PAPERS READ BEFORE THE ACADEMY,

SESSION OF 1867-68.

XIX.—On the Physiology of Protrusion of the Tongue, and its Deviation to the Affected Side in Unilateral Paralysis. By Thomas Hayden, M.D., M.R.I.A.

[Read June 11, 1866.*]

In the communication which I have the honour of submitting to the Academy I propose to discuss the physiology of protrusion of the tongue, and to endeavour to explain the apparent anomaly by which, in unilateral paralysis of that organ, as exemplified in hemiplegia, it deviates in protrusion to the paralyzed side, whereas the features, as is well known, move to the opposite or unaffected side, as does likewise the tongue itself in all its movements save that of protrusion.

In order to render intelligible what follows, it will be necessary to start with a few general propositions in reference to the action of voluntary muscles.

Muscular contraction consists essentially in intrinsic molecular approximation, by which the constituent particles of the muscle, its sarcous elements, are brought into closer mutual proximity, and the extremities of the muscle itself are drawn towards one another.

The range of contraction of a muscle is directly as the length of its fibres, irrespectively of tendon and all other extrinsic substances, and has been variously estimated at one-half to two-thirds of their length.

The force of the contraction of a muscle is as the number and diameter of its fibres, irrespectively of their length; and its effect depends mainly upon the angle at which it is inserted into the osseous lever; the order of lever used; and the point of attachment.

In no instance can a muscle in contraction carry its moveable, beyond its fixed point of attachment.

A muscle acting upon a lever at an acute angle, and moving it in the direction of its axis, may, however, carry the proximal extremity of the lever far beyond its own fixed point of attachment, the distance being regulated by the length of the lever, and the length of the fibres of the muscle (see diagram No. 1, Pl. XIII.).

Two levers so acted upon by two coequal forces, and moving at an acute angle, say of 45°, would have a tendency to intersect at their point of mutual contract; if inflexible, and offering equal resistance, they would both be arrested at this point; but if flexible, of equal power of resistance, and propelled by equal forces, they would advance,

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* This paper was held over for the "Transactions," but the author not wishing to leave it any longer unpublished, it is printed here, though not properly belonging to the Session of 1867-68.

not in the axis of either, but in a line bisecting the angle formed by their prolonged axes (see diagram No. 2, Pl. XIII.).

If, however, the propelling forces be unequal, both levers will deviate to the side of that which is the weaker; and if either force be entirely annihilated, then the two levers, though with diminished impetus, will advance in the prolonged axis of the lever of the unaffected side (see diagram No. 3, Pl. XIII.).

The tongue, as a muscular organ, consists of intrinsic and extrinsic muscles. It would be easy to show, were that necessary to my present purpose, that the principal of the intrinsic muscles—namely, the *lingualis* of Douglas, is connected with the os hyoides. The function of these muscles is to impart to the tongue intrinsic motions, by which its shape and consistence are altered; whilst that of the extrinsic muscles is to communicate to it movements of place and direction, to modify its figure; and likewise of necessity its density.

The extrinsic muscles of the tongue are the *stylo-glossus*, the *hyo-glossus*, the *palato-glossus*, and the *genio-hyo-glossus;* these muscles are connected, as their names imply, with the styloid process of the temporal bone; the os hyoides; the soft palate, and the chin, or body of the inferior maxilla, respectively. The stylo-glossus retracts the tongue, draws it towards the corresponding side, deflects its apex to the same side, and acting in conjunction with the corresponding muscle of the opposite side, may expand it transversely, and raise it to the palate. The hyo-glossi retract the protruded tongue whilst contracting it in its transverse diameter, and by depressing its edges they may render its upper surface convex. The palato-glossus may raise the edge of the tongue, and, with the muscle of the opposite side, render its superior surface transversely concave.

The action of the genio-hyo-glossi is that to which I would invite the special attention of the Academy. These muscles arise from the superior genial eminence of the inferior maxilla, by a common tuft-like tendon, from which the fibres of each muscle expand like the rays of a fan; the posterior fibres pass backwards and downwards, to be inserted into the body of the os hyoides; all the other fibres pass through the substance of the tongue, at each side of the middle line, from its inferior, towards its superior surface, with various, but successively-diminishing degrees of obliquity from behind forwards; the anterior fibres, after transversing the substance of the tongue in the direction upwards and backwards for some distance, are curved forward; whilst those immediately in front, which reach the apex of the tongue, are likewise curved slightly downwards in the terminal portion of their course (see diagram No. 4, Pl. XIII.).

The absolute direction of the fibres, from origin to insertion, will be found to vary according to the position of the tongue. When that organ is entirely confined within the intra-dental portion of the mouth, all the fibres of the genio-hyo-glossus, with the exception of the extreme anterior, pass backwards and downwards; but when the tongue is protruded, or forcibly drawn forwards out of the mouth, the fibres

of the anterior half of the muscle pass upwards, and the greater portion of them likewise forwards.

I am not now concerned with the so-called genio-pharyngeus, which has been described as an offset from the genio-hyo-glossus, passing from the edge of the tongue to the mylo-hyoid ridge, and constituting the glossal attachment of the superior constrictor of the pharynx.

If the relative disposition of the inner or opposed surfaces of the genio-hyo-glossi muscles of opposite sides be carefully examined, it will be found that they are not parallel, as usually described in works on anatomy, but disposed, relatively to one another, at an acute angle, salient forwards.

This angle is maintained, and the intervening space is filled up, by a soft, granular, adipose substance, which exists in greatest quantity behind, in the vicinity of the os hyoides, where the interspace between the muscles is widest. To this substance Haller attributes the function of lubricating the muscular fibres, and thus obviating the effects of mutual friction; but this purpose we know to be served by a fine fluid, which during life, and at the temperature of the body, is probably in a state of halitus; besides, in other muscles and muscular organs, for example the heart, where action is not less vigorous, fat does not exist in the healthy state.

The principal, if not the only purpose of the lingual fat or smegma seems to be, to divarigate the genio-hyo-glossi muscles in conformity with the figure of the tongue, and thereby confer upon that organ greater precision and concentration of force in its forward movements. Haller, in his treatise *De Fabrica et usu Linguæ*, whilst attributing to this fat the purpose already mentioned, admits that it exists in greatest quantity near the os hyoides, where obviously muscular movement is least active, and where, consequently, the function he assigns to it would be least required: he says—"Interstitia enim hujusmodi fibrarum ad basin linguæ, quâ ossi hyoidi adhæret, præcipue copiosa pinguedine replentur."*

Malpighi,† whilst admitting that the principal situation of the lingual adeps is at the base of the organ, assigns to it no particular use.

As regards the agency by which the tongue is protruded from the mouth, all anatomists are agreed in regarding the genio-hyo-glossi muscles as the sole active agents in that movement. Haller‡ says, "valet hic musculus (viz. genio-glossus) linguam in anteriora trahere, et simul ex ore protrahere."

This, it will be perceived, is a very vague and indefinite account of the action of these muscles, and still less satisfactory is it, as will appear in the sequel, as an explanation of the mode in which protrusion of the tongue is accomplished. Yet, in no work preceding that of Haller, nor in any written since his time that I have had an oppor-

* Haller "De fabrica et usu Linguæ," c. xxxviii.

† Marcelli Malpighi exercitas epistolica de lingua ad Alphonsum Borellium 1664, p. 38.

‡ "Opus citat.," c. lxviii.

tunity of consulting, is a more full or definite exposition of this subject to be found than is contained in the short passage just quoted.

That the ordinary rules which govern muscular action are not applicable to the genio-hyo-glossi muscles, as protrusors of the tongue, will appear from two considerations :—

1st. There is no example in the body, unless that furnished by these muscles can be admitted as such, of a muscle carrying its moveable point of attachment beyond its fixed point, by its own contraction.

2nd. There is absolutely no example in the body, except in the instance of the tongue, of a symmetrical organ, paralysed on one side, and moving, by contraction of its muscles, *towards* the side of paralysis.

The point of origin of the genio-hyo-glossus being the superior genial eminence, the course of all its fibres, from origin to insertion, when the tongue is lodged within the mouth, must be more or less directly backwards, owing to the prominence of the chin (see diagram No. 4). The initiatory stage of the advancement of the tongue, therefore, involves no difficulty of comprehension; it is effected in accordance with the law of muscular dynamics, by which the extremities of a muscle in contraction tend to approach one another.

The progress of the tongue beyond the line of the teeth cannot be explained under this law, for it involves the transgression of the fixed point of attachment of the muscles engaged, by their moveable points, and in a ratio proportionate to its advancement; but without infringing this law, the fibres of a muscle inserted at an acute angle into a distant point of a lever may advance that lever in the direction of its axis, or at an angle with it, and in proportion to their length, as has been already shown, and will be understood by reference to diagram No. 1. In this law, I conceive, lies the explanation of the protrusion of the tongue under the action of the genio-hyo-glossi muscles, to which I now invite the attention of the Academy.

It has been already shown that these muscles, radiating from a common point of origin on the posterior surface of the body of the inferior maxilla, are inserted into the os hyoides and inferior surface of the tongue along its middle line from base to apex, penetrating its substance even to its dorsum. For the present I leave out of consideration the angularity of the planes of the two muscles, as being unnecessary to the subject under discussion, namely, the protrusion of the tongue, and in no way qualifying my argument. In the initiatory stage of protrusion the fibres of the two muscles, having all a direction more or less backwards (see diagram No. 4), co-operate to pull the tongue out of the mouth; the dorsum is depressed and rendered flat; the tongue becomes rigid and straight; the os hyoides is raised towards the mouth, and the tip advances beyond the line of the teeth. In the further progress of the tongue the anterior fibres cease to co-operate, maintaining only a state of tonic contraction, and regulating the direction of the apex under the guidance of volition. In proportion as the tongue advances a greater number of the fasciculi of

the muscles become inert as regards protrusion, till the final stage is arrived at, which is accomplished by the posterior fibres only, and therefore with greatly diminished force. Retraction of the tongue is now effected by all the fibres of these muscles, whose point of insertion is in front of their point of origin, assisted by the special retractors, namely, the hyo, and stylo-glossi (see diagram No. 4). During the progress of the tongue forwards the organ is converted into a solid and rigid lever by the antagonistic action of the stylo-glossi, palato-glossi, and hyo-glossi muscles, the two former of which tend to elevate, and the latter to depress it; whilst the stylo-glossi, by their course along the margins of the tongue to its apex, and acting in equilibrium, render it straight and rigid in its entire length. In this explanation it is impossible to ignore the wonderful selective power which the will possesses, of directing upon special groups of muscles, upon individual muscles, and even upon particular parts of the same muscle, the stimulus of contraction, and in greater or less degree according to circumstances.

Owing to the fan-like arrangement of the fibres of the genio-hyo-glossi, the anterior fasciculi of the muscles must successively pass out of action as protrusors, according as their points of insertion are carried in front of the teeth by the advancing tongue; hence the progress of the tongue forwards must be effected with progressively diminishing power (see diagram No. 4). I have verified this observation in my own person by the following simple experiment:—

A light wooden cylinder was introduced into my mouth, within the range of my teeth; the opposite end of the cylinder rested on a balance; the balance was now weighted, and I found that by pressing the point of my tongue against the end of the cylinder in my mouth, with all the force I was capable of exercising, I could lift a weight of 4lbs. When the tongue was advanced a quarter of an inch in front of the teeth, I could lift 2½lbs., and when three-quarters of an inch only 2lbs.

No doubt this result may be in some measure explained in another way. It has been shown by Schwann that muscles contract with maximum power in the acme of extension, and with a force diminishing in a progressive ratio as contraction proceeds; but manifestly so great a difference in the lifting force of the tongue, as that between 4lbs. and 2½lbs., cannot be accounted for in this way. In other words, a loss of nearly one-half the protrusive force of the tongue could not be occasioned by a contraction of a quarter of an inch in the posterior fibres of its protrusor muscles.

In the exhaustive treatise of Bourgery and Jacob,* I find the following statement:—"As to the comparison of the two genio-glossi muscles, since they are united along the middle plane, it will be difficult to apprehend a very perceptible difference between their isolated and simultaneous contraction."

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* Traité Complet de l'Anatomie de l'Homme, vol. ii., page 53.

If the muscles were united along the middle plane as described, or if they were parallel by their opposed surfaces, then, no doubt, they would simply reinforce one another; and, considering the direction in which their force is applied, it would be difficult to conceive how, under these circumstances, they could serve as reciprocal antagonists, as is the case with all other duplicate muscles disposed at opposite sides of the median line.

But anatomy shows that they are not parallel; they are disposed at a very acute angle, salient forwards, and are separated behind by a mass of soft adipose tissue as already described.

The triangular interval between the muscles, as likewise the adipose substance which occupies it, will be readily perceived on making a horizontal section of the boiled tongue of the sheep, or other mammal, near its inferior surface, and through its entire length.

Pathology shows no less conclusively a marked difference as between the isolated and combined action of the Genio-hyo-glossi muscles, and the existence of a very decided antagonism between them.

In complete hemiplegia involving the face and tongue, the features, as is well known, are drawn towards the unaffected side, whilst the tongue in protrusion deviates to the side of paralysis; this shows, as regards the tongue, an antagonism between its protrusor muscles, but of a very peculiar and exceptional character, and at the same time seems to be in contravention of the law, that muscles, when paralyzed, are overpowered by their antagonists, and drawn in the direction of the fixed attachments of the latter. In protrusion of the tongue the muscles engaged are mutually co-operative, and corrective of one another; they act upon the tongue as upon a rigid lever, but acting at an angle, each tends to carry it forwards and to the *opposite* side; acting, however, simultaneously, and with equal force, they correct one another, and carry the tongue directly forwards, that is to say, in a line intermediate between their respective axes (see diagram No. 2).

In the event of one of these two forces being suspended, as occurs in hemiplegia, the opposing force being now the sole agent in protrusion, and free to act without correction, will carry the tongue forwards and to the *opposite* or paralyzed side, that is to say, in the axis of its own proper motion (see diagram No. 3).

In case of partial paralysis of one of the opposing muscles, the tongue, being in some degree governed by the weaker force, will advance in a direction less decidedly lateral, or at an angle with the common axis of motion of the two muscles, determined by their relative contractile force, and directly as the difference in force between them (see diagram No. 3).

Granted that the genio-hyo-glossi muscles are the sole protrusors of the tongue; I submit—

1st. That their action is peculiar in this; that whilst in the first stage of protrusion they act, like other muscles, by traction; in the latter stages they act by propulsion.

2nd. That in propelling the tongue forwards they act upon it as a

lever of the first order, the anterior extremity of which projects from the mouth; the posterior extremity within the mouth being acted upon by the protrusors, and the fulcrum constituted by the palato-glossi muscles (see diagram No. 4).

3rd. The Genio-hyo-glossi muscles are disposed relatively to one another at a very acute angle, salient forwards, and therefore taken separately they act upon the tongue in protrusion, not in the direction of its axis, but at an acute angle with it, carrying it to the opposite side; but acting conjointly, and with equal force, they are mutually corrective of one another, and carry the tongue directly forwards.

And, 4th. As a necessary consequence, when the protrusor muscle of one side is paralyzed, the other, acting without correction, will protrude the tongue towards the side of paralysis.

XX.—Catalogue of 101 Drawings of Architectural Antiquities, from original Sketches, presented to the Library of the Royal Irish Academy. By George V. Du Noyer, M.R.I.A., &c., District Surveyor, Geological Survey of Ireland, to form Vol. IX. of a similar donation.

[Read November 11, 1867.]

Mellifont Abbey, Co. Louth.

No. 1. View, looking N. N. W., of the choir of the great church. This building has been erroneously regarded by recent writers as "the great church of Mellifont Abbey," and surprise is expressed that it could have contained the eleven high altars recorded to have been within it. To any careful observer, it is evident that the building in question is merely a *choir* of what may have been a church of noble proportions, possibly of forty feet in width, and twice or more that in length.

No. 2. Plan of the choir of the great church. From this it is evident that the so-called "doorway" is in reality the choir arch; its recessed pilasters being all on the interior face of the wall, the external portion being flat—a style of architecture unknown in the construction of church doorways.

The remarkable narrowness of this choir arch is no doubt the result of careful design, with a view to render the choir as sacred as possible, and allow but a glimpse from the body of the church into that more sacred portion of it, which glittered with stained glass, gold, and fresco painting.*

No. 3. Choir arch.

No. 4. Window in south wall of the choir.

No. 5. Quaint figure of an animal carved in high relief on the keystone of the outer arch. East window, from the same.

No. 6. Pilasters, N. W. angle of the choir.

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* See "Wilde's Beauties of the Boyne and Blackwater." 2nd edition.

No. 7. Pilasters, interior of the choir.
No. 8. Pilasters, interior of the choir.
No. 9. Base of pilasters, angle of choir.
No. 10. Base of angle pilasters, N. window, choir.
No. 11. Base and capital of angle pilaster, south window, choir.

From the peculiar grace of form, and deep under-cutting of the foliated capitals of the pilasters supporting the groined roof of the building I am illustrating, as well as from the presence of a broad flat rib running down the external face of each of the pilasters and their bases, as well as along the upper margin of the abacus of the capitals, it is evident that this work is not older than the beginning of the 13th century. Bloxham, and all writers on English Ecclesiastical Architecture, direct especial attention to this marked feature, as being one which is of the utmost value in determining the approximate age of a building; and it is a surer guide in this respect, than even the form of the associated arch, as we shall see presently when describing the octagonal building called "the Baptistry," and which is one of the most interesting of the ruins at Mellifont.

No. 12. Plan of the octagonal building erroneously called "The Baptistry," S.W. of, and close to the choir. It is absurd to suppose that an abbey should be possessed of a building the use of which was prohibited to the monks. We have here undoubtedly the chapter house of the community, with an apartment over it, as at Wells cathedral, and elsewhere in England. It is perhaps worthy of note, that when the masonry reached to the height of a few feet above the crown of the semicircular arches on which the upper floor of the building stood, the architect appears to have checked the accuracy of his work by laying an octagonal frame of timber over the arches, and to have enclosed it in the masonry; where the building is broken through, on the south side, the presence of this massive frame work is indicated by a square hollow in the thickness of the wall. This is at least the most apparent explanation for the existence of this singular square horizontal tube in the thickness of the walls over the semicircular arches. It may, however, be an horizontal flue for warming the groined floor over the arches, and was connected with some fireplace in that portion of the building now destroyed.

What yet remains of this octagonal building shows that it was open to the air at its basement, but groined with stone: the upper story thus formed having been lighted by a large aperture in each side of the octagon. Access to this floor must have been by a passage from the main buildings on the southern side of the octagon, every trace of which is now gone. Traces of blue and vermilion may yet be seen on the capitals.

No. 13. Plan of the abutment and arches at the base of the octagonal building.
No. 14. Cap of pilasters at the basement of the octagonal building.
Nos. 15–17. Cap of pilaster from the same.
No. 18. Base of pilaster. ,,

It is worthy of note that the style and character of the caps of the pilasters from this building are precisely those of the caps of

the pilasters from the interior of the choir of the great church of the associated abbey, though the arches are semicircular; while those of the choir are acutely pointed ; the same narrow flat rib (Fig. 11) runs down the outside of the pilasters of the octagonal structure, and is prolonged into their bases, and the same effect of light and shade in the decorations of the capitals of the pilasters in both buildings is frequently produced, by drilling holes into the stone ; the mere form of the arch is, therefore, no indication of comparative age, as some recent writers on this building would have us suppose. The semicircular arch has been selected in the construction of the octagonal building, simply to keep the structure to the required lowness of height; while the architect may possibly have supposed that this form of the arch was stronger or more effective than that acutely pointed. Be that as it may, the decorations of the caps of the pilasters, both externally and internally, with the occurrence of the flat rib on the columns, proves to a demonstration that the octagonal building at Mellifont is of the same age as the choir of the great church of the same establishment.

Nos. 19–21. Caps of pilasters, groining of the octagonal building.

No. 22. View of the northern gateway tower of the abbey.

No. 23. Plan of the same.

No. 24. Tomb slab with foliated cross, from the graveyard of St. Bernard's chapel.

Ardsallagh Old Church, Navan.

No. 25. Arches at basement of the octagonal building at Mellifont, and choir arch, Ardsallagh old church, Navan, for comparison.

No. 26. Capital of pilasters, choir of the great church, Mellifont, and capital of pilasters, choir arch Ardsallagh old church, Navan, for comparison.

To any one who has studied the salient points of construction and decoration in ecclesiastical architecture, the similarity of design and skill evinced in these two capitals of engaged columns is sufficiently striking to assure us that they are the work of the same school, and the same century. The ancient parish church of Ardsallagh or Ard-Saileach (the height of the swallows) is of two ages. The choir, including the arch, is of the 13th century, as is evinced by its semicircular form, its segmental and deeply undercut mouldings, with the narrow flat band running down their external surfaces, and that of the pilasters at its sides, the smallness and careful dressing of the stones forming it, and the casings of the windows in the N. and S. walls of the choirs, as well as the oblique peepholes which pierce the walls of the choir arch and east wall of the choir itself. Nor should we overlook the fact that the "dog's tooth" moulding is present on the capitals of the choir-arch pilasters, and the same ornament forms a marked feature in the decoration of the windows in the choir of the Abbey church at Mellifont.

As an example of the exuberant fancy of the sculptors of the 13th century, I may mention that, at the springing of the choir arch mouldings, south side, we see a clever representation of the celebration of the Last Supper, our Lord being the central figure, and represented as holding up a knife in his right hand, in the act of cutting the bread, while the figure on his right is about to take up the cup of wine from the table which extends in front of the three figures. The corresponding carving represents an *otter hunt*, and is a most spirited design; three dogs are crowding eagerly over each other, and seize a female otter by the head and neck, the animal being in the act of protecting its cub, by clasping it tightly to its side by its right paw (that farthest from its pursuers), and close to some protecting bullrushes. It is difficult to understand what connexion there could be between these two designs, and we must therefore attribute this incongruity to the fancy of the sculptor.

No. 27. Plan of the old church of Ardsallagh, Co. Meath.

No. 28. Cap of pilaster in choir, showing the Otter hunt.

No. 29. Window in the west gable, which originally lighted the apartment or dwelling-place of the resident ecclesiastic.*

Slane Abbey, &c., Co. Meath.

No. 30. View of two rough upright slabs of silurian grit in the graveyard of Slane Abbey, Co. Meath. In the centre of each slab a calcarious layer has weathered out down their edges, thus forming a rude groove. A recent writer on the antiquities of Slane calls this an ancient grave, and asserts that the stones are six feet apart, and states that the rough grooves I have described were intended to receive the ends of flat flags, to form a kind of roof to the structure. Setting aside the inaccuracy of the first statement—for the slabs are only three feet ten inches apart—I do not hesitate to say that I believe these rough flags once formed the doorway to a large stone beehive-shaped hut, or cloghaun, possibly the original house and church of St. Erc, the patron saint of the place. Doorways of this rude character are still to be seen in the primitive beehive-shaped churches on the Islands of Arran, and on Church Island in Lough Curram, Co. Kerry, as figured and described by the late Dr. Petrie in his work on the "Round Towers of Ireland." The writer has also figured and described similar remains, as St. Kevin's house at Reafert, Glendalough, St. Gobonet's house or church at Ballyvourney, Co. Cork, and St. Bridget's house at Faughart, Co. Louth.† One large rough slab belonging to this ancient structure is yet to be seen in the interior of the abbey church adjoining, the remain-

* See paper by the writer in the "Kilkenny Archæological Journal," vol. v., p. 27, On some Peculiarities in Ancient and Medieval Irish Ecclesiastical Architecture.

† See preceding volume of these Antiquarian Sketches, Library of the Royal Irish Academy.

ing stones having doubtless been used as head-stones on account of their recognized antiquity.

No. 31. Carving in sandstone; intricate interlaced pattern of pre-Anglo-Norman age, possibly 10th or 11th century, from the wall at the rere of Mr. Macken's house, Slane, said to have been found in the graveyard of Slane Abbey.

No. 32. Ground plan of Slane Abbey.

No. 33. Ground plan of Slane Abbey church.

No. 34. West door and window. Tower of ditto.

No. 35. Shield bearing the royal arms of England, from the exterior of the south wall of the abbot's apartments, Slane Abbey.

This carving tends to fix the date of the erection of Slane Abbey as it now stands, and for the following reason: The shield is quartered —1st and 4th semé fleur-de-lis; 2nd and 3rd three lions "passant" "gardant." We know from various sources, coins, &c., that Henry IV., 1399 to 1412, was the last of the English kings who quartered for his arms the field "semé" of fleur-de-lis for France; and this fact taken in connexion with the occurrence of the chestnut flower ornament at the base of the shield, is well nigh sufficient proof that the building dates no further back than the end of the 14th century. If any additional evidence for the probable accuracy of this statement was wanting, we have it supplied to us in the form and mouldings of the windows and doorway in the south wall of the abbey.

