eye, Dublin.²

CANUTOR, 1569, between Howth and Malahide, Dublin.

CASINA, 1373, perhaps same as last.

MALAHIDE, malaida, 1450, 1544, 1567; malahide, 1570. *Anglo-Norman*, Molaghiths, 1393.³ Malahide, Dublin.

SWORDS, Ordes,⁴ 1351, 1360, 1367, 1375, 1497, 1513, 1552; "des," 1426; sordes, 1436; lordes, 1450; oraro, 1460; indes, 1497; order, 1467; Sword, 1570. *Irish*, Sord Columcille. Swords, Dublin.

C. TET, 1384, between Dublin and nida; c. destr, 1360; cap ster (before nida), 1367.

LUSK, losco, 1360, 1367, 1436, 1497, 1513; lossar, 1426; llesco, 1552. *Irish*, Lusca. Lusk, Dublin.

MIDA, 1351; unda, 1360; nida, 1367, 1373, 1384. Probably Co. Meath.

DROGHEDA, dorga, 1339; dondrich, 1351; drogda, 1375; drossda, 1426; drigodella (misplaced), 1436; drogodella, 1450; dragodal, 1490; drogodalla, 1544; drocht, 1467; drogde, 1497; drogda, 1513; drigaydalla, 1516; droxda, 1552; drigoda, 1559; drogodea, 1593; Droday, 1589. *Irish*, Droichead atha, Drogheda town.

DUNDALK, dandul, 1339; dondri, 1351; dondazo, 1360; dundal, 1569; Dundalk, 1589, 1590 H. 1. *Irish*, Dun dealgan.⁵ Dundalk, Louth.

DARCH', derch, 1327; dairhe, 1339, 1513; "cha," 1375; darce, 1367; darchen, 1426; darch, 1436, 1467, 1552; darcha, 1497; dara, 1593. A place north from Dundalk. If it be misplaced on the maps, it may be Madarge point, near Mourne. See Speed's map, 1610, perhaps Greenore.⁶

C. DESTER, 1360 (north from Dundalk); c. ster, 1384, 1436 (between mida and strangford), 1513 (between Lusk and Drogheda); l. lasto, 1367; c. stet, 1497, 1552 (north from Drogheda); loscar, 1426 (north from darchen); c. lestus, 1450; isfec, 1559 (if misplaced).

DERO, 1360, north from the last. Possibly a misplaced "derch."

¹ The same map and that of 1544 gave it correctly at "hou"; someone obliterated it there, but "... la . . . ais" is still legible.

² This islet was probably important as a sea-mark for Malahide and Swords creek.

³ "Irish Council Roll," p. 163. Willielmus Veer de Howth and Johannes Greyn de Molaghiths were to provide and buy fish for the Lord Justice's household, 1393.

⁴ Initial letter probably, as in other cases, obliterated by painted border.

⁵ Or Dealgan, "The Constable of Dealgan slain," 1317 (Ann. Loch Cé).

⁶ The only place suitable as a shelter for coasting-vessels is at the creek inside Greenore, Co. Louth.

- ARGULES, 1450; argula, 1500; argales, 1544 (in the three maps it lies north from lestres, between it and Carlingford); argalan (north from isfec and Dundalk), 1589.¹ If it be north from Carlingford, it is evidently Ardglas, Arglas, 1570, 1589. Ardglas, Down.
- CARLINGFORD,² Carenforda, 1327, 1339, 1351; Carforda, 1367; Calreforda, or Calirforda, 1426; Califorda, 1436, 1450, 1544; Caraforda, 1497; Careforda, 1513; Carefiora, 1552; Carlefor,³ 1559. Carlingford, Co. Louth.
- LESTR, 1513; after Carlingford, but perhaps a misplaced "Leiston"; also CHANOS near the same.
- C. FERET, Cap far, 1373; felet, 1375; C. feret, 1426, 1593; frich? 1467; "isfec," or isfer, 1559: between Carlingford and Strangford.
- STRANGFORD, stan, 1327; stanforda, 1339, 1351, 1360, 1367, 1373, 1384, 1426, 1490, 1497; stariforda, 1451; estaforda, 1450; estanforda, 1513; estafforda, 1552; Califorda, 1544; Califford, 1559. Strangford, Co. Down.⁴
- MOMOLAG, 1450, 1544, between Strangford and Larne.
- CAMBLATINUS, 1559, between Strangford and Bonamargy.
- CARRICKFERGUS, chjnfrich, 1327; chenofrg, 1339; donochfgr, 1351; chenofrit, 1360; chenoehfrig, 1367; chenofris, 1426; Zenochfrich, 1497; chenofric, 1513, 1552; Zenofri, 1373; Zenofro, 1384; anigri, or anigro?, 1516, 1544; Knockfergus, 1589; Carrickfergus and Knockfergus, 1609. Carrickfergus, Co. Antrim.⁵
- BRIA, Zibiri (le biri), 1450; Zibera, 1544; Brioli, 1570; The Bryalle, 1610. Probably "the Briggs" rock outside Belfast Lough.
- ULLERFORD, onerford, 1327; ulford, 1360; oneforda, or olleforda, 1373, 1384; urford, 1467; uelford, 1497; verforda, 1513; uerffiora, 1552; Olderflete, 1570, 1590, H1; Onerflete, 1612. *Irish*, ollarba.⁶ *Norse*, ulrickford. Larne Lough, Co. Antrim.

¹ There is evident confusion in several maps, probably caused by Califord, the alternative to Stariford (Strangford) being mistaken for Carlefor (Carlingford). The 1550 map seems in the wrong here.

² Karlingforda, Giraldus, *Topog. Hib.*, cap. x. It is put to south of Drogheda (drigoida) in 1436 map. Cairlinn in the Irish Annals, O'Clery's *Calendar*, calls it Snamh ech (apparently, 'horses' swimming-ford'); but it is Snamh Aighnech in the "Wars of the Gaedhil with the Gaili."

³ Carlingford being "Carlefor" on 1569 map, and Califorda, 1544.

⁴ Irish, Loch Cuan; see Annals 874, 376, 922, 924, a Norse or Danish settlement.

⁵ "Chastelle de Cnokfergouse," 1393, Irish Council Roll, p. 123.

⁶ Ollarba inbher (*inbher* rendered *fiord*), Wolveflete, Oar. Olor, and Ollarin various sources (see, e.g., "Book of Lecan," p. 41). Ollarfird. Wolderirith, Wulricksfiord. Early tradition in Annals, A.D. 296: The High King, Cairbre Liffeachair, was succeeded by two brothers not of the royal house; one slew the other, and was himself slain at Ollarba, in Maghline (Ann. Clonmacnois, and Roderic O'Flaherty's "Ogygia"). Also see under 565 for weird story of the mermaid, Liban, caught at Ollarba (Chron. Scotorum and Mut. Donegal). Olderflete is the usual name in the State

LANGRA; 1450; Laftar 1373. *Irish*, Latharna. Larne, Co. Antrim.
 ROSO, 1373, 1384. South from N.E. corner of Antrim, probably Red Bay,
 Cushendall, Co. Antrim.

NORTH COAST FROM EAST.

BONAMARGY, mones, 1339; moneth, 1351, 1467, 1497, 1513; manoxi, 1367;
 munax, 1373; momer, 1384; monexi, 1426; momolag, 1544; momo
 arger, 1569; Bonamergh, 1590; momulus, 1593; Mouarg, 1609.
 Bonamargy, Co. Antrim.
 DUNSEVERICK, dunsobrin, 1327, 1339, 1385, 1497; dunsobrinin, 1360;
 cap dunsobri, 1367¹; . . . nsob, 1375; cauo ikibusubrin, 1373;
 cauo de donsobrin, 1384; donssebrin, 1426; dunsobri, 1559; donsobrin,
 1436, 1555; donsobry, 1513.² *Irish*, Dun Sobhairce. Dunseverick.
 Co. Antrim.²
 RATHLIN ragri, 1339, 1367; abrini, 1384; ragrany, 1426; ragrini, 1497,
 1513; Racklyn, 1589; Raghlin, 1590. *Irish*, Rechrann,³ Rathlin
 Island, Antrim.
 ROSNIE, 1384, and AMAIBRI 1436, between Dunseverick and Portrush;
 perhaps the Bush and Port Ballintra, Co. Antrim.
 PORTRUSH, Proso, 1327, 1436; Portorosso, 1339; Porta rosa (or resa), 1351,
 1375, 1367, 1384; P. roso, 1373; P. rosoe, 1467; P^orosso, 1552;
 P. rossa, 1497; drosso, 1513; Portrushe, 1570, 1589, 1590. Portrush,
 Co. Antrim.

Papers and Rolls, e.g. Olderflit, 1569, Irish map and reservation of Olderfleet Haven from the grant to Angus McDonnell, May, 1586 (See Cal. S.P.I. for that year, pp. 58, 69, 125).

¹ Cauo bon sobrin, 1490.

² Sobhairche was an early monarch (*circa* n.c. 1500), says legend; but does the *sobarche*, or St. John's wort, grow near the fort? we have Duntraneen and Duneenapisha. Long identified wrongly with Carrickfergus; this error is revived without correction in the new edition of MacSkimin's "History of Carrickfergus." Some recent scholars have identified it with the Doon of Murlough east from Bonamargy; but the early maps place it either to the west of Bonamargy or (the same result) to the south-west of Rathlin; while Baptist Boazio, in a map dedicated to Queen Elizabeth soon after 1588, shows "Donsereg" between Cave Head and Whit Bay (to the east), and Dunluse (to the west), i.e. far west from "mo bonamergh." I find no corroboration for the most recent "identification" anywhere. This confirms O'Donovan's identification with Dunseverick.

³ Ptolemy's Rikina. Irish, Rachra (Rachran), Rochrinne, corruptly Raghery. Lambay originally bore the same name, which only survives on the opposite mainland at Portrane (Portrechrainn); it was Rachra in East Bregia; (see also Adamnan, (*Rechru*), and Irish Nennius, p. 127). The harbour was still Portrahern in 1308 (Dr. Joyce, "Irish Names," ser. 1, part 2, map 1). Strange to say, neither appeared in the *Portolans*.

BANN, laibani, 1327; le ban, 1339, 1351, 1426; laiban, 1360; Flu nilibano, 1367; leban, 1373; lebani, 1375; lebano, 1436; f. bani, 1467; libain, 1513; eleban, 1552; Banne, 1589; Ban, 1570, 1590. River Bann, Co. Londonderry.

LIBARA, "bra," 1367 (west of Bann); lebita, 1426. Perhaps *Irish*, Leathbarr, Liffer, Lifford.

INSCS, 1436, after Bann; LUNIVM, 1426, after lebita; FALINI, 1436, after insca; AULLUS, 1426; SCOGIUS, 1426. Unknown places; probably in Tirconnell, Co. Donegal.

ST. PATRICK'S PURGATORY, purgatoriū sancti patricii, 1413; purgatorio de S. patrizio, 1459. It appears in the anonymous catalan planisphere about 1450 as "prgtori," next "Insula de triconell"; terasanta (?), 1426. St. Patrick's Purgatory, Donegal.

TIRCONNELL ISLES, ytriconal, 1327; Insula de terconel, 1339; yterconel, 1351; Insula detriconel, 1375; triconel, 1384, 1497; Insule desconal, 1385; y^e triconel, 1426; y. de ticonn, 1436; laionel, 1513; triconell, 1552. Islands off Kilmacrenan Barony—Torry, Inishdoeog, Inishbofin, and Inishsirrer.

HEAD OF TIRCONNELL, cauo trichonel, 1490.

TORRY, Co. Donegal, Torta, 1373; torci, 1500; Toreii, 1516. Torry Island, Co. Donegal.¹

DACHVLI, Insula dachuli, 1339; daceli, 1448; dathuli, 1513; daculi, 1552.

An imaginary island, perhaps Rockall (Rokell and Rakall on Elizabethan maps); or (as Professor MacNeill suggests) Dicuil's Isle. Hardly Inistrahull.²

12. APPENDIX.

(I) IRISH MAPS IN BRITISH MUSEUM, &c.—Ptolemy, late xiv cent. No. 2, Iouernia nesos Brettanike (Burny III); copy of Fra Mauro's planisphere, 1459 (Add. 11695); Grazioso Benincasa, 1467 (Add. 11547); No. 431, his Portolano, 1468 (Add. 6390); Venetian Portolano, *circa* 1489. No. 4, coast of Ir. (Egerton, 73); Ancona chart, 1529 (Add. 11548); Portolan, *circa* 1530 (Add. 9947); Atlas, French, 1536 (Add. 5413); Venetian Portolan, *circa* 1550, No. 2 (Eg. 767); Portolan by Diego Homen, 1558 (Add. 5415). Ireland, *temp.* Eliz. (Cotton, Aug., 1114); maps by John Martines, Messina, 1582 (Add. 5019). I will only add these maps—Ireland, *temp.* Hen. VIII (Cotton. Aug.), Dean Nowell's maps, *circa* 1570 (Harl.). "Ireland," (vol. i), No. 29, general,

¹Torach in Irish; Thorach in Giraldus Cambrensis, "Topog. Hib."

²De la Cosa's map of 1500 has "origud," "boot" and bulce. The first may be from a defaced Stariford or Strangford. I cannot suggest what the others represent.

annotated by Sir W. Cecil. (II) Kenmare to Dunmanus. (III) Munster after 1565 (No. 2), addenda to 1582, by Cecil. (IV) Strangford to Carlingford, 1566 (No. 60). (V) Several by J. Goghe, 1567; Mourne, Idrone, and Thomond, parts of Co. Limerick, 1571. (VI) Dublin to Carrickfergus (No. 19). (VII) Idrone, Munster, &c., after 1580 (No. 20). (VIII) Ulster (No. 23), Antrim to Foyle (21). (IX) The Owles, Burrishowle, Irres, Tyrawley, Claremorris, &c., Co. Mayo (No. 25). (X) Spanish fort, Smerwick, 1580. (XI) Castle Mang, Co. Kerry. I only occasionally use the well-known Elizabethan map, 1569.¹

The chief of the Hardiman Maps in Trinity College, Dublin, as here used, are Nos. 1 and 2, elaborate maps of Ireland—after 1590, anonymous. No. 1 is about 1609–12. No. 6, Sea chart of Munster and Leinster. No. 7, Leinster, No. 11, Duncannon Fort, Co. Waterford. No. 14, Ulster, by Mr. Griffin of the ship "Tryemontane." No. 15, Ulster, F. Jobson, 1590 (also Nos. 16 and 17). No. 22, Lough Foyle. No. 23, East coast. No. 21, parts of Ulster and Leinster. No. 36, Munster, F. Jobson, 1589. No. 37, Munster. No. 38, Munster and Cork city, Speed, 1610. No. 43, Co. Cork. No. 56, Co. Limerick, F. Jobson, *circa* 1580. No. 57, a remarkable detailed map of Limerick city, 1590. No. 63, Shannon mouth. No. 64, Waterford city and harbour, and Duncannon. No. 67, Youghal, Co. Cork. No. 68, Connacht, 1600; also, No. 69 and 70—last by Speed, 1610. No. 72, Gallway Fort. No. 73, Galway city after 1660. See also the List of Maps by W. Reeves, Bishop of Down. No. 1080, same library.

IMPORTS, 1420–1430.

The Libel of English Policy (1416–1438), in Hakluyt's "Principal Navigations" (vol. i), throws much light on the directions from which various goods were imported about 1420–30. From Spain and Flanders, figs, dates, raisins, wine, oil, &c., saffron, and quicksilver. From Portugal, wine, figs, raisins, honey, cork, dates, and salt hides. From Brittany, cloth of gold, silk, pepper, cotton, &c. Venice and Florence, spicery and grocery, sweet wines, "apes, japes, and marmusets tayed," "niffles and triffls," and drugs. From Ireland, hides, salmon, hake, herring, wool and linen cloth, falding; martens', otters', squirrels' and Irish hares' skins; harts' hides, sheep, lamb, and kid

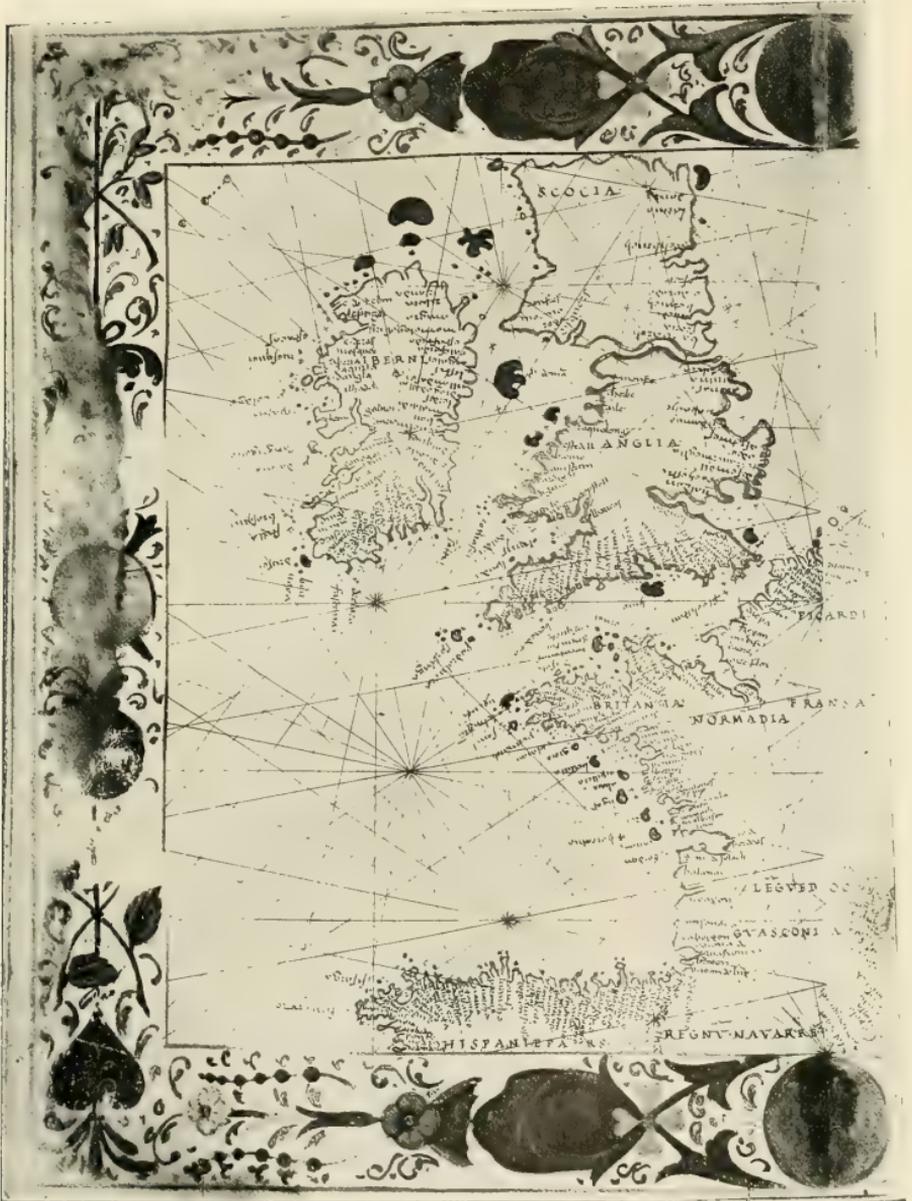
¹ Published in "State Papers," vol. ii (1834). It is, however, of little help, being a mere sketch-map; and the names are only of the chief features, and rarely exhibit unusual or instructive forms. Inishdaggell, off the N. coast of Donegal, is possibly *Insula dachuli*; *Vederfit* *haus* is Larne. It calls (wrongly) Hook Tower the "Tower of Waterford."

skins, "at Waterford, and costes many are and (as men sayne in England) be there none better havens." A jeweller in London attested Irish gold to be excellent. The poet then bids England to keep Ireland, for it is a "boterasse" and a post under England and Wales; "and God forbid but each were other's brother"! Also, "cherish marchandize, keep the admiraltie, that we be masters of the narrow sea."¹

CORRIGENDA TO PAPER ON BRASIL.

P. 230, note 3, for *Oconiensis* read *Oconiensia*. Note 4, for *Breconi* read *Brendani*; for *O'Hanlon* read *O'Donoghue*. P. 233, note², for *Terram* read *Terrarum*. P. 239, lines 22, 23, for the "buss of Emanuel Frobisher's fleet" read the "buss Emanuel of Frobisher's fleet."

¹I have to thank Mr. James Mills, r.s.o. (Deputy-Keeper of the Records of Ireland), Mr. M. J. McEnery, and Mr. Herbert Wood for many valuable suggestions as to sources of information in the Records. The second also assisted me with some identifications of the place-names. The last gave me several notes and added to many other acts of kindness that of reading portions of these proofs. I have also to acknowledge the kind permission of the Board of Trinity College, through Rev. T. K. Abbott, D.D., and Mr. A. C. De Burgh, in permitting me to publish photographs of the map of Baptist Agnesi, a late but neat and typical portolan of the second type (1450-1570). Mr. T. W. Lyster took much pains to help me with the maps of the National Library.



Baptist Agnesi's Map (Trinity College, Dublin), 1544.

WESTROFF.—EARLY ITALIAN MAPS OF IRELAND.

XVII.

ON THE ORIGINS OF LEARNED ACADEMIES IN MODERN
EUROPE.

AN ADDRESS DELIVERED TO THE ACADEMY, NOVEMBER 30, 1912.

BY REV. J. P. MAHAFFY, D.C.L., C.V.O., *President*.

THE Academy originated by Plato, without charter or opening ceremony, by the mere practice of walking and talking with his pupils in the only tree-shaded suburb of Athens, must be the first word in any history of this subject, and cannot but command our profound respect. For every such society that has since attained to fame has arisen from a like origin, save that the meetings in northern climates were indoors. The hero Hekademus, after whom Plato's garden was called, was not even a Greek hero, but a survival from some bygone race—in fact, an Attic Firbolg. If he was ever a real person and capable of resurrection, how astonished he would be at finding his name familiar over all the world, not merely including societies of learned intercourse such as the Platonic circle, but used as the ordinary Latin for all kinds of Universities, nay, even for the private rooms of very small people, who teach still smaller the rudiments of singing and dancing. Very similar is the extension of the word 'Museum' (the shrine of the Muses), from a meaning almost the same as Academy, and by the same people, to the Royal Academy of Alexandria, endowed with a great library, and with equipment for observations, but ultimately to any collection of stuffed beasts and birds and fossils—broadly speaking, any exhibition, to the curiosity of the living, of what is soulless or gone by, or dead.¹

The term 'Academy,' in its highest sense, arose with the Renaissance, and was adopted for any society that pursued and promoted learning. As such the word is commonly used in its Latin form for universities, whose chief object is the education of the young and the care of the learned professions; this use has given considerable trouble to those who were founding Academies in a far higher sense—Academies devoted, not to teaching, but to research, and in many respects distinctly opposed to the Universities. It

¹ It is still used, I must add, in its proper sense, of a literary club in some German university towns.

is shown in the beginning of one of the most famous in Europe—the Academy of the Lynxes, founded in 1603.

When the men of the Renaissance came in contact with the free inquiries of the Greeks, unhampered by theology—when they woke up to the fact that there were great sciences of nature, of external nature—astronomy, geography, mechanics, geology, which were ignored in the schools for the sake of theology, logic, and the Aristotelian metaphysic—these men, instead of attempting to revolutionize the Universities, determined to found societies for searchers into the physical sciences, which should not be bound to teach the youth, or prepare them for professions, but rather to seek the new truths of nature by experiment, by scientific observation, by research, and communicate their results at meetings of what they very properly called an Academy of Sciences. Their members were to be very few and select, their meetings small, and not meant for the vulgar public; their results, if approved, were to be printed in the Acts of the Academy, whose publication was one of the main objects of the Society. Above all, they were not to be confined to the learned men of one centre, such as Rome, or Florence, or Venice, but were to include among their Corresponding Members distinguished men from any part of the world. They were to do what the old universities would not or could not do.

How essential this conception of the special function of an Academy was, and how it has lasted to the present day, you may see in this city of Dublin, where I have been asked, more than once, what place there was for a second learned society beside the ancient and wealthy university, which counted among its Fellows and Professors the foremost intellects of the country. The Royal Academy and the Royal Dublin Society here, as others elsewhere, propose to do work widely different from that of any university. Their members are not compelled to teach, or to control the youths, or to administer any particular policy, or train for any profession. So far as the Academy is concerned, they are free to pursue the sciences in what way they choose, and to communicate their results in what form they may select.

It may not be familiar to most of you that the first attempt to found such a Society, and in imitation of the Royal Society of London, was made by Archbishop Marsh, while he was Provost of Trinity College. He found the care of 500 rowdy youths so irksome that he inaugurated, about 1700, a small and learned society, of which the famous Sir William Petty was President, and the papers written by its members—William Molyneux, Secretary; St. George Ashe, and others—were communicated to the Royal Society. It was not till 1731 that the Dublin Society began its splendid work, but one of practical usefulness, not of abstract scientific research.

There was another fundamental contrast between the early notion of an Academy and that of an university. While the latter taught the traditional knowledge—in science and philosophy, the system of Aristotle; in literature, the classical languages, and those of the Holy Scriptures—the new Academies were distinctly in opposition to Aristotle, who, in their opinion, limited and shackled research. Languages or polite literature were with most of them only a secondary matter, which they rather tolerated than promoted, especially as regards what have ever since, with some truth, been called dead languages. But in one direction they admitted that much good could be done—in the purifying and ennobling of the local languages of their respective countries, and the substitution of them as the language of modern science for the traditional Latin. More than one of them laboured at constructing an universal language and character which would save all the millions of hours spent in acquiring the mere tools to prosecute science. Here they encouraged a large and practical purpose. They desired men of research not to be hampered with a learned and artificial speech, but to express what they had to say in their own tongue, without any linguistic hindrance.

Some of them went much further, and the *Vocabulario* of the Accademia della Crusca in Florence, a work in five folio volumes, published about 1600, was, I suppose, the earliest great Dictionary of the Italian tongue. A century later Leibnitz, a great founder of Academies, carried out the same idea, and the purifying and humanizing of the German language, which even Luther's great Bible had not raised to the adequate level, was one of the most serious objects which he proposed to the Academy of Berlin. He was led, as all great men are, by precedent, and this he found in the older Italian Academies. The Royal Society of London, founded only a generation earlier, was that which he most of all desired to take as his model, but he was much exercised by that body's adoption of the term *Society*, instead of *Academy*; so much so that he suggested its adoption for the new foundation, seeing that the other term was so frequently used as to be almost vulgar. But in a great centre like London, where the members were not far asunder, there is much to be said for the term *Society*, especially as it makes the term *Fellow* suitable for its members. An Academy, which may be worldwide, has *Members*, not like the *Fellows* of a College or a Society. These considerations of the proper use of language have been violated by a recently founded body, which, instead of becoming a department of the great and famous Royal Society, founded a distinct British Academy, and called its members *Fellows*—a novelty not to be commended. We have, however, no right to criticize our neighbours, seeing that the solecism "Fellow of this University" has even crept into the Chapel of Trinity College. All these improprieties, however, were left in the

shade by the defunct Royal University, Ireland, which had neither a College for its Fellows nor Professors for its University. These remarks may be thought irrelevant by those who forget that the maintaining of the purity of spoken idioms has been from the outset one of the express objects of the learned Academies of Europe. Any little contribution which I can make does, therefore, find a just place in this Presidential address.