No. 36. Window, from the south wall of the abbey.

The broadly foliated termination to the drip moulding of this window is very characteristic of the period to which I refer the erection of the present building.

No. 37. Fireplace, from the same abbey.

No. 38. Large oval opening near the summit of the side aisle wall; abbey church.

No. 39. The Priest's tomb, from the graveyard of Slane Abbey church. The name on this tomb slab is KENUAN, though a recent writer on the antiquities of this district calls it KERWAN—an error of no great importance, yet one which a writer on antiquities should not have made.

No. 40. Decorated key-stone to an arch, now built up in the gatepost to the graveyard of the abbey church.

No. 41. View of the decoration on the left side of ornamental key-stone, gatepost to the graveyard, Slane Abbey church.

No. 42. View of the right side of same stone.

A recent writer calls this "a face of a nun," though for no apparent reason, as the religious establishment with which it is associated was occupied by canons regular. Possibly this carving represents a female face, though it may be that of a youthful chorister. The high foliated ornament over the head is purely architectural, and the decorations at either side of the head represent grotesque animals with large claws and richly foliated tails.

No. 43. Corbel representing the bust of a bishop, or mitred abbot,

now placed in the wall of the national schoolhouse, Slane village. The rose ornament on the breast of the figure shows it to be of Tudor age, and the coat of arms on the adjoining shield—a saltier engrailed with an ermine tail in each point—should aid in determining the family name of the ecclesiastic.

No. 44. Opposite view of the same corbel, showing the head of the pastoral staff.

No. 45. Plan of the small monastery of St. Erc in Slane demesne.

No. 46. Ornamented key-stone, from the doorway of the same monastery.

A recent writer describes this ornament as a "fleur-de-lis," to which it has not the slightest resemblance, it being in fact two Tudor leaves of rectangular outline branching from a short stem.

These, and the foregoing critical remarks, may be by some considered as of little importance, yet they correct printed and widely circulated errors, and show with what materials some of our guide-books are decorated.

No. 47. Window in west gable, and lighting the loft in the same monastery. As is very common in Tudoresque buildings, the semi-circular arch is often introduced in juxta-position with the pointed or flat arch.

No. 48. Carving in relief of a St. Catherine, from a stone preserved in the same monastery.

No. 49. View of Fennor Castle, Slane. This building belongs to that class of fortified houses which were erected over the eastern counties in Ireland during the middle of the 16th to that of the 17th century. A stone in the adjoining graveyard bears the following defective inscription, which may possibly record the erection of this structure:—

* * de Wilkenstone Generosi qua katherine * * *
ille quidem ano dni 1548. et 24 mes
Februarii illa bero

No. 50. Plan of Fennor Castle.

No. 51. Niche in the east gable of the same. The acutely pointed form of the arch over this recess, the tricusped decoration beneath, the broad bead moulding, with external flat, narrow rib, and the angle of the niche, being simply chamfered, indicate the work to be of the close of the 13th century, or beginning of the 14th. Peepholes in the west wall of the choir, and in the west gable, are all features peculiar to this period. The west gable is prolonged to receive two bells. The most interesting feature in this old church is the masonry at the S. W. angle of the nave, of which No. 52 is a sketch.

No. 52. View of the S. W. angle of the same old church. It is evident that the masonry here is quite different to that of every other part of the building; it is formed of large blocks of gritty sandstone, the relics of a much older church. The top stone at the springing of the roof is most peculiar, being carved into the form of a broad, flat,

projecting corbel, curved beneath. This singular ornament is never found, except on some of our oldest churches of lime and stone. For example, at the Church of the Trinity at Glendalough—a building ascribed to the seventh century by Dr. Petrie in his essay on the Round Towers.

No. 53. Plan of Fennor old church, showing the position of the more recent sacristy erected against the south wall of the choir, and covered by a lean-to roof of stone. At the N. E. angle of the nave, close to the choir arch, a pulpit was erected on the exterior of the wall.

No. 54. Plan of Castle Dexter, or De Exeter, on the Boyne, opposite Beaupark.

No. 55. View of Baronstown cross, near Slane. North face.

No. 56. Same. West face.

No. 57. Same. South face.

No. 58. Same. East face.

No. 59. Plan of Gormanstown old church, near Slane.

No. 60. Anglo-Norman coffin-shaped tomb slab, bearing a foliated cross, rising from a plinth of three steps, and the outline of a double-edged sword, with large pommel and small cross-guard. Round the edge of the slab is the following singular inscription in the Latin, French, and English languages, and in the Anglo-Norman character :—"PATER. NOSTER. P (prend) CHARITE PUR (pour) LAEMES (l'ame) SER (sir) EDWARD DERCE, DECESECD (deceased)."

Tradition, and such history as we possess, attribute the erection of the Castle of Dunmore, on the Boyne, to one of the Darcys; and I have little doubt that the tomb, which may date to the end of the 14th, or beginning of the 15th century, commemorates the death of the builder of the castle in question. This slab had lain partially buried in the graveyard of Stackallen church, where it had remained unnoticed till I exhumed it in the month of June, 1866.

No. 61. Coffin-shaped tomb slab from the graveyard of Stackallen church. While digging up the Darcy tomb, I came upon the slab now figured. It is ornamented with a standard cross, rising from a semi-circular base, enclosing an ornament like a scallop. The cross partakes of the Greek form, ending in eight points. The upper enclosed spaces over the cross are filled with a carving in low relief, resembling an heraldic rose of many petals; and the quadrangular space at the intersection of the arms of the cross is filled with an ornament resembling five laurel leaves. The general style of this cross is neither Irish nor English. I have seen nothing like it in my rambles over the southern half of Ireland, and I believe it to be of foreign design, and, possibly, unfinished.

No. 62. Plan of Dunmoe Castle, on the Boyne. This edifice is rectangular, with circular towers at each of the remaining angles, in which respect it resembles some of our 12th and 13th century castles. Its loop-holes are, however, too small, and its walls too thin for their height, and its flanking towers too insignificant for a building of so early a period. A joggled arch over one of the chimneypieces in the upper

story shows that it may not be older than the close of the fourteenth century.

No. 63. South doorway of Knockcommon old church, near Duleek, county of Meath.

No. 64. Plan of Dowth old church, county of Meath.

No. 65. South door of ditto.

No. 66. North door of ditto.

No. 67. Small door leading from the north wall of the choir of same to the sacristy, which is now totally gone. The two main doorways to this church are semicircular-headed, with the angles plainly chamfered. That now illustrated is pointed, and its angles recessed and rounded—a moulding somewhat characteristic of the end of the 14th century. We have here another example of the introduction of the semicircular with the pointed arch in the same building—a fact which is apparently a stumbling-block to some recent writers on the antiquities of this district.

No. 68. Ardcath old church, county of Meath.

No. 69. South door in nave of Ardcath old church, with small window adjoining it on the west. The doorway is pointed, with the angles chamfered; the window is semicircular-headed, with the angles also chamfered. We have here, therefore, another example of the combination of the two forms of the arch in a church of one period. The date of this building may be late in the 14th century.

No. 70. Doorway in south wall of chancel of Ardcath old church. This, like the small window just alluded to, is semicircular-headed, but the angles are untouched.

No. 71. Window in north wall, and chancel window of the same church.

Duleek, County of Meath.

No. 72. Ancient cross in the graveyard of Duleek abbey church. This small, but beautiful cross of the old Irish type, possibly ninth or tenth century, is well worthy of study, and belongs to the class called "Scripture crosses," of which we have such magnificent examples at Kells, in the Co. Meath. The west face of this cross is that which I have illustrated as being the best preserved and most interesting.

As usual, the space at the intersection of the arms is occupied by a representation of the crucifixion. Over this the figure of a cock beneath two seated figures represents the temptation of Peter. Below the crucifixion is a bas-relief representing the betrayal of our Lord by Judas. The device below this I cannot explain; but that filling up the lowest compartment on the shaft is clearly St. Joseph with the Virgin and child.

The most remarkable carvings are those in the small compartments at either end of the arms of the cross. Each of these is filled with a sitting figure—the one on the right holding the short pastoral

crook, or cambutta, and the other the crutch-headed staff—two very distinct insignia of pastoral rank, and which are frequently carved on our decorated standard crosses. Directly in front of each figure is a large ball, which is evidently being tossed from one to the other by the ends of their respective staves; and I cannot help hazarding the conjecture, that here we have a representation of some game as practised by the clergy or their attendants, which we might call ecclesiastical croquet.

No. 73. Plan of the Abbey church of Dulcek, Co. Meath.

No. 74. East window of the same.

No. 75. Tablet commemorative of the building of the east window of the same church, in 1587.

No. 76. Font at the same church.

No. 77. Effigy carved in low relief on tomb slab, now lying in the chancel of the abbey church. The date of this carving cannot be older than the 16th century. The costume of the figure is rather singular; it consists of a loose garment reaching to the ankles, with tight sleeves. Over this is another and still looser dress reaching to the knees, and over all is a long full cloak fitting tightly to the throat, and thrown open, to show the inner clothing. The right hand rests on the right hip, while the left hand grasps a massive crook-headed staff, the curve pointing outwards. The mitre is of lofty proportions, and apparently devoid of any ornament or jewellery, if we except two broad ribbons which flutter behind it. Over the right shoulder is a shield without armorial bearings, but surmounted by a helmet in profile, and crested with a mermaid holding aloft the comb and glass. In the old church of Tristernagh, near Edgeworthstown, a tombstone to the memory of the family of Meares (or Mares) bears for crest a mermaid. I offer this fact for what it is worth in aiding to determine the name of the ecclesiastic whose tomb I have described.

No. 78. The Cross of Duleek. This is not, properly speaking, a cross, but rather a rectangular monolith, with decorated apex. An inscription on its S. W. face states that it was 'builded' by Jenet Dowdall, wife to William Bathe, of Athcarn, Justice of Her Majesties Court of Common 'Plees,' for him and her A. D. 1601. He deceased the 25th of October, 1599." This pillar is decorated on its N.W. and N. E. faces by rude full-length figures of saints, the lowest being that of St. Kenane, the patron of Duleek.

No. 79. Tablet commemorative of the building of the bridge of Duleek in 1587.

No. 80. Tablet from the old barn (? bawn) of Bellewstown, bearing the arms of Bellewe and Nugent.

No. 81. Tablet from Mr. Maxwell's garden at Bellewstown, bearing the arms of Bellewe and Plunket, and the date 1598.

No. 82. Plan of the old chapel of the barn of Bellewstown, erected at the close of the 16th century by Sir John Bellewe, Knight. This building is now used as a stable attached to the house and farm yard of Mr. Maxwell.

No. 83. Window from the S. wall of the said old church.

No. 84. Remains of the east window of the said old church.

Had this consecrated building, erected and used for sacred purposes by the piety of one of our ancient nobles, been converted into a barn or storehouse for the reception of the "fruits of the earth," I should have felt somewhat resigned at its spoliation; but that it should be desecrated by the odour of cattle, and the proverbially racy language of grooms and stable boys, is something not exactly commendable, even on the strictest grounds of convenience or economy.

No. 85. The white cross on the roadside near Duleek, Co. Meath (W. face).

No. 86. The same, showing the E. face.

This cross bears the arms of Bathe and Dowdall. From the general outline, style, and character of the work, as well as the attitude of the crucified figure, I am led to think that its design is Italian or French—certainly not Irish; its date cannot be earlier than the close of the 16th century.

No. 87. The wayside cross at Annsbrook, Co. Meath. This, like the cross of Duleek, is a monolith eleven feet six inches high, standing on a stepped plinth; it bears the date 1600, and was erected by Jennet Dowdall for herself and husband, William Bathe, of Athcarn, justice.

No. 88. Inscription on the Annsbrook cross, Co. Meath.

No. 89. East window of the old church of Donore, near Drogheda (restored).

No. 90. Tablet from the side wall of the building attached to the old castle of Darlinstown, Co. Meath, bearing date 1586.

No. 91. Tablet from the old church of Moortown, commemorating the death of Dame Jenet Sarsfeld, lady dowager Dunsany, A. D. 1597.

No. 92. The Trynche tomb, from the graveyard of the old church of Clongill, Co. Meath.

In the month of August, 1865, I lighted on this quaint and interesting tomb slab; and, on communicating the discovery to the Rev. Dr. Brady, he kindly informed me that it was commemorative of the death of the ancestor of the Clancarty family. The shield bears in chief a lion passant, with the sun in splendour over it. The lower portion of the shield is parted per palé, the dexter side being semé with Tudor roses, and the sinister filled with the emblems of St. Joseph's trade—the saw, the chisel, the hammer, bit-and-brace and square. The legend is as follows:—

HIC JACET JACOBUS . TRYNCHE . CLERICUS,
RECTOR, QUONDAM . HUJUS . ECCLESIÆ . DE.
CLONGELL . EX ILLUSTRI . ET . INVICTO . SCOTINO
GENTE . NATUS . CUM . SEX . LIBERIS . QUI.
HANC . VITAM . PEREGIT . DECIMO . TERTIO . DIE
MENSIS MARTII . ANO. DOMINI . 1631 .
MARGARETA MONTGOMRI . VXOR DEUNCTI
ET MATER . PREDICORUM . SEX . LIBERORUM . HOC
FECIT. * * * CONDERE .

No. 93. Tombstone of Alexander Barnewal, in the graveyard of the old church of Robertstown, county of Meath.

This monument bears the arms of Barnewal and Netterville, and the date 1618. The really interesting feature in this monument is the fact that the motto beneath the shield is in the Irish character and language, as follows :—

ȝaıı, ȝan, eaȝıa,

which Mr. Hennessy has kindly translated for me—

"*The Englishman void of fear.*"

This, I strongly suspect, is not the motto of the family; but if not the Irish designation of this particular Barnwell, it is most likely a tribute on the part of the sculptor of the monument to the memory of a deceased and venerated patron. I showed the sketch of this tomb to a member of the Barnewal family, but he was not aware that this flattering motto formed a part of the armorial bearings of the family in question.

No. 94. Effigies of Francis Plunket and his wife, Catherine Plunket, from a tomb slab in the graveyard of Robertstown old church, county of Meath, bearing date 1682. The lady's head-dress and general costume is most elaborate, and characteristic of the period, and she carries a fan in her right hand. The male figure is armed with buff coat and cuirass, the sword, and shield with the Plunket arms, being of conventional shape.

Apropos of the Plunket arms, Sir Bernard Burke gives an interesting notice on the subject in the "Dublin Penny Journal," with sketches, showing the various modifications which these arms underwent at different periods. One variety, not noticed in these remarks, viz., in chief a castle, without the bend dexter, is to be seen on the Baronstown cross, near Slane, county of Meath, and is figured amongst this collection (Fig. 55).

No. 95. Effigies of Walter Cruise and Catherine Dalton, his wife, from the Cruise tomb in the old church of Cruicetown, county of Meath, with date 1688. The male figure is dressed in buff coat and cuirass, with the small gorget at the neck; his legs are encased in large jack boots, with stirrup guards and spurs. He is without a sword, and his helmet, with barred visor, is conventional. The dress of the female is quite characteristic of the period. It consists of a loose cape or tippet falling below the elbows, the hands just appearing in front, and holding up the robe, thus exposing the under petticoat. The shoes have remarkably high heels.

No. 96. Inscription on the Cruise tomb described above.

No. 97. Sheela-na-gig, built up in the south wall of the old mill at Rosnaree, on the Boyne, near Slane.

No. 98. Granite plinth of small cross in Termonfechin graveyard, Co. Louth.

No. 99. Church of St. Mell, Ardagh, Co. Longford.

No. 100. Doorway of St. Flannin's church, at Killaloe. This illustration is given, as showing that the pilasters at either side of

the doorway are stilted, after the Anglo-Saxon manner. For other illustrations of this ancient church see previous volumes.

101. Ancient font of yellow sandstone preserved in the Cathedral of Killaloe. From the outline of this font, the Greek form of the cross on it, and the style of the foliated ornament covering it, a portion of which is in low relief, and the remainder "gravé en creu," I believe we may regard it as 10th century work, if not older.

XXI.—Note on the Investigation of the Pre-celtic Epoch in Ireland.

By Hyde Clarke, Corresponding Member of the American Oriental Society, Member of the German Oriental Society, Member of the Philological Society of Constantinople, and late President of the Academy of Anatolia, &c.

[Read November 11, 1867.]

In begging acceptance by the Royal Irish Academy of an abstract of my paper on the Iberians in Asia Minor, published by the Ethnological Society, I am desirous of enlisting the interest of the Academy in the extension of this branch of study. William Von Humboldt proved the existence in Spain of the Iberian race, which he identified with the present Basques. I have pursued the like investigation for Asia Minor, determining the existence there of Iberians, who preceded the Greeks, and showing their identity with the Iberians of Spain. I am now applying this conjoint evidence to the investigation of the Iberian names in Italy and Greece, completing the chain of Iberian occupation in southern Europe.

There remains the question of Iberian extension in Europe beyond the limits of Aquitania, and none can work this better than the members of the Royal Irish Academy.

The Iberians in Asia Minor, Italy, and Spain, presented examples of communities in a high state of culture at an early epoch; and the question is, what influence they exercised beyond their present known boundaries by colonization or by commerce? So long as they were undisturbed by the pressure of invading nations—first the Greeks, afterwards the Latins and the Celts—a race which had spread itself through the great southern peninsulas and the islands would continue to advance, particularly by sea.

Thus they would be led to Britain and to Ireland. I adhere to the belief that the Silures were the remnant of the dominant Iberians in Britain. I expect that your researches will not only prove an ancient Iberian colonization of Ireland, but the existence there of descendants of such race in the present day.

If this point can be determined, it will offer a key to many of the difficulties of ancient Irish history; it will exhibit an ancient and anterior civilization yielding to subsequent invasions as in other parts of Europe; it will show us the Iberians there, as elsewhere, seeking

the gold diggings of the island, and furnishing ornaments of that metal conformable to their state of culture. In my view it is to the nearer Iberians, rather than to the distant Phœnicians, we are to look for the chief pioneers of commercial intercourse in those epochs.

To arrive at a sound judgment on this subject, a series of researches is required.

One most important branch is the collection and analysis of the topographical names in Ireland, to be obtained from the Ordnance Survey, and other authorities. Every name should be investigated, even the names of fields. Undoubtedly this topographical nomenclature will be found to be almost without exception Hiberno-Celtic, and much of it modern; but in investigation it will yield results illustrating the Celtic occupation, and even in that respect the anterior possession by another race.

I have observed it is a law in topographical nomenclature that where a race, altogether foreign in language, enters a country, it applies a system of terms to the settlements of the formerly existing rejected race. This is what we observe in England, where words purely English or Anglo-Saxon give tens of thousands of evidences of Roman occupation, even to the names of wells. This nomenclature follows a law conforming to that applied by the Germanic population to the Roman colonies on the Rhine, and their outliers. Thus such a term as Cold Harbour will be found extensively distributed in England, the Netherlands, and Western Germania. The same law is found in Asia Minor in its application by the Turks to the sites of Greek cities and establishments, where we have Ak Hissar and Eski Hissar, representing the Whit-Chester and Old Chester of the Anglo-Saxons.

The words must be carefully analyzed and classified, compounds being entered under each of their elements. The classification will include the names of each class of object, as rivers, hills, towns, homesteads, fields, wells, &c., and it will distribute each root into its own class. It is then necessary to eliminate all the modern names, and carefully examine what are recognized as more ancient names. All names occurring since the English Settlement must be excluded, and the ancient residuum carefully studied. It will most likely be found that certain terms occur more or less in groups, and the details of situation will afford ground for identification.

It will most probably result that there is a residuum, containing first Celtic words, expressive of anterior settlement; and, secondly, of words doubtfully Celtic, or other than Celtic.

In my opinion the names of the great rivers in Ireland, claimed as Celtic, are not Celtic, but conform to the names of rivers found in the non-Celtic or Iberian area. The determination of this point is very desirable; for it has generally been assumed that the names of the great rivers of north-western Europe are Celtic; but the explanation of the names of the rivers of Spain, Italy, and Asia Minor, has to be settled

on such hypothesis as a basis, which, in our present knowledge, is inconsistent.

The ethnological evidence constitutes another head of the investigation. There are diversities in the physical aspect of the Irish population; and it is well worthy of inquiry how far any portion conform with the type of the neighbouring Basques. It will be desirable for persons having examined the local population to visit the Basques, and again return to compare their observations; and if Basque co-operation can be obtained it is desirable. I had long hoped to have taken charge of such an investigation myself.

Not only the Spanish Basque country, but the French Basque country, should be examined, and also the mixture of races on the frontiers. If members of the Iberian race be found in Ireland, they may not conform to a general, but a special or local Basque type.

If this investigation succeeds, it strengthens the tests for Celtic, and it may result in the discovery of the pre-Iberian type in Ireland.

It is very desirable the attention of the Academy should be directed to the Ligurians. These are a race ancient in Europe, and which has been little investigated. Although long since divested of political importance, it still affords a considerable portion of the population of South-eastern France, Switzerland, and Italy. I have thought I found resemblances to some exceptional Irish types among the Ligurians.

With regard to existing Iberians, I may observe that I regard the Greeks of Asia Minor as descendants, not of the Hellenic population, but of the pre-Hellenic, or barbarian population.

The formation of Ireland, cut up by bays and estuaries, is very favorable for the preservation on its wide coast of remnants of ancient populations. These are preserved even on restricted areas, and in very small numbers, where geographical or other limitations check intermarriage. Where intermarriage takes place, the majority will outgrow and replace the minority, even if it be the conqueror. Such has been the fate of the Lombards in Italy, while the Siete Communi still attest a Teutonic origin. Such has been the fate of the Goths in Spain, of Franks and Burgundians, and of the Varegues of Russia, whom I determined to be the Varini of Tacitus, and consequently that tribe most nearly allied to the English. (Angli et Varini. Tacit. Germania.)

Ireland is rich in archæological remains, and should any evidence be obtained linguistically from topographical nomenclature, or ethnologically from living races, each kind of testimony will throw light on the other. It is the accumulation of facts alone which can give us a true insight into the obscure portions of the history of men. If nothing else is obtained from these researches, we must get better data for the occupation of Ireland by the Hiberno-Celts, and we may succeed in elucidating the comparative history and chronology of Western Europe, of anterior races, of the Iberians, Ligurians, Celts, and of those great displacements which, affecting Europe from one end to the other, in themselves represent the waves of migration which have moved the mighty empires of the East.

XXII.—An Account of the Ogham Chamber at Drumloghan, County of Waterford. By Richard R. Brash, M.R.I.A.

[Read November 30, 1867.]

The Souterrain of Drumloghan is situated on the townland of the same name, in the parish of Stradbally, barony of Decies without Drum, and Co. Waterford. The site is a gently rising ground to the north of the bog of Drumloghan, an extensive peat basin, surrounded on all sides by hills, the most remarkable of which, a bold and singular looking ridge, rising east of the bog, gives name to the locality—Drumloghan, the "ridge of the lough." The scenery is wild and lonely, being destitute of trees or plantations, and surrounded by hills that seem to shut out the busy world from this weird-looking spot. Here are some relics of a remote age—an irregular piece of ground, approaching a circular form, enclosed by a rude fence of earth and stones, and grown over with clumps of ancient white-thorns, interspersed with rough unhewn stones, marks the site of one of those ancient burial places known as Killeens, or Cealluraghs, and which are unconsecrated cemeteries appropriated to the interment of unbaptized children and suicides, and which many well-informed antiquaries believe to have been originally places of pagan sepulture. This one is termed by the neighbouring peasantry Killeena, which appellation is usually applied to them in this county as well as in Cork; while in that of Kerry the name of Cealluragh is generally used. Here, however, at present there is no appearance of interments, nor has there been within the memory of "the oldest inhabitant;" yet such is the traditional sanctity of the spot, though entirely devoid of all Christian relics or associations, that it is carefully preserved and regarded with superstitious veneration.

Immediately under the fence, at the northern side, is a flat stone, buried in the ground, its upper surface level with the green sward; in this stone is an artificial cavity, $5\frac{1}{2}$ inches in diameter, and 6 inches deep, usually filled with water, and containing also a quantity of votive offerings in the shape of buttons, marbles, pins, needles, berries, &c., deposited there by persons using the water as a cure for various skin diseases, and especially for warts, polypi, &c., for which purpose persons come from a considerable distance. I saw a man there with a polypus in his nose, who, after trying various surgeons, had come to test the efficacy of "the well," as it is here called. The peasantry affirm that this cavity is never without water in the dryest summer, and that it never freezes during the hardest winter.

About twenty yards to the south-east of the Killeena is a rude block of stone, upon the upper surface of which is a basin-shaped cavity, perfectly circular, and ten inches in diameter, and certainly of artificial formation. It is of that class of monuments usually denominated

rock-basins; and, though no tradition attaches to it, the peasantry look upon it as a sacred stone.

The Killeena appears to have been originally enclosed, or rather contained within the area of a very extensive rath, a segment of the enclosing fence of which still exists to the north, and a further portion of it being traceable, though overgrown with grass, yet still elevated above the general ground level. It was in the process of removing this fence that the tenant farmer, Mr. William Quealy, discovered the Souterrain; and, being a person of considerable intelligence, he immediately stopped the workmen, and communicated the fact to Mr. William Williams, of Dungarvan, a gentleman well known for his antiquarian tastes, who lost no time in proceeding to the spot; under his direction, the chamber was carefully opened, the earth removed from the interior, and also from the exterior, when, to that gentleman's great delight, he discovered a number of Ogham inscriptions on the side pillars and roofing stones.

Mr. Williams immediately communicated his discovery to me, and, on Thursday, September 19th, I visited the locality, accompanied by Mr. George Atkinson, of the Department of Science and Art, South Kensington, Mr. Williams kindly accompanying us.

The monument resembles that class of our megalithic structures known in this country as *Leaba Diarmada agus Ghrainné*, or "Diarmid and Grainne's Bed;" it lies east and west, and was completely covered up in the fence already alluded to, being about half below and half above the natural surface level of the ground.

The chamber is an irregular parallelogram, slightly curved in its length, which is 9 feet 10 inches; width in the centre, 4 feet 10 inches; average height, 4 feet 4 inches. (See Plan, Pl. XIV.) It consists of two side walls, formed principally of rough undressed upright pillars, the irregular spaces between being filled with coarse uncemented rubble masonry, the east end being built across in the same manner. The roof (see Pl. XV.), is formed of slabs of undressed stone, laid across lintel-wise, and resting on the side walls. The original entrance appears to me to have been at the east end, where there is a portion of a covered passage, 5 feet in length; 2 feet 3 inches in width; and 2 feet 2 inches in height, the east end of this passage being stopped by the clay bank. (Pls. XVII. & XVIII.) These narrow passages, or, as they are usually designated by the peasantry, "creeps," are very general in rath chambers; they are sometimes of very considerable length when leading to a single chamber, and usually connect a number of chambers: in many instances they are so low and narrow, as to oblige the explorer to creep on his face and hands; hence the very appropriate name given to them by the country people.

All the stones composing the chamber are perfectly rude and undressed, showing no tool-mark whatsoever except the Ogham scores; these are found on a certain number of the side pillars and roofing stones, and under such circumstances as plainly indicate that they

were used as mere building materials by the constructors of this rath chamber, as many of the inscriptions were so placed, that they could not have been seen but for the removal of the superincumbent earth, as they were on the top angles of the roofing stones.

And here I would remark, that it is most desirable, when discoveries of Oghams are made under such circumstances, they should, if possible, be entirely uncovered.

Before proceeding to describe the monuments of Drumloghan Souterrain, I would wish to make a few remarks on the obstacles that have hitherto attended the development of this branch of our national antiquities.

When the attention of Irish Archæologists became directed to this subject in the last century, much discredit was attached to the pursuit, in consequence of the circumstances under which the Callan Mountain discovery was brought under the notice of the learned; and from the mistaken belief, then very general, that the inscription there found was a forgery, public interest in the subject died away.

The subsequent discoveries of Mr. Pelham, though very remarkable, failed to re-awaken the attention of our antiquaries; and it was not until the later more numerous finds of Mr. Windele and Mr. Hitchcock, and the learned papers of the Right Rev. Dr. Graves, showed that the Ogham monuments held an important place in our national archæology, that a more general interest was awakened to the subject.

It has been to me a matter of some surprise that our very best Irish scholars have given scarcely any attention to the translation of these inscriptions; and I have heard it stated that such have on many occasions refused to offer an opinion on, or attempt a translation of, copies of inscriptions forwarded to them for that purpose. Such a fact has had a very discouraging effect on the study of these monuments; men of humbler pretensions naturally shrinking from a task avoided by men of greater learning and experience in Celtic philology.

I rather think, however, that other important and pressing literary obligations, occupying the time and attention of such men as the late Professors O'Donovan and O'Curry, prevented them from entering on new fields of investigation, rather than any inability to cope with a subject which I believe either of these lamented scholars could easily have mastered, had they turned their attention towards it.

While it must be admitted that many of the inscriptions are impossible of translation, it is equally a fact that very many others, from their extreme brevity and simplicity, can be easily understood; the failure of many attempted renderings resulting from one or other of the following causes :—

Firstly. An ignorance of the true nature and intent of the monuments.

Secondly. The linguistic difficulties presented by the obsolete Gaedhelic in which they are inscribed.

Thirdly. Ignorance of the contractions used in engraving on a material where brevity was essential.

Fourthly. Imperfection of copies, as well as of the inscriptions themselves, from weather wear and other injuries.

Fifthly. The pre-conceived ideas or prejudices of the translators, leading them to imagine what the inscription ought to be, and thence torturing, misplacing, and misreading the characters in every possible way, in order to bring out allusions to some local historic fact, or to the name of some famous mythic chief, king, or druid, or of some deity supposed to have been worshipped in pagan times.

Rejecting such illusory modes of investigation, and taking up the key alphabet from the Book of Ballymote, as adopted by the Right Rev. Dr. Graves; and, with its assistance, comparing and carefully analyzing a number of these inscriptions, the candid and patient investigator will, I think, be led to the following conclusions :—

Firstly. That the monuments are almost exclusively sepulchral or monumental.

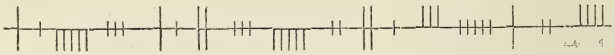
Secondly. That in such cases they seldom record more than the name and tribe name of the deceased; with occasionally his profession as a warrior, a poet, a judge, and sometimes an exclamation of grief, as "alas," "woe is me," &c.

Thirdly. That they are inscribed in the simplest and briefest manner, connecting words scarcely ever used, and words frequently expressed by initials.

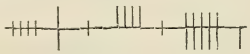
Fourthly. That the word "Maqui," the genitive of son, occurs in the majority of the monuments in some or other of its forms; and that where it thus occurs, it becomes the key word of the inscription; as before, and after it, we are sure to find a proper name; and that the position of this word dictates the position in which the legend is to be read.

Having premised thus much, I shall now proceed to describe the inscriptions. In the accompanying plan and sections I have numbered all the large stones, both inscribed and uninscribed, and shall commence with the roofing slabs. (See Pl. XV.)

Roofing Slab, No. 1.—This stone is five feet in length, and nine inches by eight inches in the centre; there is a large fracture in the upper front edge, and it presents to us two lines of characters on the under angles. The inscription commences on the front angle, about two feet from the end; three strokes of the last character are on the top edge, and is as follows :—



The second line on the opposite angle:



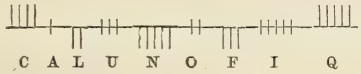
The characters are clearly cut, and perfectly legible, so that there is no difficulty in determining their values. The inscription appears to me to commemorate two individuals, and I read it as follows:—

"MANU, SON OF UNOGA; TIMOCE, SON OF ARB."

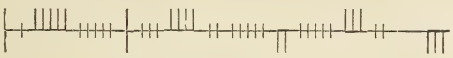
These names are of a peculiar type, not found in our annals and pedigrees, but are quite consistent with the names usually found on Ogham monuments. The equivalent for "Son of" varies from the usual formula of "Maqi;" connecting the first two names, it is "Mag;" in the second instance it is the common form of "Mac." I would here remark that, while "Maqi," the genitive of Mac, is the form most generally used in these inscriptions, the word in all its inflections is found also on them: thus we have "Maqu," "Maqo," "Maqe," "Maq," and frequently "Maqqi," also occasionally "Moc" and "Magu."

These names I have failed to identify in any of our ancient records to which I have access. In the "Annals of the Four Masters" I find two names that have some family resemblance to that of the first on the monument; they are those of Mantan, slain by Eremon at the battle of Breogan; 3506; and Manach, a priest and woodman to St. Patrick, A. D. 448.

Roofing Slab, No. 4.—This stone is of irregular shape and dimensions, and is five feet three inches in length, and seventeen inches by ten inches in the centre; it has two lines of characters on the upper angles, which were consequently concealed until the superincumbent earth was removed from the top of the chamber. The inscription commences on the front angle at two feet ten inches from the end of the stone, as follows:—



It is then taken up at the opposite angle, commencing two feet from the end, as follows:—



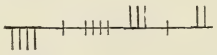
There is a fracture at the top of this stone between the letters O and F, where probably one or two characters were inscribed. I have attempted a rendering of this inscription, which I submit to the judgment of those learned in Oghamic lore:—

"SLEEPS UNOFIC, SON OF MUCOI, [UNDER THIS] STONE, MUTE" [OR] "IN SILENCE."

"Cal," according to O'Brien and O'Reilly, is *sleep, slumbers;* "Li" is obviously a *stone,* a *flag;* "To, Toi," according to the same authorities, is *silent, mute, dumb.*

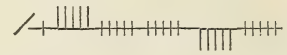
I make no conjecture as to the imperfect portion. The name Unofic I have failed to identify; it has a family likeness to the following: "Uchadon, A. M. 3650; Ugaine, A. M. 4546, 4567; Uirgren, A. D. 283."

Roofing Slab, No. 6.—This stone is five feet four inches in length, and twelve inches by seven inches in the centre; a fair and regular-shaped right-angled pillar; it has two lines of characters on the under angles. The inscription commences four feet from the end of the stone at one of the angles, as follows:—



S A E T A D

The last character is on the top of the stone; it is taken up on the opposite angle at two feet nine inches from the end, thus:—



M A Q I I N I

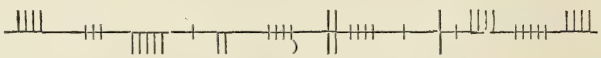
This inscription is exceedingly simple, and reads—

"SAETAD, SON OF INI."

Other readings may probably be suggested, as "Sae Tad, son of Ini." The word Sae may be considered an Oghamic abbreviation of "Sagart," a priest; or "Saoi," a learned man; and "Tad," a proper name, equivalent to "Tade," "Tadh," "Tadhg."

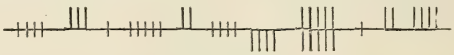
Many of this name are found in Irish History, beginning with Tadhg, son of Olioll Ollum, A. D. 195. I incline, however, to the more simple form of the inscription.

Roofing Slab, No. 7.—This is a very irregular-shaped stone, measuring four feet six inches in length, and twelve inches by eight inches in the centre; it has three lines of characters—two on the upper angles, the third on one of the under. The inscription commences two feet from the end of the stone, as follows:—



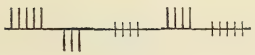
C U N A L E G E A M A Q I C

It is continued at the opposite angle, commencing two feet four inches from the end, thus:—



E T A I D E S R A D C

The third line will be found on the angle under the last, commencing also two feet four inches from the end, thus:—



Q F E C I

The characters are well cut, and quite legible, and no controversy can arise as to their values. I have ventured on a reading of a portion of this interesting inscription; the rest I confess my inability to translate. I read it—

"CU-NALEG EA MAQI CET AI DESRAD."

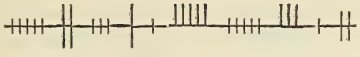
That is, "Cu-Naleg of the tribe of the Son of Cet, the learned Brehon."

The prefix "Cu" is very usual, at least very frequently found to ancient historic names; many examples will be seen in the "Index Nominum" of Dr. O'Donovan's "Annals of the Four Masters." From the peculiar position of the letters "ea," I take them to be an archaic form of "Ua," which, according to O'Brien, "signifies any male descendants, whether son or grandson, or in any other degree or descent from a certain ancestor or stock." This "ea" I have found in the same position upon other Ogham monuments. "Cet." This name is found in some ancient authorities: according to Keating, Mac Ceacht was one of the three Tuatha De Danan Kings of Ireland when the Clanna Miledh landed. Again, we have Cet Mac Magach, who slew Connor Mac Nessa with the mythic brain ball of Mesgedhra, as related in the historic tales called "Oitte," i. e., "Tragedies," and which are to be found in the "Book of Leinster." We have also Mac Cecht, one of St. Patrick's smiths.

It also occurs as a prefix to several names in the "Annals of the Four Masters." "Ai," according to O'Brien, "the learned," "Desrad" the same as "Desrut, a judge" (O'Reilly's Dict.), the D and T being commutable in the Irish language.

The other six characters in this inscription I have been unable to render with any degree of probability.

Roofing Slab, No. 8.—This is a coarse and very irregularly-shaped stone, three feet nine inches in length. The inscription is in one line upon an under angle, the arris of which is very irregular and rather rounded.



I G U M A Q I D A G

The rendering of this is very simple,

"IGU, SON OF DAG."

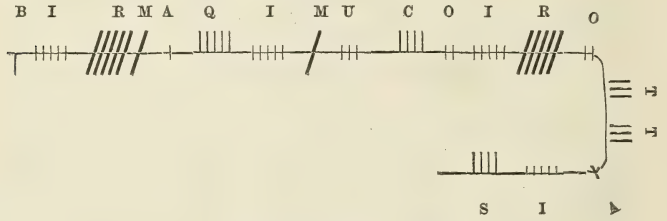
I have been unable to trace these names in any of our ancient pedigrees, as far as I have been able to consult them.

We are familiar with one of the names as a compound in that of a celebrated mythic personage, the Dag-da, a deified chief of the Tuath De

Dananns. We also find it in Dag-airne, son of Goll, son of Gollan, slain A. M. 3656 ("Annals of the Four Masters").

This last finishes the inscri bedlintel slabs. I shall now proceed to describe the inscribed upright stones, which principally compose the walling at the north and south sides, taking them in order as they are numbered on the accompanying elevation from the entrance.

South side Pillar, No. 1. (Pl. XIX.)—This stone stands at the entrance of chamber, and is rough, and of irregular shape; it is three feet, six inches in length; and twelve inches by nine inches in the centre. The inscription commences at the bottom of the stone, close to the ground, runs up one angle, across the head, and a short way down the opposite angle; and is as follows:—

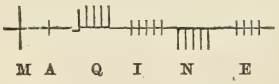


"BIR MAQI MUCOI ROTT AIS."

which I render as follows:—"Bir son of Mucoi [in] red death," "Rot," according to O'Reilly, is "Red;" "Aise" is "Death." This was probably the monument of a warrior slain in battle, or buried where he met his bloody fate. The inscription is singularly archaic and expressive.

The name "Bir" I have been unable to trace, unless it may be a form of "Bar," or "Barri," a Munster name, recognized in St. Finn-Barr, founder of the See of Cork. The patronymic "Mucoi" I shall refer to hereafter.

South side Pillar, No. 3.—This is a rough triangular-shaped stone, three feet eight inches in length—and thirteen inches by seven inches at the bottom; while it is but four inches by three inches at the top; at present it is bottom upwards, the inscriptions commencing two feet from the thick end, occupying a space of one foot, eight inches in length.



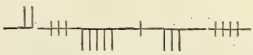
"THE SON OF NE."

The inscription is well and cleanly cut, is in good preservation, and there is no other trace of letters on the stone.

This name appears in Keating in the form of Naoi, a skilful harper, brought into Ireland by the Clanna Miledh. The chiefs of the invaders, Heber and Heremon, disputed about the right to retain so excellent a musician in their service; which was decided by casting lots, in favour of Heber. We find amongst the guests assembled at Tara on the occasion of a great banquet given by Cormac Mac Airt, as described in the "Book of Ballymote," the name of Nia-Mor, a King of Connaught; also the name of Enna Nia, a king of Leinster. It is stated in the "Book of Invasions," that the plain of Magh-Tuireadh, the scene of the great battle between the Fir-bolgs and Tuath De Danans, was anciently called "Magh-Nia."

South side Pillar, No. 5.—This is a coarse-grained, irregularly shaped oval flag, three feet three inches in length, and eighteen inches in width at centre; it has two lines of characters on its front angles, reading from the bottom upwards, and commencing as follows:—

O D A F E M Q O



D E N A F E

There is a fracture in the top of the stone, and the lower part of the strokes forming the Q are obliterated, or knocked off; but the upper ends of the five strokes above the angle are quite distinct, and with the letters M before, and O following, formed the word Maqo. The A is wanting; but this may be accounted for by the injury to this part of the stone, though we have other instances where this vowel has been omitted in the same word.

The legend is very simple and reads—

"ODAFE, SON OF DENAFE."

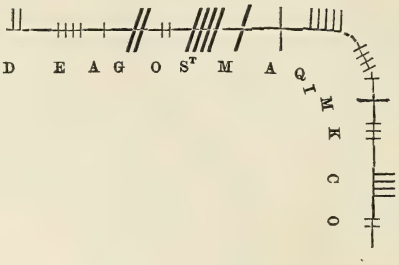
These names are of a hopelessly foreign cast; I can make nothing of them.

North side Pillar, No. 1. (Pl. XVI.)—This is a rude, unshapely piece of conglomerate, much weather worn; it is 3 feet 6 inches in length, 10 inches wide, and 8 inches thick in the centre; it has only three characters on one angle towards its top.

L R I

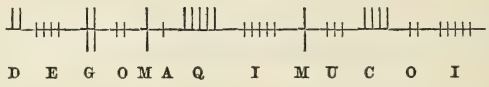
The upper part was broken to make it fit into its present position; and the upper part of the angle is fractured; this, and the natural weather wear of a stone so friable in its texture, will account for the disappearance of the remainder of the inscription; the letters that remain are much worn down, but are still legible. This is the second instance in which the consonants crossing the stem line are oblique.

North Side Pillar, No. 4.—This also is an irregularly-shaped slab, standing on its smaller end, which position must have been its original one. It is in length 3 feet 7 inches; 1 foot 10 inches by 8 inches at its largest end, and 5 inches by 5 inches at its smaller. The inscription commences at 1 foot 2 inches from the bottom, and continues round a portion of the top.



The introduction of the character expressing the double consonant *st* I cannot account for. I have found the double consonant *ng* in a similar position on another Ogham monument; whether they are errors of the engraver, or have a peculiar signification, must remain for further investigation.

The name Deago on this monument is a singular one, which I have failed to identify among our ancient names. It is, however, a remarkable fact, that it is found on one of the monuments in the Cave of Dunlo, county of Kerry; and still more remarkable, in connexion with the same tribe name. The inscription from Dunlo is as follows:—



"DEGO MAQI MUCOI," &c.

The constant recurrence of the tribe name of Muc, in its various forms, is worthy of observation. I have not noticed any other repeated but this. On one of the Ballintaggart monuments we have "Moccoe;" on a lintel stone in St. Seskinan's Church, county of Waterford, we have "Muc;" from a pillar-stone at Burnham House, county of Kerry, "Muce;" on two of the Drumlohan we find it is "Mucoi;" and on one "Muco." The name is evidently that of a tribe very widely diffused, from the extremity of the county of Kerry to that of Waterford, and found also on a monument at Placus, county of Cork.

Muc is Gaedhelic for boar; and the custom of taking family names from animals was prevalent in Ireland, as well as in other countries, as "Mac Sionach," son of the fox; "Mac Cue," son of the hound, &c. That the boar was held in great estimation in Ireland, if not actually reverenced, we have strong indications in the traditions and folk-lore of the peasantry, and yet stronger evidence in the fact, that it enters into the topographical nomenclature of our island to a great extent.

The porcine terms Muc, Torc, Lioth, and other appellations connected with the unclean animal, as Chollan, a hog; Cro, a stye; Banb, a young pig, will be found designating numerous localities through the country.

Thus, an ancient name of Ireland was Muc-inis, or hog island: there is a Muc-inis in Lough Derg, on the Shannon; also a Muc-inis on the coast of Clare; and a district on the banks of the River Brick, county of Kerry, called Muc-inis; also Muck-ros, in the same county; a Muc-moe, in the county of Monahan; a Ballynamuc and Kilamucky, county of Cork; a Coolnamuck, county of Waterford. One of the western islands of Scotland is called Muc-inis, and her territorial chiefs, up to a late period, were styled Lairds of Muc. We have Torc Mountain, Killarney; Mam Torc, in Connaught, Glen Torcan, and numerous other hills, glens, and natural objects, into which the word Torc enters. The boar-name Liath, enters into the designation of one of our counties, Leitrim, anciently Liath-Truim; as well as of Tara Hill, anciently called Liath-Druim, &c. One of our early kings, called Olmucadha, or of the great swine, reigned from A.M. 3773 to 3790.

The prominence thus given to this animal in our legendary tales and topographical nomenclature suggests the idea, that the boar may have been identified with that system of animal worship which we have some reason for believing once existed in this country. The Hindoos reverenced the varaha, or boar, as one of the incarnations of Vishnu; and in the geography of the Hindoos, Europe is set forth as "Varaha Dwipa," or Boar Island, equivalent to the Muc-inis of our own. He (Vishnu) is represented as residing there in the shape of a boar; "and he is described as the chief of a numerous offspring, of followers, in that shape" ("Asiatic Researches," vol. viii. pp. 302–361).

I hope this digression may not be considered foreign to the subject in hand, my object being to illustrate the use of this tribe name as found on the Drumloghan and other Ogham monuments.

Having thus endeavoured to describe these interesting inscriptions, which are a valuable addition to our still increasing stock of Ogham literature, I would desire to call attention to a few particulars worthy of notice in connexion with this find.

Firstly. That we can form no opinion as to the age of this chamber, the people by whom it was constructed, or the purposes for which it was intended, as in the excavations nothing was discovered that could throw light on such inquiries.

Secondly. That the Ogham monuments were used merely as building material, having the ends knocked off where it suited the builders, and being placed in every position that suited the exigencies of the work, without any reference to the inscriptions, some of them being in fact turned upside down, and several placed where they could not be read except by removing portions of the structure.

Thirdly. That the inscriptions are all in good order, and perfectly legible, the only exception being that with the three characters already alluded to; and that this favourable circumstance is owing to their concealment in this crypt, where they have been preserved, probably for ages, from the hand of violence and the injuries of weather.

Fourthly. That eighteen simple letters are used in these inscriptions, a double consonant, *st*, being used once only; and that none of the characters given in the scales published by Dr. O'Donovan and the Right Rev. Dr. Graves, as representing diphthongs, are made use of.

Fifthly. That the monuments exhibit no traces of marks or carvings of any kind—no cross, or other Christian emblem; and that the inscriptions show no indications of the pious formula that usually distinguishes the memorials of a Christian people.

Sixthly. The singularity of the names, which, though not actually found in our ancient annals, are of that archaic type which we meet in our bardic remains.

I shall here recapitulate these names, hoping that our Gaedhelic scholars may be able to identify them in the course of their investigations:—

Manu,	Cu-Naleg,
Unoga,	Cet,
Timoce,	Igu,
Arb,	Dag,
Unofic,	Bir,
Mucoi,	'Ne,
Saetad,	Odafe,
Ini,	Denafe,

Deago.

The remarkable uniformity of the names found on all the Ogham monuments hitherto discovered, and their general dissimilarity to those usually found in our annals and other historic documents, point significantly to the fact, that the people who inscribed them were a peculiar and distinct tribe. The question then arises, who were this people? from whence came they? and in what age did they live?—questions easier asked than answered. While I must state that I have no theory on this subject, yet I think there are some facts and considerations that point to one of the many migrations to our island recorded in the bardic annals as the people to whom we are indebted for the introduction of the Ogham; and I would briefly set these before the Academy in the way of suggestions. The great majority, then, of our Ogham monuments are found in the province of Munster, and principally in the counties of

Kerry, Cork, and Waterford, embracing a large extent of the south and west coast, from Tralee Bay, in Kerry, to Waterford harbour. As near as I can ascertain, the following numbers of monuments have been found: in Kerry, 75; Cork, 42; Waterford, 26; Limerick, 1; Clare, 1. These are all in the province of Munster. All the rest of Ireland supplies but 10; of these 5 are in the county of Kilkenny, still a southern county; the others are divided as follows: 1 in Wicklow, 1 in Meath, 2 in Roscommon; so that for the purposes of our argument it may be fairly assumed that the three southern counties named above form the Ogham district.

Again, it is worthy of remark that the majority of these monuments are found on the seaboard of the above-named counties—very many of them on the strands. The Drumlohan find is within three or four miles of the sea, as are many others of the Waterford and Kerry Oghams; those found in the county of Cork are more inland. The inferences from these facts are obvious.

First. That the Ogham was not invented in our island, else it would have been used generally throughout the country, and would not have been confined to one district.

Secondly. That it was introduced by a maritime people, who landed on our south or south-western shores, spreading themselves along the seaboard of the counties already named, and who ultimately became masters of the whole island.