I think it well to illustrate these general considerations by some notices of the early history of some famous Academies. I am obliged to give prominence to those to which I have the honour to belong, for from them I have received the necessary documents, which are not easily to be found in any of our public libraries. Many others—such, for example, as the Academy proposed by Leonardo da Vinci, at Milan—are not treated in accessible books, nor are our Encyclopædias, so far as I have searched them, of any use [whatever]. We hear of even an earlier attempt—the *Academia Pontaniana* in Naples in 1453, and an *Academia Platonica* in Florence, founded by Lorenzo dei Medici in 1474. But why name any more of them, when we are told by the learned historian of the French Academy (Pellisson) that in Italy alone were found 116 scattered about through every famous city of the peninsula? He tells us that most of them either had a short life, or their best members, such as della Porta, were incorporated among the Lynxes, whose famous society may now occupy us for a few minutes.

There is no Academy in Europe which can compare with that of the Lynxes in its combined antiquity and dignity.¹ By the liberality of the late King of Italy, the active co-operation of Sella, when Prime Minister, and the generous conditions of sale made by Prince Corsini (Duke of Casigliano), whose fine palace, with all its family treasures in pictures, books, and prints, they now possess, this Academy has little likeness to that founded by the Prince Frederick Cesi.² He was then a boy of eighteen, full of enthusiasm for the new sciences—astronomy, physical geography, botany, and the like; and he associated with him three young men of twenty-seven, of whom the most important was John Heck, a Dutchman from Deventer, but a Catholic, who had left Holland owing to persecutions by the violent Protestants, and had studied in the University of Perugia, where he obtained the degree of Doctor of Medicine in 1601. This training accounts for much of his work in botany and toxicology. Cesi was a rich nobleman; the rest were of no distinction in their origin or circumstances. But I note two things: one the presence of a medical man, versed in the study of the human frame and the nature

¹ Cf. *Breve Storia della Accademia dei Lincei*. D. Carutti. Rome, 1888.

² Elder son of the Duke of Acquasparta, whom he succeeded in the title.

of drugs, and also this larger fact that there is no mention or thought of any existing university—and there were many—whether in praise or blame. The feeling which often does make itself heard is this: we will not submit to the Aristotelian theories of nature; we will search them out for ourselves.

To carry out these ideas, four young men propose in their *Linceography* the following magnificent programme:—The Academy was to establish Houses called Lyceums, in the four quarters of the world, provided each with its own revenue, where the members should lead a common life; each should possess a museum, a library, a printing-house, observatories, machines, botanical gardens, laboratories—everything that pertains to research. From each of them every new observation or discovery was to be communicated to the rest. The main purpose of the Institution is thus described: “The Order or Academy of the Lynxes is a class or college of students, who, having established for themselves suitable rules, and having joined in mutual and friendly counsels, shall apply themselves with seriousness and diligence to the sciences. Their end is not merely, by living together in rectitude and piety, to acquire knowledge and wisdom, but to publish what they discover to all men with voice and pen peaceably, and without annoying anybody.” This last clause seems the most chimerical of all. How could such a society fail to offend those who thought themselves the authorized expounders of all human learning?

There is no rule affecting the secular clergy as members: but the regular were not received; it is even ordained that those who join an Order after their election shall give away their ring to some new member. This ring held an emerald with a lynx’s head engraved upon it, because it was thought an animal (then still found in the wild parts of Italy) of such acute vision that it saw through the surface into the inner parts of any object on which it fixed its gaze. Cesi was even disposed to require of his associates celibacy, for there is no greater obstacle to a life of research than the *mollis et effeminata requies* of marriage. The motto on the ring was *Sagacius ista* (more sagacious than this (lynx)). The first four members, after the fashion of those days in all the academies, took strange names—*Celivago*, *Tardigrado*, *Eclissato*, *Illuminato*.

The 17th August, the day of their foundation in 1603, was to be kept by every Lynx throughout the world as a day of feasting, hospitality, and joy, in remembrance of the founders—a thing which reminds us of Epicurus and the directions he gave his sect.

On the other hand, it is well to quote the original document regarding the attitude of the Lynxes towards the established religion:—

“Let it be the anxious care of the Lynxes to live devoted to all Christian

Princes, especially the ecclesiastical, and their Vicars and Administrators, and work for all good men; but to treat men of letters, and especially leading theologians, with special veneration; above all things, to love and obey Almighty God and supplicate Him to illuminate the minds of the Lynxes with His Holy Spirit . . .; and moreover to pray for intercession with Him to the Blessed Virgin Mary, St. John the Evangelist, and St. Catherine, also all the Saints who were Doctors and philosophers—St. Thomas Aquinas and St. Ignatius Loyola as being especially favourable to letters—and this, both collectively and individually, in all the Society's feasts." Finally—I have abbreviated the document considerably—St. John the Evangelist was elected, from the great company of the Saints, special protector of the Lynxes because his spiritual vision was so penetrating and transcendent.

These things show the very harmless and pious views of the founders; yet not many years elapsed before the Church interfered with their liberties, and the condemnation of Galileo, their most distinguished member, who had subscribed the extant roll on April 25, 1611, proved to them clearly that no submission to authority in words could save men who searched for the truth in things after a manner which might easily lead to a subversion of the traditional philosophy.

The attitude of the Lynxes during the trial of Galileo¹ was calm and dignified, and they asserted strongly that his theory had only been put forth as a hypothesis, not as a new truth to upset any existing doctrine. Though in the greatest danger from the Inquisition—it was only sixteen years since Giordano Bruno had been burnt in Rome—the Society made no confession of guilt, nor did it consider any justification required.

The literary activity of the founder and his fellows was very great. They wrote and read a vast number of papers for the Society, of which the enumeration, printed by their modern historian, amazes us. Heck travelled all over Europe—even to Ireland—for nine years, and wrote down his many experiences. He conferred with Kepler, and with Tycho Brahe at Prag; and either he or some other member pressed on the Prince the importance of making Francis Bacon a member. But he was too far off. While the founder lived they were amply provided by him, and afterwards at intervals by generous cardinals; but the want of a fixed income was a standing danger to the Academy, and was probably the reason why almost all its sisters in Italy were extinguished.

¹ With the exception of one mathematician, who gave evidence against Galileo, and was accordingly debarred from all intercourse with the Society. To expel him would have been dangerous.

If the Lynxes were founded mainly to prosecute scientific studies, the case of the French Academy, founded by Cardinal Richelieu in 1635, is wholly different. The suggestion for this foundation was derived from a private society of cultivated, rather than learned men, who had social evenings together, wherein they discussed literary questions, and especially the purification of the French language. These meetings became famed for their pleasant conversation (just as the breakfast at the Zoological Gardens on the occasion of the weekly meeting of their Council has that reputation in Dublin), and this was reported to the Cardinal, then all-powerful in the State, and moreover a purist in language. We are told by their excellent historian Pellisson¹ that they were unwilling to surrender their privacy and liberty, when the Cardinal signified that he would be their protector, but to thwart his wishes was thought too dangerous; people spent years in the Bastille for far less offences than that. Moreover, Richelieu desired that everything in France should depend upon himself—in that quality the forerunner of Louis XIV and of Napoleon; he was jealous of anything remarkable that had not emanated from his favour. So the Academy, in spite of the delay of three and a half years before it was sanctioned by the Parliament, where Richelieu had many secret enemies, received its patent, and went to work in 1637, with the formal duty of “ornamenting, embellishing, and augmenting” the French language, which was then rapidly attaining a primacy in Europe. The members were not to meddle with theology, politics, or science, but confine their work to producing essays on matters of literary style and to criticizing the works submitted to them. They were attacked by many satires, and ridiculed for the attempt to limit freedom in the use of language. There were those who regarded it as a further inroad on liberty by the autocratic Cardinal, and indeed not without reason; for when Corneille’s *Cid* appeared and took the public by storm, Richelieu compelled the Academicians, sore against their will, and in spite of all their protests, to submit this work to the criticism of a committee chosen by lot, with broad hints that they should censure its style, because it displeased his creature, M. de Scudery. They were ordered to correct the text before it was printed for the public. I need not follow this well-known affair further. It augured badly for the future of the Academy, which could hardly flourish under such protection.

Its next project was the publishing of a great dictionary of standard French, as well as a grammar determining what was correct usage. This task was evidently suggested by the earlier effort of the Accademia della Crusca, which had laboured forty years at their *Vocabulario* of the Italian language, and gained thereby not only great glory but great profit.

¹ Cf. Pellisson’s *Histoire de l’Académie française*.

The further history of the French Academy does not now concern us. Its general frame—a President and Chancellor, who were frequently changed, and a ‘perpetual’ Secretary, who held his office for life—was very common in the older academies. It secured two great objects—(1) the raising the credit of the Academy by associating many distinguished men with its name; (2) the securing of continuity in its ordinary policy by means of a trusty permanent official. If it suffered from State patronage, it at least gained a safe income, and we wonder that for a long time it was not provided with a fixed domicile, but in this it encountered a difficulty common to the progress of many other similar foundations, which started from private societies.

The history of the English *Royal Society* lies before you in the handsome volume re-edited in this very year, their 250th anniversary, by Sir Archibald Geikie. Here, again, we have the usual circumstances—a club of private persons deeply interested in positive science, meeting together to make and record experiments, and discuss the discoveries to which they might lead. There was the same desire to escape publicity, and to give themselves fancy names. The club was known as *The Invisible College*.

It is very likely that Bacon’s *New Atlantis*, first published in 1637, and very popular in the succeeding years, acted as a stimulus, though his vast scheme was far more like that of the original Lynxes, and those we shall find in Germany. Yet I have little doubt that the numerous Academies of Italy must have been as well known to some of these men as was the *della Crusca* to the French. During the stormy days of the middle seventeenth century one of them, quoted by Geikie, says they only met “for the satisfaction of breathing a freer air, of conversing together in quiet, without being engaged in the passions and the madness of that dismal age.” The mathematician John Wallis gives a list of these men who met about 1645; and it is remarkable that he mentions Theodore Haak, a German from the Palatinate, as first suggesting the idea. Their inquiries were confined to science pure and applied, especially to that which was experimental, and they pointed to Bacon and Galileo as their precursors. Robert Boyle was the leading spirit among many eminent thinkers, including William Petty and Christopher Wren. About 1658 they began to meet in large rooms in the Gresham College, and presently to think of forming a definite Society. The poet Cowley was indeed one of them, but not as a poet. He had published a tract on the advancement of Experimental Philosophy. Then, just as in the case of the French Academy and Richelieu, King Charles II heard of it, and signified he would become its patron. The English king’s patronage was not so irksome as that of the ambitious cardinal had been to the French Academy. The king was rather bent on amusing himself, though he had with him a very

different companion, Prince Rupert, whose signature, with those of the king, his brother James, and Prince George of Denmark, you can study in the beautiful facsimile of the Roll lying on the table. The Society was much larger than the French forty, because they admitted nobles as such, without expecting from them more support than liberal contributions to their funds. The king endowed them with the ground on which Chelsea Hospital now stands, and bought it back from them when he determined to build that hospital. It is recorded that he looked on with profound amusement at the experiments to find the weight of the atmosphere—what could that signify to anyone?—but I do not see confirmed in Geikie's trustworthy History the story we were all told in our youth, that he set them the problem to discover why a live fish in a tub of water made no difference in its weight, whereas a dead one did. We used to be told that a sceptical member who proposed the king's assertion should be verified by experiment was thought to have verged on high treason in his doubts. These were the humours of the Society as repeated in satirical poems and criticisms which emanated from the old-fashioned, who suspected some heresy in everything new. There is distinct evidence that the Universities—though their professors of mathematics and physics were among the earliest members—looked upon the Society as damaging to their reputation and influence. I have said that there was no linguistic side, no polite literature included, save by exception, though great men of letters were admitted—Dryden and Waller among them. But there was an attempt made by one of the greatest of them, John Wilkins, afterwards Bishop of Chester, to obviate the difficulties of international work being carried out in vernacular languages. How could learned men communicate their discoveries one to another across the globe? Far from insisting, therefore, on the purification of English, in imitation of French and Italian examples, he set himself to invent an international script, wherein all languages could be set down. It was somewhat like the ideographic system of the Chinese, which can be read into the language of Japanese, Manchus, Coreans, and others, because the signs represent ideas, and not words. This would seem to be a logical addition to the great schemes of having sister colleges in many lands, whose work should pass from one to the other with promptness and certainty.

His book, delayed by the destruction of parts of his manuscript and proofs in the great fire of London, nevertheless appeared in a stately folio in 1668, under the sanction and with the seal of the Royal Society, and printed by its printer. The author started with a common script, based on logical classifications of ideas; but he hoped to advance from a common script to a common language, in this the forerunner of Volapük, Esperanto, and Ido, but

on much more philosophical principles. All this work was the direct outcome of early discussions in the Royal Society.

Let us turn to the like movement in Germany—a land now teeming with great Academies, but which possessed none till near the end of the seventeenth century. When the land recovered from the horrors of the Thirty Years' War, and began to show the first signs of rivalry with Italy, France, and England, we find¹ the spirit of the Renaissance in general culture combined with the new enthusiasm for the investigation of nature, and the sense of liberty produced by the creed of the Reformation. We have seen in the instance of the Lynxes that this last was not a necessary factor in the development, as Harnack seems to think. Academies were founded both earlier and later under the patronage of the Roman Church, and even at Rome, when the Lynxes broke loose from control, there is an ecclesiastical Academy of the same name, which, in our own day, gave a splendid jubilee feast. But the right of private judgment in religion was, no doubt, a great stimulant to the same right in science; and so there were several now forgotten private societies of this kind in Germany from about 1660 onward.

The first prince, however, who took up the idea warmly was the man known as the Great Elector of Brandenburg, father of the first King of Prussia, whose conception of a Cosmopolitan Academy of Science is expressed in language that seems to us now like the dreaming of an intellect which has lost its balance. He actually issued a patent in 1667 for a Brandenburgian Universal University of the modern sciences and arts. It was to be a free home for all spirits, and an asylum for all the persecuted scholars of Europe, a place of refuge for all oppressed creeds, a centre for all pure and applied sciences, a union of minds, and the palace of the loftiest sovereign in the world, even of Wisdom. It will enjoy everlasting peace; for during wars it will be declared inviolable under international treaties; even amid the din of arms the Muses will not there be silenced. Every liberal art will be taught without limitation; they will all manage their own affairs, and stand under no authority but that of the Elector; all aids for prosecuting sciences will be granted them. The Platonopolis which the pupils of Plato had dreamed, the poets of the Renaissance seen in visions, was now to be the creation of the Protestant State of Brandenburg! Learned men would find there on the Parnassus of the Greeks the Maecenas of the Romans, great novelties indeed, I may add, for exiled Jesuits and Calvinists, who, whether they played the part of the lion or the lamb—indeed they had played them both in turn—would

¹ As Adolf Harnack says in his full and accurate *Geschichte der k. preussischen Akademie der Wissenschaften*, Berlin, 1906, which has been my guide.

here lie down together, and a little child—the Elector of Brandenburg—might lead them.

The family likeness to the pronouncement of Lynxes, nay, to the vision of Bacon in his *New Atlantis*, is very striking; and yet I have found no evidence that the Great Elector knew either of them. Whether Bacon had not heard of the Italian visions is a question which I cannot answer without further investigation. At all events the patent issued by the Elector was the rhodomontade, not of a philosophical speculator, but of a famous ruler with sound practical sense, and the founder of the political greatness of North Germany. Those who have studied the hopes and anticipations of the whole epoch of the Renaissance will find that its young men everywhere felt a similar wild enthusiasm, though they were not kings, and expressed it in less fanciful ways. The German enthusiasm was just as great as the rest though perhaps a little clumsy, and the hopes of that age very different from those of our specialized and prosaic scientists.

It was a happy coincidence, indeed, that these hopes and aspirations accompanied the rise into eminence of Leibnitz, not only one of the greatest philosophers but one of the greatest organizers of learning that ever lived, who showed his vast genius in no respect more brilliantly than in his promotion of Academies. He urged, indeed, that the foundation of such international institutions should be coupled with the re-union of creeds, and that Catholic and Protestant should find some common ground of dogma which might remove some of the most deplorable obstacles to the development of a higher civilization. But on this point the age was not with him. People had, indeed, become sick of theological disputes, and had come to consider this cause of desolating wars with weariness and with disgust. But they were quite willing to pursue secular learning without any regard to creed; and so Leibnitz found no serious hindrance here to his other great plans. The material obstacle which had always stood in the way was the impossibility even to imagine any Academy as self-supporting. The Italians had depended on the splendid but sporadic liberality of enthusiastic noblemen. Leibnitz knew that a State endowment afforded a more reasonable hope, and his insistence upon this condition was of great service. But he sought it not so much in direct subsidies as in obtaining grants of State monopolies of such things as only learned men produce. Chief of these was a proper reformed Calendar for the use of all the nation, at a time when astronomy was still new and marvellous, and things now obvious were wonders to the ordinary public.

He knew very well that this one monopoly would not suffice, and proposed many other fanciful sources of income, such as a tax on travelling abroad, but in none of them was he successful. On the other hand, he found at Berlin

a most sympathetic sovrain with his consort—Frederick I and Sophia (a princess of Hanover)—who assumed the royal title in 1700, and in the same year issued a patent for the Prussian Academy, and very promptly too, for the reform of the Calendar was urgent, and was sure to be adopted by all the Protestant States in Germany. The building of an observatory for practical astronomy was suggested by that of Greenwich, and was necessary for the Calendar; the study of the purification of the vernacular was naturally suggested by the French Academy, and both these models were now well known—indeed, Leibnitz had been made an honorary member of the Societies both in London and Paris.

But for the sake of finding further means, he even projected a practical side to improve mechanical arts and agriculture, so that, had he been in Dublin, he would have added our Royal Dublin Society to this Royal Irish Academy. Not content with this success, Leibnitz embraced within his view the foundation of some such body in every capital of Northern Europe, especially that of Russia, from which he hoped to reach the learning of China, which seems then to have been much overrated. But everywhere through Germany—at Dresden, at Frankfort, and particularly at Vienna—he promoted the founding of Academies, so that, though he did not live to see it, there arose a whole network of them—most of which still exist—all due to his scientific propaganda.

It may interest us to consider how one man, however brilliant and versatile, could possibly exercise so vast an influence. I attribute much of it to his having taken a leaf out of the book of the Jesuits, though they were certainly no friends of his—*Sed fas est et ab hoste doceri*. They had discovered that in those days nations were to be converted by converting the nations' princes. Their influence then radiated from the throne all over the country. So Leibnitz was perpetually dealing with courts far more than with the existing societies; and he brought his influence to bear more perhaps as a politician than as a pure man of science.

No more interesting example of the method of Leibnitz, and indeed of the general course of the foundation of an Academy, is to be found than in the history of the many attempts to make Vienna the centre of such a body.¹ A German called Konrad Pickel, who also bears the name of Celles, had long since founded in Ofen a *Literaria Sodalitas Danubiana*, which, on his appointment as Professor in Vienna, he transferred (1490) to that city. It was only a private society, but on very broad lines, including Hungarians.

¹ It is all set forth admirably in the *Geschichte der Gründung und der Wirksamkeit der kaiserlichen Akademie der Wissenschaften*, &c., by their secretary, Alfons Huber, in 1897.

Italians, and Slavs among its members. But for want of State support it died with its founder in 1508. Wars with the Turks, pestilences, and religious differences prevented various other attempts from succeeding. The spiritual conquest of the Empire by the Jesuits, which lasted from about 1590 to 1773,¹ acted as an insurmountable obstacle; for though that famous Order always valued letters and even science, both could only be studied under its supervision. They obtained control of the faculties in Vienna in 1627, and founded universities in their own sense in Graz (Styria) and Prag (Bohemia), the strongholds of southern Protestantism, from which their counter-Reformation had swept out the Evangelical creed. But when Paris and Berlin had founded Academies, Leibnitz thought it high time (1704) to persuade the head of the Holy Roman Empire (Leopold I) to make a like foundation in Vienna. For this purpose he came repeatedly to this capital; he had the support of the famous Prince Eugene of Savoy, and proposed the founding, not of an Academy—for that title, he says, has become rather cheap—but an Imperial Society of Sciences, combining the objects of the French Academy and our Royal Society. He even included practical sciences in his scheme. As elsewhere, he proposed to raise means by the monopoly of the Calendar and taxes on various luxuries. The whole thing seemed settled in 1715, for the Emperor had formally consented, when a new war with the Turks and Leibnitz' death put an end to the almost realized scheme. The famous Leipzig Professor Gottsched made another attempt in 1749. But his plan, which would have made the Academy like our Royal Dublin Society in character, though seriously discussed, ended in failure—again owing to financial objections. The suppression of the Jesuits in 1773 immediately produced renewed schemes for an Academy of Sciences free from theological control; but the Empress Maria Theresa had no liking for it, and would not promote it. Her successors were wrestling with great wars, and with the dangerous poison of revolutionary ideas.

The Napoleonic crisis had long passed before a group of learned men resumed the attack upon the Imperial Government, reminding it that in all Europe there was but one other capital, Constantinople, which did not possess such a Society. Their efforts failed for several years, being delayed by official stupidity and political suspicions, till Metternich, when Prime Minister, at last determined to play the part of Richelieu in France, and sketched out a plan quite on the lines of the petitions of the learned; and so the Academy was brought into real existence. But the police authorities were still insisting upon supervision of the papers and proceedings of the new body, when the

¹ The date of the famous Bull, *Dominus ac Redemptor noster*, which suppressed them.

Revolution of 1848 swept away all this obscurantism; and from that date this great foundation has lived and prospered under nominal control and generous support of the Crown.¹

When we look at the present state of the Royal Irish Academy, we may well be almost amazed at the strict conformity of our theory and practice with the ideas that led to the creating of all the old Academies in Europe. The great founders, from Prince Cesi to Leibnitz, would have nothing to say against any of our methods, and would be delighted to find how the plans they formed and the results they strove to attain had been at least partly matured in this furthest corner of north-west Europe. We are indeed broader than some of our forerunners in that we do not exclude from our ranks any member of any religious order, and have indeed received from such ecclesiastics great and notable help in our departments both of modern science and of polite literature. I take our primary object to be the publication of papers on abstruse science which cannot expect many readers, and therefore owe their publicity to our patronage. But we have not been idle in the department of polite literature, and there are, in our various Transactions, essays which are recognized as having made a large advance in their subjects, and which are prized as of permanent value. Even as to the lesser object of purifying and regulating vernacular speech, so as to make it a fit vehicle for literary and scientific writing, we have paid special attention to one of the languages of this country which I find it difficult to classify. For if we call it the vernacular speech of the country, we find ourselves in the midst of conflicting opinions—one party regarding it as a dead, the other as a living language. There are still more who regard it as neither the one nor the other; and even these cannot agree, for some tell us it is dying a gradual but certain death, while others affirm that it is rising like a phoenix from its ashes, and bursting into new and vigorous life. Fortunately our Academy has no interest in settling this dispute. For if it be regarded as an ancient and important branch of the Aryan languages of Europe, it comes directly within the scope of the science of Comparative Philology, and the interpretation of the precious MSS. preserved by the Academy affords an admirable field of research in the truest sense. But if we regard it as a modern tongue which wants purifying and crystallizing by sound texts, grammar, and dictionary, not only have we in hand the most elaborate lexicon of the language that has ever been attempted, but we have supplied the teachers of literary Irish with a text-book which they have all

¹ Time has failed me to make a similar study of the Academy of Munich, which was created in 1759. I am also relieved of the duty of giving the history of this our Academy, because it has been admirably treated by one of my predecessors, Dr. Ingram, in his Presidential address of 1890.

pronounced indispensable—I mean ‘The Three Shafts of Death,’ as edited by one of my predecessors in this dignity—a scholar and thinker whose profound and brilliant services to this Academy and to this country neither his own proud aloofness from the crowd, nor the envy of smaller rivals in the same field, nor the interested depreciations of politician-scholars, can ever tarnish or supplant.

But even to those who are prosaic enough to hold that English is the real vernacular of this country, I venture to offer a further suggestion for its purification. It is with deliberate intention that I have not spoken of “original research” as one of the objects which an Academy should promote and patronize. And my reason is that the phrase seems to me either idle or misleading. In the proper sense, all research is original; and research is not to be confined to the seeking of new facts of nature, but must be extended to the solution of problems suggested by these facts. In the proper sense, any student who solves a mathematical problem by the application of his former knowledge performs an act of research. So does the student who has the problem proposed to him of turning a piece of English into correct Latin prose. He has to apply his stock of knowledge to a new problem; and in both cases the research is so far original that he does it from his own store of knowledge, and his own intelligence. How strictly original it is in the latter case is proved by the fact that no two attempts, even by scholars of equal merit, will ever be even nearly the same. Each will show variations, making it the peculiar production of its author. All research, therefore, in the proper sense is original, whether it be the solving of an abstract problem, the rendering of one speech by another, the finding of a new planet in the abyss of space, or the cataloguing of the minutest vermin that infest the solitudes of Clare Island,¹ provided even the last depends on a method supplied by the student, or discloses to us a new law of nature, even in the narrowest sense. On the other hand, if we understand by original research a course of study which no other searcher has ever yet attempted, then we reduce the phrase either to one of the rarest application, or to the pursuit of some idle and trivial problem, of which its originality is the very sign of its weakness. The great discoveries of the world are, no doubt, due, if not to accident, to original research in the highest sense. But to apply this phrase to the work of every student in a laboratory, set by his teacher to make particular experiments, is surely to call things great and small by the same name, and to give a pompous title to what is only the

¹An exhaustive catalogue of the Fauna and Flora of Clare Island, off Clew Bay, Co. Mayo, now being prepared under the auspices of this Academy.

drudgery of learning. Such drudgery is necessary in every science, especially to the learners; but let it be called by its proper name, *research*, without the absurd qualification so common among sciolists of our age. Let this be my last digression devoted to the work of the Academy.

And so, living as we do in an atmosphere charged with political and theological electricity, we have never experienced an explosion from within or a persecution from without. We have escaped the dangers both of penury and of patronage. We stand aloof from factions and parties—in this perhaps unique in Ireland; we stand aloof even from the Universities, though we welcome in our ranks those of their teachers who desire to be more than schoolmasters. The task of educating the young, of combating not only ignorance, but idleness and stupidity, not to speak of the blunders, of incompetent primary teaching—all this is a noble task, and many a fine man has devoted his life unselfishly to those harassing duties. But far higher is, and must ever be, the search after truth for its own sake, the deciphering of the vast cryptogram of nature, the contemplation of the laws of matter and of mind, which Aristotle—in this at one with his critics—thought the supreme felicity attainable even by the gods.

XVIII.

ORNAMENTED BRONZE SPEAR-HEADS WITH APERTURES IN
THE BLADES.

PLATES XLVI-XLVII.

BY GEORGE COFFEY.

Read JANUARY 13. Published FEBRUARY 8, 1913.

IN my paper on the classification of Spear-heads of the Bronze Age found in Ireland, published in 1894, I touched upon a type of ornamented spear-head with apertures in the blade, of which there are a number in the Academy's collection, and I derived the type from the spear-heads with loops joined to the base of the blade, these appearing to be a transitional form between the looped and rivet-holed spear-heads. The manner in which I considered the type evolved can be seen on reference to my paper, fig. 24, p. 499, and figs. 27-30, p. 500.¹

I am now somewhat doubtful as to the evolution of this type having taken place in such a direct way, and am inclined to consider the openings in the blade may also be due to the influence of a primitive class of spear-head found in the Greek Islands.