Thirdly. That the language spoken by those invaders, and engraven on their sepulchral monuments, became the language of the country, and is the same as that which has come down to us, saving those mutations to which time and civilization subject all languages. But the question naturally arises here, if such a people landed on our southern shores, and, making themselves masters of the island, imposed their language and customs upon the whole, why are their engraved monuments not found all over the country? An answer to this may be found in the supposition that they came as colonists—perhaps the first colonists, and very probably few in number; that it took a considerable lapse of time before they fully occupied the southern parts of the island, and much more before the entire was peopled. In these early times population increased but slowly, internal feuds and other causes checking their growth. Before this people grew beyond the limits of the southern district they may have abandoned the use of the Ogham, and adopted a more advanced character, suited to a more advanced stage of civilization, and derived most probably from foreign intercourse. For it is certain that the Gaedhil had letters independent of the Ogham prior to the introduction of the Roman alphabet by St. Patrick, in the fifth century. That such a transition took place is evident from the fact, that the learned among the Gaedhil preserved the Ogham as a literary curiosity, and used it occasionally in annotations and scholia, delighting to write their own names in it.

Yet the other alternative may also be considered—namely, that the people who used this character may have been invaders, and not original colonists; that being invaders, they were probably weak in numbers, though of a superior civilization to the aborigines, whom they found, perhaps, thinly populating the country. Those invaders having formed a settlement in the immediate district where they landed, and increasing in numbers by the course of nature, spread themselves along the seaboard, and around those commodious harbours and sea inlets so plentiful on the south and south-western coasts; being themselves a maritime people, they affected the shores, both from a natural desire for the sea, the convenience of fishing, and for politic reasons, inasmuch, as by the sea they could hold communication with their native land, receive reinforcements from thence, and by it also make their escape if unexpectedly hard pressed by the aborigines. Such has ever been the policy of colonists under similar circumstances. In this immense district, comprising the counties of Cork, Kerry, and Waterford, such a colony may have existed for centuries, growing into the power and numbers of a considerable state, ere they were able to extend their dominion over the whole island. Such a state of things as, in fact, existed in England at the time of the Roman invasion, when the island was divided into a number of states totally independent of each other, and often engaged in fierce wars. In this alternative we might also suppose that the Ogham fell into disuse among them ere their power was extended over the whole island. That such a state of things is not only possible, but probable, we may infer from the fact, that the descendants of the Norman invaders were near five centuries settled in Ireland before they were able to subdue the country; and that for the same period their language and letters were unknown outside their limited dominion, known as the "Pale;" while the letters and idiom brought by them originally into the country would be in our days unintelligible, except to the learned alone. Here, I think, is a parallel case to what may have occurred in our island at a remote period. The argument might be further amplified and illustrated; but as I desire only to indicate a line of investigation, I shall leave the pursuit of it to others.

Now, among the many migrations recorded by our Bardic historians, there is one, and only one, to whom the introduction of the Ogham might be attributed with any degree of plausibility—namely, that tribe called the Clanna Miledh, or Milesians.

Rejecting the mythic origin and adventures of the ancestors of Miledh, and the conjectural chronology of the Bards, we may safely admit the probability of an ancient eastern tribe having migrated through, or from the northern parts of Egypt, along the shores of the Mediterranean to Ceuta, and from thence across the straits into Spain—the very identical route taken by another eastern tribe in subsequent ages, who founded an oriental empire in Europe that lasted nearly eight centuries. Tarik and his Arabs did in A. D. 710 what their ancestors

accomplished, perhaps, fifteen centuries before—for "history but repeats itself." The Phœnicians founded Gades eleven or twelve centuries B. C. These traders never founded colonies in uninhabited districts; they were merchants and chapmen, and without a population they could not trade. At all events, during the dominion of Carthage, and in the days of the Scipios, Spain was not only colonized by the Phœnicians, but was inhabited by a numerous, wealthy, and prosperous aboriginal population.

That Spain may in these days have thrown off some of her adventurous, or superabundant population, is not at all unlikely. That one of these bands may have dropped on the southern shores of Ireland is equally probable; because any person looking at the map of Europe cannot fail to see that the south of Ireland is the natural land-fall from the north of Spain.

Whether such a migration as we have been considering took place before or after the intercourse of the Tyrian people with the British Isles, it is now impossible to say; more likely it took place subsequently, as we must believe that enterprising people to have been the pioneers of all maritime discovery. All our native historians, however they may differ on other points, unanimously insist on this Spanish invasion, and the entire subjugation of Ireland by the invaders; and here I would remark, that this statement is corroborated by the opinions of many learned men having no Celtic sympathies or prejudices whatsoever. The scope of the present paper will not permit me to recapitulate these opinions.

Our native authorities go on to state that these invaders came in a fleet of thirty ships; that in each were thirty warriors, with their wives; that they landed at Inbher Sceine, now the Bay of Kenmare, in the county of Kerry; that from thence they marched inland, and encountered an army of the natives, stated then to be a people called Tuath De Dananns, at Sliabh Mis—a mountain district between the bays of Tralee and Dingle; that a battle was there fought, in which the latter were defeated. This engagement appears to have been a running fight, as was usual in that period amongst semi-civilized tribes, continued through a series of glens, or valleys, at the foot of Sliabh Mis; two of these are called Glen-Fais and Glen-Scothian, from Fais and Scota, two amazons who fought in the ranks of the Clanna-Miledh, and were there slain. These localities are as popularly known by the above names as any others in the country; and in Glen-Fais there are certainly evidences of some remarkable transactions having there taken place at some remote period.

Here are two enormous pillar-stones, one eleven feet in height still erect; the other is ten feet in height, in an inclining position, the latter having a fine Ogham inscription engraved thereon. There are also an unascertained number of ancient graves, cist-formed, containing human remains; the discovery and opening of several of which are described in a paper read before the Academy by the late Venerable

Archdeacon Rowan, on November 8th, 1858. Now, the account given by the bardic historians of the speedy subjugation of the whole island to the Gaedhil, as the Clanna-Milidh are more generally called from their ancestor Gaedhelas, is perfectly fabulous, and unworthy of credit; a handful of adventurers could not in so short a space of time conquer the native population, and occupy so large an extent of country, forest-grown, and full of natural fastnesses. We must remember that, after near five centuries of military occupation and warfare, the English, in the reign of Queen Elizabeth, were compelled to cut down all the woods before they succeeded in reducing the country to submission.

We must, I think, conceive that the progress of the Gaedhelic power in Ireland was of such a nature as I have already described.

Again, it is a strong corroborative fact, that in the very county in which the Gaedhil are said to have first landed are found by far the greatest proportion of Ogham monuments; that they are found on the reputed scene of their first battle, and in very remarkable numbers in and about the very localities where they made their first appearance and sojourn. The advent of the Spanish colonists was, no doubt, an epoch in the primitive history of Ireland to them. I believe she is indebted for her Brehon laws, her poetry, her music, and that system of Oriental paganism of which so many relics remain to us.

It may be very naturally asked, have we any evidence of the existence of such a people in Spain? or is there any historic evidence of the state of that country, or of the people inhabiting it, at the remote period claimed for the Gadhelian invasion? I think that Strabo provides an answer to so natural a query in his description of the Turdetani and Turduli—a people or peoples inhabiting southern Spain. Hear what he says of them: "These people are esteemed to be the most intelligent of all the Iberians; they have an alphabet, and possess ancient writings, poems, and metrical laws, six thousand years old, as they say. The other Iberians are likewise furnished with an alphabet, although not of the same form, nor do they speak the same language" (Strabo, Bohn's edit. vi., p. 209). He further states that the people called themselves Turdetani, and their country Turdetania; this word is pure Gaedhelic, Tir-de-Tana, from Tir, a country, land; de, of; Tana, a drove, a herd, "the land of herds." The Greek geographer states, "that Turditania bred a superabundance of cattle (ibid., p. 217), and that they were famous for the production and export of wool, and that rams for the purpose of covering fetched a talent" (ibid., p. 216). He further states that they were also called "Turduli;" but whether they were two distinct tribes, or one tribe having two appellations, he could not exactly say. Now, Turduli is as intensely Gaedhelic as any word can be; "Tir-duile," from Tir, a country, land (in the Sanscrit, Tir means land border), and Duile, a pleasant land or country. How indicative both these names are of the beautiful and fertile Andalusia, the richest province of southern Spain, originally inhabited by those people. I am well aware how delusive etymological likenesses are, and how apt to lead us astray

in investigation, nor do I usually attach much importance to them; but in this instance, where, without doing any violence to the structure of words, we find one language interpreting another so aptly, according to the very physical features and productions of a country, we are bound to attach some value to them, were it only as corroborative evidence.

The topography of southern Spain is intensely Gaedhelic. Many of its rivers, streams, lakes, hills, and other physical features, are called by names which can only be interpreted by that language; while the peasantry themselves, in their character, customs, and superstitions, are a similar race to our own. In addition, there is corroborative evidence in the strong sympathies existing, from time immemorial, between the people of the south and west of Ireland and the Spaniards, in the constant intercourse from the most ancient times continued down to late medieval times; and in the ethnological affinities between the people of various parts of the west and south-west coast of Ireland and those of Spain; not of the Biscayans or Catalans, who were of the Gothic race, but of the Andalucians, who were of the Eastern type.

I have before stated that it was not my intention to broach any theory on this important subject; my desire has been rather to indicate a line of investigation that has suggested itself to me from the various considerations I have already adduced. I trust that this much-neglected subject will receive from the members of this Academy that attention to which I believe it is entitled, from its bearing upon an obscure era of our national history.

XXIII.—Observations on Mr. Brash's Paper "On the Ogham Chamber of Drumlohan." By the Right Rev. Charles Graves, D.D., Lord Bishop of Limerick.

[Made November 30, 1867.]

The Bishop of Limerick, in moving that Mr. Brash's paper be referred to the Council for publication, observed that the thanks of the Academy were due to Mr. Brash for his detailed description of the Drumlohan cave, and the Ogham monuments contained in it. To such an acknowledgment Mr. Brash would not be disentitled if it should hereafter appear that he had fallen into some errors in his copying and deciphering of the inscriptions. In ordinary cases, Oghams, being of a great antiquity, have been more or less defaced by the action of the weather, if not in other ways; but special difficulties stand in the way of copying inscriptions on monuments built, like those described by Mr. Brash, into the walls and roof of an underground gallery, without any attempt being made to leave the inscribed edges visible. The Bishop stated that his own drawings of the Ogham inscriptions in the cave at Dunloe had undergone some important corrections on the occasion of a second visit to the place. Comparisons of the names appearing in them

with others found elsewhere had suggested corrections which a further examination proved to be necessary. In fact, the intelligence of the antiquary, having a general notion of what he may expect to find in an inscription, gives no small help to his senses of sight and touch in reading it.

Looking for the first time at the inscriptions now laid before the Academy, the Bishop would hazard one or two conjectures. It appeared to him probable that the inscription on the south side pillar, No. 1 (see p. 110), ended with the name Rittias, or Rettias, not Rottais. The former of these frequently occurs on Ogham monuments existing in Kerry. He also suggested that the inscription read by Mr. Brash as Igu Maqi Dag (Roofing Slab, No. 8, p. 109) may prove to be Lugu Maqui Deg, the last three letters being the commencement of the name Dego, occurring in the inscription on the north side pillar No. 4 (see p. 112). This name is better known to us in the nominative form, Dichu, which we meet in the life of St. Patrick.

Without attempting to offer an extempore criticism on the readings and translations of the inscriptions proposed by Mr. Brash, he observed that he thought that in the inscription on the roofing slab No. 1 (see p. 106), he recognizes a name Nocati, or Nogati, which he had seen elsewhere. He also directed attention to the element Cuna in the inscription on the roofing slab No. 7 (see p. 108), which, in Ogham proper names, represents the Con of ordinary spelling. According to this view, the first word in the inscription would be the genitive case of Conlaedh, or Conlaech.

The Bishop reminded the Academy that the almost universal occurrence of the word Maqi in the Ogham inscriptions, and the fact that these inscriptions consisted in general merely of names and patronymics, had been announced by him in his first communication on this subject to the Academy.

He also observed that the case of Drumlohan, like that of Dunloe, near Killarney, is a ꝼıꝛꞇ, one of those places in which we may expect to find Ogham monuments. The Brehon Laws, as quoted by him in a former communication, refer to Oghams preserved in *Firts* as evidences of the ownership of land; doubtless, because they exhibited the names of persons who had long before lived upon it. Some of the Ogham monuments entombed in caves are so much weather-worn, that they must have stood exposed to the air for ages before they were built into the places where they have been discovered.

The Bishop declined to discuss the theory proposed by Mr. Brash as to the persons who introduced and used the Ogham character in this country. At the same time he intimated his belief that the Ogham does not represent the language, or the alphabet of a colony which migrated into Ireland in such remote times as Mr. Brash seems to point to. But, whatever be the value of these speculations—and their interest cannot be denied—the Bishop declared his conviction that the deciphering of the inscriptions will give us materials from which we

shall be able to make the safest inferences. The difficulty of effecting their interpretations does not arise so much, according to his view, from their remote antiquity, or our imperfect acquaintance with the language in which they are expressed, as from the circumstances that they were originally intended, like the Ogham character itself, to be cryptic—legible only by the initiated. And this accounts for that disinclination shown by Irish scholars to undertake the deciphering of them. They are an exercise of something more than ordinary philological skill.

The Bishop concluded by expressing a hope that he would be able before long to lay before the Academy a communication illustrating these views.

XXIV.—Further Notes on Muscular Anomalies in Human Anatomy, and their bearing upon Homotypical Myology. By Alexander Macalister, L.K.Q.C.P., L.R.C.S.; Surgeon to the Adelaide Hospital; Demonstrator of Anatomy, Royal College of Surgeons; and one of the Honorary Secretaries of the Royal Geological Society of Ireland.

[Read December 9, 1867.]

On a former occasion I laid before the Royal Irish Academy a catalogue of the principal variations which I had noticed in Human Myology during the several preceding Sessions in the dissecting-room of the Royal College of Surgeons. Through the past winter of 1866-7, I have added to the list many irregularities of note, which appear to me to be well worthy of record. I had not the opportunity of examining each subject which came into the Anatomy Hall for dissection; but of those whose examinations I have directly superintended I have preserved notes of sixty cases, not one of which failed to display some deviation from the arrangement usually called normal, and in some these departures from type were gregarious to a singular extent.

The observation of anomalous muscles forms one of the most interesting departments of Teratology, and is interesting in a comparative point of view, as showing, firstly, the relation between the muscles of man and those of other vertebrate animals; and, secondly, as illustrating and indicating the correct homotypy of muscles in different regions of the same body. To the second of these subjects I would wish to call attention in the present paper. The teachings of individual anomalies must always be received with caution, for Teratology, if not corrected by Embryology, is at the best but an uncertain guide. It has, however, one great advantage, namely—that of indicating special lines of study to be followed up in other branches.

The general conditions which I have found to exist with regard to the occurrence of anomalies seem to be the following:—First, with regard to their frequency in different regions, I have found them to be most numerous in the forearm; secondly, in the face; thirdly, in the foot; fourthly, in the back; fifthly, in the neck; sixthly, in the

thoracic wall; and least frequent in the abdomen, hip, thigh, and perineum. M'Whinnie, who gives a short *resumè* of all that was known in his time of these anomalies ("London Medical Gazette," N. S., vol. ii. 1846), says, they are least frequent in the face and neck, then in the trunk, and most frequent in the extremities—a generalization which does not accord with what I have seen. In some cases the order of frequency seems to depend upon the degree of specialization of function uniformly enjoyed by the muscle in question in man and other animals—that is, when a muscle, or group of muscles, enjoys great variation of use in man, or is developed for varying purposes, and in varying positions and degrees of perfection in lower animals, abnormalities occur most frequently in it; while a group of muscles, that in all animals is devoted to one uniform use, or set of uses, is not so liable to vary. Likewise, we find frequency of variation of any muscle in man to be in direct proportion to the amount of divergence which that muscle usually exhibits from the type muscle, as found in the majority of the individuals of the animal kingdom. To illustrate these points, if we look at the triceps extensor cubiti—a muscle uniformly with one action—or the quadriceps extensor cruris, or the muscles of mastication, we will find that they are comparatively seldom the seat of variation; while the flexors and extensors of the fingers and toes present an individuality in every subject which we may examine. It is likewise worthy of note, that in the different regions of the body the order of frequency of the different forms of muscular anomalies varies in each part: thus varieties of fission are most common in the back and thorax; those of coalescence I have seen more frequently exemplified in the forearm. I have illustrated this in the following diagram, in which the numbers, read vertically, indicate the degree of frequency of variations, commencing with one which shows the most common locality for the form of variation. When a variety of any kind is very seldom met with, I have marked it *rare*, instead of characterizing it by a number:—

	Absence of Muscles.	Coalescence.	New Muscle Germs	Fission.	Duplication.	Other Varieties, Course and Attachment.
Forearm, .	3	1	1	3	1	2
Face, . .	2	3†	5	5	3	5
Back, . .	4	2	6	1	8	1
Arm, . .	Rare.	6	7	4	5	3
Foot, . .	5	5‡	3	6	6	4
Neck, . .	Rare.	7	4	2	2	6
Thorax, . .	6	4	2	7	4	7
Abdomen, .	1*	8	8	8	7	8

* Psoas parvus, pyramidalis.

† Coalescence is the normal mode of insertion of some of the facial muscles, and consequently the instances used in the compilation of this table were cases of unusual union.

‡ Exclusive of the union of flexor longus digitorum and flexor hallucis longus tendon which is to be found in nearly every foot.

In the compilation of this table, regard is had to the absolute number of specimens of variety, and not to the number of species of variations in each region; but it is a matter of experience that the two closely correspond, and muscles which frequently vary are liable to the greatest number of kinds of irregularity.

This and the succeeding table I have made out from my own observations alone, and thus they may differ from the experience of others in several respects. However, to form true estimates of these degrees of frequency, the combined experience of many observers would be requisite. In the construction of these tables, I have taken into account all my observations, extending over the Sessions 1859–67, inclusive, and not merely the results of last year's researches.

As the preceding table indicates the relative order of the occurrence of anomalies in the various regions of the body, so the second list illustrates the frequency of occurrence of the classes of varieties in each region :—

	Forearm.	Face.	Neck.	Back.	Arm.	Foot.	Thorax.	Abdomen.
Coalescence, . .	4	3	1	4	4	1	6	5
Absence, . . .	2	1	5	3	6	4	5	3
New Germs not normal part of the body	3	6	2	6	3	3	3	1
Duplicity, . . .	6	5	6	5	5	6	4	6
Varieties of Course, .	1	4	3	1	1	2	2	2
Fission, ...	5	2	4	1	2	5	1	4

I have not found all classes of varieties more common on the right than on the left; but I agree with M'Whinnie, that anomalies are more frequently unsymmetrical than otherwise. Some new muscles, as the flexor carpi radialis profundus, seem to occur more frequently on the right side, as the eight instances recorded by Wood (P. R. S., 1867, p. 530; and "Journal of Anatomy and Physiology," vol. i., No. 1), are all upon that side ; and the three instances in which I have found it are likewise on the right. The rectus thoracicus displays a similar proclivity to the right side. Some other irregularities seem to occur at least as frequently on one side as the other; thus, I have seen the humeral head of the biceps rather more often on the left than on the right.

Varieties are, probably, more common in males than females; those of fission and suppression occur more frequently in the latter, as they usually possess a weaker muscular system. Anomalies of duality, altered course and attachment, and coalescence, most frequently are to be found in males. New muscular germs are more frequently developed in the male sex, although an exception has been claimed for some. Bochdalek, in speaking of the crico-thyroideus posticus (kera-

tocricoid of Merkel), mentions, that it is always in females that he has found it; but Professor Turner has found it in males as well, and I have likewise seen it in both sexes.

The proportionate frequency of the occurrence of variations in individual muscles is likewise a point of interest. I have found the muscles most frequently abnormal to be the following, which I have grouped in the order of frequency of variation :—

1. Palmaris longus; 2. flexor digitorum longus pedis et flexor hallucis (alterations in their mode of union); 3. biceps flexor cubiti; 4. extensor ossis metacarpi pollicis; 5. pectoralis major; 6. coracobrachialis; 7. digastric; 8. peroneus tertius; 9. zygomatici. From this list I have excluded such muscles as risorius Santorini, salpingo-pharyngeus, pyramidalis abdominis, psoas parvus, whose frequency of absence is often nearly as great as their presence. During the past session I have preserved records of the presence of some of these rare muscles in the subjects examined, and they are as follows :—

Azygos pharyngei	1 in 60		Psoas parvus	1 in 20	
Levator claviculæ	1 in 60		Peroneus tertius	3 in 4	
Rectus sternalis	1 in 30		Peroneus quartus	1 in 8	
Zygomaticus minor	1 in 3		Peroneus quinti	1 in 5	
Palmaris longus	3 in 4		Extensor ossis metatarsi hallucis	1 in 60	
Subscapulo-humeral	1 in 3				
Pyramidalis	1 in 3				

With regard to the producing causes of anomalies, we cannot definitely pronounce any general principles until the mode of the original formation of the several muscles in the embryo has been thoroughly wrought out; but they seem to be capable of being grouped into two sets. First, those caused by altered conditions of embryonic forms; and, secondly, those caused by subsequent faults of development. Muscle germs, not normal portions of the human body, but natural to other animals, are often found as anomalies, and can only be explained in one way—namely, the tendency which all animal structures exhibit of wandering towards a primordial or archetypal symmetrical form, to which neighbouring animal individuals are related, either as parallels or descendants. There seems to be a typical muscle system in vertebrate animals, as there is a typical skeleton—a starting point from which all the muscular arrangements of the varied species have been originally modelled, and towards which they continually tend to revert. To this class, also, belong those classes of muscular duality depending upon vegetative repetition; and many instances of suppression are referrible to the same set of causes. On the other hand, the cases of muscle fission, coalescence, and some cases of suppression, are due to the varying conditions of development of contiguous muscles; the first and last depending on deficient growth; the second upon exuberant development and union from excess of formation: hence, the latter is usually associated with increased muscle power, and the former with weakness; and all these may be produced in adults by subsequent

causes. Many of the cases of altered attachments are due to subsequent alterations of normally developed muscle germs, and almost any diseased joint will furnish us with illustrations of some of these: for instance, many of the cases in which the biceps tendon is connected to the intertubercular sulcus of the humerus, in place of being attached to the glenoid ligament depend upon chronic rheumatic disease, and muscles may be fastened to anomalous sites on bones as a result of local inflammation, of wounds, of fractures or dislocations, or from disease.

Of the first class of anomalies, or those muscles not forming parts of the typical human frame, the following examples have occurred to me within the past session:—

1. Two specimens of the rectus thoracicus—one a large and well-marked muscle, the other weak and aponeurotic, and both were unsymmetrical, and on opposite sides. This muscle has recently been carefully illustrated by Professor Turner, of Edinburgh, in the "Journal of Anatomy," No. II., p. 246, pl. xii., fig. 1–6. Of the instances figured by him, fig. 6, the right side resembled the first of these which I have found, and the other resembled the left part of fig. 3. Of the cases published by Turner, five were on the right side, two were on the left, five were mesial or crossing, and nine were symmetrical. All the specimens which I have seen have been eleven, and of these, two were double, eight single, and on the right; and one single, and on the left. Gruber, in the "Mémoires de l'Académie Impériale de St. Petersbourg," tom. iii. 1860, describes having found it symmetrical thrice, and having seen it single once, on each side. Wood mentions three examples on the right side, one on the left, and one symmetrical instance. Hallett mentions many instances, but gives no numerical account. From these forty-two specimens, it will be seen that the symmetrical instances are to the unsymmetrical in the proportion of fifteen to twenty-seven; and, of the latter, the specimens on the right are to those on the left as seventeen to five. Turner has supported the opinion first broached by Wilde ("Comment. Acad. Petropol.," vol. xii. 1740, p. 320); and Hallett, that it is connected with the cutaneous system of muscles—a part of the panniculus; but I think we may see some reasons for holding a different opinion, especially in connexion with its tendinous lineæ transversæ, seen by Hallett and Meckel, and with its connexions with the sternomastoids, the rectus and the ribs, it seems, generally, at least, to be a true vertebral, or rib muscle. Besides, I think we may have a different opinion, upon theoretical grounds, to be stated hereafter.