This is suggested by Montelius,² who includes in this class (as I did) the spear-heads in which the openings in the blade are formed by the junction of the wings and the loops; he derives two examples found in Holstein from England. They may, however, have come from Ireland, which was at that period, according to my theory, in direct connexion with the Continent. The original home of the spear-head with a tang and two side apertures is the Greek Islands, where this type is known from the commencement of the metal period, being derived from a stone prototype and attached to the shaft in the same manner; that is by placing it in a split shaft and binding it in through the side apertures. Socketed spear-heads with openings in the blades have been found in South Italy and Sicily, Austria, East Russia, and France, but they are very rare in these countries.

¹ Proc. R. I. A., vol. xix, p. 486.

² Die Chronologie der ältesten Bronzezeit, p. 215.

The apertures in the blade are considered by Canon Greenwell to have been introduced in order to economize the metal, and this only at a late period in the evolution of the spear-head. He states that some spear-heads found in Italy, Hungary, etc., have small round holes at the base of their wings; but these do not in any way represent the lunate openings or the loops on the socket of spears found in the United Kingdom.¹ It may, however, be pointed out that a somewhat short socketed spear-head found in East Russia, figured by Montelius,² shows two large openings in the wings resembling those in spears found in the United Kingdom.

The identification of the type with the United Kingdom may be said to be certain, as the socketed spear-head itself appears to have been evolved in the British Islands, and the only question is how far the form with the apertures in the wings may have been affected by the type of the Greek Islands, or whether it was due, as Canon Greenwell suggests, to economizing the metal, or again was evolved from the looped spear-head. Some specimens of this type of spear-head have, as well as the lunate openings, small circular holes either at the base of the openings, or alternately one above one opening and one below the other on opposite sides, in which case the lunate openings are placed not directly opposite to one another, and in one example the small holes are placed one above each opening and one below it.

One example found at Denhead, Coupar Angus, has no less than ten circular holes, six above the lunate openings and four below them, making two series of five holes on each wing. In the case of the Irish examples, I have examined the holes to see if there was any trace of any substance having been inserted in them, but I could find none. The casting of one spear-head of this type is singularly good and rare; it is unfortunately much broken, but was very highly ornamented. There was a raised rib down the centre of the mid-rib and a similar raised rib round the lunate openings and the inner sides of the wings, which are peculiar, as, where they start from the lunate openings, they are, as can be seen in the figure, separate from the mid-rib, though they no doubt joined this higher up. The circular holes at the base of the openings are also decorated with a raised rim, and probably contained settings of some kind. In some the breadth of the wings is decreased in width and the socket has lengthened, while the openings, which are small, are placed higher up in the wings. The casting of the spears is very fine, and they are ornamented with ribs round the apertures and down the sides of the

¹ *Archaeologia*, 61, p. 452, note.

² *Die Chronologie der ältesten Bronzezeit*, p. 214, fig. 518.

mid-rib, and in some cases ornamental ribs of cable pattern run down the centre of the mid-rib and are continued on the socket, being carried round the rivet-holes. The outline of the blade assumes an ogee curve in some which I estimate as late; they probably represent the latest evolution of the type, and much art has been expended in their decoration. In others the ornamentation, though plainer, is somewhat similar, as there is in most cases a raised rib on each side of the centre rib, which is carried down on each side and continued as a flat projection containing the rivet-holes. The outer side of the lunate opening is also ornamented with a raised edge. There is one large example in the Academy's collection placed in this class which has the base of the socket ornamented with rings and reeding (Plate XLVII, fig. 5). When complete this spear must have measured 13 or 14 inches in length, and must have been a very fine specimen. The ornamentation of these spear-heads with the lunate openings presents many analogies with the spear-head found at Tempo, Co. Fermanagh, which I recently described and placed at the end of the period of the looped spear-heads, about 1200-800 B.C.¹ This conclusion was principally based on the excellence of the casting and its provenance with contemporary leaf-shaped swords. One of these spear-heads with lunate openings in the blade was found in the Dowris hoard.² Supposing this to have been contemporary with the other objects of the find, such as the trumpets and caldrons, it would bring the date down to well within the limits above mentioned, and these spear-heads must have lasted down to the latest period of the Bronze Age, though they may have been in use very much earlier.

I give illustrations of all the spear-heads of this type at present in the Academy's Collection, and append the localities where they were found.

DESCRIPTION OF PLATES.

PLATE XLVI.

Fig.

1. Found in a small rath in the townland of Corcerum, near Loughgilly, Co. Mayo. St. Columba's College Collection. (1906 : 46.)
2. Locality not stated. (W. 88.)
3. Electrotype; original in possession of T. B. Costello, M.D., probably found in the neighbourhood of Tuam, Co. Galway. (1908 : 6.)
4. Locality not stated. (W. 112.)

¹ Proc. R. I. A., vol. xxx, sec. C, p. 92.

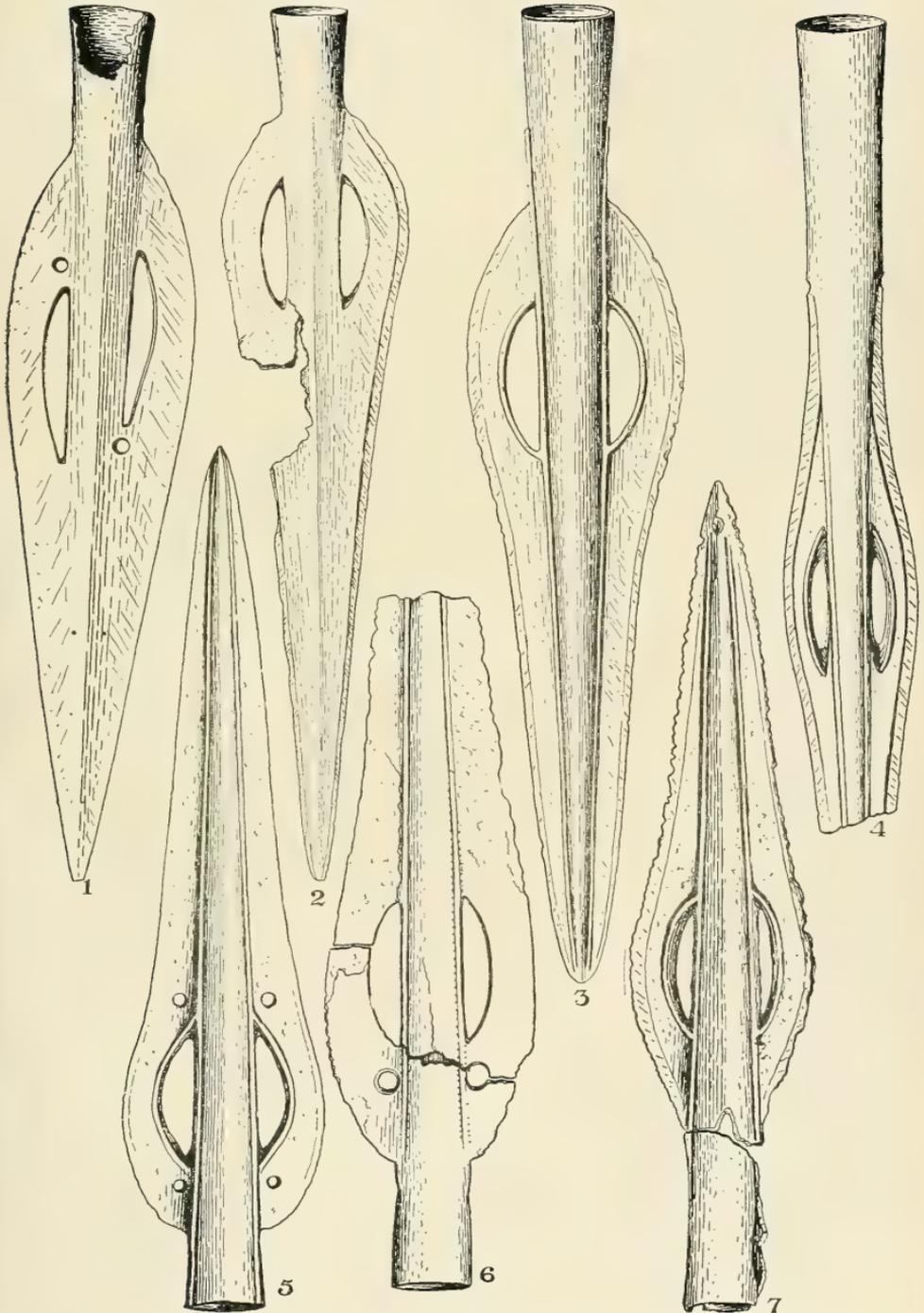
² British Museum Bronze Age Guide, p. 28.

Fig.

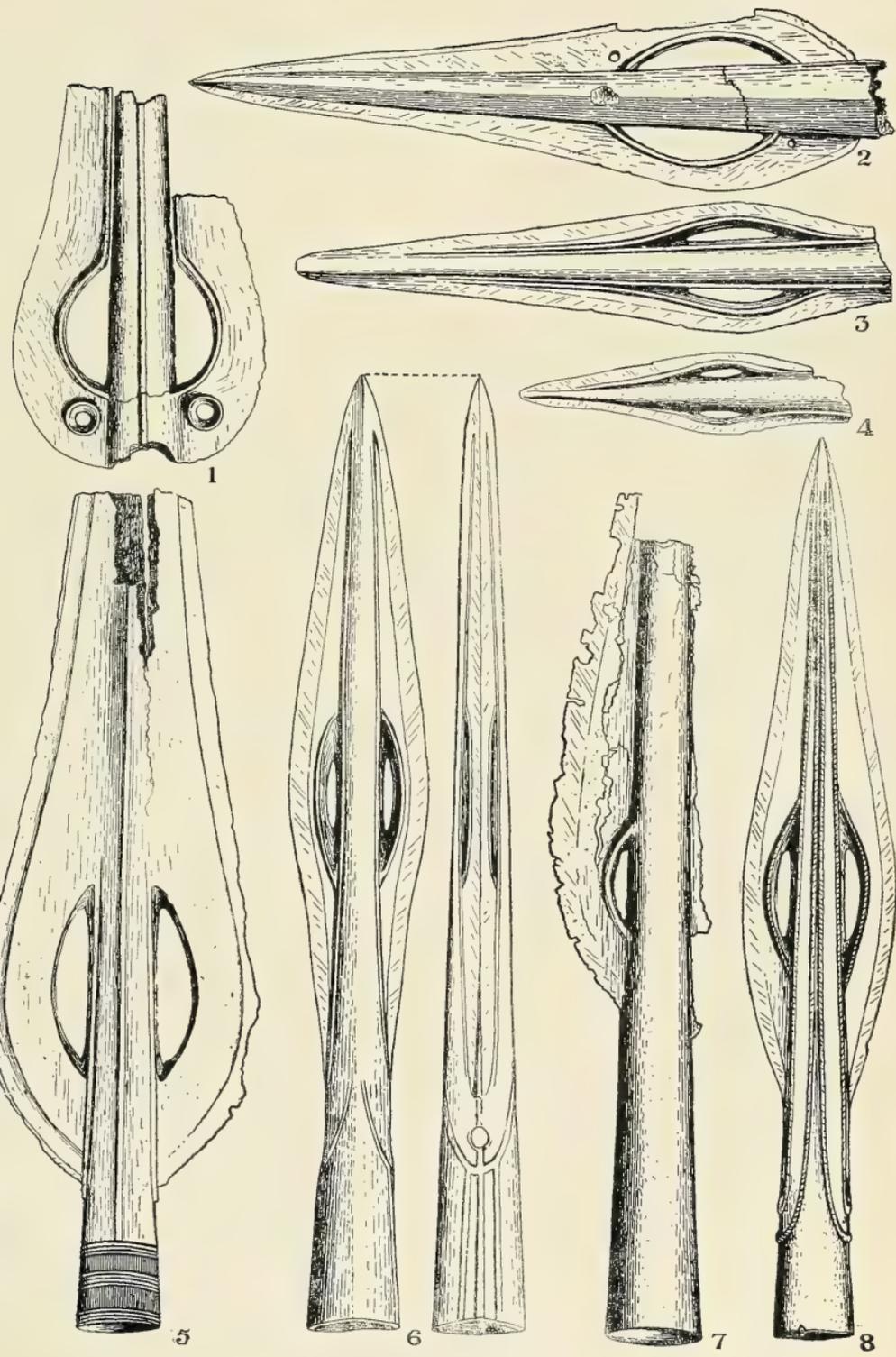
5. Locality not stated; formerly in collection of the Royal Dublin Society.
(W. 252.)
6. Locality not stated; formerly in the collection of Dr. Petrie. P. 265.)
7. Exact locality not stated. (1881: 213.)

PLATE XLVII.

1. Locality not stated. (W. 100.)
2. Locality not stated. (1881: 25.)
3. Locality not stated. (P. 314.)
4. Said to have been found in a rath near Strokestown, Co. Roscommon.
(1879: 46.)
5. Locality not stated. (W. 36.)
6. Locality not stated. (W. 253.)
7. Locality not stated. (W. 112.)
8. Presented by the Shannon Commissioners, so presumably found in or
near the Shannon. (W. 34.)



COFFEY.—ORNAMENTED BRONZE SPEAR-HEADS.



COFFEY.—ORNAMENTED BRONZE SPEAR-HEADS.

XIX.

TWO UNPUBLISHED LUNULAE AND OTHER OBJECTS.

PLATE XLVIII.

BY GEORGE COFFEY.

Read JANUARY 13. Published FEBRUARY 8, 1913.

IN my paper on the Distribution of Gold Lunulae,¹ in which I mapped their geographical distribution, and gave a list of all those either existing or of which there were any records that I could trace, I was able to show that at least sixty-one specimens had been found in Ireland, while eighteen had been found in England or on the Continent. Since the publication of the paper three more lunulae have been found, two in Ireland, which are unpublished, and one at Hanover in Germany, recently published.² Of the two Irish examples one was found at Lisnover, Bawnboy, County Cavan, in September, 1910, by Mr. Patrick McAvinue and his son while quarrying stones. They came upon the lunula 8 or 9 feet below the surface in a fissure of the rock. It was obtained by the Royal Irish Academy from the finders as treasure trove, and is now deposited in the National Collection. This lunula is a fine specimen, and is in exceptionally good preservation. It measures $8\frac{1}{16}$ inches in height, $7\frac{1}{16}$ inches in breadth, and the aperture for the neck measures $5\frac{5}{16}$ inches. It weighs 1 oz. 14 dwts. 5 grs. The general character of the ornamentation is of the usual type, and resembles that of several others in the collection. The illustration will make the details clear; but attention may be called to the expanded ends for attachment, which vary in the different examples (Plate XLVIII, fig. 1).

I regret to say I have not been able to trace the provenance of the other lunula. It is at present in the possession of Mr. H. G. B. Clements, of Killadoon, Celbridge, and he has kindly allowed me to have a drawing of it made for the purposes of this paper. Mr. Clements informs me he knows nothing of the provenance of the lunula, except that it was formerly in the possession of the Earl of Leitrim. It weighs 1 oz. 13 dwts. 21 grs. In its present state it is broken across, as shown in the drawing. It measures 8 inches in breadth and $7\frac{5}{8}$ inches in height. Both the expanded ends for the attachments of the fastening have been broken off, and on one side two holes

¹Proc. R. I. A., Vol. xxvii, Sec. C., p. 251.

²Journal Roy. Soc. of Antiquaries of Ireland, vol. xlii, p. 48.

have been pierced, probably in recent times. The ornamentation of the lunula is unusual and is very finely done; it somewhat resembles the example found at Dunferth, Co. Kildare, figured in my former paper.¹ The illustration (Plate XLVIII, fig. 1) will show the details; but attention may be called to the decoration of the two end portions; here, instead of the usual cross-hatchings, etc., we have two strips of ornament somewhat like a necklace in form, and stopping within a few inches of the ends.

Since January, 1909, therefore, we have been able to add three more lunulae to the former list, making sixty-three found in Ireland and nineteen in England and on the Continent. The discovery of the lunula in Hanover is most interesting, and is a further proof of the intercourse between Ireland and the Continent during the Bronze Age.

On the same occasion that Mr. Clements showed me the gold lunula he also showed me a gold ball which I at once recognized as being one of the eleven golden balls which were found at Carrick-on-Shannon in 1834, and of which seven were acquired for the Academy's collection. Mr. Clements gave me an extract from a letter from Nathaniel, Earl of Leitrim, to his wife, undated, but of about the year 1835. The extract runs:—"I have not yet made my entire confession with respect to my extravagance yesterday in Dublin. It consisted in buying an antique Irish ornament, lately found in Roscommon, a large golden ball, about the size of a lemon; there were thirteen of them, all of different sizes, but diminishing gradually, hollow and perforated, as if intended to be strung, from which it is conjectured they must have been worn as an ornament round the neck. I met with it, or rather them, at West's . . . , and the price of the one I bought . . . was £9."

It will be noticed that in this account thirteen balls are mentioned, whereas in the account in the *Dublin Penny Journal*, Nov., 1834, vol. iii, p. 144, only eleven are mentioned, the same number that is given in Wilde's Catalogue. One of these balls is in the British Museum, and Sir Hercules Read kindly supplied me with the information that it was purchased from Messrs. Franklin in 1839. It weighs 929 grains, and has a diameter of $\frac{1}{2}$ inches and a height of 2.8 inches. We can, therefore, now account for nine out of the eleven, or possibly thirteen, gold balls originally found. Mr. Clements kindly allowed me to have an electrotype copy made of the golden ball in his possession; and I shall be able to place this copy on exhibition with the seven balls already in the collection. It is much to be hoped that the whereabouts of the other balls, unless melted down, may be discovered.

¹ *Op. cit.*, Plate IX, No. 1.



FIG. 1.

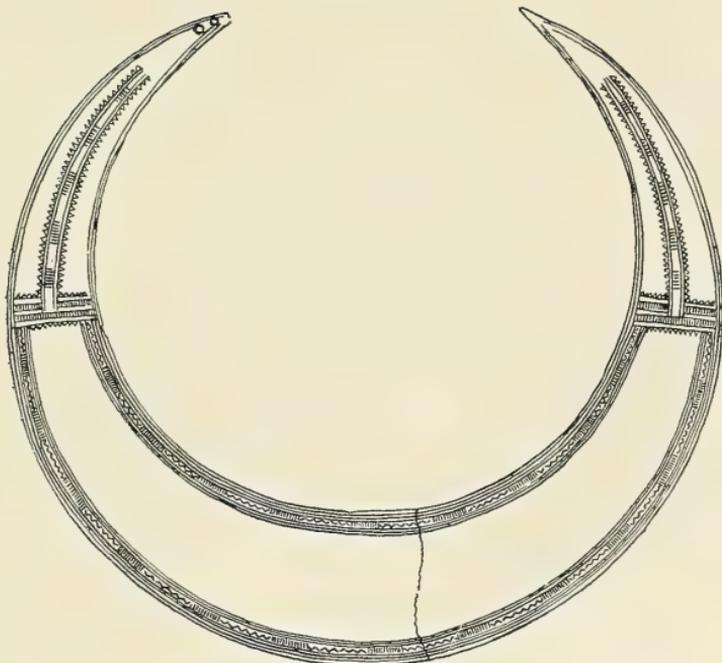


FIG. 2.

XX.

SOME MATRICES OF IRISH SEALS.

BY E. C. R. ARMSTRONG.

PLATES XLIX, L, LI, LII.

Read JANUARY 13. Published FEBRUARY 20, 1913.

THE Academy's collection contains many interesting matrices of Irish seals ecclesiastical and secular. A number of the former have been previously described in various publications, but it seemed desirable to include in the present paper all the more important examples in order to make the whole collection easily accessible to future workers. I am glad to be able to publish among the early miscellaneous matrices specimens inscribed with the names of Kavanagh, O'Reilly, O'Brien, and Dougherty. The illustrations are from photographs of wax impressions taken from the matrices (seals), and, though less effective than drawings, are preferable, as being scientifically more exact.

The matrix of a seal is the piece of metal, ivory, or other material in which the device is cut in intaglio; the term "seal" applies to the impression made from the matrix, in former times usually in wax, in modern times more frequently by means of embossing the impression directly on to the document by means of a spring press.

The material usually employed for the matrices of seals was bronze, but stone was sometimes used, as examples to be described will show. Royal personages often had their seal-matrices made of gold, while silver was common for matrices of corporations and persons of rank. Lead was used by the poorer classes. The matrices of the modern bishops' seals of the eighteenth and nineteenth centuries were usually made of brass.

In the thirteenth, fourteenth, and fifteenth centuries, the cutting of the designs of matrices was carried to a high degree of skill and artistic merit. During these periods a seal was an indispensable portion of a legal document, and so continues in many transactions to the present day. Everyone knows the small red discs of paper that are attached to transfers of stocks and shares, degenerate, but no less real, representatives of the splendid wax impressions

of mediæval times. In the early periods, matrices often had to be renewed, sometimes because they became worn out; sometimes because more modern types were desired. The seals of high officials, civil and religious, were generally broken at the death of the owners and in some cases buried with them. The seal of William de Toucy, Bishop of Auxerre, who died in 1182, was broken with an axe and buried with him.¹

Unfortunately during the last century a number of forgeries of antiquities were circulated, and, among these, false matrices of seals were common. There are one or two matrices in the Academy's collection which appear open to suspicion.

The following publications have dealt with Irish ecclesiastical seals, and incidentally their matrices:—

"*Sigilla Ecclesiae Hibernicae Illustrata*," by Richard Caulfield, Cork, 1853. This little work was brought out in parts, and is now difficult to obtain complete. It will be referred to in the present paper as "Caulfield."

"*Catalogue of Seals in the Department of Manuscripts in the British Museum*," 1895. Volume iv. This volume gives descriptions of a number of Irish seals; it describes seven, and illustrates four impressions, of which the matrices are in the Academy's collection. It will be referred to as B. M. C.

"*Seals*," by Walter De Gray Birch. (*Connoisseurs' Library*.) This work reproduces the British Museum Catalogue's plate of Irish seals, but gives no detailed descriptions of any of them.

"*Dublin Penny Journal*," vols. i and ii, 1832 and 1833. Several of the matrices now in the possession of the Academy were published and described in this journal. These accounts are valuable, as they were written at the time the matrices were found, and have preserved details as to their discovery. It will be referred to as D. P. J.

My friend Mr. M. J. McEnery, Assistant Deputy Keeper of Public Records in Ireland, has assisted me in reading some of the inscriptions on the seals. The inscriptions pass from Roman capitals through Lombardic and Black letter, back to Roman capitals. In many cases they are composed of mixed letters, Roman and Lombardic; and though an attempt has been made to indicate the style of the inscriptions, they must not be taken as exact copies of the lettering, but merely as an approximation.

¹ "*British Museum Guide to the Mediæval Room*," p. 193. See also on this subject the *Archæological Journal*, vol. xi, p. 277.

MATRICES OF BISHOPS' SEALS.

Pre-Reformation.

Following Dr. W. H. St. John Hope's classification,¹ Episcopal seals may be divided into the following:—Seals of dignity with their counterseals, private seals or *secreta* and seals *ad causas*. The seal of dignity was used for sealing charters and other documents concerning the property of the See, the *secretum* was for sealing deeds connected with the bishop's private estate; and the seal *ad causas* was used for documents of less importance, such as marriage licenses, testimonials, probates, &c.

The figures of ecclesiastics on the matrices are too small to give very precise details as to the vestments, &c., worn; but it may be noted that in several examples the heads of the croziers carried by bishops or abbots assume the Celtic U-shaped form, and also that the bishops carry their croziers with heads turned inwards or outwards as best suited the design. The early seal-matrices have a loop for suspension, and, as in those times the custody of an official matrix was of the utmost importance, they were, no doubt, often actually worn by persons. When the Vice-Chancellor of Richard I, King of England, was drowned in the Mediterranean, he was carrying the matrix of the royal seal suspended from his neck.²

The seals of dignity are almost invariably pointed oval in shape, this being the form in which the device of the earlier seals—a standing or seated effigy of the bishop—could be most conveniently displayed. The seals of dignity show a considerable evolution of type, the earliest being those which contain the effigy of the bishop without any ornaments or accessories at the sides of the figure. To this class belongs the most interesting bronze matrix of the seal of Carulus, Bishop of Clonfert. This matrix is somewhat worn; it is pointed oval in shape, with a loop at the top for suspension. It measures $2\frac{1}{4}$ inches by $1\frac{1}{2}$ inches. The device is the effigy of the bishop, wearing a mitre and a decorated chasuble. His right hand is raised in the act of benediction, and he holds a crozier with the head turned inwards in his left. (Plate XLIX, fig. 1.) Inscription—

✠ S' CARVLI CLONFERTNSIS EPI.

From the style of the matrix it may be placed in the first half of the thirteenth century.³ Ware's list of bishops does not give any Bishop of Clonfert of this

¹ Proc. Soc. of Antiq. of London, second series, vol. xi, p. 271.

² "Chronica Magistri Rogeri de Houedene," vol. iii, p. 105.

³ "Caulfield," p. 47, pl. vii, fig. 5.

name; but Mr. G. H. Orpen has kindly supplied me with the following note:—"As to Carolus Clonfertensis. ' In a grant from *C. Rex Connactie Deo et ecclesie beate Marie Cisterciensi*, preserved in the archives at Dijon, one of the witnesses is 'Caro Cluainfertensi' . . . ; and from the names of the other witnesses, the deed must be dated at or very near the year 1224, the date when Cathal Croudérg O'Conor, King of Connaught, died , I think it very probable that the seal in the Museum is the seal of this Carolus."

There is another portion of the matrix of an early seal of dignity in the Academy's Collection; it was formerly in the possession of Mr. Hodder M. Westropp.¹ It has been doubted whether this was a genuine matrix on account of the style of the lettering in the inscription and the fact that an archbishop is termed EPI; but it has not the appearance of a forgery. It belonged to an Archbishop of Armagh. Only half the figure, which appears to have been seated, remains—the leg and the uplifted right arm. Inscription—

ARDMACHAENSIS EPI.

The matrix is of bronze, and shows a fine green patina; it measures in its present state $2\frac{7}{8}$ inches in length. It is probable—if the matrix is genuine—that it was purposely broken, as was often done with early matrices on the death of the owner.

The matrix in the collection I should place next in date is an interesting, but much worn, specimen of bronze. The figures at the side indicate it as being a little later than the two previously described. It was apparently originally covered with silver; but of this, only the word DIONISI and a fragment on the pedestal, on which the figure stands, remain. The device is a figure of a bishop wearing a mitre, vested with a chasuble, and apparently holding a crosier in one hand, and having the other uplifted. The figure stands on a V-shaped pedestal, and has at each side a figure of an animal; but the matrix is so much worn it is not possible to determine what species are meant. (Plate XLIX, fig. 2.) The inscription, with the exception of the word DIONISI, is practically illegible; but Mr. McEnery has read it as

SI DIONISI DEI GRACIA RAPOTEN SIS EPISCOPI.

DIONSISI is a later cutting on a matrix of earlier date, and this name does not occur among the list of Bishops of Raphoe. The original matrix probably belonged to the thirteenth century; it measures $3\frac{1}{16}$ inches by $1\frac{3}{4}$ inches, and has a looped handle at the back.

The Academy's collection contains no matrices with the effigy between

panels containing heads in high relief; or between panels containing half effigies of saints or between full-length canopied figures of saints; so we come to the type in which the effigy of the bishop has ceased to occupy the most important place, and appears either kneeling or standing at the base of the design, the principal position being occupied by figures of the Virgin and Child, representations of the first founders, groups of saints, or some subject connected with the history of the See.

The Academy possesses three examples of matrices of seals of this class. The earliest is that of Thomas Barrett, Bishop of Elphin, 1372-1404.¹ The matrix is bronze, and measures $2\frac{3}{8}$ by $1\frac{1}{8}$ inches. It has a pierced handle at the back, is pointed oval in shape, and very finely cut. The device represents the Virgin enthroned beneath a pinnaced Gothic canopy; the background is decorated with sprigs of foliage. She wears a crown, and carries a sceptre ending in a trefoil. She is holding the Child standing on her right knee. On the canopy is a shield of arms, three mitres. (Plate XLIX, fig. 3.) This coat is quite different from that at present used by this See, sable two golden crosiers in saltire, in base a silver lamb couchant; but the latter arms are probably not of very old adoption. I think it probable that the three mitres may have been used by Elphin, allusive to the cap or mitre of St. Patrick, "the chief relic of all Connacht," which is stated to have been preserved at Elphin,² Elphin being one of the Sees which claim to have been founded by St. Patrick. Three silver mitres on a sable field is the present coat-of-arms of the Bishopric of Meath; but a crosier is stated to have formed part of the arms in addition to the mitres in the early eighteenth century; and the coat as it stands at present is probably not of very old adoption.³ According to Ware, three mitres were used as the arms of Derry in the seventeenth century.⁴ This matrix was obtained by the Academy in 1851 in exchange for an English seal.⁵ Inscription—

Sigillum dñi thome dei gracia elphinensis epi.

The words have sprigs of foliage between them instead of stops.

The next example is the interesting stone matrix of John Mothell, Bishop of Limerick. The matrix is pointed oval, and measures $2\frac{1}{2}$ by $1\frac{5}{8}$ inches. The device represents St. Munchin, founder and first bishop. He is seated, and wears a mitre and chasuble; his right hand is raised in the act

¹ B. M. C., p. 714, and pl. xii, fig. 17, 383. Cotton, "Fasti Ecclesiae Hibernicae," 1850, vol. iv, p. 122.

² "Annals of Loch Cé," vol. ii, p. 119 (A.D. 1406); "The Old Irish World," A. S. Green, p. 104.

³ Crossly, "Peerage of Ireland," 1725, p. 176.

⁴ Ware, "History of the Bishops of Ireland," p. 285.

⁵ Proc. Royal Irish Academy, vol. v, p. 199.

of benediction, and in his left he holds an archbishop's cross. The figure is seated in a canopied niche, with screen-work at the sides. Beneath, under a rough arch, is the half-figure of a bishop with a mitre, and carrying in his left hand a crosier, which is turned inwards, his right hand being raised in benediction. (Plate XLIX, fig. 4.) Inscription—

Sigillū dñi jobis ep̄i lymrencis.

This was the seal of John Mothell, A.D. 1426-1458,¹ an Augustinian Canon of the Abbey of Kells, Co. Kilkenny. The cutting of the design is rough, but it appears to be a genuine matrix. It was acquired by the Academy about 1849.

The last matrix of this class is that of Richard Lang, Bishop of Kildare, 1464-1474.² This matrix is bronze, and most elaborately carved. It is pointed oval, measures $3\frac{2}{16}$ by $2\frac{3}{8}$ inches, and has a pierced handle. The design represents the Virgin between two figures, all standing under heavily canopied niches. The figure on the right has been thought to be St. Conlaedh, the first bishop of the See, and that on the left St. Bridget. St. Conlaedh is represented wearing a mitre and chasuble. He holds a long, cross-ended staff in his right hand, and apparently has the other raised in benediction. St. Bridget is surmounted by a halo, and carries a crosier turned outwards. Beneath is a Bishop with a crosier, gazing up in adoration at the saints. (Plate XLIX, fig. 6.) The design of this matrix is remarkable; and I do not know any English or foreign example quite like it. The lettering of the inscription is debased, and most difficult to read. It runs—

✠ Sigillum ricardii darense Episcopi Lang.

The order of the words has been inverted, and the name Lang is cut in a kind of rustic character, and larger than the rest of the inscription; instead of stops the words have sprigs of foliage between them. This seal is described (from an impression) but not illustrated in the "British Museum Catalogue,"³ where it is put down as "A doubtful seal."

There is only one pre-Reformation matrix of a secretum in the Academy's collection, and that is the private seal of Stephen Brown, Bishop of Ross, succeeded 1402.⁴ The matrix is bronze, and circular, a shape usual for seals of this class. It measures $1\frac{1}{4}$ inches in diameter, and has a handle ending in a pierced trefoil. The device is the bishop's arms within two

¹ "Caulfield," p. 36. pl. vii, fig. 1: B. M. C., p. 707, pl. xii, fig. 17, 361; Cotton, *op. cit.*, vol. i, p. 380.

² Cotton, *op. cit.*, vol. ii, p. 229.

³ B. M. C., p. 709.

⁴ Cotton, *op. cit.*, vol. i, p. 352; "Caulfield," p. 34, pl. vi, fig. 14.

interlaced trefoil-shaped ornaments. The arms are quarterly, first and fourth three bars, second and third a bishop's mitre. (Plate XLIX, fig. 5.)
Inscription—

✠ SÆCRÆTVR̄ · STÆPANI · EPISCO · PI · ROSSAN · SIS ·

The inscription is broken up in a rather curious way. The matrix was presented to the Academy by Mrs. Butler.¹

I have kept to the last of the pre-Reformation bishops' seals a most interesting matrix of slate of thirteenth-century date, which has been in the collection for some time, but has not been displayed. It was purchased from Francis Whelan, of London, in 1894, but no particulars as to its provenance or history are available. The matrix has a diameter of $2\frac{1}{4}$ inches, and is $\frac{3}{8}$ inch thick. It is cut on both sides; the device on the obverse is a Paschal Lamb, carrying a flag, and having its head surrounded by a halo. The lamb stands within a square compartment, and the words AGN' DEI are engraved above it, while on the top of the compartment is a canopy. (Plate XLIX, fig. 7.) Inscription—

PRIMAS : IBERNIA : AC : SÆDIS : LÆGATUS.

A hole has been bored through the matrix, and on this account the last letters of the last word are not quite clear, but I take them to be US.

The reverse (the counterseal) has a representation of the holy women coming to the sepulchre, rendered in an archaic fashion. The tomb is depicted as a box-like object. The half-figures on the left represent the women, and a figure on the right the angel. Underneath the tomb on the left are two soldiers carrying spears, and on the right is another very curious figure. The whole device is surmounted by a canopy. (Plate XLIX, fig 8.)
Inscription—

SIGILLV̄R̄ SANCTI SÆPVLCRI.

I sent Mr. O. M. Dalton of the British Museum impressions of this matrix, and, judging from these, he considered the matrix genuine and of thirteenth-century date. I also communicated with Dr. H. J. Lawlor, who informed me that, taking the matrix as belonging to the thirteenth century, it was probably that of the seal of Henry de Loundres, 1212 to 1228.² Henry de Loundres as Archbishop of Dublin would be termed Primate of Ireland; and he was appointed legate by Honorius III. No doubt the design of the Holy Sepulchre refers to the manor and palace of St. Sepulchre beside St. Patrick's Cathedral.

¹ Proc. Royal Irish Academy, vol. viii, p. 219. (The first word of the inscription has been misread as "Scutum.") ² Cotton, *op. cit.*, vol. ii, p. 11.

Post-Reformation.

The earliest post-Reformation bishop's matrix is that of John Steere Bishop of Kilfenora. 1617.¹ The matrix is copper and pointed oval in shape; it measures $2\frac{1}{2}$ by $1\frac{5}{8}$ inches. There are traces of solder at the back—perhaps to secure a handle. The device is an effigy of the bishop enthroned within a canopied niche of Renaissance style. He wears a flat round cap and post-Reformation vestments. He has a moustache and square beard, and holds in his right hand a book, and in his left a roll of paper. (Plate L, fig. 1.) The throne divides the date 1617, and below it are the words **fidel in mio**, referring to Luke xvi. 10:—"Qui fidelis est in minimo, et in majori fidelis est." Inscription—

SIGILL · EP'ALE · I'OIS EP'I · FENNEB ·

A cherub's head is placed at the commencement of the inscription and another at the base after I'OIS. There is a description of an impression of this matrix in the "British Museum Catalogue"; but the date is given as 1566 or 1552, and the seal ascribed to either John Devereux, Bishop of Ferns, 1566, or John O'Hinalan, Bishop of Kilfenora, 1552.²

The next in date is the matrix of George Baker, Bishop of Waterford and Lismore, 1660-1665.³ This is a well-cut oval matrix on a thin piece of brass, riveted on to a thick iron base, and measuring $2\frac{1}{4}$ by $1\frac{5}{8}$ inches. The device represents the bishop enthroned. He wears a rochet, lawn sleeves, chimere and scarf, and on his head is a flat cap with a tuft. He wears a beard and his hair is long and curly. His right hand is placed on his breast, and his left arm rests on the arm of his throne. Behind his hand, and resting against the back of his throne, is a small rod. His arms are displayed on a shield at his feet, a fesse between three swans' heads and on the fesse three cinque-foils. (Plate L, fig. 2.) Inscription—

✠ SIGILLVM · OFFICIALE · GEO · EPISE · WALERF · AND · LISMOR ·

Out of the Bishop's mouth comes a scroll inscribed VIRGA · AN · MILITIA · VENIAM. This motto appears to be blundered. Dr. Lawlor suggests that it may have been intended to mean "Virga an mollitia (?) veniam." He considers in any case the words refer to 1 Corinthians iv. 21.

These two matrices are interesting records of the ecclesiastical dress of

¹ "Caulfield," p. 48, pl. viii, fig. 13; Cotton, *op. cit.*, vol. i, p. 503; *Archaeological Journal*, vol. x, p. 162.

² B. M. C., p. 711, pl. xii, fig. 17, 376.

³ "Caulfield," p. 18; Cotton, *op. cit.*, vol. i, p. 129.

the seventeenth century; and it is much to be wished that the custom of placing the effigy of the bishop on his seal had continued, instead of the modern practice of using as a device a coat-of-arms—in many cases of very poor design.

Crossly, "Peerage of Ireland," 1725, p. 200, describes another seal of Bishop George Baker, of Waterford, in which the device is a figure of the bishop preaching from a pulpit. He also describes the seals of Michael Boyle, Archbishop of Armagh, 1678, and of Thomas Fuller, Archbishop of Cashel, 1660; in both cases the device is a figure of the prelate, and heraldry is reduced to reasonable proportions, the arms being placed on small shields occupying only a little part of the seal.

Our President, Dr. Mahaffy, has called my attention to the very interesting seal of James Ussher, Archbishop of Armagh, 1624–1655, and Bishop of Carlisle *in commendam* from 1642. The device is the Primate preaching from a raised pulpit to a large congregation, represented sitting in tiers, one above the other. Below is the motto: VAE MIHI SI NON EVANGELIZAVERO (1 Corinthians ix. 16). Below this again is a shield of arms, an archbishop's cross and pall (Armagh), impaling the arms of Ussher, a chevron ermine between three ushers' staves. The seal is illustrated, "Victoria County History of Cumberland," vol. ii, pl. iii, facing p. 46.

The Academy possesses the matrices of a number of modern episcopal seals. They are of little interest and not worth detailed description. The matrices are of brass and, with one exception, which has pointed ends, are oval in shape; they measure about $2\frac{3}{8}$ by $2\frac{3}{4}$ inches. The device is the arms of the See impaling the arms of the bishop surmounted by a mitre. The designs of the arms are poor, and the mitres relatively too small for the size of the shields; while the union of dioceses in modern times and the consequent marshalling together of several coats has made the final arms of the Sees unpleasantly complicated. The consistorial seals sometimes display the arms of the See alone, sometimes impaling those of the bishop. In some cases the dates are given in the inscriptions, in others in the body of the seal divided by the mitre.

The arms at present used by the Irish Sees do not call for special remark. In three cases, Tuam, Clogher, and Waterford, they are undoubtedly derived from devices used on early seals, while those of the remaining Sees appear, as a whole, to have been assumed in post-Reformation times.¹ As above stated, the union of dioceses has not improved their appearance, and where the arms

¹ For details as to the arms of the Irish Sees consult Woodward, "Ecclesiastical Heraldry," p. 200; also a series of papers by J. Vinycomb, with notes by J. R. Garstin, in the *Ulster Journal of Archaeology*, commencing new series, vol. iii, 1897, p. 2.

of two united Sees, like Derry and Raphoe, or Down, Connor and Dromore, are quartered, the effect is not pleasing. The arms of the Archbishops of Armagh and Dublin, an archbishop's cross and pall on an azure field, are the same as those of Canterbury and York ancient; and, as Mr. Everard Green has so ably shown, are all the same, and not the original arms of the Sees, but the heraldic way of displaying the insignia of an archbishop who had received the pall.¹

With regard to the personal arms of the bishops as displayed on their seals, the list of names will make it apparent that some belonged to noble houses, others were either entitled to arms by descent or else obtained a grant from the officers of arms; and if there were any not so entitled, they appear to have followed the modern practice, and when they wished to use arms, adopted those of some family of the same name with or without a difference.²

LIST OF MATRICES OF MODERN EPISCOPAL SEALS IN THE ACADEMY'S
COLLECTION.

- Armagh, Archbishop of, William Stuart, 1800.
 Cashel, Archbishop of, Richard Lawrence, 1822.
 Cashel, Emly, Waterford, &c., Bishop of, Stephen G. Sandes, 1839.
 " " " Robert Daly, 1843. (Matrix
 engraved by I. Parkes.)
 Derry and Raphoe, Bishop of, William Higgin, 1853. (The *quartered* arms
 of Derry and Raphoe impaling the arms of Higgin.)
 Down and Connor, Bishop of, Nathaniel Alexander, 1804.
 Clogher, Bishop of, William Foster, 1796.
 Clonfert and Kilmaedugh, Bishop of, Mathew Young, 1799.
 Cloyne, Bishop of, William Bennet, 1794 (the other side of this matrix is
 engraved with the device of the Bishop's previous seal for Cork and
 Ross, 1790).
 Cloyne, Bishop of, Charles Warburton, 1820.
 " " John Brinkley, 1826.
 Cork, Cloyne, and Ross, Bishop of, Samuel Kyle, 1835.

¹ Proc. Society of Antiquaries of London, second series, vol. xvi, p. 394.

² "In our own country [Great Britain] men of all ranks have always been eligible for the highest ecclesiastical positions, and on attaining them have often, down to the present day, assumed armorial bearings for use upon their seals, etc., though frequently the connection of the Prelate with the family whose arms were adopted was, to say the least, extremely difficult of proof. . . . I have alluded to the practice by which a Bishop who possessed no armorial bearings by inheritance generally assumed for himself either a coat borne by a family of the same name, from which he supposed he might be descended; or, and with much greater propriety, an entirely new coat, and this is the custom still both among Anglican Bishops and those of the Roman obedience." (Woodward, "Ecclesiastical Heraldry," pp. 22 and 81.)

- Cork, Cloyne, and Ross, Bishop of, William Fitzgerald, 1857.
 Cork and Ross, Bishop of, William Bennet, 1790 (reverse of his seal for Cloyne).
 Cork and Ross, Bishop of, Samuel Kyle, 1831.
 Derry and Raphoe, Bishop of, William Higgin, 1853.
 Elphin, Bishop of, John Law, 1795.
 " " Jemmett Browne, 1772.
 Killaloe and Kilfenora, Bishop of, Richard Ponsonby, 1828.
 Leighlin and Ferns, Bishop of, Percy Jocelyn, 1809.
 " " Thomas Elrington, 1822.
 Limerick, Ardfert, and Aghadoc, Bishop of, Thomas Elrington, 1820.
 " " " " William Higgin, 1849.
 Meath, Bishop of, Nathaniel Alexander, 1823.
 Ossory, Bishop of, Robert Fowler, 1813.
 Waterford and Lismore, Bishop of, Richard. (The inscription of this matrix has the surname erased. The other side is engraved for the seal of Richard Bourke, Bishop of Waterford, 1843.)

There is a small oval matrix of steel or iron in the collection of the Royal Society of Antiquaries of Ireland. It measures $1\frac{5}{8}$ by $1\frac{3}{8}$ inches. (Plate L, fig. 3.) The device is a shield of arms, an archbishop's cross and pall on an azure field, impaling, quarterly azure and gold, in the first quarter a golden pelican wounding herself. These are the arms of Hoadly, and the matrix therefore belonged to John Hoadly, Archbishop of Dublin, 1729/30 to 1742.² There is no inscription on the matrix.

The matrix of Euseby Cleaver, Bishop of Cork and Ross, 1789, is preserved in the British Museum. It is of the same type as the preceding, and the device is the arms of the See impaling the arms of Cleaver, two bars between three castles, a crescent for difference.

In addition there are in the Academy's collection the following matrices of consistorial seals. In some cases these have the arms of the See only, in others the arms of the See impaling the bishop's arms.

The consistorial seal of Richard (Lawrence), Archbishop of Cashel, Prim. of Ireland and Metrop. of all Munster, 1822. (Arms of See.)

The consistorial seal of Robert Daly, Bishop of Cashel, Emly, Waterford, &c., 1843. (Arms of See impaling arms of Daly.)

The consistorial seal of Stephen G. Sandes, Bishop of Cashel, Emly, Waterford, &c., 1839. (Arms of See impaling arms of Sandes.)

¹ Papworth, "British Armorial," p. 1038.

² Cotton, *op. cit.*, vol. ii, p. 24.

The seal of the Consistorial Court of the Lord Bishop of Derry & Raphoe. 1842. The Hon. Richard Ponsenby.) (Arms of Derry and Raphoe *quarterly*.)

The consistorial seal of Samuel (Hutchinson) Bishop of Killala and Achonry. 1759. (Arms of the See of Killala, an open book enfiling a crosier in pale.)

The consistorial seal of Henry (Maxwell), Bishop of Meath, 1766. (Arms of the See.)

MATRICES OF DEAN'S SEALS.

Pre-Reformation.

The Academy possesses the matrices of three deans' seals. The earliest is the seal of Joseph, Dean of Armagh, 1256 or 1257.¹

The seal, which is of bronze, and pointed oval in shape, measures $1\frac{5}{8}$ by $1\frac{1}{16}$ inches, and has a pierced handle. It is very finely cut, and varies from the usual type in having as the device an eagle boldly executed with outstretched claws and wings. (Plate L, fig. 4.) Inscription—

✠ S' : IOSGB : DECANI : ARDMAQHANI.

It was found on the site of Temple Bridgit, in the City of Armagh.

The next in date is the matrix of David, Dean of Kilmaeduaugh. The matrix is pointed oval, and measures $2\frac{1}{4}$ by $1\frac{7}{16}$ inches; it is of thick bronze, and has a pierced handle. It is a good deal worn; the device, a usual one in the fourteenth century, represents the Virgin and Child in a canopied niche (Plate L, fig. 6.) Inscription—

Sigillum david decani duaſcensis.

The words of the inscription have fleurs-de-lys between them instead of stops. No particulars are known of David, but his name appears as Dean of Kilmaeduaugh in the early part of the fourteenth century.² The seal was found in the ruins of the Cathedral of Kilmaeduaugh about 1849.

Post-Reformation.

The matrix of Marcus Lynch, Dean of Clonmacnois, 1628.³ The matrix of bronze is pointed oval in shape, and has a pierced hinged handle. It is much abraded and has been repaired in one place. It measures $2\frac{1}{8}$ by

¹ Cotton, *op. cit.*, vol. iii, p. 30; D. P. J., vol. ii, 1833, p. 112; *Archaeological Journal*, vol. xi, p. 73.

² Cotton, *op. cit.*, vol. iv, p. 202; B. M. C., p. 714, pl. xii, fig. 17, 384.

³ Cotton, *op. cit.*, vol. iii, p. 144. D. P. J., vol. i, 1832, p. 124.

$1\frac{3}{4}$ inches. The device represents the Cathedral of Clonmacnois, with steps leading up to it. (Plate L, fig. 7.) Inscription—

✠ SIGILLVM · MARRCI · LINCH · DECAN · DE · CLONMACNOSIE.

The inscription is worn, but there appear to be stops between the words. The letters CLON seem to have been recut. This matrix was discovered about 1830 in the old burial-ground of Tassagh, which lies four miles south of Armagh.

Matrix of the seal of James Verschoyle, Dean of St. Patrick's, Dublin, 1794–1810.¹ A flat brass matrix, $2\frac{3}{8}$ by $1\frac{7}{8}$ inches. The device is rather worn; it represents a shield of arms, an effigy of St. Patrick wearing a mitre and holding a staff (arms of the Deanery), impaling the arms of Verschoyle, a chevron between three boars' heads. (Plate L, fig. 9.) Inscription—

JAC · VERSCHOYLE · LLD · DEC · EC · CA · S · PAT ·
DUB · INS · MAI · 3 · 1794.

This matrix is in the collection of the Royal Society of Antiquaries of Ireland, which is at present deposited on loan in the National Museum.

There are three late brass matrices of Deans of St. Patrick's, Dublin, preserved in the Art Collections of the National Museum, Dublin, which I am able to include through the courtesy of the keeper, Mr. J. J. Buckley.

The first is the matrix of the seal of John William Keatinge, 1810–17. The matrix is oval, and measures $2\frac{7}{16}$ by 2 inches; device, arms of the Deanery impaling the arms of Keatinge, silver a saltire gules between four nettle-leaves, surmounted by the crest of Keatinge, a boar passing through a bush of nettles. Inscription—

* · IOHANNES · GULIELMUS · KEATINGE · DD · DEC · EC · CA ·
S · PAT · DUB · INS · JUN · 2 · 1810 ·

The second is the matrix of the seal of the Hon. Richard Ponsonby, 1817–28. The matrix is oval and measures $2\frac{3}{8}$ by $1\frac{7}{8}$ inches; device, the arms of the Deanery impaling the arms of Ponsonby, gules a chevron between four combs silver, surmounted by the Ponsonby crest, in a ducal coronet three arrows one in pale and two in saltire, points downward, encircled with a snake. This matrix was engraved by W. S. Mossop. Inscription—

SIG · HON · RICARDI · PONSONBY · A · M · DEC · COL · ET · ECCL ·
CATH · S^{TI} · PAT · DUB · INS · IULII · 8 · 1818

The last is the matrix of the seal of Robert Daly, 1842–43. The matrix

is oval and measures $2\frac{2}{16}$ by 2 inches; device, arms of the Deanery impaling the arms of Daly, per fesse silver and gold, a lion per fesse (sable and gules) between two dexter hands in chief gules, surmounted by the crest of Daly, under an oak-tree, a greyhound running (sable). Below the shield, suspended by a broad ribbon, is the Dean's badge as registrar of the Order of St. Patrick's, a book with a shamrock in the centre, and one in each corner. Inscription—

* SIG ROBERTI DALY AM DEC COL ET ECCL CATH S^T PAT DUB
INS DECEM 13 1842

MATRIX OF AN ARCHDEACON'S SEAL.

There is only one pre-Reformation matrix of an archdeacon's seal in the Academy's collection, which is that of John, Archdeacon of Cashel. This matrix departs from the usual type; the device is a sea-horse cut in a blood-stone set in silver. (Plate L, fig. 5.) Inscription—

✠ S' IOH'IS CASHLE ARCHID.

It is not possible to identify the archdeacon for whom this matrix was cut, but it probably belongs to the thirteenth century. It measures $1\frac{1}{16}$ by $\frac{1}{2}$ inches, and has a small looped handle. It was found about the middle of the last century in Co. Tipperary.¹

MATRICES OF THE SEALS OF CHAPTERS.

Pre-Reformation.

Matrix of the seal of the Chapter of Leighlin. The matrix is bronze and circular; it has a pierced handle at the back, and measures $2\frac{1}{16}$ inches in diameter. The device is, on the right, a figure of a bishop wearing a mitre and a chasuble, holding in his left hand a crosier, and having his right hand (on the second finger of which can be seen a ring) raised in benediction, and on the left the figure of St. John the Baptist, holding a disc on which is the Agnus Dei. (Plate L, fig. 8.) Both figures stand in niches under a canopy. Inscription—

✠ SIGILLVM : CAPITVLI : ECCLESIE : LEATHLINENSIS.

This matrix is probably of thirteenth- or early fourteenth-century date.

¹ "Caulfield," p. 14, pl. iii, fig 7.

Post-Reformation.

Bronze matrix, much worn, of the seal of the Chapter of the Diocese of Emly. Circular matrix measuring $1\frac{1}{8}$ inches in diameter with a pierced handle at the back. The device is a representation of the Cathedral. The inscription is much defaced, but as far as I can make it out reads—

✠ SIGILLVM · CAPITVLI · IMELACENSIS.

The matrix belongs to the sixteenth or seventeenth century.¹

MATRICES OF THE SEALS OF CONSISTORIAL COURTS.

Steel matrix of the seal of the Consistorial Court of Killaloe; it measures $2\frac{3}{8}$ by 2 inches, and has a hinged handle. Device, two keys in saltire; wards upwards; above is the motto—

PRO · REGE · LEGE · ET · GREGE,

and below a shield of arms, a cross saltire coupé at the ends, and five fleurs-de-lys thereon. Inscription—

✠ SIGILLVM · CURIÆ · CONSISTORIALIS · LAONENSIS · 1697.²

Brass matrix of the seal of the Consistorial Court of the Diocese of Ardagh, 1774. The matrix is oval and measures $1\frac{3}{8}$ by $1\frac{9}{8}$ inches. Device, arms of the See, silver a cross azure between four trefoils, on a chief azure a key in pale ward in chief. These colours are shown by the tincture lines on the matrix. Apparently the arms now used are gold a cross gules between four trefoils vert, on a chief sable a golden key.³ Inscription—

✠ THE CONSISTORIAL SEAL OF THE DIOCESE OF ARDAGH 1774.

Oval silver matrix of the seal of the Consistorial Court of Cloyne, measures $3\frac{3}{8}$ by $2\frac{5}{8}$ inches. Device, shield of arms, a mitre between three crosses formy fitchy. The shield is surmounted by a cherub. Inscription—

SIGILL : OFFICII : CVRIÆ : CONSIST : CLONENSIS :⁴

Brass matrix of the seal of the Consistorial Court of Cloyne. Pointed

¹ "Caulfield," p. 12, pl. ii, fig. 9, B. M. C., p. 706.

² "Caulfield," p. 46, pl. viii, fig. 12.

³ Woodward, "Ecclesiastical Heraldry," p. 205.

⁴ "Caulfield," p. 33, pl. vi, fig. 13.

oval, measures $1\frac{5}{8}$ by $1\frac{1}{8}$ inches. Device, arms of the See, a mitre between three crosses formy fitchy impaling the arms of Kyle, gold three candlesticks sable. The shield is surmounted by a mitre, and has the date 1840 below. Inscription—

CURIAE · CONSIST · CLONENS SIGILL OFFICIAL ·
VENERAB · SAM^L · MOORE · KYLE · L · L · D · VIC · GEN ·

Oval brass matrix of the seal of the Consistorial Court of Ossory, 1801. Pointed oval, measures $2\frac{7}{8}$ by $1\frac{1}{8}$ inches. Device, arms of Helsham, a chevron engrailed between three leopards' heads and the crest of Helsham, an esquire's helmet, all surmounted by a mitre. Inscription—

THE · SEAL · OF · THE · CONSISTORIAL · COURT · OF · OSSORY ·
PAUL · HELSHAM · V.G.²

MATRICES OF MONASTIC SEALS.

Very few matrices of seals of abbots or priors or common seals of religious bodies have found their way into the Academy's collection, and of these none belong to the more important foundations which were ruled by a mitred abbot with a seat in Parliament.