2. The cleido-occipitalis occurred five times during the past year; one of these was on the right side of the neck of a male subject, and arose from the middle fourth of the clavicle on its upper border, external to and separate from the cleidomastoid; passing upwards, it was crossed by the auricularis magnus nerve; and higher up, by the occipitalis minor; and, finally, was inserted into the outer half of the superior transverse occipital line. The sterno and cleido-mastoids were perfectly separated in this subject, up as far as the point of insertion, the

clavicular being crossed and overlapped by the sternal head, the latter being superficial to, and the former being crossed by the spinal accessory nerve, which then lay beneath the cleido-occipitalis, and passed back to the trapezius. Other examples of this muscle occurred, but none so distinct nor so characteristic. Within the present session (1867–8), I have seen one instance of the cleido-occipital which is interesting, as occurring in connexion with multiple variation; it was in the neck of a very fat female subject, and co-existed with a bi-laminar cleido-mastoid; a double sternal origin for the sterno-mastoid, composed of two parallel tendinous slips; a double sterno-thyroid, whose fibres were prolonged upwards to the os hyoides; a sterno-hyoid, whose sole origin was from the posterior surface of the sternal fourth of the clavicle, and a supernumerary muscle, to be described afterwards, between the two latter. This same subject possessed the accessory muscle on the back of the neck described by Mr. Wood, namely, a flat fascicle from the tendon of the serratus posticus superior to the transverse process of the atlas. In it, likewise, the omohyoid arose from the second fourth of the clavicle from the sternal end, and so lay directly external, and nearly parallel to the sternohyoid, with which indeed it coalesced, for its upper third. This muscle, likewise, was fleshy for its whole length, and had no trace of a scapular origin. The cleido-occipital muscle has been described by Mr. Wood ("Proceedings of the Royal Society," 1867, p. 519,) and he has found it present in twelve out of thirty-four subjects, and all these were symmetrical. In my experience, I have not seen it quite so common, as I have only met with it once in every twelve subjects. I have seen, however, much more frequently cleido-occipital fibres inseparable from the cleido-mastoid.

3. The levator glandulæ thyroidei of Sömmering is perhaps scarcely to be regarded as an anomaly, as its description is to be found in the ordinary anatomical text books. I found it once attached to the prominent angle of the pomum adami, and inserted into the apex of a large pyramid of Lalouette; the others were inserted into the fibrous capsule of the lateral lobe of the thyroid body.

4. This subject likewise possessed a kerato-cricoid like that described by Merkel ("Anat. und Physiol. der menschlischen Stimme und Sprachorgans," Leipzig, 1857, p. 132). This muscle has been also noticed by Bochdalek ("Oesterreich. Zeitschrift," 1861, No. 4), who mentions that he has always found it on one side, and in females; but Patruban gives a case in which it occurred on both sides; and Turner (Edinburgh "Medical Journal," February, 1860, p. 744), has met with it four times on the right, twice on the left, and once on both. I have seen, during last session, this muscle four times singly, and I have found it in male larynges, as likewise has Turner.

5. The cephalo-pharyngeus was represented by an aponeurotic band, devoid of muscularity, in a subject possessing an azygos pharyngis, as before described ("Proceedings Royal Irish Academy," April, 1866, Pl. vi., fig. 1. b). The former muscle seems to attain its maximum of development in cetaceans, as I have seen it very large in the *Globio-*

cephalus svineval (described in "Proceedings of the Zoological Society," 1867, p. 481). Its use in these animals is to assist in the forcible elevation of the glottis, into which its fibres are continued, into the gaping aperture of the posterior nares.

6. I have seen a single specimen of the muscle, described by Bochdalek as the triticeo-glossus passing from the corpus triticeum in the posterior thyro-hyoid ligament, to enter the substance of the tongue, with posterior fibres of the hyo-glossus. Although frequently looked for, I have but once seen it; but Bochdalek has found it much more frequently present, as out of twenty-two subjects he has found it present in eight. My specimen was on the right side, but he has described it on both. It seems to me to be nothing but a fourth differentiated part of the hyo-glossus muscle, to whose posterior border it is nearly parallel, and from the kerato-glossal part of which it is little more separated than is the chondro-glossus from the basio-glossus.*

7. The Scalenus minimus has occurred several times, and once in connexion with a large bi-laminar scalenus posticus and medius; it displayed no peculiarities.

8. In the subject before mentioned as possessing the cleido-occipitalis and the clavicular origin of the omo-hyoid, there occurred a small new muscle (*cleido-fascialis*), which sprang from the back of the clavicle between the origins of the sterno-hyoid and omo-hyoid, by a narrow fleshy origin, passed upwards and inwards between the sterno-hyoid and sterno-thyroid muscles for about an inch, and ended in a flat expanded tendon, which was inserted into the fascia of the neck. It seemed to be a tensor of the cervical fascia, and differed from the vertical tensor, or costo-fascialis cervicis which I described in my last paper.

9. Two other instances of the mento-hyoidean muscle, figured in my former paper, have occurred, in both cases double, and separate from the digastric. This muscle is always on a plane superficial to the digastric; and I would be inclined to regard it as a modified cutaneous muscle—an inner part of the platysma myoides.

10. A few instances are on record of muscular bands in connexion with viscera, and two very curious instances were found last session. The first of these was shown by Mr. Hewitt, junior—namely, a thin but distinctly muscular band, arising from the outer surface of the front wall of the fibrous layer of the pericardium, and extending upwards in the centre of the anterior mediastinum, was inserted into the capsule of the thyroid body at its lower border. This pericardio-thyroid fascicle was seen when the sterno-hyoids and thyroids had been removed, and was traced downwards by the removal of the sternum. That a slip of this

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* Since the above was written I have found a large example of triticeo-glossus, and in another subject, dissected January 20, 1868, a distinct new muscle existed in the larynx; it arose from the inferior cornu of the thyroid cartilage, and passed inwards and upwards to the outer angle of the base of the arytenoid cartilage. This kerato-arytenoid muscle may have acted as an accessory dilator of rima glottidis.

kind could have any use it is difficult to imagine; it had no connexion with the sterno-pericardial ligaments of Luschka, which sometimes, though rarely, exhibit traces of unstriped muscles.

11. The second visceral slip was situated on the abdominal wall of a young female subject, and to it I would assign the name pubio-peritonealis. It arose from the right side of the ilio-pectineal line, immediately behind the attachment of Gimbernat's ligament. From this point it ran upwards, and a little outwards, beneath the transversalis abdominis muscle, and over the fascia transversalis. After crossing the deep epigastric artery, it terminated not far out from the median line, by being inserted into the fascia transversalis and peritoneum at a distance of two-thirds of the interval between the umbilicus and the pubis. Of the normal abdominal muscles in this subject there was a pyramidalis nearly reaching to the umbilicus, a supernumerary supra-umbilical linea transversa in the rectus, and a strong and thick transversalis.

12. The chondro-epitrochlearis occurred twice, springing from the cartilage of the seventh rib, running along the lower edge of the great pectoral tendon, and ending in the internal intermuscular septum, by which it is connected to the inner condyle.

13. In the perineum of a male subject a large superficial muscle arose from the surface of the inner border of the tuber ischii, and was inserted into an expansion over the corpus spongiosum urethræ, superficial to the accelerator urinæ, and covering in the posterior part of the intermuscular triangle concerned in the second incision of lateral lithotomy. The transversus perinei was normal, and deeper seated, but there was no ischiobulbosus, or transversalis alter. This slip could not be a representative of that muscle, however, as it was superficial to the other perineal muscles, and in front of the transversus proper. From its great size and strength, being larger than all the normal perineal muscles together, it might have caused spasmodic stricture. Its affinities are very hard to determine; but, from its being placed superficially, and from the more distinct nature of other aberrant bands in this position, it might be regarded as a portion of the general panniculus carnosus specially developed.

14. A supra-clavicularis muscle, similar to the slip of that name described by Luschka, of Tübingen, in Müller's "Archiv," (1856,) p. 282, and Taf. 10, existed in the same subject as the pericardio-thyroid above described; it arose from the summit of the manubrium sterni, and passed to the front of the clavicular origin of the cleidomastoid muscle. This is the only instance of this muscle which I have ever met with; but it has been described by Haller, and was considered by him as a supernumerary subclavius, and is described, when occurring on the deep surface of the sternum, by M. J. Weber, as an upper detached slip of the triangularis sterni, to which indeed it seems to me to be closely allied.

Among the representatives of new muscle types in the upper limb, the following instances have been found:—

15. The subscapulo-humeral I found very commonly—over fifteen times during the last session; but this, I believe, is a very unusual degree of frequency. In one instance it was especially strong and distinct (this specimen was exhibited before the Surgical Society of Ireland, and is recorded in the "Medical Press and Circular," vol. iii. p. 79). Mr. Wood has found this in one instance since my first publication of this anomaly. It was described first by Wenzel Gruber, of St. Petersburg, in his "Abhandlungen aus die menschlisch. und vergleichen. Anat." Petersburg, 1854, p. 109.

16. The coraco-capsular of Wood I have found in one instance crossing, but unattached to the capsule of the shoulder, and inserted into the inner lip of the bicipital groove, in common with the upper border of the tendon of the latissimus dorsi, which did not extend quite as far outwards as usual. This is the third instance in which I have noticed its presence. Mr. Wood has met with it five times, and has given an accurate account of it ("Journal of Anatomy and Physiology," vol. i., p. 48). Mr. Wood has inferred from its comparative, as well as from its human anatomy, that it represents the short part of the adductor mass; but I have given below some reasons for believing it to be the representative of the pectineus, and I wish here to state that I withdraw my previously published belief that it represented the quadratus femoris.

17. I have met with another specimen of the extensor primi internodii pollicis et indicis, similar in all respects to the specimen described before, and co-existing with the four typical extensors.

18. An extensor medii digiti existed in two cases in the subject; it lay parallel to the extensor indicis, and arose from a space of about two inches in extent from the back of the ulna, and it was inserted into the base of the second phalanx of the middle finger, joining with the medial tendon of the extensor communis digitorum. Wood has described several instances of this anomaly; and Meckel has given an instance in which the extensor indicis sent off three tendons to the second, third, and fourth fingers: Henle's "Muskellehre," p. 213. In one arm of a muscular male subject I found this anomaly to coexist with a completely cleft biceps, an extensor digitorum brevis manus for the second, third, and fourth fingers, and an interchange of tendons between the radial extensors of the carpus, a slip from the longus being inserted with the brevis, and *vice versâ*.

19. An extensor quarti digiti, nearly separate for its whole length from the extensor minimi digiti, existed in another forearm, and completed the second group of extensors. The increase in number of the slips of this second series is interesting, as bearing upon the comparative anatomy of the dorsal muscles of the forearm. As in the otter (*Lutra vulgaris*), I have found the extensor digitorum communis sending a tendon to the pollex, and one to the second and third toe; but the extensor minimi digiti sending tendons to the second, third, fourth, and fifth toes. Mr. Huxley, in the Hunterian Lectures for 1865, likewise mentions that this muscle supplies the three inner toes in the

rabbit; and Messrs. Mivart and Murie have found it supplying two digits in the hare and crested agouti ("Proceedings of the Zoological Society," 1866, p. 405). The extensor annularis longus above described is a different muscle from the extensor of this finger, which I referred to in my former paper ("Proceedings of the Royal Irish Academy," April, 1866), which was a part of the extensor digitorum brevis manus.

20. I have not met with any additional cases of double interossei; but I would wish to remark, in this place, that the theory which I put forward in my former paper has obtained a striking confirmation from comparative anatomy in the structure of the manus of the *Hyrax capensis*. Messrs. Murie and Mivart, in their admirable memoir upon the myology of this species, note that there exist four pair of interossei on the palmar surface of the metacarpal bones, arising from the aponeurotic investment of their proximal end, and inserted into sesamoid bones, one on each side of the distal end of the metacarpals; the sesamoid bones acting upon the proximal phalanges by means of connecting fibres. There are also four larger aberrant muscles developed in this animal, which most probably are displaced dorsal interossei ("Proceedings of the Zoological Society," 1865, part ii. p. 343). Mr. Wood has suggested to me that, in his cases of double interossei, the first palmar interosseous had a bifurcate origin from the second and third metacarpal bones, and the interosseous of the thumb had likewise an attachment to the first and second. This was likewise the case in one example in the foot; but, as in the theory which I propounded, there should have been originally four germs in each interosseous space, two dorsals coalescent into each bicipital muscle, and two palmars, of which one is obsolete. These examples of Mr. Wood are only what we might expect in case of the rudimental presence of a muscle embryo.

21. The extensor secundi internodii pollicis longus of Blandin occurred once during the last session in the form of a slip, arising from the external condyle and fascia of the forearm, closely connected to the extensor communis digitorum. It passed superficial to the ordinary extensor of the second internode of the thumb, in common with which it was inserted; it traversed the third groove in the annular ligament, and so was separated below from the tendon of the extensor communis digitorum. In the common otter a similar extensor tendon for the pollex comes from the extensor communis.

22. Two new instances of the brachio-fascialis have occurred within the past session, but in no respect dissimilar to those already described. One other third specimen arose from the coracoid process in common with the short head of the biceps, from which it soon separated, and formed the entire of the semilunar fascia.

23. The flexor carpi radialis brevis seu profundus of Wood occurred but once during the past year, co-existent with the palmaris longus. This specimen was published by Mr. Wood ("Proceedings of the Royal Society," 1867, p. 530), to which paper, and to another by the same author in the "Journal of Anatomy and Physiology," vol. i., p. 55, I would refer for fuller information on this muscle.

24. An instance of the extensor carpi radialis accessorius of Wood I found in both arms of a muscular male, arising behind the extensor carpi radialis longus by a flat, fleshy belly, which ended in a fine tendon, that, becoming fleshy, was inserted into the outside of the first phalanx of the thumb, outside the abductor pollicis. This muscle was digastric, as was also Mr. Wood's instance; and notes of another specimen of the same kind were given to me by Dr. Richardson, of Dublin.

25. A distinct scansorius muscle occurred in one instance posterior and parallel to the tensor vaginæ femoris, but much more deeply seated, separated from the anterior border of the gluteus minimus, and inserted into the anterior and inferior portion of the root of the great trochanter. This muscle, homotypically, is of great importance, and is one whose affinities have been often mistaken; it has been frequently confounded in comparative anatomy with another muscle, which we should consider as a perfectly diverse element. I refer to the iliocapsular, or opponens quadrato-femoris. To the scansorius type should be referred the muscle described by Professor Haughton as opponens quadrato-femoris in the ostrich, "Proceedings of the Royal Irish Academy," 1864, figs. 6 & 7, p. 17; as also the muscle described by the same author as iliocapsular in the lion, "Proceedings of the Royal Irish Academy," May, 1864, fig. 14, p. 30. From the true scansorius type the iliocapsular differs in several respects: firstly, that in the former the origin is dorsal, while in the latter it is ventral, or marginal; secondly, that the point of insertion in the former is on the outer, or exotrochanteric aspect; while in the latter it is in the neighbourhood of the lesser trochanter.

26. The peroneus quarti metatarsi, arising from the front of the fibula for its lower fourth, and inserted into the base of the fourth metatarsal bone, has been present as a separate muscle three times without any peroneus tertius. Four times it has co-existed with it nearly separate from the last muscle for its entire extent. In two cases the peroneus tertius, quarti metatarsi, and quinti digiti co-existed; and in one the peroneus longus, brevis, tertius, quartus (Otto), quarti metatarsi, and quinti digiti, were all present. The peroneus quarti metatarsi in another instance was represented by an offshoot from the outer tendon of the extensor longus digitorum, and it always passed in the same sheath of the annular ligament as that tendon. The nomenclature of these muscles is a little confusing, and this muscle would be much more correctly designated peroneus quartus; but Otto (Neue seltene Beobacht.) has applied this name to a muscle to be referred to below, and even the name peroneus quarti digiti is used by Messrs. Murie and Mivart to represent a muscle in *Dasyprocta cristata*, "Proceedings Zoological Society," 1866, p. 405, springing from the site of the origin of the peroneus brevis, and passing to be inserted into the first phalanx of the fourth toe. I have therefore applied the name used above as its most correct exponent.

27. The peroneus quinti digiti I have found very frequently pre-

sent as a detached slip from the anterior bundle of the tendon of the peroneus brevis. It has never occurred as a detached muscle last year, and its termination has been usually into the extensor aponeurosis of the toe. Sometimes a thin fascial expansion took its place, which, however, lost its individuality before reaching its usual point of destination.

28. The muscle which Otto has named peroneus quartus (called in my former paper p. sextus) has occurred once in last session, differing in some points from the individual muscles which I have described under the same name before. This muscle was five inches in length, fleshy, and it arose from a distinct line on the fibula, between the origin of the peroneus brevis and the flexor hallucis longus; passing downwards, it became tendinous, and wound round the back of the external malleolus in the same groove as the peroneus brevis, from which it was separated by a fold of the synovial membrane lining the theca; and, finally, it was inserted into a tubercle on the os calcis, behind the process for the middle slip of the external lateral ligament, posterior to the tendon of the peroneus longus, which crosses it near its termination. This muscle, it will be seen, differs from No. 16 in my former paper in the following points: firstly, in arising behind, and not over the peroneus longus; secondly, in being inserted into the os calcis, instead of the cuboid bone.

29. A singular internal peroneo-calcanean muscle, perfectly separate from the normal structures, I have seen in one instance to arise from an oblique ridge, two inches in length, above and behind the external malleolus, and directly below the flexor hallucis longus; from this origin a small penniform muscle was continued downwards and inwards, soon ending in a tendon, which passed in the halluceal groove on the back of the astragalus, external to the flexor hallucis tendon, and beneath the sustentaculum tali, to be inserted into the anterior and internal part of that process, near the outer and posterior attachment of the calcaneo-navicular ligament. This slip was perfectly unconnected to the flexor hallucis, and it is one whose homotypical relations are of considerable interest. I was inclined to regard it at first as a representative of the flexor carpi radialis brevis of Wood; but from this it differs, in possessing a fibular (ulnar) origin. It has been suggested to me that it might be a palmaris muscle, either brevis or accessorius; but for both of these we have much more distinct homotypes, as we shall see hereafter. Failing these, we are obliged to seek its upper limb representative elsewhere; and we will find that the only probable solution of the difficulty is the regarding it as a representative of a muscle otherwise unrepresented in the inferior extremity, namely, the pronator quadratus. In support of this explanation we have the following argument:—Both are at the lowest part of the limb; both have their origins from the lower end of the fibula (ulna); while in the forearm the fibres of the pronator quadratus pass downwards and pollexward; the fibres of the anomalous slip run in a direction downwards and halluxward. In one instance, in the left arm of

a female, the pronator quadratus was arranged in a tripartite form, and the lowest portion arose from the inferior extremity of the ulna, and passed downwards and outwards, being inserted into the lowest end of the front of the radius, the anterior ligament of the wrist joint, even as far as the upper edge of the scaphoid bone. In another subject, the pronator sent its lowest fibres, in a fleshy bundle, springing from the ulna, to a small round tendon, which crossed the lowest part of the radius, and was lost in an aponeurosis over the trapezoid bone. In this instance all we require is the suppression of the upper or transverse part of the muscle, which would be useless in the leg, and the vertical elongation of the lower part, and we have precisely the condition observed in the anomaly now recorded.

30. I have found another instance of the extensor primi internodii hallucis perfectly separate from the extensor proprius hallucis. I have likewise met with a separated tendon arising from the belly of the extensor proprius, and inserted into the first phalanx of the great toe. In one other instance a tendon arose in the annular ligament, without any muscle, and was inserted into the same bone.

31. The extensor ossis metatarsi hallucis I have seen, but it is much rarer than the last, and during the past session has only occurred in one subject. It was described by Henle in his "Muskellehre," p. 275.

32. A psoas accessorius was present in one male subject, arising from the sides of the bodies of the first and second lumbar vertebræ, by fleshy fasciculi, and inserted into the lateral aspect of the third, fourth, and fifth lumbar vertebral bodies by flat tendinous fasciculi. It seemed a repetition in the lumbar region of the longus colli.

Of the second class of muscular anomalies, or those in which muscles are reduplicated, the following have occurred during the last year:—(1) Rhomboideus minor, once; (2) extensor ossis metacarpi pollicis (in one subject in which there was no extensor primi internodii pollicis); (3) abductor pollicis; (4) extensor secundi internodii pollicis once; (5) extensor minimi digiti three times. This muscle often had two tendons, and was triple in one, sending two slips to the little and one to the ring finger (*vide supra*); (6) glutæus maximus in two places; (7) the great pectoral similarly divided, the deepest lamina giving off the entire of the suspensory frænum of Winslow; (8) the sterno-cleido-mastoid, as before mentioned; and, (9) in the same subject the sterno-thyroid; (10) the adductor longus; (11) the popliteus I have seen double, the superficial part larger, and lying over the external lateral ligament, the deeper layer being under, and attached to the ligament, an arrangement described by Fabricius ab Aquapendente.

The tendency of muscle germs to become doubled is among the most singular facts in teratology; the mode of duplicity may be one of two, either as in round or long muscles, it may be seen assuming the aspect of two parallel and corresponding muscles, or secondly, in flat muscles it takes the form of bilamination. The former mode of increase I

have found, or has been described by others, as involving the following muscles:—

Tensor tarsi.
Obliquus superior oculi (Albinus).
Corrugator supercilii.
Zygomaticus minor (Morgagni et mihi).
Digastric (Albinus).
Digastric anterior belly and single posterior.
Styloglossus (Meckel).
Stylopharyngeus (Böhmer).
Sternothyroid (Gantzer et mihi).
Thyro-hyoid (Cowper).
Levator anguli scapulæ.
Supinator longus.
Palmaris longus.
Extensor ossis metacarpi pollicis.
Extensor secundi internodii pollicis.
Extensor minimi digiti.
Subclavius.
Scalenus posticus.
Supinator brevis (Fleischmann, Sandifort, et mihi).
Genio-hyoid (M'Whinnie).
Sartorius (Rosenmüller).
Scalenus anticus.
Abductor pollicis brevis.
Extensor indicis.
Rectus thoracicus.
Popliteus (Fabricius ab Aquapendente, Bevan et mihi).
Cremaster (Cowper).
Adductor longus.
Rectus capitis lateralis.
Rectus capitis posticus major.
Pyramidalis.
Pyriformis.

The second form of duplication, or that of superimposed strata, has occurred in the cases of the following:—

Pectoralis major.
Pectoralis minor.
Trapezius (Tiedemann).
Rhomboids.
Pronator quadratus (M'Whinnie et mihi).
Complexus.
Glutæus maximus.
Adductor magnus.
Vastus externus.
Vastus internus.
Gastrocnemius.
Solæus.
External oblique (Tiedemann). I have seen instances of this confined to the left side.

The occurrence of this class of anomaly can only be accounted for on the principle of vegetative repetition of parts—a principle upon which we explain those abnormal instances of supernumerary limbs or members, and even complete janiceps. The vital capacity for exertion conferred by anomalies of this class is not easily ascertained; but most probably the existence of multiple irregularities of this nature would be co-existent with, and causative of, increased power, as in the celebrated case given by Tiedemann. The most common seat of laminar reduplication I believe to be the rhomboides; of parallel multiplicity, the short extensors of the thumb.

Variations of the third class, or those by fission, have occurred in the cases of many muscles:—(1) the great pectoral, which in one subject was widely differentiated, no fibres arising from the manubrium sterni; (2) in the sternomastoid fission has occurred in several instances, similar to No. 3, in my former paper; (3) fissions of the biceps; (4) coracobrachialis; (5) gluteus maximus; (6) quadratus femoris; (7) flexor sublimis digitorum; (8) subscapularis; (9) adductor magnus; (10) adductor longus; (11) brachialis anticus; and, (12) flexor brevis pollicis have occurred, similar to that already described; and to

my list I have the following additions:—(13) pronator quadratus in four cases, disposed in various ways—either lying in two strata or divided into two portions, an upper and a lower. In the left arm of a female, examined November, 1866, the pronator was in three parts—one, a small separated fascicle, the lowest, arose tendinous from the front of the ulna immediately above its articular extremity, and was inserted fleshy into the lowest surface of the radius, to which it passed downwards and outwards. The remaining part of the muscle was disposed in two strata, the superficial of which arose from the fifth of the ulna, commencing two-thirds of an inch above the styloid process; its origin was tendinous, and from it the fibres passed in a direction slightly radiating to be inserted into a space of the radius a little wider than usual: at the upper and inner side of the muscle the deeper lamina of fibres came into view, and they were entirely exposed by reflecting the superficial stratum; they arose from the ulna, commencing a little above the lower border of the superficial fibres, and extending rather higher on the bone than the limit of origin of the former. These latter are rather behind the limit of the interosseous membrane, a portion of which intervenes between their layers. This specimen indicates the two series of variations which I have found. When this muscle is disposed in two strata, they generally are disposed with their tendinous and fleshy parts alternate. Another forearm exhibited a trifid pronator, one a narrow triangular band below tendinous at the ulna, and fleshy at the radius; the middle likewise triangular, but has its tendon and belly in the opposite direction; the superior, being quadrilateral, had its fleshy portion similar to the lowest part. A third specimen showed a small pyriform fleshy belly, which originated from the lower end of the ulna, crossed obliquely downwards to the end of the radius, where it ended in a tendon, which was inserted into the aponeurotic structures over the scaphoid, trapezium and trapezoid bone. This slip was nothing but an extraordinary development of the lower border of the pronator, and its nature and affinities have been before discussed. Varieties of the pronator are not very frequent; but they have been noticed by Meckel, who has described it as double ("Anatomie," Jourdain and Breschet's Transl. vol. ii. p. 179). Barton, of the Philadelphia Hospital, has likewise described a peculiar condition of this muscle, in which it was composed of two triangles—one with a radial base and an ulnar apex, and the other with an ulnar base and a radial apex (Barton, quoted in Horner's "Special Anatomy," vol. i. p. 426).

(14.) The pronator radii teres I have seen cleft in one distinct instance, which I have described with others in the "Journal of Anatomy," vol. ii., No. 1.

(15.) The specimen of cleft subscapularis has been recorded in the same Journal, vol. i. p. 316. A similar instance I recorded and figured in my former paper, "Proceedings Royal Irish Academy," vol. ix. plate 7 *a*; (16) high differentiation in one instance occurred in the extensor longus digitum pedis, and in the representative muscle of the forelimb. (17) Of very common occurrence is a fission of the subcruræus, which

muscle appears in two parallel bands; (18) a fission of the anterior belly of the digastric occurred in one subject, in which the posterior belly of that muscle was normal. Corresponding instances are numerous, and are described by many authors ("Platner de Musculo Digastrico Maxillæ Inferioris," Lipsiæ, 1737); (19) the supinator brevis I have likewise seen split, the division corresponding to the point of perforation of the posterior interosseous muscle; (20) several remarkable cases of high division of the superficial, or perforated flexor of the fingers, have occurred to me, similar to No. 14 of my former paper. In that instance, the digastric portion of the flexor sublimis supplied the index and middle fingers; while in one of the recent cases, the digastric division of the muscle supplied the index and little fingers; while the middle finger tendon originated mainly from the radial origin ("Journal of Anatomy," vol. i. p. 319).

The cause of fission is easily understood, as resulting from the subsequent atrophy of connecting fibres, or from the separation of the component parts of complex muscles. The muscles in which this species of deformity has occurred to me from time to time are:—

Pectoralis major.
Pectoralis minor.
Serratus magnus.
Sterno-cleido mastoid.
Biceps cubiti.
Adductor magnus.
Supinator brevis.
Flexor sublimis digitorum.
Flexor brevis digitorum.
Infra-spinatus.
Deltoid.
Coracobrachialis.
Supinator longus.
Psoas parvus.
Brachialis anticus.
Pyriformis.
External pterygoid.
Extensor communis digitorum.
Extensor brevis digitorum pedis.
Platysma.
Gluteus maximus.
Gluteus medius.
Quadratus femoris.
Trapezius.
Crico-thyroid.
Pronator radii teres.
Pronator quadratus.
Flexor brevis pollicis.
Latissimus dorsi.
Orbicularis palpebrarum.
Levator anguli scapulæ.
Rhomboideus.
Splenius.
Complexus.
Subscapularis.
Extensor digitorum pedis longus.
Scalenus anticus.
Digastric.
Extensor carpi radialis longior.
Extensor carpi radialis brevior.

Varieties by suppression I have seen frequently in the case of some muscles. Psoas parvus has occurred four times—that is, once in fifteen subjects. Palmaris longus, although more constant in general than plantaris, in the proportion of three to two; yet, during the past session, has been much more frequently absent than the latter, palmaris being present in seven out of every ten, and plantaris in nine out of ten. Of the other muscles, I have found a case of deficiency in the teres major ("Journal of Anatomy and Physiology," vol. i., p. 317)—a muscle whose deficiency has not, I think, ever before been noticed. Suppression has thus occurred in my experience to—

Platysma myoides.
Zygomaticus major.
Zygomaticus minor.
Levator labii superioris.
Orbital part of orbicularis palpebrarum.
Pyramidalis nasi.
Occipito-frontalis.
Levator palpebræ superioris.
Tensor tarsi.
Trapezius—occipital portion.
Trapezius—cervical portion (1).
Sternal head of sterno-mastoid (1).

Posterior belly of omohyoid (2).
Entire omohyoid (2).
Genio-hyoid.
Stylo-hyoid.
Sterno-thyroid (1).
Scalenus anticus (1).
Serratus posticus superior (1).
Serratus posticus inferior (2).
One or two teeth of either.
Trachelomastoid.
Longissimus capitis (1).
Iliocostalis dorsalis (1).
Clavicular head of great pectoral.
Clavicular head of deltoid.
Triangularis sterni.
Psoas parvus.
Pyramidalis abdominis.
Transversalis abdominis (1).
Rhomboideus minor.
Middle portion of serratus magnus.
Cremaster in male.
Teres major (1).
Long head of biceps.
Coronoid head of pronator teres.

Scalenus posticus (Meckel).
Quadratus lumborum (M'Whinnie).
Sartorius (Theile).

Palmaris longus.
Palmaris brevis.
Radial origin of flexor sublimis.
Lumbricales manus, all (1).
Extensor minimi digiti.
Opponens minimi digiti.
Little finger slip of extensor communis digitorum.
Pyriformis (1).
Gemellus superior (2).
Gemellus inferior (1).
Transversus perinei.
Subcruræus.
Plantaris.
Peroneus tertius.
Third lumbricalis pedis.
Transversus pedis.
Outer slip of extensor digitorum longus.
Corresponding portion of flexor brevis.
Long flexor tendon of little toe.
Flexor brevis minimi digiti.
Temporal head of the superior constrictor pharyngis.
Pterygoid head of the same.

Transversus pedis (Böhmer).
Stylo-glossus (Quain).

Of the class of anomalies by coalescence I have found many instances: the two zygomatici, by hyperdevelopment of their fibres, have united together, or with the levator labii superioris, and the latter often received a band from the orbicularis palpebrarum. Decussative union between the anterior bellies of the digastric I have seen once since last year, and fusion of the genio-hyoid muscles took place in the same subject.

The anterior belly of the omo-hyoid muscle in several subjects (three) coalesced by its inner edge with the sterno-hyoid, as described by Mr. Turner, "Edinburgh Medical Journal," May, 1861, p. 982. In these subjects there was not always a digastric arrangement of the latter, which Mr. Turner has noticed as an usual concomitant of this combination. Indeed I have found the digastric arrangement by no means as common in this muscle as is very often stated. Connecting fibres between the sterno-hyoid and mylo-hyoid, sterno-thyroid and thyro-hyoid, and between the crico-thyroid and inferior constrictor pharyngis, are extremely common; and, as noticed elsewhere, the tendon of the pectoralis minor is united in many cases to the supraspinatus by a continued slip over the coracoid process. The deltoid and brachialis anticus I have seen inseparably connected by communicating fibres at the insertion of the former, and likewise the posterior fibres of the former with the outer head of the triceps. This muscle may have thus an extensive series of coalescences. I have seen it in different subjects

to coalesce with the trapezius, infraspinatus, pectoralis major, supinator longus, and brachialis anticus, and in this instance with the triceps.

The relation of the teres major to the latissimus dorsi sometimes is the subject of variation. Usually these muscles are united along the lower or upper border, and a bursa intervenes between the surfaces; this, however, is sometimes absent, and perfect coalescence may, though very rarely, take place. The anconeus and the triceps were inseparable in several cases; coalescence of the brachialis anticus with the supinator longus I have again noticed, as described in my last paper.

A fasciculus of fibres in one subject dipped from the deep surface of the biceps, and passed downwards into the substance of the brachialis anticus. This is contrary to the direction of any connecting slip that has been hitherto described.

The pectoralis major I have frequently seen united with the origin of the external oblique: and the band described before as passing from the coraco-brachialis to the brachialis anticus I have likewise found frequently as before mentioned. Slips uniting the flexors sublimis and profundus digitorum are likewise frequent, as are connexions between the two radial extensors of the carpus.

The flexor pollicis longus gave off in one specimen the deep flexor tendon to the index fingers—an arrangement of great interest, when we consider the relative position of these flexor tendons in the Quadrumana. In the chimpanzee, Professor Humphry found the flexor pollicis represented in one instance by a slender tendon from the palmar fascia, the condition found by Huxley in the gorilla; in another, by a tendon from the ulnar side of the flexor profundus digitorum. The front of the radius was occupied in this animal by the indicial part of the flexor profundus. Wilder describes the index and polliceal portions of the flexor in the chimpanzee as separate from the rest of the muscle, as in the anomaly just described; and Duvernoy states that the same arrangement existed in the gorilla. In three specimens of Macacus, Halford has found that once the flexor pollicis was conjoined with the common flexor; while in two others it was as in man. In *Macacus sinicus* I found the flexor pollicis tendon to arise from the middle of the surface of the flexor profundus; and the same is described by Haughton, in *Macacus nemestrinus*, a condition which Dr. Finney has found as an anomalous condition of these tendons in man. The same arrangement is found in *Cercopithecus fuliginosus* (Haughton, "Proceedings, Royal Irish Academy," 1865, p. 64), while in Lagothrix and Cebus it is the most external of the tendons of the flexor profundus which goes to the thumb. Several of the Quadrumanous types of flexors I have described in the "Proceedings of the Natural History Society of Dublin" for 1866.

Among the polliceal groups unions were not unfrequent: the extensor ossis metacarpi pollicis and primi internodii were often united, a single belly giving off the double tendons.

Another specimen of union between the gluteus medius and pyri-

formis has occurred this Session, similar to that noticed in my former paper.

Of the connexions between the flexor hallucis and communis I have seen a very large number, as of the entire number of subjects which I have examined, not one was free from some mode of junction; these unions of the flexors have been carefully described so often that it is needless to dwell any farther upon them here.

Union has likewise existed between the adductor brevis and magnus, similar to the state which I have found in the masked pig of Japan. Between other muscles very little separate by nature, unions have occurred often, such as between the splenius capitis and colli, transversus colli and trachelo-mastoid, longus atlantis and longus colli, rhomboideus major and minor.

I have found a considerable increase in the class of irregularities, of course, and attachments in muscles. This class of varieties encroaches upon the last group or the class of coalescences in many instances. These additional variations were as follows :—

1. The platysma myoides in one instance, the subject possessing the large cleido-occipital before described, had a distinct round sternal origin and a strong clavicular attachment; otherwise it was normal, and gave off an oral slip rather lower than usual. This is the band usually miscalled in the books the risorius Santorini, as the muscle described by that anatomist was not, according to Henle, this slip of the platysma (Henle's "Muskellehre," p. 107).

2. The middle constrictor pharyngis I have twice seen possessing an extensive syndesmo-pharyngeal origin from the stylo-hyoid ligament, and likewise from the lesser cornu of the hyoid bone. In one of these cases the superior constrictor extended only as far upward as the hamular process of the sphenoid.

3. Varieties of the biceps have been as common as usual, especially in the forms of additional origins, or more seldom as separate insertions. Of the former, as usual, the commonest has been the humeral head from the bone, usually from an oblique line, intervening between the insertion of the coraco-brachialis and the origin of the brachialis anticus (in my former paper I described it as being from the brachialis, but that I believe to be a second and much rarer head). This humeral origin I have met with once in every eight subjects—a much higher percentage than I have ever met before, and agreeing with Theile's experience ("Encyclop. Anat." vol. iii., p. 217). During the previous seven Sessions this only occurred in the proportion of once in every twenty-five subjects.

Thus the different supernumerary heads which have been described for this muscle are :—1st, the before-mentioned humeral slip; 2nd, from the brachialis anticus directly—the second commonest; 3rd, a slip from the supinator longus; 4th, a slip from the pronator radii teres; 5th, from the insertion of the deltoid, either by a strong fibrous band or by a large muscular origin, which I have seen existing in a subject that possessed no long head for this muscle; I

have seen this coexisting with the long head; 6th, a band from the great tuberosity (Meckel); 7th, from the lesser tuberosity (Wood); 8th, from the outer lip of the bicipital groove; 9th, from the tendon of the pectoralis major to the long head; 10th, from the tendon of the lesser pectoral to the short head over the coraco-brachialis; 11th, I have seen a slip of the coraco-glenoid ligament inserted into the intra-articular part of the long head, for which it formed an origin; 12th, a fleshy slip from the internal intermuscular septum to the inner border of the fleshy belly; 13th, a tendinous fascicle from the triangular ligament continued into the short head; 14th, a slip from the 8th rib passing along the border of the serratus magnus to the short head (Wood); 15th, a double short head was described by Theile; 16th, a head from the floor of the bicipital groove has been seen by Moser (Meckel's "Archiv. Band vii.," p. 227), and Gruber (Müller's "Archiv." 1848, p. 426); 17th, an origin from the capsular ligament of the shoulder (Wood, Theile). These are the chief forms of supernumerary origins which have been recorded, and of all of them, except 14, 15, and 16, I have seen instances during the past session. Some of my specimens likewise exhibited multiple origins: for instance, in one instance in which no long head existed, one origin sprang from the outer lip of the bicipital groove; another from the humerus above the brachialis anticus; while the short head received an accession from the pectoralis minor. In another subject, the origin from the great tuberosity co-existed with the ordinary heads, and the slip from the coraco-acromial ligament to the short head co-existed with a humeral origin. This latter may be anterior or posterior to the brachial artery.

4. The palmaris longus has likewise been the seat of very great variations—some referrible to the presence of the palmaris accessorius, and others, anomalies of the normal muscle. During the past session, the commonest variety was the presence of an intermediate fleshy belly with two tendons—one of origin and one of insertion. This I have never seen to co-exist with a normal palmaris;* and so I think it may be regarded as a variation of the proper palmaris longus. In the examples of this variety, the fleshy portion was from two to seven inches in length: in one the tendon of origin was thick and round; in others it was flat; in the former the insertion tendon was thin and aponeurotic, while in most of the latter it was thick. One instance occurred in which it was fleshy the whole way, as described by Henle; in another it was represented by a purely tendinous fasciculus, an arrangement not before described; a second head occasionally existed for it, in one instance from the coronoid process under cover of the pronator radii teres (Meckel describes a supernumerary palmaris attached to this process). In another instance the second head arose from the radius in common with the radial origin of the flexor sublimis. Henle ("Muskellehre," p. 192) describes an arrangement somewhat similar to this. In another instance there was

* Since this was written I have met with an example of the coexistence of a normal palmaris and this variety in the same forearm.

no condyloid origin, and the muscle arose from the lower part of the tubercle of the radius as described by Janser, ("Nederlandsch. Lancet," 1850, Jan. p. 431). In these cases the anomaly seems to arise from the presence of the accessory palmaris, of which the last is a rare specimen. Its insertion has varied also in some instances during the past Session. I have found it forming a large portion of the origin of the abductor pollicis. In another instance there was the following curious arrangement; a muscular band, arising from the inner condyle, was inserted into the inner border of the ulna near its middle; its insertion detached a tendon which terminated in the annular ligament.

The palmaris accessorius in another instance arose from the fascia over the ulnar artery, descended for about two inches, and then becoming tendinous, was inserted into the annular ligament and palmar fascia. I have likewise seen the tendon of this muscle springing from the antebrachial aponeurosis in the usual position behind, and internal to the normal palmaris, and inserted into the annular ligament without any vestige of a fleshy belly. Before passing from the varieties of this muscle, it might be useful to present a table of all the recorded anomalies of which it is the subject. The muscle may be:—1, absent; 2, double and ordinary; 3, double, one (the inner) being inverted; 4, the inverted muscle alone may exist, with a flat aponeurotic tendon of origin, or with a round tendon; 5, a single intermediate belly and tendons of origin, and of insertion (these tendons I have seen both round or both flattened, but usually one—that of origin most commonly—is flattened, and the other is rounded); 6, it may be fleshy for its whole length; 7, it may be tendinous for its whole length; 8, may arise from above the internal condyle; 9, it may arise from the internal condyle beneath the origin of the flexor sublimis; or, 10, it may arise from the coronoid process alone (Meckel), or have a second head from it; 11, it may have a second origin from the tubercle of the radius (Janser), or may have this as its only attachment; 12, or, as above described, it may have an origin from the radial head of the flexor sublimis digitorum; 13, it has been seen as a slip derived from the flexor sublimis digitorum; or, 14, from the flexor profundus (Fleischmann "Abhandlung der Physik. Med. Soc. in Erlangen" Band i., p. 25), and the same occurred in one instance during the past Session; 15, a slip from flexor carpi ulnaris may supply its place; 16, or from the flexor carpi radialis (Wood); or, 17, two tendons spring from one fleshy belly (Wood); or, 18, a tendon arising from the epicondyle was inserted into the fascia (Dursy); or, 19, I have seen it represented by a thin slip arising over the ulnar artery from the fascia of the forearm. Its insertions have been found to vary likewise by its being attached to the (20), pisiform bone; 21, or into the origin of the abductor pollicis; 22, or being connected to the ulna, as above described. The Palmaris accessorius may be as a tendinous band, as a muscular belly over the ulnar artery, or may be inserted into the abductor minimi digiti (Wood, "Proc. Rl. Soc.," June, 1864). Of the twenty varieties just recorded, the second, fifth, sixth, seventh, eighth, ninth, fifteenth, seventeenth, eighteenth are undoubted

varieties of palmaris longus; the third is from the presence of both longus and accessorius; the ninth, tenth, eleventh, and twelfth may be varieties of the flexor carpi radialis brevis; and the nineteenth is most likely a form of flexor accessorius.

One other remarkable variety occurred as a large expanded muscle, half the size of the flexor carpi ulnaris. It arose by two heads—one a tendinous, or rather fascial slip from the point of the internal condyle of the humerus, superficial to the pronator muscles; the second head arose fleshy and tendinous from the inner edge of the ulna, under cover of the flexor carpi ulnaris, and extended for nearly the lower two-thirds of that bone; the two origins were separated above by the ulnar nerve, as no ulnar artery existed in the subject, but they soon united. The insertions of the muscle were two fold: first, by a tendon to the palmar fascia; and, secondly, by a much stronger band, likewise tendinous, into the abductor pollicis.

In a male subject, with a large normal palmaris longus, the accessorius arose by a flat tendon from the internal condyle, and passing downwards, became fleshy, and was inserted by a two fold attachment—one into the annular ligament and palmar fascia, and a second into the abductor minimi digiti; these insertions were quite separate, the former being tendinous and the latter fleshy.

5. The flexor carpi radialis presented a radial origin below the tubercle of that bone, and in another case from the second head of the flexor sublimis digitorum. It likewise exhibited a coronoid origin, which in one case was separated by the median nerve from the condyloid head; and in another case the largest part of the fleshy mass arose from the deep surface of a process from the biceps tendon. The former cases were probably instances of the coalition between the normal flexor and the deep radial flexor of Wood. (For the nature of the slip from the coronoid process, see the "Journal of Anatomy and Physiology," vol. ii. No. 1, p. 8).

6. A very distinct example of the middle head of the gastrocnemius occurred in another subject similar to the one described in my former paper.

7. The passage of the lesser pectoral over the coracoid process I have referred to in a paper in the "Journal of Anatomy" for May, 1867, and I have found, since that paper was written, out of 29 extremities that its tendon passed over the coracoid process in 12. Of these it was attached to the triangular ligament in five, pierced through it in the remaining seven, and was attached to the supra-spinatus tendon, to the capsular ligament, and the head of the humerus in the remainder. In that paper, I showed that the coraco-glenoid fasciculus of ligament first described by me in the "Proceedings of the Royal Irish Academy," vol. ix., pl. iv. fig. 1, *a*, was the representative of the prolonged tendon, and was absent in cases where the prolonged tendon existed.

8. In the left hand of a thin old male subject, the indicial tendon of the flexor sublimis became suddenly fleshy opposite the metacarpo-

carpal articulation, and formed a belly two inches in length, which ended opposite the base of the first phalanx by again becoming tendinous. This seemed an attempt at the digastric arrangement which I have before described, and it has a very interesting point, namely—that it shows a step towards the degradation of the perforated muscle in the foot, as the modification in that region is merely the occurrence of this change to all the tendons, with a suppression of the leg portion.

9. In the leg of one female subject, the extensor digitorum brevis sent a slip to the little toe, as well as to the four inner—an arrangement which I believe to be one of very rare occurrence.

As a supplement to the catalogue of muscular anomalies just enumerated, we may naturally and with some interest consider the light which it sheds upon the vexed question of the serial homologies of the muscles in the different parts of the body, and we may consider these in two groups—1st, those of the limbs; and secondly, those of the trunk.

The serial homology of the muscles of the upper and lower extremities is a subject which *primâ facie* appears much simpler than it really proves to be when studied in detail; and I think a great deal of confusion has crept into the subject from trying to reason exclusively from the anatomical arrangements of one animal or class of animals. In no single animal, be it man or saurian, do we find the muscles typically arranged; but the investigation of the myology of the limbs of individuals of different races teaches us that the muscles of each limb are built up after the model of a definite archetype; but they teach us equally plainly that in no individual animal do we find the typical arrangement fully represented: both limbs show us modified muscles; and the question resolves itself into these parts—what type muscles are there, and what representatives do we find of these types? This branch of Comparative Anatomy began its systematic existence in the writings of Vicq d'Azyr, although it was foreshadowed by others before that time, and we may say of it truly, as he did, "Dans cette especе nouvelle d'anatomie comparée on observe comme dans l'anatomie comparée ordinaire ces deux caractères que la nature parait avoir imprimés a tout les êtres, celui de la constance dans le type et de la variété dans les modifications. Elle semble avoir formè ces differences especes et leurs parties correspondantes sur un même plan qu'elle soit modifies a l'infini." We may, for the convenience of further consideration, divide the groups of muscles in every vertebrate extremity into the following series: first, those of the basal joint of the limb; secondly, those of the shaft of the primal bone; thirdly, those of the second, or ginglymus joint; fourthly, those of the metacarpal series; and fifthly, those of the digits.