The matrices at our disposal may be divided into those of official seals with the name of the abbot or prior, of official seals of abbots and priors without the name of the individual, and of common seals of abbeys and priories and other religious bodies. With regard to the second division—i.e. seals of abbots or priors without the name of the individual—it is a question whether these should be placed under the seals of the heads of religious houses, or whether they should be classed apart. As in the smaller houses there is evidence to show that these seals were used as common seals, and that, taken as a whole, they were used for official purposes, and sometimes in place of the formal common seal of the abbey or priory, it appears better to place them in a class apart.³

The Academy's collection is far too small to give any representative series of devices, but while the seal of the abbot or prior generally bore his effigy, either as the principal device or subordinate in a niche, the common seals of the communities displayed very varied devices, such as the Holy Trinity, scenes from the life of our Lord, or from the life of the Virgin, the Virgin

¹ Cotton, *op. cit.*, vol. i, p. 254.

² Cotton, *op. cit.*, vol. ii, p. 306.

³ See Proc. Society of Antiquaries of London, 2nd S., vol. ix, p. 197, where this matter is fully discussed and citations given

and Child, subjects connected with the lives of the Saints to whom the establishment was dedicated, or purely architectural representations.

To the first division—i.e. seals with the name of the abbot or prior—belongs the matrix of John Kennedy, Abbot of Bangor, Co. Down. The matrix is stated to have been found in the ruins of Saul Abbey, Co. Down.¹ There are no details as to its acquisition in the Academy's register, but it appears to have been considered as the original matrix. It is bronze, with a pierced handle, and is worn at the ends. It is pointed oval in shape, and measures $1\frac{1}{8}$ by $1\frac{3}{8}$ inches. The device represents the figure of the abbot wearing a chasuble, and holding in his left hand a U-shaped crosier, his right being raised in benediction. He stands in a finely carved Gothic niche, with tabernacle work on each side. Below is a shield with the arms of Kennedy, a chevron between three crosslets fitchy; the shield also shows a chief, but possibly this is an ornament, and not part of the arms. Behind the shield is a crosier. (Plate L, fig. 10.) Inscription—

S. R. PRIS: JOHANNIS KENNEDY ABIS DEI BANGOR.

The style of the matrix belongs to the fourteenth century. The name of John Kennedy has not been preserved in the records of the Abbey of Bangor; but Dr. Lawlor has pointed out a reference to him, dated March 26, 1395, in the Rotulus Clausus of 18 Richard II. (No. 31, p. 154, "Rotulorum Potentium et Clausorum Cancellariae Hiberniae Calendarium," 1828.)

Hearing there was another matrix of this seal at Bangor Castle, Co. Down, I communicated with Mr. H. C. Lawlor, of Belfast, who kindly compared an impression of the Academy's matrix with an impression from it, and informed me they are absolutely identical. The fact of there being two matrices absolutely identical caused me to conclude at once that one of them was a cast of the other. On a recent visit to the British Museum I had the opportunity of showing the Academy's matrix to Sir Hercules Read. I am sorry to say he did not think very well of it on account of certain details in the lettering, etc. I am therefore inclined to think that the specimen in the Academy's collection is a cast made probably at the time the matrix at present at Bangor Castle was found. It must be remembered that the custody of a matrix in early times was a matter of great importance; and it is unthinkable that there could be two absolutely identical matrices in use at the same time.²

¹ D.P.J., 1832, p. 205.

² "The severe punishment of abjuration of the realm is on record as having been inflicted for counterfeiting the seal of another person: and when a matrix was lost the owner gave public notice of the fact, lest the finder, or the thief, might turn it to his own purposes; and at his death it was

I also place in this division the bronze matrix of the seal of the abbot of the Augustinian monasteries of Trim and Durmagh, now Durrow.¹ The matrix measures 2 by $1\frac{1}{4}$ inches, and has a loop for suspension on the reverse. On the obverse it has the figure of an abbot, full face. He wears a kind of flat round cap and monastic robes. He holds a crozier in his right hand and a book in his left. (Plate LI, fig. 1.) Inscription—

✠ SIGILL · M · ABBATIS · S · MARIE DE TRVIM.

On the reverse is the figure of an abbot turned sideways, with a tonsured head, and wearing the same kind of dress; he holds a crozier with both hands. (Plate LI, fig. 2.) Inscription—

✠ SI · M · ABB' · S · MARIE DE DVRMAḠ.

The letter M appears to be the initial of the Abbot's name.

The matrix was found at Lynberry, near Mullingar, about 1833.

The two following matrices belong to the second class—i.e. official seals of Abbots and Priors without the names of the individuals.

Bronze matrix of the seal of the Abbot of the monastery of Canons Regular of Prémontré, at Lough Cé, Co. Roscommon.² This matrix has been cast, and I have no doubt that it is a forgery; the effigy, which, being deeply cut, would in the ordinary course be preserved from abrasion, is very indistinct, while the lettering, though badly cut, shows little marks of wear. The matrix is pointed oval, and measures $2\frac{5}{16}$ by $1\frac{3}{16}$ inches, and has a pierced handle. It is stated to have been found on the strand near Galway. The device represents the effigy of the abbot. He wears a mitre and chasuble; in his right hand he holds a crozier, and in his left a book. Inscription—

* S ABBATIS SICI TRITATIS + DCI LOCH QVU

There was a monastery on Holy Island, Lough Cé, in 1700 A.D.; and this was refounded in 1215 by Clarus MacMoylin O'Moillechonry, Archdeacon of Elphin.³

Bronze matrix of the seal of the Cistercian abbey of St. Peter's at Athlone.⁴ The matrix has a looped handle, is pointed oval, and measures $1\frac{3}{4}$ by $1\frac{1}{8}$ inches. It was found near the Shannon, and was presented to

placed in a box, or purse, closed under the seals of three 'honest persons,' and in due course was defaced, as we have said, by his heirs or executors." ("Companion to English History (Middle Ages)." F. P. Barnard, p. 123.)

¹ D.P.J., 1833, p. 408; Archdall, "Monasticon Hibernicum," 1786, vol. i, p. 393, and vol. ii, p. 575.

² Proc. Royal Irish Academy, vol. xix, p. 371.

³ Archdall, *op. cit.*, vol. ii., p. 614.

⁴ Archdall, *op. cit.*, vol. ii, p. 600.

the Academy by the Rev. Denis Murphy, S.J.¹ The device represents the half-length figure of the Virgin and Child. The figures are well modelled. The Virgin holds a globe in her right hand. The Holy Child has his right hand raised in benediction, and holds some object—perhaps a bird—in his left. Below is the figure of a priest fully vested, standing at an altar, saying mass. His right hand is raised making the sign of the cross over the chalice which he holds in his left hand. There is a tall cross on the altar in front of him. (Plate LI, fig. 4.) Inscription—

✠ S' PRIORIS S̄C̄I P̄TRI D̄E ATHLOYN.

To the last division—i.e., the common seals of religious foundations—belong the following matrices :—

Bronze matrix of the seal of the convent of Ballindown, Co. Sligo.² This finely cut matrix is pointed oval in form and measures $2\frac{7}{8}$ by $1\frac{3}{4}$ inches. It has an ornamental pierced handle. Previous to its acquisition by the Academy it was in the collection of the Rev. Sir George Bishopp, a former Dean of Lismore.³ The device represents the Virgin seated, holding the Child. She wears a crown, and her robe has long sleeves. In her right hand she holds a star of five rays to which the Holy Child points. (Plate LI, fig. 3.) Inscription—

* SIGILLVM : ĀP̄ITVLI : PRIORIS · ET · ĀŌN̄VENTVS : D̄E :
BVLLQ̄N̄ḠIŌN̄Ā.

The family of M'Donogh, Lords of Corran and Tirerril, founded an establishment at Ballindown in 1427 in honour of the Virgin Mary for nuns of the Order of Saint Dominick.⁴

The very interesting but unfortunately much worn and broken matrix of the priory of St. John (?) at Tuam.—The matrix is of bronze, and has a green patina; at the back, in the centre, is a looped handle. It is round, and measures $2\frac{3}{8}$ inches in diameter. The device represents three figures under rude canopies. (Plate LI, fig. 5.) The central figure has the letters I ḡ A on his breast. Inscription—

* SIGILLV̄M ĀŌN̄V̄ĒN̄C̄VS (.) IS D̄E CVAV̄M.

It is probably the matrix of the seal of the priory of St. John the Baptist at Tuam.⁵ It was found near Loughrea, Co. Galway, some time before 1867, and was deposited in the Academy's collection by Lord Talbot de Malahide on behalf of another person. This matrix probably belongs to the thirteenth century.

¹ Proc. Royal Irish Academy, vol. xix, p. 373.

² Proc. Royal Irish Academy, vol. ii, p. 32.

³ Cotton, *op. cit.*, vol. i, p. 171.

⁴ Archdall, *op. cit.*, vol. ii, p. 626.

⁵ Archdall, *op. cit.*, vol. i, p. 298.

The bronze matrix of the seal of the Cistercian monastery De Benedictione Dei at Athlone, Co. Roscommon, found at Athlone.¹ The matrix is of bronze and is circular, with a solid funnel-shaped handle with a loop at the top. It measures $1\frac{5}{16}$ inches in diameter, and the handle is $2\frac{1}{8}$ inches in length. The device represents the Virgin seated, with the Child on her right knee, under a canopy, and a burning pillar on either side. (Plate LI, fig. 6.)
Inscription—

* S + $\overline{\alpha\omicron\nu\epsilon\tau\eta}$ + $\overline{\text{DE}}$ + $\overline{\text{BR}\overline{\text{D}}\overline{\alpha\omicron\eta\epsilon}}$ + $\overline{\text{DI}}$.

The last of this series is a circular bronze matrix measuring $2\frac{1}{8}$ inches in diameter, and having a pierced handle at the back. The device represents the Crucifixion; but it is so greatly abraded that I cannot make out the details. The inscription is so worn that I cannot decipher it. It was probably the seal of some religious community.

MATRIX OF THE SEAL OF THE EXEMPT JURISDICTION OF NEWRY AND
MOURNE.²

This matrix, though of very modern date, is interesting; it is silver and oval in shape. It measures $2\frac{1}{8}$ by $1\frac{11}{16}$ inches, and is quite flat and an inch thick. It is preserved in a small wooden box, which is labelled as made from the wood of the famous Newry yew-tree. It was presented to the Royal Irish Academy by Mrs. Bagot, the widow of the Very Rev. Daniel Bagot, Dean of Dromore, last official principal, Vicar-General and Commissary-General of the exempt jurisdiction. The device represents a figure seated in a chair of state with a yew-tree on either side. (Plate LI, fig. 11.) The figure has on his head an Earl's coronet, but he is wearing a flowing alb—with very full sleeves, which fit tightly round the wrists like a Bishop's—neck-bands and a scarf. He holds in his right hand a book. The Earl's coronet refers to the Earl of Kilmorey, and the clerical costume to the ecclesiastical nature of the office. Inscription—

* SIGILL : CVRLE : IVRISDICT : EXEMPT : DE : VIRIDI : LIGNO :
AL^S : NEWRY.

Within the field of the design is the word **KILMOREY**.

I extract the following particulars about this exempt jurisdiction from the Right Hon. J. T. Ball's account in the Report of the Commissioners on the Irish Church³ :—

¹ Proc. Royal Irish Academy, vol. viii, p. 219.

² See Ulster Journal of Archaeology, new series, vol. iv, 1898, p. 108.

³ "Report of Her Majesty's Commissioners on the Revenues and Condition of the Established Church (Ireland), 1868." Appendix, No. 16, p. 113.

“The Exempt Jurisdiction of Newry and Mourne owes its origin to a monastery which before the Reformation was established at Newry, and of which the Abbot was what is termed a mitred abbot. The instrument under which the jurisdiction was founded is not now forthcoming, nor is its date known; it must have been some Papal bull or grant, and it was undoubtedly of very remote antiquity. The meaning of an exempt jurisdiction is that a certain district and the clergy within it are wholly outside episcopal control. In the present case the Abbot and not any bishop was the spiritual governor. Like all the monasteries, the Newry house was dissolved, and the Abbot ceased to exist at the Reformation, and all the possessions of the monastery were transferred to the Crown. These possessions were by the Crown originally conferred upon one of the Bagnall family, from whom the present Lord Kilmorey derives part, and the Marquis of Anglesey derived another part. The Kilmorey family have always not only claimed, but actually exercised, an exempt jurisdiction over the same territory as the Abbot. They have a Court, appoint a Vicar-General, formerly gave probate of wills, and granted letters of administration to intestates, and continued to do this until the Irish Probate Court Act, A.D. 1857, abolished all other testamentary jurisdiction. . . . The Abbot had no power to administer the rite of confirmation. It is still more certain that Lord Kilmorey has none. Accordingly the Primate is at intervals invited within the exempt jurisdiction to confirm the children of Newry parish, and the Bishop of Down confirms those of the other parishes.”

In the “Ancient and Present State of the Co. of Down, 1744,” p. 90, it is stated that the Abbey was called the Abbey of Newry, and in the foundation Charter “*Ibar Cyn tracta*, i.e. the flourishing Head of a Yew-Tree.”¹ It is added that according to native tradition there were two yew-trees in the grounds of the Abbey, and hence the name *Monasterium de viridi ligno*. The same work states that the episcopal jurisdiction was exercised by the Temporal Proprietor on the dissolution of the Monasteries, and at that time by Robert Needham, Esq., the owner of the town and manors. It is added that the seal of the Court is “a mitred Abbat in his *Albe*, sitting in a Chair, and supported by two Yew-trees, with this Inscription, *viz. Sigillum exemptae Jurisdictionis de viridi ligno, alias, Newry et Mourne.*”

MATRICES OF LATER SEALS OF THE ROMAN CHURCH.

The collection also contains a few matrices of ecclesiastics of the Roman Church. For much information about these I am indebted to the kindness

¹ See Joyce, “Irish Names of Places,” 1910, vol. i, p. 512.

of His Grace Dr. Walsh, Archbishop of Dublin, who examined the matrices and identified the prelates concerned.

The first is bronze and circular. It measures $1\frac{0}{16}$ inches in diameter. The device is a shield of the arms of O'Reilly, a tree between a lion on the dexter side and a hand on the sinister: there are two amourini at the side of the shield, which is surmounted by a coronet set with fleurs-de-lys. (Plate LI, fig. 8.) Inscription—

HVGO . RELIVS . KILLMOREN . VIC . APOST.

This was the seal of Hugh O'Reilly, Vicar Apostolic of Kilmore and Roman Catholic Primate of Ireland, 1627-1651. It was presented to the Academy in 1868 by the Rev. C. P. Meehan. The matrix was probably cut in France.

The next is an oval brass matrix with a wooden handle. It measures $1\frac{3}{8}$ by $1\frac{1}{2}$ inches. The device is a shield of arms, two lions supporting a garb, in chief three swords two in saltire and one in fesse. The shield is surmounted by an archbishop's cross, and over this is an ecclesiastical hat with three tassels on each side. (Plate LI, fig. 7.) Inscription—

✠ IO : BRENANVS : ARCHIEPISCOVVS : CASSELLEN . & ECCLIA R .

Above the hat is inscribed—

WATERFS & : LISMS' : ADMINIST.

Archbishop John Brennan was Archbishop of Cashel from 1677 till his death in 1693.¹

The next is a circular brass matrix, $1\frac{1}{2}$ inches in diameter. The device is a shield with the arms of O'Connor, an oak-tree eradicated, and the crest, an armed arm holding a sword, surmounted by an ecclesiastical hat with three tassels on each side. (Plate LI, fig. 9.) Inscription—

* FR. IOAN^S O'CONNOR · ORD. PR. ED. S · T · PR. ESENT^S ET ·
PROTON · AP.

This was the seal of John O'Connor, a Dominican 'Ordinis Praedicatorum,' Prothonotary Apostolic, and who held the degree of "Sacrae Theologiae Praesentatus."

He appears to have been a member of the Dublin house of the Order of Dominicans in 1756, when he was twenty-six years old, and in 1772, when apparently Prior of the Dublin house, he published a devotional work.

The last is a small oval brass matrix with a funnel-shaped handle. It measures $1\frac{3}{8}$ by 1 inches. The device consists of a double-headed eagle

¹ See Renahan, "Collections on Irish Church History" (Dublin, 1861), pp. 287-296.
See De Burgo's "Hibernia Dominicana," p. 828 of the Supplement.

bearing on its breast a crucifix; above this enclosed in an oval frame are two human arms, saltire wise, and above these a cross and below a heart. (Plate LI, fig. 10.) . Inscription—

SIG · DELEG · COM & VIC · APO · REG · HIBERNA.

The seal of the Delegate Commissary and Vicar Apostolic of the Kingdom of Ireland.

The initials F · A · C in the body of the device stand for its owner. He was a Franciscan, as is shown by the crossed arms. These are found on all seals of the Order, and, when painted, one is represented as naked, and the other with a brown sleeve, the former being symbolical of the arm of Christ, and the latter of that of St. Francis.¹

The matrix was found at Clonmethan.

The following three matrices of ecclesiastical seals are preserved in the British Museum:—Matrix of the seal of the Austin Canons, Abbey of St. Peter and St. Paul, Co. Monaghan, and the matrix of the seal of the Clergy of Kilmore, both of the fourteenth century; also the seventeenth-century matrix of the Convent of Ballinrobe. There are two matrices in the Public Art Gallery and Museum, Belfast: one of the seal of John, Abbot of Saul, and the other of the official seal of the Metropolitan See of Armagh.

MATRICES OF LOCAL HERALDIC AND MISCELLANEOUS SEALS.

The matrices of local seals in the Academy's collection at present number only four; but there are four others in the collection of the Royal Society of Antiquaries of Ireland, at present on loan to the National Museum. With the exception of the matrix of the seal of the Irishtown, Kilkenny, the matrices are late in date, and their devices lack the interest and individuality displayed on so many of the earlier local seals. The matrix of one of the seals of the Corporation of Gowran is curious, with its device of the sacred monogram and emblems of the Passion; but it has no artistic merit, and is probably not earlier than the seventeenth century. These matrices, as a whole, are not of very great interest, and as they have been described and illustrated in publications easily accessible, it will only be necessary to give a list and indicate where the descriptions are to be found.

In the Collection of the Academy.

1. Silver Matrix of the seal of the Corporation of Belturbet, Co. Cavan. (Ulster Journal of Archaeology, new series, vol. i, 1894, p. 112.)
2. Silver Matrix of the seal of the Mayor of Youghal. (Journal Roy. Soc. of Antiq. of Irel., vol. vi, p. 140.)

Ex inform. the Rev. Fr. Thomas, o.s.f.c. (Provincial), Franciscan Capuchin Friary, Dublin.

3. Wooden Matrix of the Tholsel Court of Limerick. (*Journal Roy. Soc. of Antiq. of Irel.*, vol. xiii, p. 244.)
4. Brass Matrix of the seal of the Barber Surgeons' Guild of Limerick. (*Journal Roy. Soc. Antiq. of Irel.*, vol. xiii, p. 243.)

In the Collection of the Royal Society of Antiquaries of Ireland.

1. Bronze Matrix of the Corporate seal of the Irishtown, Kilkenny. (*Journal Roy. Soc. of Antiq. of Irel.*, vols. i, p. 486, and v, p. 330 : Kilkenny, by John Hogan, 1884, p. 183.)
2. Silver Matrix of the Corporation of Thomastown. (*Journal Roy. Soc. of Antiq. of Ireland*, vol. iv., p. 86.)
3. Brass Matrix of the Corporation of Gowran (1). *Journal Royal Soc. of Antiq. of Irel.*, vol. xii, p. 116.)
4. Brass Matrix of the Corporation of Gowran (2). (*Journal Roy. Soc. of Antiq. of Irel.*, vol. iv, p. 93.)

Among the matrices of heraldic and miscellaneous seals I have picked out the following, which are of interest, and have not, so far as I am aware, been published before:—

I much regret I am unable to identify any of the persons to whom these matrices belonged; but this could only be done with certainty if records, sealed with impressions of the matrices in question, were available, or if there were contemporary documents mentioning the seals in use by individuals. The difficulty of identification is increased when the device is not armorial. By taking the probable dates of the matrices and consulting the Irish Annals, guesses could have been made; but, in my opinion, this course might have led to confusion, and been a source of future error.

Circular flat silver matrix, $\frac{7}{8}$ inch in diameter. Device, heater-shaped shield, arms, a fesse engrailed of three points. Plate LII, fig. 1.) Inscription—

✠ SĪ · BERTI · FILI · DAVIT.

Circular flat silver matrix $\frac{1}{6}$ inches in diameter. Device, heater-shaped shield, arms, a fesse, on the fesse a molet for difference. (Plate LII, fig. 4.) Inscription—

* LAVRENDIVS PĒCYT.

The arms of Petyt are gold, a fesse sable.¹ The name of Petyt occurs frequently in the Calendar of Documents relating to Ireland from the twelfth to the fourteenth centuries. See vols. i–v.

Shield-shaped flat bronze matrix. The handle has been broken off; it

¹ Burke, "General Armory," 3rd edition.

measures 1 inch in length, and $\frac{1}{8}$ of an inch across the top. Device, shield of arms, a lion. (Plate LII, fig. 10.) Inscription—

✠ S .: ANTORII : PAVLI.

Circular bronze matrix, $1\frac{3}{16}$ inches in diameter, with ornamental quatrefoil handle; device, a heater-shaped shield, with a flory-headed rod in pale—perhaps a sceptre. (Plate LII, fig. 6.) Inscription—

✠ S IGHAN MACART.

The seal of John MacArt. There are sprigs of foliage between the words instead of stops.

Circular bronze matrix, 1 inch in diameter. The cutting of this matrix is very coarse; but I take the device as intended for a shield: if so, I think the arms may be described as barry of six pieces, three of them being gobony (Plate LII, fig. 9.) Inscription—

✠ S GOTTFRÆD'DOARDI.

The seal of Godfrey Dougherty. (The first letter of the second word is very badly cut and might be read as "P.")

Circular flat silver matrix, $\frac{1}{8}$ inch in diameter, with a pierced handle. Device, a galley afloat and two fishes swimming in the sea. (Plate LII, fig. 5.) Inscription—

✠ S' D: NACHAD BAV' IBRIAN.

The seal of Donogh bán (the fair) O'Brien. (The first letter of BAV' is ambiguous, but appears to be intended for a B.) The Christian name on this seal puzzled me completely; but Mr. McEnery came to my assistance, and was able to make it out as above.

Circular bronze matrix, 1 inch in diameter, showing traces of a handle. Device, a seeded fleur-de-lys. (Plate LII, fig. 2.) Inscription—

✠ S' DOMNALL KIMANAC.

The seal of Domnall Kavanagh. (Professor John Mac Neill suggested that the first letter of the second word was K, and I have adopted this. I thought the letter was Q.)

Rough circular bronze matrix, 2 inches in diameter, with socket at the back for the insertion of a handle. Device, a hand between two wheel-like figures. (Plate LII, fig. 3.) Inscription—

IOHANNES · ORELI · MILES.

This matrix was found in Co. Cavan.

Circular flat bronze matrix, $1\frac{1}{4}$ inches in diameter with a loop at the back. Device, an eagle rising. (Plate LII, fig. 7.) Inscription—

✠ IOHANNIS DE GVIDONIS.

Circular flat silver matrix, $\frac{3}{4}$ inches in diameter. Device, a griffon. (Plate LII, fig. 8.) Inscription—

* MAVRICI · Y DORYEÆ.

The letter after O in the last word is doubtful; but if it is an N, the name would read 'Maurice O'Donnell.' This matrix is stated to have been found near Athlone.

Circular flat bronze matrix, $\frac{7}{8}$ inches in diameter, with a looped handle at the back. Device, five keys; wards in chief. (Plate LII, fig. 11.) Inscription—

* S' IOH'IS · DÆ STONÆWÆLLÆ.

Small circular bronze matrix, $\frac{3}{4}$ of an inch in diameter, with a cylindrical handle. Device, an eagle or bird of prey striking a duck. (Plate LII, fig. 12.) Inscription—

* ALAS IE SV PRIS.

This and the two following specimens probably belong to the fourteenth century.

Small circular bronze matrix, $\frac{3}{4}$ of an inch in diameter, with a cylindrical handle broken at the top. Device, a bird. (Plate LII, fig. 13.) Inscription—

* PRIVE SV.

The second letter looks like another P, but must, I think, be intended for R; and so the inscription would be *Privé suis*.

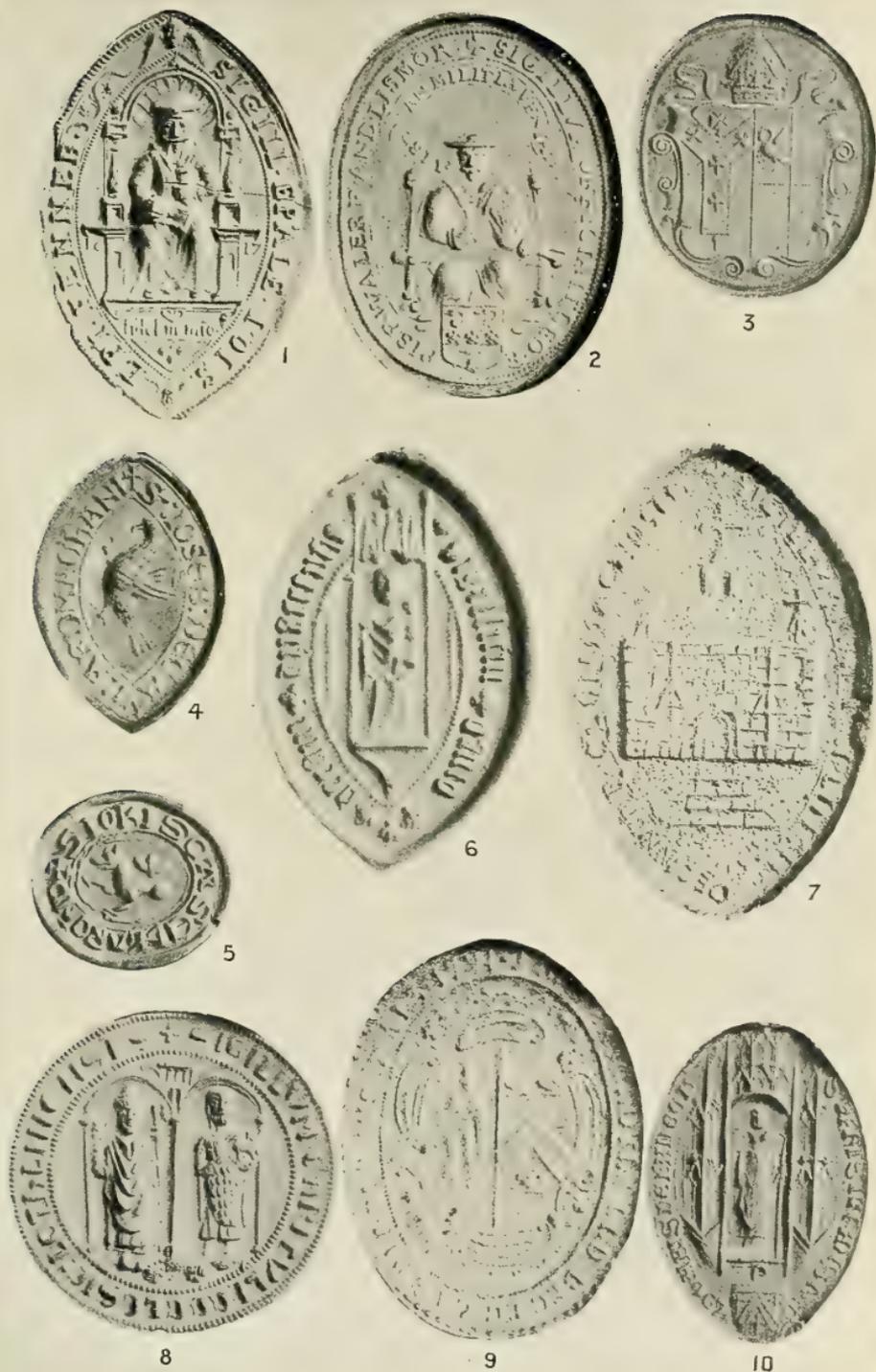
Small circular bronze matrix, $\frac{5}{8}$ of an inch in diameter, with cylindrical handle, ending in a loop. Device, a half-moon with a human face. (Plate LII, fig. 14.) Inscription the same as the last example with a similar blundering of the second letter.