The comparative positions of the two limbs have been discussed frequently, and many anatomists have argued from their interpretations of bony arrangements as to the disposition of the muscles. Now, as the bones are in function to some extent subsidiary to the surrounding soft parts, we may find that a consideration both of the osseous and muscular

anatomy will give us the most accurate information upon the subject of these serial homologies. The theories of position which we have to examine in the first place are five, first—that of Professor Owen ("Nature of Limbs," 1849), that the front of the arm represents the front of the thigh, the biceps cubiti representing the rectus femoris; but this is open to the objection, that it homologates joints which have reverse actions, and is contrary to the disposition of the bony and muscular parts of the limb, although based upon some striking peculiarities in the limbs of Marsupials as the upward prolongation of the fibula in the Wombat, which is interpreted as a patella by Owen; secondly, the theory of Maclise (Art. Skeleton, Todd's "Cyclopædia," vol. iv., p. 852), that the lower end of the humerus has been twisted round, as indicated by the musculo-spiral groove, and hence the displacement of the parts of the limb below. This has been strongly defended by Martens (Nouvelle comparaison des membres pelviens et thoraciques ("Mémoires de l'Académie des Sciences et Lettres, Montpellier," tom. iii., p. 4, 1857); but to it there are many objections, that the bony fibres show no sign of such a twist; that we have no embryonic evidence of torsion; that the muscles present us with no appearances in favour of such a change;* thirdly, we have the theory Vicq D'Azyr, that the left arm and the right leg correspond, an idea which we will revert to afterwards, and which is severely reviewed by Martens (*loc. cit.* p. 474); fourthly, we have the theory proposed by Mr. Huxley, in the Hunterian Lectures for 1864, that the bony points at the upper end of the primal limb bone resemble their alternates, that is, the greater trochanter femoris corresponds to the lesser tuberosity of the humerus, and *vice versâ*, and that the supraspinatus is the homotype of the iliacus. These views he bases upon the structure of Ornithorhynchus, and the arrangement of the trochanters of Cholœpus, Galeopithecus and Pteropus, and it is defended by Mr. Mivart in his very valuable monograph on the myology of *Echidna hystrix* ("Trans. Linn. Soc.," vol. xxv., p. 396, *et seq.*); but although bearing with it the weight of great names, and very striking peculiarities of structure in these aberrant forms of Mammalia, I would venture to dissent from this very original and striking theory, and that upon the following grounds: first, it seems contrary to the anatomical structures of the great majority of animals, in which the correspondence between the greater trochanter and greater tuberosity is more than a mere fancied resemblance; secondly, because in three of the Chelonians which I have examined (selected because in them the basal bone of the two extremities so nearly correspond), the hawksbill turtle, *Emys geographica*, and *Testudo græca*, the correspondences of arrangement, both in the bones and muscles of the two limbs, were not what might be expected in conformity with the theory—the greater trochanteric

* It is particularly when it comes to deal with the soft parts that the fallacy of this theory appears, and the consideration that it requires the brachialis anticus to act as the representative of the cruræus is enough to stamp it as not accordant with anatomical fact.

muscles were still represented by the typical greater tuberosity ones; thirdly, because the muscle correspondences based upon this theory are by no means as striking as those to be ascertained by the acceptance of the fifth theory, which, with little modification, we will find to be the most suitable, and the one most clearly in accordance with the comparisons about to be instituted. The theory I would wish to propose is this—the basal bone of the limb I believe, with Mr. Mivart, to be typically a columnar organ with muscles placed along its four sides; this is modified by the projection and lamination of its angles, or by its occasional flattening into a flat surface, a change that is accomplished by the great elongation of the two edges and the flattening and obsolescence of the others: thus the basal segment may present us with an outer and inner side, as we find in both limbs in man; in the thoracic limb having its upper surface represented by the supraspinous fossa, and its outer by the infraspinous; its lower by the axillary costa, and its inner by the subscapular fossa. In the pelvic member we find these surfaces represented—the upper by the portion of the ilium below the middle curved line, the external, by the space intervening between the middle line and the crest of the ilium; the inferior, by the anterior iliac margin, and the internal, by the iliac fossa. Thus most of the muscular and bony points of the upper part of the limb I believe correspond in the manner pointed out by Professor Humphry ("Human Skeleton," p. 599, and "On the Limbs of Vertebrate Animals"). The femur and humerus I believe correspond to the one type; the greater and lesser trochanters to the greater and lesser tuberosities respectively; and at the lower end, as the head of the fibula does not come in contact with the lower end of the femur, the capitulum humeri is not represented at all upon the latter bone; and the two sides of the trochlea correspond to the two condyles of the femur. In this latter point there is a slight difference in the theoretic arrangement which I would here propose from Dr. Humphry's comparison. When we compare the bones of the foreleg, we find that the fibula and tibia present us with some points of divergence from the forearm bones, or radius and ulna. Comparing the bones at the upper ginglymus articulation, we find that the tibial element in the one case taken with the patella represents the ulnar element in the upper limb taken in common with the olecranon; and the fibular head is the representative of the upper extremity of the radius, its articular surface diminished because its action is lost, and its tubercle elongated, because required for the insertion of the outer flexor; but when we compare the terminal segments of the limbs, we find that to homologate properly the hand and the foot, we require to rotate the segment, so that the thumb or polliceal edge of the hand and the halluceal edge of the foot will both point forwards. Now, in doing this, it will be noticed that the radius will be brought forward, taking the place in the upper limb which is occupied by the tibia in the lower. If we examine these bones as they are placed in the foreleg of the elephant, we will there see that to homologate the fore and hind foot, a permanent state of crossing or pronation is required, and thus we can explain the apparent discrepancy

between the upper and lower ends of the individual leg bones, by supposing that they have undergone a change of position and of continuity—the upper end of the radius and the lower end of the ulna correspond to the fibula, while the remaining segments represent the tibia. This opinion was first broached by Cruveilhier ("Anat. Descrip.," t. i., p. 315), and I believe, when we come to examine the soft parts, we will find these correspondences to be indicated with precision and clearness.

It may assist in the subsequent homologation of the muscles if we place in a tabular form the bony correspondences of the limbs in man; but it must be recollected that these points are not representative one of another, but that both the upper and lower limb bones are representatives of these parts in a typical limb:—

Basal Bone, Upper.	Lower.
Subscapular fossa	Iliac fossa.
Dorsal costa scapulæ.	Crest of the ilium.
Axillary costa.	Anterior edge of ilium.
Inferior angle.	Anterior superior spine.
Tricipital spine.	Anterior inferior spine.
Glenoid cavity.	Acetabulum.
Supraspinous fossa.	Space below middle dorsal line.
Infraspinous fossa.	Space above middle dorsal line.
Superior angle.	Posterior superior spine.
Coracoidean notch.	Sacrosciatic notch.
Spine for conoid ligament.	Spine of ischium.
Coracoid process.	Tuber ischii.
Coracoid apex.	Ascending ramus of ischium.
Spine of scapula.	Middle curved line.
Coraco-acromial ligament.	Rudimentary pubis?

Of the position of the clavicle I say nothing; it is not of very great importance to our present object to determine its exact nature.

Humerus.—Upper Primal Bone.	Femur.—Lower.
Head and Neck.	Head and Neck.
Greater tuberosity.	Greater tuberosity.
Lesser tuberosity.	Lesser tuberosity.
Coracobrachial line.	Linea aspera centre.
Intermuscular ridges—separated.	Edges of linea aspera interval contracted.
Dorsal surface.	Extensor, or front surface.
Nutritious foramen.	Nutritious foramen.
External lip of trochlea.	Outer condyle.
Inner lip of trochlea.	Inner condyle.
External condyle.	The flattened side of outer condyle.
Inner condyle.	The flattened side of inner condyle.
Capitulum.	Obsolete.

SECOND SERIES OF LIMB BONES.

Radius and Ulna, and Carpus.	Tibia and Fibula, and Tarsus.
Olecranon.	Patella.
Coronoid process.	Posterior lip of inner condyle of tibia.
Greater sigmoid cavity.	Articular surface of tibia.
Lesser sigmoid cavity.	Tibio-fibular facet.
Posterior margin of ulna.	Crest of tibia.

Inner surface of ulna.	Inner side of tibia.
Outer surface of ulna.	Outer anterior side of tibia.
Styloid process.	External malleolus.
Tubercle of radius.	Styloid process of fibula.
Head of radius.	Head of fibula.
Back of radius.	Inner surface of fibula.
Front of radius.	Posterior surface of fibula.
Styloid process of radius.	Internal malleolus.
Two facets on inferior end of radius.	Facets on lower part of tibia.
Scaphoid bone.	Scaphoid.
Semilunar bone.	Astragalus.
Cuneiform.	Os calcis.
Pisiform.	Sesamoid, in peroneus longus.
Trapezium.	Ento-cuneiform.
Trapezoid.	Meso-cuneiform.
Os magnum body.	Ecto-cuneiform.
Os magnum head.	Head of astragalus.
Unciform.	Cuboid.
Pollex.	Hallux.
Little finger.	Little toe.

It has been objected by Martens that the union of two long bones is contrary to the laws of coalescence; but it may be readily explained by the shifting of the lower epiphysis from the one bone to the other.

Having premised these considerations, I would suggest that the muscular comparisons are to be made as follows:—The basal joint of each limb is invested with a muscular external covering, usually rough and fasciculated, represented by the glutæus maximus, in part, in the lower limb, and by the deltoid and the dorsal portion of the trapezius in the upper limb. The coccygeal portion and sacral origin of the first truly represent the trapezius; but, as the intervenient ridge is not developed in the lower extremity, the origin is shifted in man to a considerable degree. The points of insertion of this muscle in both limbs closely correspond, and as it is a homotype generally admitted, we need not make any further remark regarding it.

Beneath this lie several muscles—one immediately in contact, which is inserted usually into the outer part of the greater tuberosity (trochanter), and whose fascial investment has a tolerably constant relation to the first-named; this muscle typically is attached to the outer portion of the columnar basal bone, and in the upper limb is named infraspinatus, in the lower is meso-gluteus. These muscles exhibit in man a striking resemblance in the arrangement of their fibres, and both exhibit a tendon between two planes of muscle fibres. As the margin representative of the spine of the scapula is completely obsolete in the pelvic representatives, the muscles separated thereby encroach on each other in the lower limb of man remarkably, so that the third muscle actually extends below the level of the second. This constitutes the supraspinatus, or upper marginal muscle, and in the lower limb the glutæus minimus, or endogluteus, the alteration between the representatives of these types in human anatomy arising from the fact—first, of the absence of the shelf or partition in the lower

limb, and secondly, from the alteration of the axis of action, on account of the greater elevation of the basal bone in comparison with its thoracic representative. Along the inferior margin of the basal bone lies the fourth muscle of this series, represented in the lower limb by the scansorius or gluteus quartus, and in the other extremity by the teres minor. These muscles agree, first, in their insertion point being typically low upon the great tuberosity; secondly, by their relation being so close to the last-mentioned pair of muscles, a third of which it forms. Its human relationship long led me to entertain the mistaken idea that the meso-gluteus was of the same type as the supraspinatus, and the endogluteus represented the infraspinatus; but I believe the balance of evidence is in favour of the arrangement as above given. One thing seems clear, that the representation of the upper limb pair is to be looked for in these two muscles of the gluteal series. A second marginal muscle occurs on the inner edge of this lower border, the iliocapsular of the lower limb, or the subscapulo humeral of the upper, neither being constant muscles in man, although of regular occurrence in many animals. The last of the basal muscles on the inner surface of the typical bone is the subscapularis of the upper, or the iliacus of the lower limb, and that they correspond may be assumed for the following reasons:—both are composed of fine muscular fibres; both are inserted into the smaller tuberosity or trochanter; both pass close to the capsular ligament of the basal joint—indeed often having the subjacent bursa (which exists under each tendon) communicating with the cavity of the joint; both have the main artery of the limb in contact with them; both occupy nearly the entire of a surface of the basal bone, which surface is on the visceral aspect of that limb. Certainly in some animals the iliac attachment seems to be very much everted. In the opossum I have found it so, and in the Ornithorhynchus and Echidna Professor Huxley and Mr. Mivart have been led to assign a different position to it from this very fact; but putting against these few cases, first, the instances in which the origin of the subscapularis is marginal, as in the *Testudo græca*, and Hawksbill, and secondly, the arrangement of the iliacus in the vast majority of animals, I think we are entitled to consider that the subscapularis and iliacus are the representatives of the inner marginal muscle of the columnar basal bone.

To the ischiatic side of the basal bone lie a third or rotator group, very irregularly represented in the two extremities. The chief elements of this series are the pectoralis minor in the upper extremity, and the obturator muscles in the lower: the obturator internus is most probably represented by the pectoralis minor, as I have tried to show ("Journal of Anatomy," vol. i., p. 317), and as illustrated by the pectorals of the ostrich, in which the component bones of the scapular shoulder-girdle are converted into a single os innominatum. The insertion of this muscle into the coracoid process is but a stopping short of the obturator at the lesser ischiatic notch; and there is usually, as I have elsewhere

shown, a crescentic deficiency in the triangular coraco-acromial ligament corresponding with it, and a continuing, though usually unconnected band, the coraco-glenoid ligament. The gemelli are mere extra-pelvic slips of the obturator, and have no representatives in the upper limb. The obturator externus of man, I think, we may regard as the homotype of the subclavius—that muscle is invested with a fascia which forms a ligamentous band stretching out to the humerus, as the pubio-femoral accessory ligament is related to the obturator externus, and the muscle is in the upper limb often continued into the coracoid process, either directly or by means of fibres of the trapezoid ligament, or through slips, like the coraco-clavicular of Wood.

The pyriformis muscle of the lower limb has no distinct upper limb homotype in man; but in other animals a distinct and corresponding muscle is met with either in the form of the masto-humeralis of Cetaceans—a muscle which in those animals that possess a clavicle is modified into a levator claviculæ, or trachelo-acromial of Cuvier (-*Omo atlanticus* of Haughton), as such nearly constant in Quadrumana, and often met with in man; the last, or quadratus femoris type, found in the lower extremity, is likewise obsolete in the group of the shoulder girdle muscles of man, but it is possibly represented by the epicoraco-humeral muscle described and figured by Mr. Mivart in *Echidna hystrix?* Blainville suggests that it may be represented by latissimus dorsi.

We may thus arrange in tabular form the upper and lower limb equivalents of the typical muscles of the extremity, and we will find the correspondence to be as follows:—

Glutæus maximus,	=	Deltoid and part of trapezius.
Glutæus medius,	=	Infraspinatus.
Glutæus minimus,	=	Supraspinatus.
Pyriformis,	=	Trachelo-acromial, or masto-humeralis.
Obturator internus and two gemelli,	=	Pectoralis minor.
Obturator externus,	=	Subclavius.
Quadratus femoris,	=	Epicoraco-humeralis of Echidna?
Iliacus internus,	=	Subscapularis.
Scansorius,	=	Teres minor.
Iliocapsular,	=	Subscapulo-humeral.
Tensor vaginæ femoris,	=	Teres major.

The teres major of the upper limb having its function in the human hinder limb performed by the glutæus medius, is detached from the bone and united to the deep surface of the fascia under the name of tensor vaginæ femoris; the two resemble each other in course, and in general relation to the great extensor set of muscles. The tensor appears to go to the outer instead of the inner edge of this series—first, on account of its altered function; and secondly, because of the obsolescence of the ridge for its reception. The tensor vaginæ is attached to the femur in the ai, according to Meckel, and to the patella in the seal; and the teres major I have seen sending a slip into the triceps, which would only require to transfer its attachment to the fascia, which in

this situation is so thin that it needs no special muscular tensor, and we would have the condition of this muscle similar in both limbs.

From the ischiatic segment of the basal bone in each limb we have another series of muscles, the adductors—muscles truly femoral in man, but degraded to the tibia in the seal, forming an illustration of a principle commonly to be noticed in anatomy, that when a muscle loses its special individuality of action, its insertion becomes degraded, or extended to more than one bone or segment of the extremity. This group is represented usually by five elements, well developed in the lower limb of man, these are: one, basio-tibial, the gracilis, represented in the upper limb of man by the chondro-epitrochlearis, a slip from the cartilage of the seventh or eighth rib to the inner condyle of the humerus, and inner intermuscular septum: the second element, or the great adductor portion, extends from the tuber ischii (coracoid process) to the primal limb bone, and is represented in the thigh by the adductor magnus—in the arm, by the portion of the coraco-brachialis overlying the musculo-cutaneous nerve. These parts agree, first, because they are inserted the nearest to the flexor aspect of the limb, and in contact with the flexor muscle; secondly, because this portion of the coraco-brachialis extends the farthest down the limb—I have seen it extending as far as the epitrochlea; thirdly, because it is most closely in connexion with the main artery of the limb as a deep relation, as is the adductor magnus to the femoral. The third portion of the adductor mass, or pectineus, is a muscle whose fore limb representative is very difficult of determination, its typical origin we find to be from the pubis, and its insertion the ridge below the lesser tuberosity. Now, in this position precisely we find the small muscle described by Mr. Wood as the coraco-capsular—considered by him as a representative of the adductor brevis; but the reasons which lead me to associate it with the pectineus as a representative of the same type are the following: first, because its origin is the point the nearest possible to the suppressed pubis; secondly, its insertion is exactly typical, viz., to the ridge below the lesser tuberosity; thirdly, its relationship to the inner rotator, or subscapularis, which is exactly that of the pectineus and iliacus: in all these respects the coraco-capsular seems a very clear homotype of the pectineus, and it leaves the coraco-brachialis proprius to act as the representative of the remaining part of the true adductor mass, which in many animals is condensed into one muscle. The subnervous portion I have found divided into two parts on several occasions—one attached to a tendinous sling figured by Henle, immediately behind the nerve, and a third more posterior, which I have found perfectly separate and close to the inner head of the triceps; these are the representative of the same type as the adductor brevis; the adductor longus is represented by the great pectoral muscle.

The muscles of the mesial joints are much more definite and easily understood; they are arranged into two groups, an extensor and a flexor series; the former are sometimes conjoined into one mass as in the human arm, but sometimes exhibit four or five individual parts per-

fectly separate; there is usually in the lower extremity an aberrant superficial portion lying obliquely over the rest of the mass—the sartorius, which in the upper limb is represented by a superficial portion (dorsi epitrochlearis) lying over the triceps. This muscle in the lower extremity is usually attached to the anterior superior spine of the ilium, and passes to the inner side of the head of the tibia; or as in the seal, to the inner side of the patella, or into the fascia of the inner side of the thigh for two-thirds of its length, as in the crocodile (Haughton, "Proceedings of the Royal Irish Academy," 1865, p. 50); in some animals, as the Hyrax, it is absent in the upper limb. This muscle is represented by the dorsi-olecranal (usually called dorsi epitrochlear) slip of monkeys—found in the hare, rabbit, guinea-pig, and agouti, and many other animals; by a scapulo-fascial muscle in the pig, which I have described before ("Proceedings of the Royal Irish Academy," April, 1866), and which exists in the horse, and as a second latissimus dorsi in Echidna. Beneath this, the second portion of the great extensor mass is to be found, the rectus, represented in the upper limb by the long head of the triceps, whose origin is from the basal bone in the neighbourhood of the capsular ligament of the shoulder or hip, and often in both limbs attached to the capsule itself. The insertion of this mass is central and usually regular; occasionally, as in the hinder limb of the ostrich, varied by an extension into some lower muscle: the origin of this muscle is marginal, but always inclined to the outer side, hence it is beneath the infraspinatus and teres minor above, and beneath the scansorius and gluteus medius below: this covers over the deeper portions of the muscle, a mesial, an outer and an inner, the former pair represented in man by the outer head of the triceps in the arm, and by the cruræus and the vastus internus in the lower limb. The latter is of the same type as the inner head of the triceps above, and the vastus internus below; there is usually a small bundle of muscular fibres beneath the middle segment, inserted into the synovial membrane, the subcruræus of the lower limb, and the subanconeus of the upper: the latter is by no means so constant as the former. The resemblances of these need no remark.

The flexor group of muscles consists usually of four elements, sometimes of five; these most usually are the two heads of the biceps, and the two inner hamstrings in the lower limb, and the brachialis anticus and biceps in the upper. Now, contrasting these, so as to find their individual correspondences, we see that the shorter head of the biceps femoris is the obvious representative of the occasional humeral head of the biceps flexor cubiti. The coracoid origin beside this is the probable homotype of the long head of the biceps, with which it agrees in several respects—first, as its origin is from the ischiatic element of the basal bone; second, because its fibres are connected with the former element when it exists in the upper limb, although, indeed, in the thigh this union is by no means a necessary arrangement; for the femoral head is inserted into the semi-tendinosus in the ostrich, and into the

semimembranosus in the rhea and emu (Haughton, "Proceedings of the Royal Irish Academy," 1866, p. 95), showing that this is a separate element; thirdly, in the Marsupials the biceps cubiti flexor is divided completely ,and the coracoidean head is always radial in its insertion; similarly in the crocodile, the only head of the biceps is a coracoid one, and its insertion is as usual radial, and in Echidna the insertion is radial and ulnar, as in the pig. These different reasons lead us to believe that the short head of the arm biceps is the representative of the long head of the biceps flexor cruris; besides, in the cases noted in my former paper, in which the biceps cubiti could be severed into two parts, the coracoid portion was always prolonged into the radial tendon. We thus have to homologate the semimembranosus and semitendinosus with the glenoidal head of the biceps and the brachialis anticus; and here we find some difficulties to be explained, which can best be done by the hypothesis, that the type represented by the long head of the biceps humeri in the upper limb corresponds to the tendon of origin of the semimembranosus, and to the insertion of the semitendinosus. This may seem fanciful, but it is indicated by three circumstances—firstly, the origin of the semimembranosus is tendinous and elongate, like the long head of the biceps; it is also the nearest to the articulation of any of these hamstrings, and the most external; secondly, the insertion of the semitendinosus and that of the biceps in part resemble each other in being often fascial, and in being truly ulnar in many cases, especially where there is but a single glenoidal origin for the muscle. Thus the guinea-pig, porcupine, beaver, rabbit, and agouti, have only an ulnar insertion; thirdly, that in the semitendinosus we always find a tendinous intersection, the cicatrix of the union of the two segments, to which my attention was directed by Dr. Bennett, but which is well known by practical anatomists. The presence of this band of tendon is inexplicable upon any other hypothesis, and this supplies all the conditions necessary for its production. We have no sign of the second junction, viz., the union of the two other parts of the dissevered muscles in the semimembranosus, for that corresponds to the junction of the tendon with the fleshy portion of the muscles. In my former paper I stated my belief that the short head of the biceps represented the semimembranosus, but that view I withdraw, and deem inadmissible; and the glenoidal portion of the tendon of this type we have represented in the lower limb by the ligamentum teres coxæ. The last element of the flexor group, the belly of the semimembranosus, to which we should superadd the origin of semitendinosus, has its representative in the brachialis anticus, which is known by its close relationship to the adductor mass (coraco-brachialis), by its coracoid (tibial insertion), and its being placed usually on a plane internal to and deeper than the other hamstrings or flexors.

The muscles clothing the second series of bones of the typical limb we find arranged in three groups: those specially devoted to the movements of the individual bones, the one upon the other, constituting the

first of these classes, including the supinators and the pronators ; the muscles attached to the metacarpal bones constitute the second class, and the muscles set apart for the motions of the phalanges constitute the third.

Of these three groups, the second presents us with the principal varieties, both in the way of anomalies and in individual variations, throughout the orders of the vertebrate sub-kingdom; it constitutes a most remarkable class; it seems as if typically there had been five pair of muscles developed—a flexor and extensor for each metacarpal bone. Thus we find the first bone extended in the foot by the tibialis anticus, flexed by the tibialis posticus; in the hand an aberrant muscle, extensor carpi radialis accessorius, is developed occasionally in place of the former, and sometimes a few tendinous fibres of the flexor carpi radialis occur in the room of the latter. The anomalous muscle mentioned above was described by Mr. Wood, and my friend and colleague, Mr. Richardson has communicated to me a description of an instance of it which occurred in his dissections. For the second metacarpal bone we have a flexor in the ordinary flexor carpi radialis, and an extensor in the extensor carpi radialis longior ; the foot has the first of these represented by the tibialis secundi of the hare (named so by Mr. Huxley), and the second probably by the second tibialis anticus described by Mr. Mivart in the echidna ("Tr. Linn. Soc." vol. xxv., p. 392), or the tibialis anticus of the agouti ("Proceedings of the Zoological Society," 1866, p. 411), although in the former animal the tendon is inserted into the hallux. The third metacarpal has an extensor—the extensor carpi radialis brevior; and as a flexor it has the flexor tertii metacarpi of Wood, or flexor carpi radialis profundus; these have no ordinary representatives in the foot. The fourth metacarpal and its corresponding metatarsal have no separate muscles attached to them, as in the consolidated state of the foot there could be no use for them as specialized muscles. Of the flexor quarti metatarsi we have the trace in the slip of the peroneus longus, so frequently connected to the base of the fourth metatarsal bone. In the hand a slip of the flexor carpi ulnaris is sometimes attached to the base of the fourth metatarsal, or a fibrous band from the pisiform is attached to that bone; the muscles of the fifth metatarsal bone are easily recognized ; the peroneus longus is evidently, as Meckel has stated, of the same type as the flexor carpi ulnaris. Its course and its sesamoid bone (representing the pisiform), and the transverse palmar course of the tendinous slips of the latter, in the *Ursus arctos* and sloth; the peroneus brevis is the obvious representative of the extensor carpi ulnaris, even though in hyrax, Messrs. Murie and Mivart found them going, the longus in front of the malleolus, and the brevis behind it. This is but an accidental change in position.

Having thus homologated the metacarpal flexors and extensors, it may be interesting to reduce our results to a tabular form at this stage :—

	Hand.	Foot.
Flexor of first metacarpal (-tarsal)	Obsolete.	Tibialis posticus.
Extensor of first „	*Extensor carpi radialis accessorius,*	Tibialis anticus.
Flexor of second „	Flexor carpi radialis,	*Tibialis secundi* (Huxley).
Extensor of second „	Extensor carpi radialis longior,	*Tibialis anticus* of Agonti. *Tibialis anticus secundus* of Echidna.
Flexor of third „	*Flexor carpi radialis brevis* (Wood).	Obsolete; *sometimes a slip of peroneus longus.*
Extensor of third „	Extensor carpi radialis brevis.	Obsolete.
Flexor of fourth „	*Slip of flexor carpi ulnaris.*	Peroneus longus, slip of.
Extensor of fourth „	Obsolete.	
Flexor of fifth „	Flexor carpi ulnaris,	Peroneus longus.
Extensor of fifth „	Extensor carpi ulnaris,	Peroneus brevis.
and its continued slip, „	*Ulnaris quinti,*	*Peroneus quinti.*

The muscles in italics are either common anomalies in man, or muscles in lower animals.