Small oval silver matrix, $\frac{5}{8}$ inches in length, with a pierced handle. Device, cut on a setting of glass, a swan. Inscription—

* SIGILLVM SÆCRÆTI.

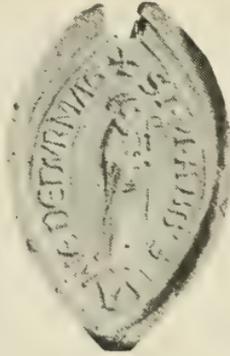
In conclusion I venture to hope that the publication of these matrices may lead to others finding their way into the collection, as, for instance, the fifteenth-century matrix of Octavian, Archbishop of Armagh, which was exhibited to the Royal Historical and Archaeological Association of Ireland in 1872, and the splendid one of William, Bishop of Kildare, which was described in the "Irish Penny Journal" in 1840, and stated then to be in the possession of a gentleman in Dublin.







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XXI.

MINUTE BOOK OF THE CORPORATION OF DUBLIN, KNOWN
AS THE "FRIDAY BOOK," 1567-1611.

By HENRY F. BERRY, I.S.O., Litt. D.

Read JANUARY 12. Published FEBRUARY 22, 1913.

SOME time since the manuscript volume which it is now my privilege to exhibit to the Academy was entrusted to me with a view to the ascertainment of its nature and contents. It was in the possession of the late Sir John T. Banks, M.D.; and it is the intention of his executors to present it to the Corporation of Dublin. The volume proves to be a copy of certain of the minutes of proceedings of a committee composed of the mayor and aldermen of Dublin, which met for the purpose of carrying on civic affairs. It dates between October, 1567, and 8th May, 1611, covering an eventful period of over forty years in the municipal annals. It is a paper book, 13 in. by 8½ in., in a vellum cover, the folios being numbered 1 to 97, 106 to 112, and 115 to 118, with eleven folios at the end, written on, but not numbered. The dates are continuous, save at the end, where entries seem to have been irregularly made. The book is endorsed "Lib. C.," and must at one time have formed portion of the ancient city records. It would appear to have been commonly known as the "Friday Book," which is sufficiently appropriate, as the first entry is a minute to the effect that the mayor and aldermen are to assemble in the Tolsell every *Friday* at nine o'clock in the forenoon. An order is stated to have been laid down in the "Friday Book" for dismissal of Martin Hussey from the office of sheriff (Gilbert's "Ancient Records of Dublin," vol. i, 495), which will be found at fol. 91^a of the volume now before you. An order of the Assembly in 1601 speaks of certain things "more at large entered in the Friday Book" (Gilbert, ii, 513). These matters, which dealt with intruders in St. Patrick's Street, will be found at fol. 106. The meetings held are termed "assembly of the aldermen to consult with the mayor for the government of the city," thus giving a clue to the functions of the body, which seems to have acted as an inner council, the city assembly forming the outer circle. In 1573 it was called a "fellowship, or company"; and during debates the junior aldermen were to speak first. A number of rules are laid down and subjects

discussed which do not appear to have come before the Assembly, which makes the volume of some importance, as throwing further light on our civic history at so remote a period as Elizabeth's reign. I supply a calendar of its contents, and preface it by briefly calling attention to the more interesting subjects with which it deals.

There are several notices of city property. Its title to Fercullen, which was held under statute 3 Edward IV (c. 77), was called in question in 1581; as also that to Taghadoe, co. Kildare, which had formed portion of the possessions of All Hallows' Monastery. In 1597 the committee are found leasing to Edward Loftus, recorder, a large tract in Glendalough, with the tithes of the rectories of "Sancti Salvatoris," Rathdrum, and Killaghe. Henry de Loundres, archbishop of Dublin, had confirmed to All Hallows the church of St. Saviour. In 1609 a cause was depending between the city and Sir John Talbot as to Malahide, which was referred to the arbitration of the Lord Chancellor and the Chief Baron.

On 27th October, 1597, an examination was made by the mayor as to the city charters, &c., extant. Among the records is enumerated the "White Book," and "an old book of the revenues of All Hallows called *Credo Mihi*." With regard to the mayoralty, there are several instances of the office being refused, or of those elected making arrangements by which its duties were handed over to others. The plea for non-acceptance was generally that of inability to support the expense of the dignity; and occasionally sums were voted to enable the holders to bear the charge. In 1583 John Lennan, who had a residence outside the city liberties, was granted £10 for house rent within them during his year of office, together with a proportion of the debts due the city.

Similar cases of refusal are found among those who were elected to or eligible for the office of sheriff; and in each instance fines and imprisonment were inflicted as punishment. When one Martin Hussey was made sheriff in 1607, and could not be found near at hand, a pursuivant was specially sent to the island of Valencia, with an attachment. Hussey was fined £100; and later, on his submission and promise to pay, he was permitted to hold his place in stations and meetings, and to exercise his trade as before. With regard to the sheriffs' duties, when, on the occasion of a general hosting in 1597, a question arose as to whether one of them should go in person as leader, and, if so, which, it was decided that, following ancient precedent, one of them was bound to go; but they were allowed to arrange between themselves which it was to be.

From about 1580, on several occasions, questions arose as to the immunity of aldermen from payment of cess levied for support of soldiers billeted on the

city; and sheriffs were fined for including their names in the lists of those liable. By the year 1597, however, the number of soldiers coming to the city was found to have increased so much that it seemed only just that this privileged class should bear their part in relief of their neighbours.

As to the office of recorder, when a vacancy occurred in 1595, Edward Loftus, then a law student in England, was specially recommended by the Lord Chancellor for the post; and inquiries as to his competency were directed to be sent to that country.

There is some mention of the city plate, and special articles were purchased from time to time, "to follow the sword," as the record (using an ancient phrase, denoting the mayor's jurisdiction) quaintly puts it. In 1609 a sum of £7 15s. was expended in having a new pommel and cross of pure silver set in the King's sword, which was daily carried before the mayor.

Naturally, the subject of the defence of the city in times of danger occupied a considerable portion of the deliberations of the assembly. Gunpowder was kept in the city store-house, and pikes were provided. In 1597, during the progress of Tyrone's rebellion, a number of entries concern the watch, both standing and roaming, who were employed on the walls, at the gates, and within the city, night and day. St. Audoen's bell was rung at the appointed time, and the mayor had imposed on him the duty of seeing to this. The captains of the guard kept their court in the new hall, and had a fixed allowance for fire and candlelight. The postern gates in the city walls were a source of anxiety, and the mayor directed such persons as had any in their premises to have them built up with stone and lime. Sir John Gilbert, in Appendix II. to his third volume of "*Ancient Records of Dublin*," has brought together a large number of "civic regulations for the defence and protection of Dublin," 1596–1601, taken from Egerton MS., 1769, British Museum, London, the originals of which are those found in the "*Friday Book*" before us, of whose existence Gilbert seems to have been unaware. The Egerton MS. is but a copy—an accurate one, however, as I have collated the entries. Some precautions against the peril of fire are recorded; and on many occasions the scourge of the plague occupied the anxious attention of the city fathers. Alarm was created by its appearance in England in the autumn of 1592, when London suffered much. The mayor was empowered to send two sufficient persons to board every vessel coming to the city from England, and no goods were to be put off until he gave order. On one occasion, the master of the Barber Surgeons' Guild was moved to send two of its members to examine and certify as to a case of the plague.

Many entries relate to the trades exercised in the city and suburbs. In 1581 sellers of ale and victuallers licensed by the mayor were to lodge all

strangers coming to the city, and all such were to have their signs. So high an official as Sir Francis Walsingham, H. M. Chief Secretary, applied that the wife of one Frith, an inhabitant but not a freeman of the city, might ply her calling as a sempstress, which was granted on condition that she procured the necessary materials from city merchants only. In 1588 a special place in Cork Hill was assigned for the free fishermen of the city for selling their fish, while the free fishermen who then dwelt in Fish (Fishamble) Street were allowed to sell at their own stalls. The Trinity Gild (that of the merchants) seems to have had special jurisdiction with regard to herrings, for, on an occasion when the mayor had purchased some quantity of that fish, he became bound to make no further bargains for such without the privity of the master and wardens of that fraternity. During the course of the year 1600, the Master of the Bakers' Company forbade the members to bake bread, so that the city was unprovided with that commodity. He was committed to Newgate, where he was to remain at the discretion of the mayor. As a consequence, the Council, in the Lord Deputy's absence, directed that the assise of bread should be laid down, which the mayor carried out.

In 1609 the activity of Dutch merchants in capturing portion of the city trade was the cause of some anxiety to the citizens, especially as these foreigners managed to evade payment of imposts, &c. In a particular case recorded in the "Friday Book," one Jaques Marshis of Amsterdam was encouraged to venture to Dublin with a freight of dry goods, for which he hoped to maintain a freedom in St. Patrick's; and some velvet was taken from a Dutchman by the Merchants' Gild, which was sold in the franchises, contrary to the charters. A Mr. Jacob appears to have instigated the aggressiveness of the foreigners. He was counsel in a Bill presented to the Star Chamber against the mayor, &c., and was said to have declared in open court that he would overthrow the city charters. As a result, an order was made that any free citizen buying from Dutch merchants should be disfranchised or fined.

There are some notices of the riding of the franchises, which in 1607 was said to have been long omitted. The destruction in 1597 of a large number of houses, and the deaths of nearly 400 inhabitants by the blowing up on Wood Quay of 144 barrels of gunpowder belonging to Government, caused so much sorrow that the muster of citizens at Cullenswood, which usually took place on Easter Monday, was given up that year.

The city school and its masters occupy some space. Mr. Bruerton, master in 1599, was to have £15 salary paid him by the sheriffs; and in 1605, Robert Mason was paid fifty shillings, old silver, for keeping the "Free" school from Michaelmas to Christmas. On one occasion, munition belonging

to the city, for which it seemed difficult to find room, was stored in the upper rooms, of which the mayor had the key.

The ancient city watercourse is occasionally noticed. The Talbots of Templeogue, through whose lands in that part of its course the stream flowed, are frequently mentioned in the city records in connexion with it. In 1608 Robert Talbot made claim to port corn out of every mill in the city and suburbs which used its water, as also to the watercourse itself, as his ancient inheritance, and he commenced a suit against one of the city leaseholders. There is a note appended to this entry to the effect that the port corn had been granted to Richard Talbot by the city for the purpose of enabling him to maintain the course, with a reference to the book of By-laws, 4 and 5 Ph. and Mary.

Government constantly applied to the Assembly for loans on pressing occasions. At such times, citizens likely to lend were appealed to, and a warrant under the city seal was given for the necessary amount. The parties willing to assist entered into bonds, which were cancelled on the repayment of sums advanced.

Whenever any measures for the advantage or interest of the city were being preferred to the Crown, it was customary to send over agents as "solicitors" to London. In 1608 Michael Hamling, acting in this capacity, was to accompany the recorder to England, when provision for his expenses during a probable absence of even more than six months was made. During 1609 the city agreed to take up £350, through their agent, Robert Cutts, of London. To secure the parties guaranteeing, a number of prominent citizens, the recorder heading the list, agreed to deliver into their hands plate worth, in each man's case, £10, until a general cess could be made. On this occasion the mayor and sheriffs wrote to Sir James Lye, asking that should their causes be referred to him he might signify their deserts to the King, and make known to the Lord Lieutenant their loyalty. The matter more particularly in hand at the time appears to have been that of the Dutch merchants before referred to. The practice of depositing plate in pledge appears to have been a usual one. Thus, when in 1595, the sheriffs still owed money on their account, one of them, Mr. Ussher, delivered to the treasurer two silver bowls with a cover, double gilt, London touch, he undertaking to pay later on.

Questions as to infringement of the charters and as to their maintenance arose. That under which the mayor acted as escheator was questioned in the Exchequer; and special counsel were retained in 1505 to assist the recorder in defending the rights of the city. Commissions were also directed to the mayor for trials of capital crimes, which were questioned, and it was resolved that he

was to refuse to sit, under such, until it were decided whether the charters were not sufficient.

Another source of trouble was the question of the extent of the city liberties in St. Patrick's Street, and in 1608 certain of the assembly were empowered to treat with the Lord Chancellor,¹ as to that street, the Coombe, New Street, and St. Kevin's Street being united to the franchise of the city. He agreed to this for his life, for which he was to have £66.

The civic authorities of the day appear to have been on excellent terms with the representative of the Crown in Ireland, and some instances of civilities and courtesies passing between them are recorded. On the departure of Lord Mountjoy, deputy, in May, 1603, the mayor and aldermen resolved to accompany him to the shore with "heartiest farewell." In September, 1606, a butt of good sack and two hogsheads of Gascon wine were to be selected by a committee for presentation to the Lord Deputy (Sir Arthur Chichester), as an acknowledgment of his furtherance of city affairs. In January, 1611, a committee was again appointed to select a butt of sack, two hogsheads of Gascon wine, and 40 lb. of white sugar in loaves, for presentation to Sir Arthur Chichester on the occasion of the marriage of his daughter.² Chichester had an only child—a son—who died in infancy; and there can be no doubt that the bride-elect was one of the daughters of his wife, Lettice (who was a daughter of Sir John Perrot), by her marriage with Walter Vaughan of Golden Grove, Caermarthen. Jane married Sir Adam Loftus of Rathfarnham; and Elizabeth married Sir Edward Moore, son of the first Viscount Moore, of Drogheda, but which was the bride in January, 1611, in the absence of dates in the pedigrees, it is not possible to decide.

It is interesting to find that commencements in Trinity College during the earliest celebrations of that now time-honoured function were attended by the Mayor and Corporation of Dublin, presumably in state. In October, 1608, an entry states that, it having been found that commencements may be held on a certain day, this would hinder the meeting of the Assembly. It was accordingly resolved to fix it for a later date.

¹ Thomas Jones, archbishop of Dublin.

² An account roll of 1611 in the Public Record Office has a note of the expense of repairing and trimming up the hall of Dublin Castle and other rooms, &c., there, in January of that year, against the marriage feast.

CALENDAR OF THE “FRIDAY BOOK.”

fol. 1^a. . . . October, 1567.

It is agreed by Mr. Mayor and his brethren aldermen, whose names are subscribed, that they and their successors assemble every Friday in the Tolsell, by 9 o'clock, forenoon, under penalty of two shillings, and not to depart without the mayor's leave. The fines to be employed on the city's works, and these not to extend to aldermen lawfully absent. Friday Meeting

John Fitz Symon, mayor.

Thade Duff, &c.

fol. 2^a. 13th February, 1568.

Cess of £20 on the whole body of the city, to pay the commons that bare the [charge of the] soldiers. Cess.

fol. 2^b. 20th June, 1569.

Michael Bea, now mayor, shall cause to be made a proportion of fifteen score black bills¹ of the best sort, for the city's store, the treasurer of the city to disburse of the city's treasure twelve pence for every bill. Black bills.

fol. 3^a. 4th November, 1569.

Mr. James Stanyhurst, recorder, Mr. Richard Fynglas, Queen's serjeant at laws, Mr. Edward Fitz Simon, Mr. Edward Barane, and Mr. Patrick Coghe, shall peruse a copy or draft made by William Forster of the lease to be passed by him to the city, same to pass when agreed on. John Gaydon fitz Nicholas, if he be within the limits of the city, to be called thereunto. Forster's lease.

fol. 3^b.

Mr. James Bellewe, manager, to make warrant to the treasurer for purchase of four yarn grappers and twelve leather buckets, in case of fire. Fire.

14th November, 1572.

Also agreed that the key of the loft of the Crane² should have been delivered to Walter Ball and Thomas Cosgrave, now sheriffs. Crane.

fol. 4^a. Friday after the Feast of the Conception, 1572.

Nicholas Ball and Andrew Luttrell, late sheriffs, to defend a suit against them in the Exchequer for searching, and their charges to be borne by the Treasury. Suit against sheriffs.

¹ A kind of pike or halbert—the usual weapon of watchmen.

² It stood at the northern extremity of Winetavern-street, and was used as a Custom House.

fol. 4^b.

Aldermen.

Those admitted aldermen by fine, and not being sheriffs, to pay 40 shillings over and above said fines; sheriffs to pay 40 shillings on being admitted aldermen.

fol. 5^a.

12th December, 1572.

City tenants' rents.

City tenants to stop their rents for money due to them from the city for loans.

fol. 6^a.

Last Friday of August, 1573.

Lease to Barran.

Lease to Edward Barran of a cellar and garden, part of St. George's lands, in the lane running to the Key; to be sealed next assembly.

fol. 6^b.

First Friday of October, 1573.

Aldermen's gowns.

Aldermen who have not been mayors, on Station days to wear violet gowns, on pain of £5.

fol. 7^a.

16th October, 1574.

Soldiers quartered.

Soldiers not to be quartered in the city or suburbs without paying three pence a meal at least, unless it be for twenty-four hours on arrival of any band from England, or on their despatch to England. This order to stand until there be reason to change it in respect of the price of victuals.

fol. 7^b.

3rd December, 1574.

Necessary costs.

Such money as may be necessary for searching and exemplifying an Act of Parliament for the mayor and sheriffs of Dublin to be searchers, for another Act as to poundage; and for an Act of confirmation of the grants, franchises, and customs of said city, to be delivered by the treasurer, he receiving warrant for that purpose from the mayor, &c.

fol. 8^a.

Friday next before St. Lawrence Day (10th Aug.), 1578.

Committal of Aldermen.

In the Tolsell, Richard Fiane and Nicholas Fitz Symons, aldermen, uttered against each other inconvenient and undutiful speeches. They to be committed to ward for 24 hours, and to pay 10 shillings.

fol. 9^a.

15th March, 1580.

Imprisonment of Alderman Ball.

Alderman Nicholas Ball to be imprisoned, for 24 hours, and to pay twelve pence to the poor of the Newgate in bread, &c., and as much to poor prisoners in the Castle; also a steel box to hold money for the poor, before he be released, for having uttered speeches against Mr. Alen.

fol. 10^a.

11th July, 1580.

Tailors to elect anew a master.

Corporation of Tailors to elect anew a master. (Morgan Newman, master, and the wardens having forced James Forster to be master for the year.)

Forster, by order of the Assembly, had been dismissed from the liberties of the city, and had not been restored. The Tailors Company prayed stay of election. Morgan Newman ordered to be committed to the Marshalsea for his contempt in giving the books of orders, &c., contrary to the commands of the Assembly.

fol. 11^a. 24th September, 1580.

Henry Shelton, sheriff, to pay £10, or deliver plate to that amount, for having charged the whole number of aldermen with bearing [the charge] of soldiers, contrary to their immunity. Sheriff fined.

fol. 12^a. 20th March, 1581.

Agreed by the mayor and corporation assembled together, that £200 be bestowed for ordnance, for defence of the city. Defence of city.

fol. 13^a. 16th June, 1581.

Taverners [sellers of ale] and victuallers to be appointed by the mayor, &c., to lodge all strangers coming to the city. None others to do so on pain of 20 days' imprisonment. The victuallers appointed to have their several signs. Taverners and victuallers. Signs.

fol. 13^b. 1st December, 1581.

Agreed in Assembly held by the mayor and aldermen, that Richard Bonsell, treasurer, disburse money for examining witnesses concerning the city's title to Fercullen.¹ Fercullen.

fol. 14^a. 23rd March, 1582.

Nicholas Duff, alderman, to defend the suit brought against him by the children of Robert Ussher, deceased, for the corn of Taghadoe,² the city to have half the charges, and the farmers of All Hallows the other half. On recovery, the profits to be divided between the city and the said farmers. John Luttrell to be joined with Duff in defence of the suit. Taghadoe.

fol. 15^a. 6th October, 1582.

James Rian, who had been elected sheriff, came before Nicholas Ball, mayor, and the aldermen, being in consultation at the Tolsell, and besought them to be discharged of said office, he not being able to support the charge. They put him on oath, and he was dismissed; another sheriff to be elected. Election of sheriff.

fol. 16^a. 20th November, 1584.

Nicholas Ball to be treasurer and chamberlain of the city for a year, he to have £10 for undertaking the city causes. Treasurer of city.

¹ A district at this time nearly coterminous with the present parish of Powerscourt, co. Wicklow.

² Barony of Salt, co. Kildare.

fol. 17^a.

14th September, 1583.

As to residence of mayor.

The mayor and aldermen, assembled in the Tolsell, called before them John Lennan, alderman, nominated mayor, and asked him whether he would keep his dwelling during his mayoralty in the liberties of the city. He answered that if he might not dwell in his own house out of the liberties, he would have dwelt within, and other answer he would not make. Owing to the uncertainty of this answer, he to be committed to ward till he consent to dwell in the liberties, according to ancient usage.

fol. 18^a.

20th September, 1583.

Mayor's house-rent.

Said Lennan to have £10 for house rent in the city. To incite him to get in the city debts, he to have £18 out of them.

fol. 18^b.

5th February, 1585.

Repair of Tolsell.

The east side wall of the Tolsell in need of repair. Richard Rownsell, Nicholas Ball, Richard Fagan, and John Forster to agree with Hugh Oboghell, mason, or any other good workman, to take same in hand.

fol. 19^a.

10th September, 1585.

Building of Christ Church.

Thomas Smith, treasurer, to be paid the balance of his account, he being now appointed to disburse certain money towards building of Christ Church, being part of a grant made by the city to said church.

fol. 19^b.

(No date.)

Sheriff fined.

Thomas Gerall, sheriff, to pay £10 for placing two soldiers in every alderman's house, he to be committed till he pay or deliver his pawn.

fol. 20^a.

21st July, 1587.

R^d. Fagan, mayor.

The election of Richard Fagan as mayor to stand, and he to enter into recognizances in £1000, to appear before the mayor. If he refuse, he to be put in ward.

fol. 21^a.

6th October, 1587.

Mrs. Frithe, sempstress.

Letter from Sir Francis Walsingham, Knt., Her Majesty's Chief Secretary, on behalf of one Frithe's wife, inhabitant of this city, and not free of same, for permission to use her "semestry" in the city. Leave granted, to next assembly, she to buy all her stuff from city merchants only.

[In margin.] On a letter from the Secretary, a woman (not being free) is admitted to use the trade of a sempstress.

fol. 21^a.

22nd November, 1588.

Sale of fish.

Ordered that a place be appointed on the Cork hill where the free fishers of this city shall stand to "utter" their fish; and out of the city revenues

£4 10s. to be bestowed in boards and other necessaries for furnishing same, the mayor to compel them to resort thither for sale of their fish. Nevertheless such free fishers as now dwell in the Fish Street to have liberty to sell their fish at their own standings or stalls, as long as same be not thought hurtful to the market by the mayor. Other fishers who henceforth shall dwell in said street to be forced to bring their fish to said shambles to be sold. Unfree fishers that come to the market to be compelled to sell their fish below the freemen in the place.

fol. 22^a. 29th November, 1588.

The school-house of the city is disfurnished, and wants seats and other necessaries; £5 to be bestowed for same. City school-house.

fol. 22^b. 29th November, 1588.

The drummer, trumpeter, and gunners, having allowance of gowns from the city, often attended in cloaks of divers colours, which was unseemly, and as the mayor had never given cloaks to them with badges by which they might be known to belong to the city, it is ordered that same cloaks be counted as parcel of their said livery, containing each 2½ yards, the overplus to be given them in money or in cloth. The badges (in number six) cost 44 shillings, with two badges more that are set over a cassock, to serve for a messenger or footman to attend on the city. The cost to be borne on the city revenues. Livery and badges, trumpeters and gunners.

[In margin.] This was granted by an Assembly.

[This whole entry is scored out.]

fol. 23^a. 29th November, 1588.

For the "risings out" of the constables in their several wards on causes concerning their offices, they should carry staves by which they may be known. It is thought fit the charge of the staves should be borne not by the treasurer, but by the inhabitants in their wards. The number of staves forty-one, with the Queen's arms and the arms of the city in gold, and three other staves with like arms in silver. Constables' staves.

fol. 23^b. [Here are given the names of the constables who have had staves delivered to them.]

fol. 24^a. 28th February, 1589.

The mayor to give his warrant to the treasurer of the city for payment of £10 stg. to Robert Poyntor, master gunner: he shall also have for one day a labouring man out of every house in the city and suburbs that is thought able to bear the same, to labour as he shall direct, for finding out of saltpetre and Gunpowder.

making gunpowder. On this condition, said Poyntor has promised to furnish the city with 2000 weight of good corn powder at sixpence per pound. He will keep the powder in the storehouse of the city.

fol. 25^a 4th August, 1589.

John Gaydon. Referred to the meeting to choose a citizen who would prosecute to the Queen in England for causes and suits. John Gaydon, alderman, is chosen.

fol. 26^a 2nd October, 1590.

Munition. Some munition having been received for the Queen's use, the next mayor and sheriffs to take charge, and be accountable for it.

fol. 27^a 6th October, 1592.

Plague. A motion from the Lord Deputy as to the infection of the plague, which is in England and chiefly in London, whence merchants resort, being prevented here. Agreed that in the case of every barque or vessel coming from England to this city, the mayor appoint two sufficient persons to go on board, no goods to be put off until the mayor please. He to receive payment from the city.

fol. 27^b 27th October, 1592.

Munition. Thomas Smith and Walter Ball to act on behalf of the city to the Lord Deputy and Council as to removal of munition lying in James Taylor's house, and payment of house rent where it was kept.

Custom taken at Trim. Agreed that Thos. Gerrot, Mr. Chamerlen, and John Shelton prosecute those at Trim who take custom of the citizens passing with their goods through that town, as the city charters will warrant, by advice of the recorder ; John Wafer also to join in the prosecution.

fol. 28^a 10th November, 1592.

Refusal of office of sheriff. Geoffrey Cantwell, imprisoned on fine of £100 for refusing the office of sheriff, petitioned the aldermen for release. Agreed that the mayor confer with him as to his ability to undertake the office. The fine to be confirmed in the next quarter assembly, and then Geoffrey to be discharged.

fol. 28^b 21st March, 1593.

Meetings on Tuesdays. Meetings of the aldermen on Fridays to be changed to Tuesdays weekly, on such penalties in default of attendance as in the case of the Friday meetings.

[In margin.] It is meant that the water bailiffs shall give warning by Mr. Mayor's direction.

fol. 29^a. 27th November, 1593.

Philip Conran to deliver to Mr. Francis Taylor, treasurer, £10 received of City plate. Geoffrey Cantwell, baker, for fine, which is to be delivered by the treasurer, with £15 more, in full payment of a bason and ewer, parcel gilt, bought of Nicholas Barran for the city, weighing 100 ounces at five shillings; this bason is to be delivered yearly to the treasurer, who is to deliver it to the mayor from year to year.

fol. 30^a. 13th May, 1595.

Edward Loftus, gentleman, now at study of the Law in England, Recorder. recommended by the Lord Chancellor as recorder. Agreed that letters be sent to England inquiring into his sufficiency.

fol. 30^b. 4th November, 1595.

Debt due by Mr. Usher and Mr. Flemynge, late sheriffs, on their account. Said Mr. Usher delivered to the treasurer two silver bowls with a cover, double gilt, and of London touch, he undertaking to pay by Candlemas his and Flemynge's account. Sheriffs' accounts.

fol. 31^a. 28th November, 1595.

The weekly assembly of aldermen to consult with the mayor for the government of the city to be on Friday, notwithstanding any order to the contrary. Friday meetings.

fol. 31^b. 13th November, 1595.

The bridge gate being ruinous, the mayor to direct a warrant to the treasurer for money to the workmen to take down the battlements of said gate as they think meet. The master of the works to make a gate at the slip adjoining, or at the end of the house adjoining to the east end of said gate. Bridge gate.

fol. 32^a. 20th December, 1595.

Much of the money cessed for bringing a watercourse into the city is behind, same being leviable in the mayoralties of Mr. Jans and Mr. Gerald. Now Mr. Chamberlayn, Mr. Weston, and Mr. Kennedy, aldermen, are to call before them the said Jans and Gerald, and take their accounts, Mr. Usher to make his account to said auditors of money for the watercourse. The auditors are also to call before them the constables of wards, in office in those years, to account. Watercourse.

fol. 32^b. 5th March, 1596.

The custom of wool, tallow, &c., which should be sent out of the realm, was given to the city by statutes 11 & 13 Elizabeth, out of which the city got nothing. Lately licence was given to Mr. Weston to transport wares Custom on goods sent out of the city.

prohibited by said statutes: and, on petition to the Deputy, we are authorized to seize them, so as to try our title to said custom. Ordered that Michael Chamberlayn and John Usher, aldermen, collect the custom on such prohibited wares as shall be transported from this city. If the parties refuse to pay, the wares to be seized.

fol. 33^a.

11th March, 1596.

Bridge gate,
&c.

An order was made last assembly for building the bridge gate and repairing the new gate, but no authority was given to compound with the workmen. Ordered that the mayor, Nicholas Ball, John Foster, Nicholas Weston, John Usher, and Matthew Handcock, with the master of the works, compound with the workmen.

fol. 33^b.

26th March, 1597.

Agents to
England.

As to choosing agents for divers suits, agreed that Walter Sedgrave, Nicholas Ball, John Foster, and William Gough, aldermen, determine what suits are fittest to be preferred to Her Majesty for the good of the city.

fol. 34^a.

26th March, 1597.

Powder
explosion.

On account of the late fire, by the burning of Her Majesty's powder, the houses and buildings of the city are so ruined, and the cess such that the time is rather for sorrow than mirth, and it is hard matter to draw the people to their wonted muster on Black Monday; it is ordered that on said day, said muster and going to the wood of Cullen be forborne. The mayor, aldermen, &c., to meet in the New Hall on said Monday for choosing the mayor and sheriffs of the Bullring,¹ &c.

fol. 35^a.

1st April, 1597.

Muster at
Cullenswood
not to take
place.Agents for
England.

Francis Taylor and William Gough, aldermen, to be the city agents for exhibiting suits to the Queen, they to be ready to take shipping for England by 10th April.

fol. 35^b.

22nd April, 1597.

Expenses of
agents to
England.

Michael Chamberlayn, mayor, is bound to Nicholas Borran, alderman, in 100 marks, on condition that whereas the masters of the eight corporations of the city are committed to the marshalsea for refusing to pay their portion of a cess of £100, which proportion amounts to the sum of £33 6s. 8d., to be employed by the city agents who are to be sent as suitors to Her Majesty in England, said Borran is to be repaid the sum he lent as soon as the mayor has set the eight masters at liberty, or £4 3s. 4d. as soon as any of them is set at liberty.

¹ Mayor of the Bullring elected by the citizens to be captain of the Bachelors. The ring was an iron one in the Cornmarket, to which bulls were fastened for baiting.

fol. 36^a.

13th May, 1597.

The number of soldiers coming to the city increasing, it is requisite that, notwithstanding there is order to the contrary, the aldermen should help the other citizens to bear the charge, considering the present scarcity and the poverty of the poor neighbours. It is ordered that the sheriffs place the soldiers in such sort as that the aldermen shall not bear any. In respect whereof, every alderman shall pay twelve pence each day for the number of soldiers now in the city and who are coming. This sum to be taken and levied every day for one week by Nich. Burran, to begin on the coming of the supply now expected, and to continue no longer than the mayor and aldermen see good. Provided it be not hurtful to the former grant of freedom to the aldermen by the Assembly.

Cess for
soldiers
quartered in
city.

fol. 37^a.

29th June, 1597.

The following question arose on the issuing forth of this general hosting. Whether any of the sheriffs should go in person, as chief leaders of the company, and which of them. Agreed that of ancient custom and precedent, one of them is appointed to go; and so it is now ordered that one of them go with the companies pressed forth for the city, the sheriffs to agree between them which shall go.

Sheriffs to
lead
companies in
hostings.

fol. 37^b.

1st July, 1597.

There are to issue forth of this city three score men to serve Her Majesty for forty days in the wars, who are cessed on the citizens and inhabitants, according to ancient custom. As soldiers, captains, gentlemen, and clerks, being inhabitants of the city, claim to be exempted from the charge, it is ordered that the mayor take steps to compel payment of their portion.

Cess for
soldiers.

fol. 38^a.

5th July, 1597.

[Entry unfinished and scored out. Its commencement is similar to that of the succeeding entry.]

fol. 39^a.

5th August, 1597.

Edward Loftus, recorder, and John Elyot, alderman, to have a lease of twenty messuages, 1000 acres arable, 600 acres pasture, 100 acres wood, and 200 acres moor, in “Colla Salvi (Sancti) Salvatoris, in Glindelaghe”; one messuage, 200 acres of land, 100 acres pasture, in Rathdromyn [Rathdrum] Rectory of Sancti Salvatoris, Rathdromyn and Killaghe, tithes, &c., within the county of Dublin, to begin from Easter last, and to end Easter next. In consideration for this they have paid the treasurer £10.

Lease,
Rathdrum,
&c.

fol. 39^b.

7th October, 1597.

City watch.

Thirty-four men shall be set forth nightly by the inhabitants of the city within the walls for a running watch, over and beside the standing watch, thirty to watch in person. The other four shall be in "deade payes"¹ for the entertainment of the leader. The number to be levied out of every house in particular; and the watch to begin when the mayor shall appoint. The aldermen and constables to see the watch set forth nightly on sound of drum.

fol. 40^a.

21st October, 1597.

Corn.

Nicholas Boran, John Elyott, Alderman John Myles, and Nicholas Feld to bring before the mayor any indebted to the city for any corn. If they be refused or be slack in payment of said corn, said persons to receive the corn at the hands of the creditors, and deliver same to the mayor, and he to see same sold for the city.

fol. 40^b.

25th October, 1597.

Postern gates
in city wall.

In this time of danger, it is expedient that such postern gates as are in the city walls be stopped and made up with lime and stone in defensible manner. The mayor to send directions to such as have any such posterns in the city walls to build them up. If the owners of said posterns be slack, the mayor to direct the master of the city works to build them up.

fol. 41^a.

27th October, 1597.

City watch.

Nightly by 8 o'clock, one able man shall issue out of every house in the city and suburbs, and watch the whole night. They are to be well armed with swords, muskets, calivers, corsets and pikes, at the charge of the master of each house, during the mayor's pleasure. The aldermen and their deputies in every ward to see that the men issue armed.

fol. 41^b.

27th October, 1597.

City charters
and records.

The mayor examined what charters of the city the recorder and aldermen had in their possession, belonging to the city; and on oath the recorder confessed that he had the following, which he delivered to the mayor, and for which he alleged his bill or note remained in the treasure house of the Tolsell.

1. A breviat of the city charters written by Mr. William Gough.
2. White Book containing copies of city charters.
3. Inspeximus and charter, Richard III, wherein mayor and recorder are justices of the peace and gaol delivery.

¹ The pay of dead soldiers, illegally appropriated by officers.

4. Patent, Henry IV or Henry V, wherein the mayor and bailiffs are justices of the peace and of labourers.
5. Patent, Edward III, that citizens shall not be empanelled in juries and assises.
6. Exemplification of a statute, *temp.* Edward IV, that citizens imprisoned for felony or treason shall be brought to mainprise, and a petition to the Lord Deputy and Council for allowance thereof.
7. Charter, Henry VIII, granting to the city the Abbey of All Hallows.
8. An old book of the revenues of All Hallows, called *Crede Mihi*.
9. Inspeximus, Edward III, of a charter whereby the inhabitants of the city shall not be put in juries for their lands in the country, and for which the bill of John Wafer, merchant, is in the treasury, and for which said John has a note under the hand of Mr. Ed. Loftus, recorder.

fol. 42^a.

27th October, 1597.

Delivered to the mayor by Mr. Michael Chamberlayn, on examination aforesaid, these charters remaining in his possession, for which, as he alleged, his bill remained in the treasury. City charters, &c.

The Golden Charter of Elizabeth, which he had for the maintenance of the grant of the custom of sheep-skins and other things.

An exemplification of a statute of Henry VII for poundage.

fol. 42^b.

17th January, 1598.

Libel against Nicholas Weston, mayor, read at the table. We cannot find him impeachable of the things contained therein; and the libeller is a dishonest and wicked person. Libel against mayor.

Mr. George Taylor delivered to the mayor a charter Henry VII or VIII, being an inspeximus of divers grants (dated 20th April, 1st year) left in his keeping.

fol. 43^a.

3rd March, 1598.

The mayor bargained and bought of George Morisson and Matthew Symson four score last¹ of herrings at £11 15s. 0d. the last, freeing the strangers of all charges of delivering same at the Key. Resolved that two parts be taken by the master and wardens of the Trinity Gild for the use of the brethren, they to pay the strangers what the mayor promised. The other third part received by the mayor for artificers and citizens. The Gild members who take now shall have the same proportion on the next occasion. None to buy herrings. Herrings.

¹ A last of white herrings was one barrel.

in future without the license of the mayor. The mayor to make no further bargains of herrings without the privity of the master and wardens of the Trinity Guild.

[From a sentence commenced and not finished, it appears that the mayor bought of a Scotchman.]

fol. 43^b.

19th June, 1598.

City loan.

A meeting of the mayor, sheriffs, commons, and citizens in the Tolsell. The mayor, sheriffs, Mr. Nicholas Ball, and Mr. Burran to take on their credit £1,000. The rest of the aldermen bound to acquit them harmless. If not, the money to be levied of the citizens by way of cess. The Trinity Guild and such as usually bear with them to pay two parts, and the eight corporations to pay the remaining third.

fol. 44^a.

30th June, 1598.

Contributions to H.M. service.

Certain aldermen refused to contribute with the rest in the services for Her Majesty. Agreed that not only such as are now in question, but all hereafter, shall be contributory.

fol. 44^b.

21st August, 1598.

[This and the two succeeding entries will be found in Gilbert's "Ancient Records of Dublin," vol. iii, pp. 525-6.]

fol. 45^b.

6th September, 1598.

Thomas Gerrald's account.

Thomas Gerrald, for debt on his account, was committed to the Tolsell, 3rd September. The mayor allowed him out, and he did not return, though ordered. It is resolved that his contempt deserved imprisonment in the marshal ward during the mayor's pleasure.

fol. 46^a.

7th October, 1598.

Diet of soldiers.

Sums are due to the citizens for diet of soldiers for three years past, and bills remain in divers hands. Mr. Weston, Mr. Ellyot, Mr. Shelton, and Mr. Palles, Mr. Panting, and Mr. Gooding are to be called on to deliver an account of their receipts and payments for diet in that time, and to bring in the several tickets, &c., so as to show what is due to the citizens.

[The entries in folios 46^b, 47, 48 will be found in Gilbert's "Ancient Records of Dublin," vol. iii, pp. 526-8.]

fol. 49^a.

8th February, 1599.

Merchants' Key.

The stones and gravel at Merchants' Key, left there on repair of the Bridge gate, have now become noisome. Same to be speedily removed, and the street cleaned.

[The entries in folios 49^b and 50^a will be found in Gilbert’s “Ancient Records of Dublin,” vol. iii., p. 528.]

fol. 50^b.

3rd April, 1599.

Warrant of attorney under the city seal given to James Bellew, mayor, Nicholas Ball, Richard Fagan, Walter Sedgrave, Francis Taylor, Michael Chamberlayn, Walter Galtrin, John Usher, Gerred Young, and John Morffee, aldermen, and to William Shelton, in behalf of Mr. Conran, alderman, for borrowing £1000, to be lent to the Lords Justices for Her Majesty’s service; said warrant is left in trust in the hands of Nich. Ball, to be safely kept. Parties have taken up £600, and entered bond for £1200, for payment by 1st May next, and £150 more, for which the mayor has given his bond to Mr. John Foster and Mr. Pantin, for which sums the mayor is to procure warrant from the Council for payment on the arrival of the next Treasurer, and on payment to discharge said several sums, and cancel the letter of attorney.

City loan for
the Queen.

[Margin.] This entry is void, for the money borrowed is received, and the city’s seal in that behalf given is cancelled.

fol. 51^a.

2nd April, 1599.

A short recital of the loan requested above. There was borrowed of Alexander Palles and others the £1,000, and it was agreed that a letter should be sent to Mr. Robert Cutts, London, that on default of payment, Mr. Palles might take up so much in London on the security of the city. As Mr. Palles was immediately repaid by Sir Henry Wallop, vice-treasurer and treasurer of war, yet in disorderly fashion he will not redeliver the [document under] city seal, to be cancelled. We now place this his dealing on record, leaving deserved punishment to be inflicted on his repair hence again.

Mr. Palles.

The aforesaid writing was delivered me 21st May, 1599, and remains in desk. Jas. Bellewe, mayor.

fol. 51^b.

13th April, 1599.

In Mr. Weston’s mayoralty, received by certain persons 100 pecks of malt, garnered in Mr. Weston’s house, by long lying whereof there is great waste, and besides, garner rent, &c. Same should be sold, the mayor to see to some one having the corn winnowed and measured, so as to learn the waste, and then see it sold. The money to be converted to the city use, to be delivered to the treasurer. Mr. Burran, Mr. Ellyot, Mr. Mylles, and Nicholas Ford to help the mayor.

Malt in
Mr. Weston’s
house.

fol. 52^a.

10th May, 1599.

Mr. Bruerton,
schoolmaster.

As to the fee due Mr. Bruerton, schoolmaster, being (as he says) £15 stg., the mayor to cause Mr. Panting and Mr. Gooding to be committed till they pay so much as the rest on their account as sheriffs, out of which Mr. Bruerton to be satisfied. The key of the schoolhouse to be taken by the mayor, and the munition to be placed in the upper rooms thereof.

fol. 52^b.

18th May, 1599.

Mayor, &c.,
of Bullring.

By ancient usage, the mayor and sheriffs of the Bullring should be at charge in making a seemly show on May Day by muster, &c. They being "tolerated" last May Day, and commanded to make show on Ascension Day, they contemptuously did not perform their duty. They to be called and cited for contempt, and not to be delivered till they put in sufficient pawns or enter into bond to perform their duty.

fol. 53^a.

22nd May, 1599.

Diet of
soldiers.

Mr. Panting commanded to bring a perfect book declaring his disbursements about obtaining the money due for diet of soldiers during his shrievalty, and what he paid of the odd pay, and what is "resting" of the £103 he received, by which further steps may be taken to pay the debt due for munition.

fol. 53^b.

27th June, 1599.

Repair of
city conduits.

The city needs a sufficient plumber to oversee the conduits; Mr. Mayor to write to Michael Quyck, now at Bristol, to send a workman, and a ton of lead and forty pounds of tin. The expense to be borne by the city.

[The entries in fols. 54, 55, 56, 57, will be found in Gilbert's "Ancient Records of Dublin," vol. iii, pp. 529-532.]

fol. 59^a.

24th May, 1600.

Powder.

The entry under this date is in Gilbert's "Records," save the following:—

For help of the suburbs, a barrel of powder to be delivered out of the city store to Mr. Turner and Mr. Palles, to be divided among the inhabitants of Thomas Street, Francis Street, and James' Street at ninepence per pound, to be used for defence of the ward. The money to be left in the store where the powder is, under the keeping of those who have the keys of the powder, before delivery. It is to be remembered that Mr. Taylor has in his hands £5 for pikes, which is to be called upon.

This above £3 13s. 0*d.* is paid to Mr. Taylor, now treasurer, and to be charged on him this 10th June, 1601.

fol. 59^a. (bis).

20th June, 1600.

The arches of the bridge are greatly decayed; and it is requisite they should be repaired, and the master of the works is otherwise employed. The mayor to pass a warrant to the treasurer for £5, to be paid to John Shelton, who has undertaken to oversee repairs, to be spent in that and other works at the Key.

Repair of bridge.

fol. 59^b. (bis).

24th July, 1600.

Nicholas Weston, Dublin, alderman, stands bound by an obligation dated 24th July, 1600, to John Shelton and John Cusack, Dublin, merchants, in £100, for payment of £50, at the house of Robert Cutt, London, by 30th September next, for plate for the use of the city, to be used by the mayor as other plate belonging to the city.

City plate.

fol. 60^a.

8th August, 1600.

Mr. Weston received of Her Majesty a sum of money due the city for supplies, in his mayoralty, whereof he has left certain unpaid. He has undertaken to satisfy such inhabitants what is due to them, on his book oath; save such as Mr. Weston compounded with. He to attend for six days in the Tolsell, with the mayor and others, and the mayor to summon every parish or ward to come and receive what is due. Mr. Weston to bring in the books of the several sheriffs in whose time the money was due, whereby it may appear what is due to each inhabitant. Mr. Weston to have a warrant of attorney sealed. Mr. Taylor and Mr. Palles to attend with the mayor to see the money paid to the citizens.

Money due the citizens.

fol. 60^b.

18th August, 1600.

The tithes of the city as yet unset, and Nich. Barran, now mayor, to whose office these are a perquisite, refuses to set same. Agreed that the mayor send a warrant to Nich. Chamberlayn and William Gough, aldermen, they to resort where said tithes lie, to view them, and endeavour to set same, for the city or the mayor.

City tithes.

fol. 61^a.

5th September, 1600.

[The entry under date will be found in Gilbert's "Ancient Records of Dublin," vol. iii, p. 534.]

fol. 61^b.

19th September, 1600.

In the last Assembly it was agreed that Mr. N. Barran, lately elected mayor, was to have £100 out of casualties; and if they did not amount to that sum, the balance to be borne by the city. He now refuses to be put on oath as to his inability to support the mayoralty, and seeks his dismissal.

N. Barran, mayor.

Resolved, the better to enable him, that he is to have £25 out of casualties, in addition to the former sum granted him; and if they do not amount to that sum, the balance to be paid by the city. For his security, this is to be established in the next quarter Assembly.

fol. 62^a.

3rd October, 1600.

Defence of
city.

For the defence of the city, twelve sufficient men are to be hired as a standing watch to guard the gates in the daytime, and a cess of £40 to be made on the inhabitants by Mr. Handcock, Mr. Panting, Mr. Arthur, Mr. John Mylls, Thomas Carroll, and Nicholas Forde. A book of names of inhabitants, free and unfree, to be brought in, wherein they shall not spare any inhabitant.

If £40 not enough, a new cess for a longer time to be made. Warders to attend from the opening of the gates in the morning until the shutting at night, which is to be at 8 o'clock.

Eighteen sufficient men to be hired as a standing watch, to stand at the gates and on the walls, to attend every night from 7 o'clock till daylight.

Twelve men to be employed as a roaming watch, to pass by turns to attend the captain of the watch from 7 at night until daylight, over and beside the standing watch. Those appointed to lay down the charge for the warders are to make a cess for the standing watch. The mayor to take course for ringing St. Andoen's bell as before.

Defence of
city.

fol. 62^b. Four meet persons to be chosen by the mayor to be captains of the watch, to take charge by turns every night in their own persons, to attend with the roaming watch, and to oversee the standing watch, and to be paid two shillings for each night. They shall keep their court of guard in the new hall, with like allowance for candlelight as last year. James Bee, goldsmith, Peter Dermot, and Patrick English, baker, chosen captains of the watch.

fol. 63^a.

21st October, 1600.

Bakers.

The master of the bakers wilfully forbade his company to bake bread, whereby the city was unprovided. He was committed to Newgate, where he now is, his imprisonment to continue in the discretion of the mayor. He to make humble submission, and promise never to offend again.

fol. 63^b.

29th January, 1601.

Assise of
bread.

The mayor to take the assistance of Mr. Walter Sedgrave and Mr. Matthew Handcock, in laying down the assise of bread to the bakers, according to the direction of the council, in the absence of the Lord Deputy, and after trial made, same to be laid down in this book, whereby future mayors shall have more light for laying down future assises.

fol. 64^a.

29th January, 1601.

John Shelton, Michael Chamberlayn, and Edward Nugent bought 12 or 16 lasts of herrings coming to the city to be sold, without the mayor's licence, contrary to ancient custom ("which we resolve to continue") that the mayor should buy all kinds of victuals, and that they should be distributed by him. Those who offend and have offended to lose the benefit of their bargain, and receive such punishment as the mayor thinks meet. If they have already parted with any of the herrings, they to pay ten shillings for every last to the treasurer of the city.

fol. 64^b. I have received the patent and grant of the fee-farm of St. Mary's Abbey, to be ready to show, touching Denis Kevan's house, now in question by Mr. Burnell. Nich. Barrann, mayor. 17th February, 1601. St. Mary's Abbey.

This patent put into the treasure house, 6th October 1601.

fol. 65. [The entries in this folio will be found in Gilbert's "Ancient Records of Dublin," vol. iii, p. 535.]

fol. 66^a.

19th June, 1601.

John Shelton recovered £24 18s. 4d. alleged to be due to him since he was captain of the soldiers, that issued out of this city in his shrievalty, and Mr. Taylor was commanded to make payment or be committed. Mr. Shelton now satisfied to take the bond of John Tirrell for payment at a certain time, and Mr. Tirrell will wait for payment by the city till All Hallowtide, and then to be paid by the next treasurer out of the city revenues. It is agreed (as recovery by Shelton is against the city, and it is reasonable that Mr. Tirrell be paid, seeing he contented Mr. Shelton out of good will) that said Tirrell be satisfied said sum out of next Michaelmas rent, or other casualties, the mayor to deliver warrant to the treasurer. Such citizens as can pay to be called in, in aid of the city. Payment for soldiers.

fol. 66^b.

16th July, 1601.

Mr. Chamberlain was commanded to shut up the postern door which he has on the city wall, in the back side of his house, and it was stopped, but he again opened it. Same to be stopped up with lime and stone again at his charge, and his imprisonment of three days to be sufficient punishment for his offence. Chamberlain was also charged with buying coals in the harbour, with intent to transport them to France. This he denied, but confessed he meant to buy certain "sleck" coal, to be transported, but finding it did not answer his purpose, nor was it to the liking of the master of his ship, he released said coal, and gave the merchant liberty to sell to others. All Postern door in city wall.

this an offence not tolerable, but his imprisonment (as before) is considered sufficient punishment, he promising not to offend again.

fol. 67^a.

16th July, 1601.

Postern doors
in city wall.

All postern doors in the city walls to be stopped up with lime and stone, except Mr. Chamberlain's, to continue for a month; he to have an iron grate with a door put to said postern door, and every night same to be locked, and the key brought to the mayor. Chamberlain to enter into a bond, £100, to stop up said postern door at the end of the month (by 22nd August next).

67^b and 68. [The entries will be found in Gilbert's "Ancient Records of Dublin," vol. iii, p. 535.]

fol. 69^a.

13th November, 1601.

City debt to
Shelton.

£24 18s. 4d. recovered by John Shelton against the city was ordered to be paid. The mayor now to warrant the treasurer for payment, and to call in the rolls and notes in Mr. Chamberlain's hands, in Mr. Palles's, and Mr. Shelton's, so it may appear who ought to have paid same.

fol. 69^b.

23rd February, 1602.

Bonds for
payments.

Nicholas Ball, James Bellewe, Walter Galtrym, William Gough, and Alexander Palles, aldermen, are bound to Christopher Cusake fitz Nicholas, Dublin, merchant, in £220, for payment of £112 by 16th February, 1602. Now the mayor, &c., bind themselves in £300 for payment of the parties, and the bond to remain in the hands of Nicholas Ball.

Gerald Young, Nicholas Burran, Francis Taylor, John Ellyot, and John Arthore bound in like bond and like condition, to said Cusake, the bond to be in the hands of Nicholas Barran.

Walter Sedgrave, Richard Fagan, Michael Chamberlain, John Morphy, and John Bryse, aldermen, bound in a like bond to said Cusake, the bond to remain in the hands of Walter Sedgrave.

fol. 70^a.

25th June, 1602.

Poor resort-
ing to city.

Numbers of the poor resort to the city, to its great danger, this summer season. This must be prevented. Now three men are to be employed at 3s. 6d. a week, at the city charge, up to the 1st August, to range the city daily, to purge the streets of such, and keep them from entering the gates.

fol. 70^b.

25th June, 1602.

Debt due
John Carie.

John Carie, merchant, having charge of a late company of foot, issued out of the city to a northern "jorney," and £9 remained due of his pay, out of which he had a concordatum for £3, together with default of garrans, then

upon the country, in full payment. A decree was made against him for “resting” said defaults. It is thought fit to pay him what remains due, and the treasurer is to pay him £4.

fol. 71^a.

5th October, 1602.

Nicholas Forde, cook, and Nicholas Pursell, tanner, and Thomas Aghy, cook, who were summoned to appear at the Tolsell on an important occasion, did not attend; they to be imprisoned for 20 days, and pay £2 each for the use of the city.

Fines for non-appearance.

(These fines to be applied for building or repairing the city walls from Newgate to Gormond’s gate.)

ol. 71^b.

6th October, 1602.

Richard Pursell, baker, also was often warned to attend before the mayor on urgent occasions, and disobeyed; to be imprisoned at the mayor’s pleasure, and fined forty shillings.

Rich. Pursell fined.

(To be converted to building the walls as within written.)

fol. 72^a.

17th December, 1602.

The cup of plate in John Cusake’s hands to be brought to the mayor, as other city plate is with him. The mayor to procure means to the treasurer to grant a bill of exchange for £30, now in Cusake’s hands, same to be converted into plate, to “follow the sword,” as Mr. Shelton and Cusake think meet.

City plate.

fol. 72^b.

24th December, 1602.

It is proposed to send an agent to England to sue the Lords of the Privy Council to grant licence for provision of corn; and the money to be paid here in the new standard, with 20 in the hundred, to be paid in England by exchange. Agreed that the mayor, the recorder, Mr. Hancock, Mr. Sedgrave, Mr. Forster, Mr. Conran, and Mr. Gough consider who shall be agent, and instructions to be laid down; also as to his allowance.

Agent to England. Corn.

fol. 73^b.

31st December, 1602.

Christopher Devnish to be agent, and another fit man to assist him. He to have the twentieth part of the corn obtained, and to have towards his charge £30, new standard, on condition that if he obtain any grain, then he is to have his own charge; if not, he to have towards his charge the said £30, to be collected by cess. This is agreed to by the masters of the corporations called to this meeting.

Christ. Devnish, agent.

(It is meant that if Devnish go alone, and not be troubled with carriage,

then he shall have but £20, of the new standard, on the conditions before recited.)

fol. 73^b.

4th March, 1603.

City plate.

Three cups, with cover, had of Mr. Gough, which "follow the sword," are in bad repair and broken. As £30 new standard, now in the hands of Shelton and Cusake, are to be passed with silver by exchange: Resolved that said three cups be delivered to them, to be joined with said copper money new standard, which will amount to £50; and that they get a bill of exchange for receipt of so much in England: it is agreed that on receipt of this in England, they employ same in plate, to "follow the sword," viz. one substantial salt, double-gilded £20, and three ale cups or "Jeoghs" of best fashion, double-gilded, £10 a piece, "to follow the sword" for ever. This meant that these three cups now decayed are delivered to Cusake and Shelton, then they to deliver the mayor one great silver cup in their hands, with note of acknowledgment of receipt for the city use. The city to bear the great adventure of plate and money. Agreed to by the sheriff's, masters of corporations, and others.

fol. 74^a.

25th May, 1603.

Departure of
Lord
Lieutenant.

On departure of the Lord Lieutenant for England, resolved to accompany him to sea with heartiest farewell as a duty. The mayor, &c., agree that a barrel of gunpowder be bestowed among a convenient number of shot, to attend his lordship to shipboard.

fol. 74^b.

1st July, 1603.

City loan.

Our agents in England to take up £50 on the city's credit, with interest at 10 per cent., and the next assembly to decide whether by way of cess or out of the city's revenues. The city seal to be sent for taking up same.

fol. 75^a.

19th September, 1603.

Refusal of
office of
mayor.

William Gough, alderman, being questioned as to whether he would undertake the mayoralty next year, made dilatory answer, alleging disability and impediments. Agreed that if he do not take the place (according to law there is a penalty of £200 Irish for not doing so, which is thought too small a punishment), he to pay a fine of £2000, new standard, in shillings and sixpences mixed with silver, and not in pence or half-pence. Provided that if he take the place, or pay the treasurer on Michaelmas Day 1200 ounces of silver plate, London touch, as fine, he to be discharged of the former penalties.

fol. 76^a.

29th September, 1603.

The following aldermen, who absented themselves on the chief Assembly and station days, to pay fines of £5 to the treasurer:—Richard Fagan, Philip Aldermen
Conran, James Jans, George Yonge, Thomas Plunkett, Patrick Browne, fined.
Robert Kenedy.

fol. 77^a.

24th February, 1604.

The money borrowed from several citizens for victuals for soldiers was delivered into the store, as the Lord Deputy would have charged the poor Victuals for
citizens. Agreed that the mayor borrow £20, for which the city seal to be soldiers.
security, to be repaid in two months.

fol. 77^b.

27th February, 1604.

The money in the mayor's hands received of the masters of corporations Poundage.
to be sent to England, £10 in silver to be spent in getting a saving in the Act of Parliament for poundage, according to an order in the council book in England. The mayor to write to Mr. Hadsor, or Mr. Robert, or Mr. John Barnewall, and to appoint the money to one of them for the purpose.

[In margin.] This £10 delivered to Mr. Fox to be carried over.

fol. 78^b.

11th May, 1604.

John Ellyot, alderman, petitioned to be allowed to decline the mayoralty, Mayoralty.
owing to inability to support it, and for another to be elected, notwithstanding the law of succession that bound him. Agreed that he have £100 out of casualties, towards bearing the charge.

fol. 78^a and 79. The entries will be found in Gilbert's "Ancient Records of Dublin," vol. iii, p. 536.

fol. 80^a.

8th March, 1605.

Francis Taylor and John Arthur, aldermen, to be appointed to prosecute Debts due the
against the executors and widow of William Gough, alderman, deceased, for city.
debts, &c., due the city; costs of the suit to be paid by the treasurer of the city. Said Taylor and Arthur also to prosecute the effecting of a charter according to the King's grant. Costs to be paid by the treasurer.

fol. 80^b.

22nd April, 1605.

As to maintaining the charter wherein the mayor is made escheator, Mayor as
and now brought in question in the Exchequer: agreed that Francis Taylor escheator.
and John Arthur solicit the council of the city. Messrs. Henry Burnell, John Meed, Robert Barnewall, counsellors-at-law, to be entertained of this

city counsel to assist the recorder in the matter. Their fees and costs to be paid by the treasurer.

fol. 81 and 82^a. Entries will be found in Gilbert's "Ancient Records of Dublin," vol. iii, pp. 537-8.

fol. 82^b. 5th November, 1605.

Commissions are directed to the mayor, &c., for trial of capital crimes, &c., and other commissions to the escheator's office; whereas, by charters, none but the mayor can enquire; if these precedents be allowed, the city is likely to lose its liberties. Agreed that the mayor is to refuse to sit by virtue of these commissions, until it be adjudged whether the charters are sufficient to exclude the commissions in these points. Mr. Burnell and such learned counsel as the mayor and recorder name, to be retained, to defend the charters. The city to bear the costs.

fol. 83^a. 21st December, 1605.

Sheriff.

James Bee, goldsmith, called to take the office of sheriff, in place of James Taylor, deceased, did not attend the meeting: fined £20, silver, of harp shillings, and to be committed by the mayor to the marshalsea, until the fine be paid.

fol. 83^b. 21st November, 1605.

Mr. Preston in contempt, as Bee; he to be committed until he pay £5 fine.

City school-master.

Agreed that Robert Mason, schoolmaster, have a warrant for 50 shillings, old silver, for keeping the free school from Michaelmas last until Christmas next.

fol. 84^a. 21st November, 1605.

Sheriff.

The place of James Taylor, late sheriff, deceased, vacant. We elect Richard Browne, merchant, to be sheriff from this to Michaelmas next.

fol. 84^b. 31st March, 1606.

Coals.

Rates for coals to be as follows:—

Mostyn coals 13s. 4d. of harps the ton, from this to Easter, and from Easter to Michaelmas, 10s. 8d. harps. Scottish coals and Parten coals, 10s. 8d. in harps, a ton, till Easter; and from Easter to Michaelmas, 9s. 4d. in harps.

fol. 85^a. 22nd September, 1606.

Present to Lord Deputy.

Sir John Terrill, Knt., and Nicholas Barran, alderman, to make choice of a butt of good sack and two hogshheads of Gascon wine, at as cheap a rate as

they can, to be presented by the city to the Lord Deputy, in acknowledgment of his furtherance of city affairs.

fol. 85^b. 24th November, 1606.

On refusal by George Devnish and John Dowde, late sheriffs, to take the oath of supremacy tendered by the Lord Chancellor and other commissioners appointed, which refusal is now returned into Chancery, we elect Luke Plunkett and Nicholas Purcell, sheriffs, from this day till Michaelmas next, who are sworn accordingly. Sheriffs.

fol. 86^a. 26th November, 1606.

As to refusing the office of sheriff, a law was made that any so refusing should pay £100. Now, in the case of Devnish and Dowde, who would not take the oath of supremacy, they have incurred this fine, and we order that they remain in execution until they each pay. Sheriffs fined.

fol. 86^b. 6th December, 1606.

Considering the refusal of Lucas Plunkett to take the same oath, whereby he was not sheriff *ipso facto*, it is decreed that he pay £100. L. Plunkett fined.

fol. 87^a. 27th November, 1606.

Case of Devenish and Dowde, same order made.

fol. 87^b. 6th December, 1606.

Considering Luke Plunkett's refusal to take the oath, and which is returned into Chancery, John Lany is elected sheriff in his room until Michaelmas. Sheriff.

fol. 88^a. 20th February, 1607.

Touching a bill exhibited by Nicholas Weston, alderman, to the Lord Deputy, as to business done by him in England as agent, for recovery of money due to the city for diet of soldiers in Queen Elizabeth's time, it is agreed that John Shelton, John Cusake, Nicholas Stephens, and Edmond Malone be authorized to defend the charge; they to present him on several recognizances he is bound in to the city, and to present acts in the city rolls, as far as they may be law. Diet of soldiers.

[*fol. 89^a blank.*]

fol. 89^b. 20th May, 1607.

It was laid down in Mr. Bryce's mayoralty that he should ride the franchise, which had been long omitted, and have £5 out of fines. It is agreed that Bryce be paid by concordatum in England, out of the next Michaelmas rents. Riding the franchise.

fol. 90^a.

25th August, 1607.

Mayor. Nicholas Borron to serve as mayor next year, instead of Thomas Plunkett, formerly elected; provided that Mr. Plunkett have his place in station, viz., to be chiefest of such aldermen as were not mayors.

fol. 90^b.

5th October, 1607.

Attachment
against
Marten
Hussie.

Marten George, pursuivant, to go to the island of Valencia, or elsewhere in Munster, with the Lord Deputy's attachment for Marten Hussie, lately elected a sheriff of the city, as he could not be had at Culmullin, where he was lately looked for by said pursuivant. Thirty shillings to be paid for expenses.

Ordnance and
munition.

Survey of ordnance and artillery munition to be made by Sir John Tirrell, Francis Taylor, John Shelton, and Robert Ball; a book to be made thereof.

The two officers yet unplaced have eightpence a day on charge of Marten Hussie elected their master.

Quarter
Assembly.

The quarterly Assembly which should be held the second Friday after Michaelmas to be put off to the third Friday. If fitting, same to be further adjourned.

City watch.

In this doubtful and suspicious time, the standing watch to be increased in every ward from two to three during the mayor's pleasure.

fol. 91^a.

16th October, 1607.

Marten
Hussie fined.

Marten Hussie elected sheriff, and required by letter from Mr. Arthore, late mayor, and by special messenger, to execute said office, has not done so, nor has he taken the oath. Ordered that he be fined £100, Irish, and be imprisoned at the pleasure of the mayor and aldermen. He to be discontinued from said office.

fol. 91^b.

26th January, 1608.

Submission
of Marten
Hussie.

Marten Hussie attended and submitted. We consent to agree to his proffer, entered on before by his wife. On his promise to pay for the city's use £40, English, and three score pounds, like money—one moiety on 1st August, and the other on 1st February, for which he is to perfect a bond, he to be discharged of all offices in this city and liberties. Nevertheless, he shall hold his place in all stations and meetings next those who have been sheriffs; and he may use his trade and merchandise as before.

fol. 92^a.

18th February, 1608.

City water-
course.

Robert Talbot of Templeogue, gent., claims port corn out of every mill in the city and suburbs, unto which water coming through Templeogue to the conduits and mills of the city runs; and also claims the watercourse itself coming to the city conduits. For part of this corn he sues John Forster,

alderman, before the Council, as also the city, claiming same to be his ancient inheritance. Though the city has been in ancient possession and so continued since Henry the Eighth's time and since, yet it cannot appear how the city passed same to Talbot's ancestors. For maintaining the city's title, we agree that Forster, on preferring his petition next Assembly, have a lease on said port [corn] due, for 61 years, paying twelve pence per annum; and withal he shall not exceed the rent of two barrels of malt out of any malt mill yearly, and two pecks of wheat, market measure, out of wheat mill yearly, and bringing this cause to a final end at Mr. Forster's costs.

[Margin.] The port corn of the mills was given to Mr. Richard Talbot of Templeogue by the city to maintain the watercourse to the city.
Vide Book of Bye-laws, fo. 50, anno 4 & 5 Philip and Mary.

fol. 92^b.

16th June, 1608.

The mayor and sheriffs of the Bullring sent for to explain why they did not muster on May Day or Ascension Day, according to the mayor's warrant. Edmond Cany, mayor of the Bullring, on appearing, could not show good cause. As a fine, they are to pay to the city use two barrels of good corn gunpowder, or £10. If not, they to be committed to the marshalsea.

Mayor, &
Bullring.

fol. 93^a.

23rd September, 1608.

At the request of Robert Kennedy, alderman, John Cusake, alderman, to be accepted as mayor from Michaelmas instead of said Kennedy, formerly elected, Kennedy to have his place in station, viz., chiefest of such aldermen as were not mayors, and except Mr. Plunkett. This to be in no way prejudicial to the law of succession. Notwithstanding the above, Mr. Cusake did serve his year of mayoralty at his own costs, instead of Mr. Kennedy, and without any contribution from him. For the year following Mr. Kennedy has procured Robert Ball to serve instead of Mr. Cusake; and all this was done to preserve the law of succession inviolable, because Mr. Kennedy was in England when he should have undergone his mayoralty. This postscript was written by consent of the mayor and aldermen by me, Ri. Bolton recorder.

Mayor.

fol. 93^b.

4th October, 1608.

As to sending agents to England, according to the Lord Deputy and Council's letter—Michael Hamling, merchant, to go with the recorder to England, especially as he lately did good service there in this cause, the pleadings whereof he left with Mr. Suckling, secretary to the late lord treasurer. Unless said Michael assist the prosecution of the cause, it is

Agent to
England.

thought great time and charges will attend it. He to have £20 English, and £30 like money for his charges: for which £30 he shall account. The agreement as to Robert Ball going to be void. Should Hamling have to stay in England above six months, he to have at the rate of £20 every six months; and, if less, to have £20, without any account.

fol. 94^a.

7th October, 1608.

Friday
meeting.

The Friday meeting of aldermen to be continued as in the first order in this Book laid down: and every alderman failing to be present a quarter of an hour after 8 o'clock to pay fines in the former order, for default.

*fol. 94^b.*College com-
mencements.

Commencements will be held at College about Thursday next, which may hinder the keeping of the assembly. The Quarter Day shall be held on Thursday, 20th October, and the General Assembly on Friday next day; and Brothers' Assembly, on Monday, 17th October.

fol. 95^a.

27th October, 1608.

Friday next, being a holy apostle day, the first assembly put off till Friday, seventeenth next. (Not signed.)

fol. 95^b.

10th November, 1608.

Cessing of
soldiers on
aldermen.

A petition to the mayor and aldermen by the master of the carpenters as to cessing of soldiers, that the aldermen should bear the cess, for then the sheriffs and sheriffs' peers would bear it. Certain commons were called in, among them Nicholas Browne, baker, who seemed fully of opinion that the aldermen should be free of soldiers, and that the sheriffs and sheriffs' peers, being of the Forty-eight, should bear this with the commons. Nevertheless, Browne, forgetful of his duty, tried to raise a mutiny and work with the rest of the masters of the Corporations to oppose themselves against the aldermen. Browne to be committed to Newgate by the mayor during his pleasure.

*[fol. 96^a blank.]**fol. 96^b.*

11th November, 1608.

Aldermen
and cessing
of soldiers.

Edward Thomas, Laurence White, Richard Ashe, John Goodwing, William Turnor, Nicholas Stephens, Peter Dermot, John Beanes, Richard Browne, Edmond Malone, Thomas Eustace, Walter Britt, and Nicholas Browne, baker, did on 9th April, 1608, unlawfully combine under their hands (except Walter Britt and Nich. Browne who did not subscribe) of ambitious desire to insult the government of the privy council of the city being the mayor and aldermen (the Twenty-four), who, in consideration of their daily attendance on the mayor, &c., were in the assembly held to be free of bearing of soldiers.

In Mr. Weston’s time, on account of the arrival of a multitude of soldiers in time of war, said aldermen were contented, in favour of their neighbours, to bear some part of the burden, and now lately, some precedent sheriffs have forborne all such as were sheriffs (being now of the Forty-eight) for cessing of soldiers who were always subject to this. Now, by a petition to the mayor and aldermen, it is found that the drift of the matter is to complain to the State against the freedom of the aldermen, or to procure said aldermen to join them in getting out of the city the few soldiers remaining in it. Ordered that those named at the head be committed to the custody of Richard Proudefote, late marshal, until they submit and acknowledge their errors. If the mayor find any more of the same faction, he to commit them.

fol. 97^b.

12th November, 1608.

Richard Browne, merchant, discharged on his submission. All the rest discharged on their submissions, except Edward Thomas, who was not committed, as he was sick at the time of committal of the rest.

fol. 106^a.

29th November, 1608.

The city liberties and franchises extending as far as they ought in St. Patrick’s Street (being now in question), to be maintained to the uttermost. The mayor and aldermen to treat with the Lord Chancellor, and what they do herein to be allowed and confirmed as a law next Assembly.

Liberties in
St. Patrick’s
Street.*fol. 106^b.*

5th December, 1608.

By virtue of the above, the mayor, Mr. Taylor, Mr. Barran, Mr. Shelton, Mr. Barry, and Sheriff Allen, have treated with the Lord Chancellor as to the liberties of Patrick Street, the Coombe, New Street, and St. Kevin’s Street, being united to the franchise of the city, to which his lordship has condescended during his life; in confirmation whereof, he is to have six score pounds, English. The sum cannot be collected at once, and lest his lordship alter his mind, the writings being engrossed, the mayor and Mr. Francis Taylor are contented to lend the amount until the cess be levied.

City
Liberties.*fol. 107^a.*

13th December, 1608.

The liberties of St. Patrick’s Street now in question. Agreed that Mr. Burnell, George Taylor, Mr. Talbot, and Mr. Delahide, learned in the law, be sent for by the mayor, and they to have twenty shillings each for advice.

Liberties,
St. Patrick’s
Street.

fol. 107^b.

20th December, 1608.

City
Liberties.

A complaint exhibited before the Lord Deputy and Council by Captain Edney and others, inhabitants of Patrick Street, against the mayor, aldermen and sheriffs, as to goods seized within the liberties by the masters and wardens of the gild. The Lord Deputy wished the mayor, &c., to consult with the masters and wardens, &c., to see what course they would take. He called them together, and it was resolved that the right of the charters should be maintained, and to bring the matter to trial peremptorily.

fol. 108^a.

4th January, 1609.

Fine.

John Brice, alderman, one of the masters of the gild, being called before the mayor, &c., was charged with irreverent speeches to the mayor, proved by several witnesses. He to be committed to the Tolsell, until he pay forty shillings, or put in a pawn to the value. On his submission, further order to be made at the mayor's discretion.

fol. 108^b.

24th January, 1609.

John Heade
committed.

John Heade, shoemaker, on the 21st January, sitting in the place of judgment in the Tolsell court, uttered to the mayor most intemperate speeches, and opposed his authority in open court. He to be committed to the marshalsea until he pay £10 fine.

26th January, 1609. The fine remitted on his submission.

fol. 109^a.

24th January, 1609.

Sheriffs.

Peter Dermot, merchant, called before the mayor, and informed that it was reported to a citizen of Dublin that it was an ordinary practice by the mayor and sheriffs to bring in two kinds of sheriffs—one to be a shadow to cover others' faults; and he who does not go to church should have whatsoever he would demand of the mayor and his brethren; he that went to church should have nothing that he could demand; which was an argument that they did favour Papistry, notwithstanding some of their going to church. Dermot answered that he did not say so; but he said thus:—for five years past it was a common and ordinary practice between the mayor and aldermen that they always made one of the sheriffs for a cipher, and the other a sheriff, viz., he that went not to church to be sheriff, and he that went to church was but the cipher. For this he stands committed to the marshalsea till he pay £10 fine, English, to be employed in re-edifying the decayed walls and buildings about the city.

fol. 110.

28th January, 1609.

The causes depending in the Castle Chamber between the city and Malahide. Malahide are now to be referred to final order and deliberation of the Lord Chancellor and Lord Winch, now Lord Chief Baron; and if they do not agree, the Lord Deputy to umpire. The mayor has to enter into recognizances in a great sum in behalf of the city for performance of their order, and Sir John Talbot to enter into a like. Agreed that whatever damage the mayor sustains in this recognizance he shall be exonerated and saved harmless.

fol. 110^a.

22nd February, 1609.

The city agents petitioned the Privy Council in England to be discharged of lodging the guard, to which the Lords have given no direct answer, but have sent letters to the Lord Deputy to know on what ground said charge began. As this matter must be solicited, so that the city may be disburdened of the charge, it is agreed that whatever the mayor promise or undertake towards this end shall be performed by the mayor, sheriffs, commons, &c., of the city. If thought fit, the city plate may be pawned, and any other means used.

fol. 110^b.

10th March, 1609.

For despatch of Michael Hamlyng, agent in England, the mayor, Messrs. Kennedy, Barry, Bushope, and Carroll are to write to Robert Cutts, London, to take up £350, English, for the city's use, as by note of instructions annexed, a copy of which was sent to Hamlyng, it appears. For securing the parties above, the following shall put into their hands the value of £10 each in plate, to serve for the time, until a general taxation.

The names of those to deliver £10 in plate, viz., white plate, London touch, at 4s. 6d. the ounce, and double gilt plate, London touch, at 5s. 6d. the ounce:—

The Recorder,	Gerald Young,	Richard Ashe,
Sir John Tirrell,	Nicholas Barrann,	John Goodwinge,
Nich. Ball,	Mat. Handcocke,	Edmond Malone,
Walter Sedgrave,	John Eliot,	George Devnish,
John Forster,	John Shelton,	John Bennes,
Philip Conran,	Robert Ball,	William Preston,
Francis Taylor,	John Bryce,	Thomas Longe,
Mich. Chamberlen,	Thomas Plunket,	Thomas Birde,
Luke Plunket,	John Horish,	Robert Malpas,
Mrs. Arthur and her son Edward Arthur,	Thomas Dromgole,	Daniel Birne,
Richard Quine,	James Walshe,	Thomas Purcell,
Nich. Keving	John Galtrom,	Robert Taylor.
	Thomas Cusake,	

Agreed that letters be written and instructions sent with John Lang and Edward Ball, who are to take up the money.

fol. 110. Copy of a letter, 15th March, 1609, from the mayor and sheriffs to Sir James Lye, Knt., asking that if the city causes be referred to him he will signify their deserts to His Majesty, and make known to the Lord Treasurer their loyalty and forwardness.

The causes that moved us to desire this letter to be written :—

1. Mr. Jacobe, the solicitor, encouraged a Dutchman, Jaques Marshis, to procure a traffic in this city. When in Amsterdam, he reported that great gains might be made here in Ireland if men would venture thither, which moved many to undertake freighting a ship of dry wares, 200 tons burden. This was instigated by Captain Hareson to Jacobe, who encouraged him to go forward, and no doubt they would be able to maintain a freedom in St. Patrick's. This information was given by Maximilian to the mayor.

2. To prove he is anxious in the matter, he maintained a suit at the council table against merchants of the city as to some velvet taken from a Dutchman by the master and wardens of the gild, which was to be sold within our franchises to a foreigner, contrary to the charters.

3. He confessed to the Lord Chancellor having amended the rough draft of a bill preferred against the mayor and others for executing the effect of the charters in St. Patrick's st.

4. Notwithstanding an order at the council table, said Jacob was counsel in preferring a bill to the Star Chamber against the mayor and others, which showed his spleen. The mayor and others saw the rough draft, in which his hand was in many interlinings.

5. He maintained one Moyle in a suit against the merchants, and said in open court he would overthrow our charters (as Mr. Plunket alleges).

6. He said at the council table that there was never a merchant in this city (as Mr. Plunkett and Mr. Goodwin allege).

fol. 111^b.

7th April, 1609.

Walter Britt, on 31st March, 1609, misdemeaned himself towards the mayor, in presence of the aldermen, for which he was commanded to the marshalsea; and as he did not obey the mayor's command, he is now committed to the marshalsea until he pay forty shillings.

fol. 112^a.

26th May, 1609.

The Lord Deputy directed a warrant to the mayor for building a wall between Mr. Ware's house and the Castle bridge. Agreed that same be built

Charges
against
Mr. Jacobe.

Dutch
merchants.

Walter Britt
committed.

Wall at
Castle
bridge.

with all speed at the city charge; 300 carts of stones to be bought of Mr. Wyckon, of Glasnethen (Glasnevin), at 20 pence the cart.

The new pommel and cross newly set on the King's sword, daily carried before the mayor, weighing 22 ounces, pure silver, at seven shillings per ounce, for gilding, workmanship, &c., amounts to £7 15s. 0d. This sum to be paid out of money in the hands of Mr. Taylor and Mr. Brice.

Mayor's sword.

fol. 112^b. 4th August, 1609.

The mayor to have twenty nobles, English, for his charges in riding the franchises. To be ridden next month.

Riding the franchises.

fol. 115. 4th December, 1610.

The charge of Philip Rowley lately infected, and now shut up in a cabin, to be borne by the city; also the charge of the men who watched him. £5 to be paid by the treasurer by concordatum to Nich. Allen, tallow chandler, deputy alderman of that ward, to disburse and account. The mayor to cause the master of the barber surgeons to send two sufficient of their company with Mr. John Bowth to survey Rowley's body, and certify what they find, so that a course may be taken to discharge him.

Plague.

fol. 116^a. 4th December, 1610.

The Mayor, Sir John Terrell, Mr. Sedgrave, Mr. Taylor, Mr. Weston, Mr. Burran, Mr. Handcock, Mr. Cusake, and Mr. Malone, to meet on Thursdays and Tuesdays weekly, to consider what is meet to be provided in Parliament for the good of the city; and having agreed, to send propositions to the recorder to draw up Acts of Parliament to be sent into England.

Committee for Bills in Parliament.

fol. 116^b. 7th January, 1611.

Sir John Tirell, Matthew Handcock, and Edmond Malone, aldermen, to make choice (on the city's behalf) of a butt of principal sack, two hogsheads of Gascon wine, and 40 lbs. weight of good white sugar, in small loaves, at the cheapest rate they can, to be paid by the city, to be presented by them to the Lord Deputy against the wedding of his lordship's daughter, now in hand, in acknowledgment of his furtherance of city affairs.

Present to Lord Deputy.

[In margin.] The butt of sack cost Mr. Allen £16, wine £10, sugar bought in the common cellar, 22 pence per lb., £3 13s. 4d. Sum, £29 13s. 4d.; for carriage, 2s. 8d.

fol. 117^a. 19th April, 1611.

The recorder obtained execution against the city out of the Common Pleas for what remains due to him from the time he was an agent for the city in England. Cessers who laid down the cess for this shall take account of the whole £300, and certify disbursements; also in whose hands any of said sums

Claim against city.

remain, what may be desperate, or what may not be well got in, so as to satisfy his claim.

Suit against city.

The mayor, recorder, Messrs. Handcock, Cusake, Kennedy, and Malone, to examine the cause of the suit in Chancery commenced by Sir John Terrell against the city, and what course they advise for ending the controversy.

fol. 117^b.

8th May, 1611.

Meetings to be held on Tuesdays.

The Friday meetings to be now held on Tuesdays weekly in the forenoon on pain of two shillings for default in attendance. Hour to be 9 o'clock forenoon.

Defaulters.

fol. 118. (Here come lists of defaulters, 1567-1573, some names marked as "not in town," "a little late," &c.)

20th October [1573].

Order of proceeding at meetings.

All matters that shall be proposed to this fellowship and company to be decided or reasoned, so that first the opinion and reason thereof is to be given by the puisne and younger aldermen, and so to continue from henceforth without variation or contradiction.

Defaulters.

(Another page of defaulters.)

5th February, 1574.

Scarlet Lane.

Mrs. Peppard, widow, to have a lease for 61 years of so much of the lane joining to the back of her house called the "Skarlett" Lane¹ (paying sixpence Irish to the treasurer of the city) as by us shall be thought fit to be set, she leaving a thoroughfare in said lane to such as have lands joining said lane.

5th February, 1574.

Michael Bea.

As to the matter depending before the Lord Deputy and Council against Michael Bea, since his mayoralty. Agreed that he, at all open sittings of the Lord Deputy and Council, call on them to have his cause heard, and charge for prosecuting same, so that the mayor be made privy and consent, the body of the city to pay same. Mr. Bea to have respite of any sums due to the city until his cause be determined before the Lord Deputy and Council.

(Names of jurats, 1584 and 1588.)

(Lists of Defaulters.)

16th September, 1595.

Defaulters.

This special assembly day, by command of the mayor, for conference as to necessary affairs of the city, the following aldermen made default, being summoned to appear by one o'clock in the day. (Names, with fines of 2s.)

¹ *Alias* Isod's Lane: probably Blind Quay.

August, 1912

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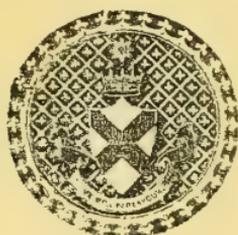
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February, 1913

17

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OF THE
ROYAL IRISH ACADEMY

VOLUME XXX, SECTION C, No. 17

J. P. MAHAFFY

ON THE ORIGINS OF LEARNED
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