The second class of muscles which we have to consider are the pronator and supinator series—a group specially developed in those cases in which the forearm bones rotate the one upon the other: of these we find typically two long and four short muscles in each limb. The first of these is the supinator longus type, represented in the lower limb by the outer head of the gastrocnemius, which resembles the former in being attached to the ridge above the outer condyle of the femur, and in constituting the outer lip of the popliteal space, the homotype of the anticubital fossa. The second or condyloid origin of the pronator teres corresponds with the last-named, and is represented in the lower extremity by the inner head of the gastrocnemius: both these muscles have lost their typical insertion in the lower limb, as there is no independent motion of the one bone upon the other. There are four shorter transverse, or nearly transverse muscles, which should act typically—the two anterior as pronators, the two posterior as supinators; of these, the upper anterior one is the slip so peculiarly human, the coronoid origin of the pronator radii teres, whose nature I have explained in the "Journal of Anatomy," N. S., vol. i., p. 8, and this has its dorsal antithetic in the supinator brevis—a muscle whose course is the direct counterpart of the former on the dorsal aspect. These two are represented in a modified form in the lower limb of man, the first as the tibial origin of solæus (*loc. cit. supra,* p. 8), and the second as the popliteus. Among the many resemblances between the supinator brevis and popliteus, I may here state that, as in the tendon of the latter a sesamoid cartilage has been described as a rare occurrence in man, although a typical condition in other animals; even so, in the origin of the former a distinct sesamoid bone existed in the extremity of one subject which I have dissected. The second pair of transverse muscles we find represented anteriorly by the pronator quadratus, which finds its homotype in the peroneo-calcanean muscle above described: the dorsal antithesis of this muscle is usually the subject of the same variety of modification as is always presented by the last-named—that is, its tendon is continued to seek a metacarpal site of insertion, and in the forearm, being specialized to perform a

supplemental function, namely, the extension of the metacarpal bone of the thumb, it is modified into the extensor ossis metacarpi pollicis. We may thus tabulate the muscles of this group :—

Supinator longus,	External head of gastrocnemius.
Pronator teres condyloid,	Internal head of gastrocnemius.
Pronator quadratus,	Peroneo-calcanean.
Pronator teres coronoid,	Tibial head of soleus.
Supinator brevis,	Popliteus.
Extensor ossis metacarpi pollicis,	Extensor ossis metatarsi hallucis.

The insertion of the last-named is one of the most variable points in human anatomy, a very good evidence that it is not a typical attachment.

The third, or finger-supplying muscles are very complex in character, but may easily be reduced into certain typical series. Firstly, to this class I would refer a set of fascial muscles, represented in the arm by palmaris longus brevis and accessorius. To the first of these types we refer the plantaris of the lower limb, because, although even in the human embryo the tendon has no connexion with the plantar fascia, yet in many of the lower animals its fascial connexion is distinct and decided. It is no argument against the correspondence of these muscles that in the arm its attachment is to the inner condyle, and in the leg of the outer, for the attachment is one of convenience of action and not of type; for there is no actual inner condyle to the femur similar to the process so named in the humerus, and the muscles which are regular in the latter are errant in the former, none but the pronator preserving even a shadow of its typical place. The second muscle, or the palmaris accessorius, a protean muscle in the arm typical in being on the hypothenar side of the proper palmaris, and being connected most commonly to some of the short flexor muscles of the hand, is represented in the lower limb by the flexor accessorius of Wood and Turner springing from the deep tibial fascia, and inserted into the musculus accessorius of flexor tendons (Wood on Anomalies, "Proceedings of the Royal Society," vol. xiii., p. 302. Turner on Variability in Human Structures, "Transactions of the Royal Society, Edinburgh," vol. xxiv., p. 184). There is another muscle on the back of the ankle, described by Gantzer, Hyrtl, and others, and attached to the deep layer of the annular ligament or to the calcaneum directly, and springing from the popliteal fascia, from the linea poplitea or tibial fascia. It is possible that this, the tensor fasciæ plantaris of Wood may be another form of the same type not at all improbable, considering the variations which it exhibits in the forelimb. The third of the fascial group, or palmaris brevis, is a true hand muscle, and will be considered as such. Of these, I know of no true antitheses, as the dorsal aponeuroses both in pes and manus are weak, and do not require special tensors.

The second of the digital group of muscles consists of a flexor and extensor series for the second phalanges of each finger. These in the forearm are represented by the flexor sublimis digitorum, and the extensor communis digitorum. In the leg they are typified by the flexor

digitorum brevis pedis and extensor digitorum longus. The first of these muscles in the upper limb has a condyloid origin, which in the lower limb is obsolete, as the condyle itself is diminished; it has a second or radial origin above the flexor pollicis muscle which is altered in its connexion, and appears in the leg as the external head of the solæus. These parts being altered, and the power of the muscle being much diminished, it is contracted into a foot muscle, and the same change has occurred to all its tendons, which I have described above as occurring to the indicial one of its hand representative, and they all are made by the suppression of the upper part to assume a tarsal origin, the insertion and its mode of perforation remaining constant. The extensor muscles of the hand and foot are the undoubted exponents, the one of the other; and as the pollex has a series of differentiated actions, we have its extensor separated from the rest of the mass, as the extensor primi internodii pollicis, and thrown back a step. There is no flexor of this series for the pollex. Similarly, we have an extensor for the hallux, the extensor primi internodii rarely developed, and retrograde one step in insertion from non-development of the second phalanx, and no proper second flexor of this group in man.

The third series of digital muscles are the flexors and extensors of the third phalanx of each finger and toe. We find these represented by the flexor profundus perforans manus and flexor pollicis above, and the flexor digitorum longus perforans pedis and flexor hallucis below. Now, in comparing these muscles in the lower limb, it will be seen that the muscles cross each other, the flexor hallucis taking a fibular (ulnar) origin, and passing outwards, while the flexor digitorum arises on the tibial (radial) side, and passes inwards. Now, no crossing takes place in the upper limb, but we find it in the lower limb, as an index of the change which has taken place in the bones of the extremity; and as these muscles are but the differentiated portions of one layer, it is not surprising that constant unions are taking place between their tendons at the point of crossing. This seems a more natural explanation, considering the position of the limb bones, than the idea that the flexors had exchanged tendons, and what should be the flexor pollicis muscle supplied the other toes, and *vice versâ*—a theory which cannot be sustained on teleological or embryological grounds. All these muscles seek insertion into the last phalanx; their corresponding extensors are but poorly developed. We have certainly the extensor secundi internodii pollicis, the rudiment of the muscle for this finger, and the extensor proprius pollicis, the fully developed muscle for the great toe; we have the extensor indicis of man as the second extensor unrepresented in the foot; the extensor medii digiti manus likewise unrepresented in the foot; the extensor quarti digiti either an offshoot from the extensor minimi digiti, as in monkeys, or as a deep forearm muscle, but still typical in its insertion, and represented in the foot as peroneus quarti metatarsi; and lastly, we have the extensor minimi digiti typified in the leg by the peroneus tertius, whose insertion is thrown back several degrees. Recession of this kind, however, is to be noticed in many of

the leg muscles—for instance, the tibialis posticus, which is deprived of its metatarsal insertion, and sometimes even tibialis anticus is similarly circumstanced; likewise the interossei pedis are usually attached to the first phalanx of each toe, while those of the hand are attached to the second and third. The second set of extensors is well developed in some animals, as I have described a few pages before in connexion with the muscles of the other. The fourth set of digital muscles belong, not to the forearm, but to the hand, and constitute a short group of flexors or extensors. The examples of this series are met with under the names of extensor digitorum brevis pedis, which sends differentiated slips to the hallux and three or (as in the case above) four toes. This is represented in the hand by extensor digitorum brevis manus, described above. Of the flexors in this group we have the types very much altered, on account of the variety of work which they are required to do: the superficial head of the short flexor of the thumb take its place as the first of these; but as the functions of the others as flexors are more efficiently executed by the other before-mentioned muscles, the use of these muscles is altered, and there is even in the human subject, even a correct gradation of these variations. If we take the first muscle of this type we will find that the extensor brevis digitorum pedis, acting at an angle with its long extensor co-operator, is inserted into its tendons at an acute angle. Secondly, the extensor brevis manus, when present, is usually inserted fleshy and not tendinous into the long extensor tendons. Thirdly, the representative of the same muscle on the flexor aspect of the foot is inserted into the tendons of the flexors, but nearer to the ankle, so as to correct their obliquity, and thus the short extensor of the second, third and fourth toes becomes the musculus accessorius pedis. In the hand such a correction is not wanted usually; but in some animals, as Hyrax, it is found assisting and regulating the action of the flexors (Messrs. Murie & Mivart, "Proceedings of the Zoological Society, 1865, p. 345). This muscle arises in these animals from a cartilaginous disc in the palmar fascia; but as many animals have, as in man, the flexor tendons running straight, and neither needing an accessory or a corrective, the insertion of the muscle is, by a slight gradation, shifted to the deeper aspect, and then to the superficial aspect of the palmar fascia, and the muscle still retaining its bony origin from the pisiform, appears as in the agouti; but losing this last relic of bony origin, we find it in the hand of man as a few scattered superficial fibres passing from the hypothenar eminence to the edge of the palmar fascia under the name of palmaris brevis.

Of the true hand muscles we find likewise there are several types: the lumbricales are perhaps differentiated accessory slips of the long flexor. The metacarpals have each got a pair of palmar and a pair of dorsal muscles along their sides, the interossei; the former as flexors and lateralizers, the latter as extensors and lateralizers. As the two lateral fingers have specialized actions, these muscles are modified for them, but the typical forms are the same. We can express these modifications most clearly in the form of a table, thus:—

First finger, or Pollex.	1. Dorsal radial, opponens pollicis. 2. Palmar ulnar, interosseus primus volaris of Henle. 3. Palmar radial, abductor pollicis. 4. Dorsal ulnar, polliceal head of first dorsal interosseous.
Second finger, or Index	1. Palmar radial, modified into deep head of flexor brevis pollicis by its insertion being shifted to the sesamoid bone. 2. Palmar ulnar, first palmar. 3. Dorsal radial, indicial head of first dorsal. 4. Dorsal ulnar, indicial head of second dorsal.
Third finger, or Medius.	1. Palmar radial, } conjoined to form adductor pollicis. 2. Palmar ulnar, } 3. Dorsal radial, medial head of second dorsal. 4. Dorsal ulnar, medial head of third dorsal.
Fourth finger, or Annularis.	1. Palmar radial, second palmar. 2. Palmar ulnar, flexor brevis minimi digiti, modified by being united to first phalanx of little. 3. Dorsal radial, annular origin of third dorsal. 4. Dorsal ulnar, annular origin of fourth dorsal.
Fifth finger, or Little.	1. Palmar ulnar, opponens minimi digiti. 2. Palmar radial, third palmar. 3. Dorsal radial, ulnar head of fourth dorsal. 4. Dorsal ulnar, abductor minimi digiti.

Thus we see that the scheme of interpretation exactly succeeds in referring to their proper types the complex muscles of the hand: when we apply to the foot, we find it equally successful, and we find the results to be as follows:—

Hallux, ...	Dorsal tibial, abductor pollicis, second head, or internal.
,, ...	Dorsal fibular, second head of first dorsal interosseous.
,, ...	Plantar tibial, first or calcanean head of abductor pollicis.
,, ...	Plantar fibular, flexor brevis pollicis.
Second toe, ...	Dorsal tibial, first dorsal interosseous.
,, ...	Dorsal fibular, second ,, ,,
,, ...	Plantar tibial, opponens or adductor pollicis, separated from second, and inserted into first.
,, ...	Plantar fibular, first slip of transversus pedis.
Third toe, ...	Dorsal tibial, second head of second dorsal interosseous.
,, ...	Dorsal fibular, third dorsal interosseous.
,, ...	Plantar tibial, first plantar interosseous.
,, ...	Plantar fibular, second slip of transversus pedis.
Fourth toe, ...	Dorsal tibial, second head of third dorsal interosseous.
,, ...	Dorsal fibular, fourth dorsal interosseous.
,, ...	Plantar tibial, second plantar interosseous.
,, ...	Plantar fibular, third slip of transversus pedis.
Fifth toe, ...	Dorsal tibial, second head of fourth dorsal interosseous.
,, ...	Dorsal fibular, abductor minimi digiti.
,, ...	Plantar tibial, third plantar interosseous.
,, ...	Plantar fibular, flexor brevis minimi digiti.

It will be thus seen that all the difficulty of the homologies of the muscles of the hand and foot are disposed of by accepting this series of correspondences.

The plan upon which the muscles of a typical limb are arranged can be thus distinctly understood, and may be resolved into a definite and symmetrical system. For the basal joint we have a system of muscles around the orbicular articulation (see diagram):—

Besides these articular muscles, we have four external abductor muscles from the basal bone inserted into the primal limb bone—one internally, the other more externally; one of these is the glutæus maximus or deltoid; the second, teres major, or tensor vaginæ femoris; thirdly, the sartorius, or dorsi epitrochlear; fourthly, part of the pectoralis major, also represented by glutæus maximus. Internally we have a group of adductor muscles, their antitheses or opponents, the pectineus, adductors, quadratus femoris, and gracilis.* In front we find four flexor muscles, behind four extensors, so we might represent the section through the middle of the typical limb thus—

Of the forearm muscles there are several series—one from either condyle to the forearm bones, the long pronator, and supinator. There are also transverse, inferior and superior, anterior and posterior, special forearm muscles, the first of which is developed as the pronator quadratus, above and below, as peroneo-calcanian, and the second as the coronoid slip of pronator teres above, or the tibial head of the soleus; the third as extensor ossis metacarpi pollicis or hallucis; the last is the supinator brevis, or popliteus—all these are typical lateralizers; then we have the flexor and extensor muscle series—one for each of the metacarpal bones, and a flexor and extensor muscle for the first, second, and third phalanx of each finger; finally, the list is completed by a dorsal and palmar pair of interosseous muscles for each finger; a palmar pair of fascial tensors not represented on the dorsal aspect.

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* It may facilitate the understanding of some of these muscle-groups if we classify them functionally, thus:—

Muscles joining Upper Limb to Trunk.		Do. Lower.
1. Trapezio-deltoid and Sterno mastoid,	=	Gluteus maximus.
2. Dorsi-epitrochlearis,	=	Sartorius.
3. Levator scapulæ, Serratus magnus, and posterior belly of omo-hyoid,	=	Psoas magnus and parvus.
4. Rhomboidei,	=	Quadratus lumborum.
5. Latissimus dorsi,	=	Agitator caudæ.
6. Pectoralis major,	=	Adductor longus.
7. Chondo-epitrochlearis,	=	Gracilis.

Flexors.		Abductors.	
Coraco-radial,	= Longhead of biceps.	Teres major,	= Tensor vaginæ femoris.
Gleno-ulnar,	= Origin of semimem. and ins. of semiten.		
Brachio-radial,	= Short head of biceps.		
Brachialis ant.,	= Ins. of semimembranosus.		

It will be seen that of these the first and fifth pass from the spines of the vertebræ to the limb; the sixth from the hæmal spines; the third and fourth from the pleurapophyses; the second from the neurapophysis; and the seventh from the hæmapophysis.

Having thus seen the method in which the muscles in a typical extremity are arranged, it becomes, in the next place, a point of interest to determine whether there is any such definite order in the arrangement of the trunk muscles as we find to be present in the limb.

Before doing this we have to determine what muscles there are in the body uniting the typical limb to the true axis, and these are named below: the most interesting of these are two—one arising from the hæmal arches, and inserted into the vertebral margin of the basal bone, developed in the forelimb as the serratus magnus; in the hinder extremity, as the psoas; both of these agree in their typical origin and insertion, for the so-called transverse processes of the lumbar vertebræ, to which the latter is attached, are in reality bases of rudimentary hæmal arches. Secondly, we have a muscle lying along the vertebral border of the last described which arises from the transverse processes, and is attached to the upper and inner angle of the basal bone, near the iliacus, or subscapularis. This muscle, in the upper limb of man, is the levator scapulæ, so often continuous with the serratus magnus. In the hinder limb, this muscle is also represented by the psoas—a muscle very often in the animal kingdom divided, and devoted partly to another and different purpose. The psoas parvus (the largest portion in "Echidna," *loc. cit.* p. 389), is the true index of this muscle in its typical position; but its differentiated portion, called the psoas magnus, in man is, by being extended into a common tendon with the iliacus, rendered a powerful accessory for the flexion of the leg. This theoretic explanation gives us the proper clue to the nature of the psoas parvus—a muscle whose affinities are otherwise difficult to be understood, and whose action must, in its usual human condition, be very limited.

Removing these muscles from the trunk, we find the true body muscles remaining, and to their nature there is the clue to be found in the arrangement of the bony skeleton; for as the osseous axis of the body is made up of a series of vertebræ, and their appendages, so it is but natural to expect the soft parts to be built upon a basis of the same kind; and accordingly, when we examine the muscles of the trunk, they can be reduced to a system of vertebral appendages; of intervertebral and intercostal muscles. Of these, the most regular groups are to be found in the thoracic region, and there we can resolve them into several groups. I select the thorax as the most typical region, because there we have the greatest amount of regularity in the osseous framework, and the greatest degree of uniformity of function among the different component muscles.

Having culled from the thoracic group all those muscles which are not truly parts of the trunk system, but which form parts of the upper limb, we find that there are five distinct types remaining, two series of intercostals, an internal-sternal transversus thoracis, and an internal vertebral transversus thoracis, and a straight vertical muscle, the rectus thoracicus; these we find to have each a definite direction, and series of attachment; and when we compare the other regions

of the body with the thoracic, we will find these five elements abundantly represented; and we find also that their representatives constitute the only true endo-skeletal trunk muscles. For each of these we have a corresponding muscle on the neural aspect, an antithesis; and with a little care we will find that the complex muscles of the back can be resolved into a series of repetitions of these five types more accurately. We may call these elements:—1. External Interhæmapophysial, or Interneurapophysial; 2. Internal ditto; 3. Spino-hæmapophysial or neurapophysial; 4. Basio-hæmapophysial, or neurapophysial; 5. Interspinal. In the dorsal region proper we can represent these antitheses thus:—

External intercostal type, ...	=	Splenius and serrati.
Internal „ „	=	Iliocostalis, Longissimus dorsi, Transversalis colli, Trachelo-mastoid, Cervicalis ascendens.
Transversus thoracis, anterior type, ...	=	Multifidus spinæ, Semispinalis colli and dorsi, Obliquus superior, Complexus.
„ „ posterior type, ...	=	Rotatores spinæ.
Rectus „ „	=	Interspinales, spinalis dorsi.

The trapezius we leave out of account, because properly it has a place in the great limb system of muscles.

If we follow out the same idea, we will find the same five elements to enter into the composition of the abdominal wall; and referring these, as we may do with great facility, to their thoracic representatives, we may tabulate them as follows:—

External intercostal type, ...	=	External oblique.
Internal intercostal type, ...	=	Internal oblique.
Transversus thoracis posterior type,	=	Transversalis diaphragm.
Transversus thoracis anterior type,	=	Pyramidalis.
Rectus anterior type, ...	=	Rectus abdominis.

In each of these muscles we have the combined representative of several muscles of each series; thus the internal oblique frequently exhibits a tendinous intersection corresponding to the first lumbar rib. I have also seen the line of the cartilage of the eleventh rib continued forwards to the rectus by a tendinous interspace in its fibres. A similar tendinous rib index has been described in the transversalis by Sömmerring. The rectus muscle, likewise, by its lineæ transversæ, exhibits a tendency towards costal intersections, which in the crocodile arrive at their fullest development in the form of abdominal ribs on either side of the prolonged sternum. Of these, in man the numbers are generally three, rarely four; but in other animals they are more numerous. The hare, for instance, presents us with eight or nine such "inscriptions." On the posterior wall of the abdomen, or more correctly, in the lumbar region of the spine, we have these same muscles antithetically represented, as follows. (In all these tables I use the names of the thoracic muscles as the nearest or clearest representatives of the typical arrangement):—

External intercostal type, ... = Serratus posticus inferior.
Internal intercostal type, ... = Iliocostalis lumborum.
Transversus thoracis anterior type, .. = Multifidus.
Transversus thoracis posterior type, = Rotatores.
Rectus thoracis posterior type, ... = Interspinales et Spinalis dorsi.

It may not be straining this system of ideal homotypy of muscular development too far to say, that in the muscles of the perineum we have these types represented to a very perfect degree : the erector penis being local representative of the external intercostal groups ; the transversus perinei representing the internal intercostals ; the levator ani and coccygeus being the homotype of the transversus thoracis posterior, the compressores urethræ of Wilson and Guthrie taking their place as transversales anterior, while the accelerator urinæ is the conjoint form of the same type as the rectus anterior.

The muscles of the neck present us with little difficulty in their reduction to the typical structure, but the traces of cervical ribs are very obscure in many instances, although some of them are clear and constant. The first cervical rib is indicated by the pre-sternal points so often present, and by the completely developed bone in rare cases, such as the instances recorded by Ludwig Stieda, of Dorpat, Virchow's "Archiv," 1866, p. 425. A second we have indicated by the ordinary tendinous intersection in the omohyoid and sternohyoid muscles, as indicated by Henle, who, in speaking of it, says—"Diese schne hat wie sich aus den varietäten des muskels erschlessen läust die Bedeutung einer Rippe ; der hintere bauch ist eine serratuszacke, der vordere ein dem sternohyoidens der ja auch theilweise vonn Rippen entspringt, analoger muskel," &c. "Muskellehre," p. 116. A third cervical rib is indicated in the oblique line on the ala of the thyroid cartilage, and a fourth in the body of the hyoid bone. Taking these into consideration, we may reduce the neck muscles under the following heads :—

1. External intercostal type, ...	Scaleni anticus and posticus.
2. Internal ,, ...	Scaleni medius and minimus. Anterior belly of omo-hyoid.
3. Transversus costalis anterior type, ..	Sternothyroid, thycohyoid, cricothyoid.
4. Transversus costalis posterior type, ..	Recti capitis antici. Longus colli.
5. Rectus anticus, ...	Sternohyoid.

Of the posterior part of the neck we find the antithetic muscles of the series to be—

1. Exo-intercostal type, ...	Splenius capitis et colli.
2. Endo- ,, ,, ...	Transversalis colli, et trachelo-mastoid.
3. Transversus costalis ant. type, ...	Semispinalis colli, multifidi, complexus.
4. Transversus costalis post. type, ...	Rotatores.
5. Rectus type, ...	Interspinales, rectus posticus major et minor.

There is still one of the neck vertebræ unaccounted for in this enumeration, namely, that between the hyoid bone and the ramus of the lower jaw; and in this space we have the stylo-hyoid, digastric,

and styloglossus muscles representing the outer intercostal type—the hyoglossus as the homotype of the inner intercostals; the mylohyoid fibres as the representatives of the transversus thoracis posterior, while the transversus thoracis anterior is unrepresented. The anterior rectus series is abundantly clear, as the genio-hyoid, genio-hyo-glossus and the mesial muscle of Bochdalek. Lastly, we have the cranio-facial axis, which presents us with a series of muscles perfectly accordant to the primary type; an exo-intercostal in the masseter; an ento-intercostal in the temporal; a transversus anterior in the buccinator; a transversus posterior in the pterygoids; and, from the nature of the organs in the mesial line, a completely suppressed anterior rectus.

The idea of ascertaining the serial comparisons of muscles is not new. De Blainville and Meckel, in a few points, attempted to determine some of these types, and others have done the same; but to my knowledge the complete comparison of the muscles, serially, has never been wrought out. In the few instances in which Meckel did indicate these relations, he relied only upon external resemblances. Thus he described the sterno- and cleido-mastoid, respectively, as the representatives of the rectus and pyramidalis abdominis, and the two splenii, capiti et colli as their antitheses, but assigns no reason but that of resemblance. Henle, likewise, in the passage quoted above, has done the same; but in the tables above constructed we can see that an uniform and typical arrangement is probable, though varied by segmentation and transference of attachments.

There are two other classes of muscles existing in the vertebrate animal—one a class of tegumental muscles, the panniculus series exemplified in man by the occipito-frontalis, the external auricular muscles, the facial superficial muscles, the platysma myoides, the mento-hyoid, Lucas' fibres in the axilla, the post-scapular fibres of Turner ("Journal of Anatomy," Part ii., vol. i., p. 252); the supra-acromial and supra-gluteal muscles of the same author—a slip which I have seen crossing the perineum from over one gluteus maximus to the other in front of the anus. These have nothing to do with the typical muscle series; and the second class, or visceral series, includes the ento-tympanic muscles, the ento-orbital muscles, the ento-laryngeal, the heart—perhaps the diaphragm (although this latter may be but an internal prolongation of the transversus type). The pericardio-thyroid, the hepatico-diaphragmaticus of Knox, the pubio-peritonealis, and the sterno-pericardialis, which I have seen once in man as a true muscle, and once in a young pig. All these are true visceral appendages, and not skeletal in nature, and so must be removed from the list under our review.

The main principles of the foregoing remarks may be summed up under the following heads:—

1. The muscular structure of the vertebrate animal is constructed upon a definite basis, or after a definite type.

2. This definite type is of a corresponding nature in all the regions of the body, with varying degrees of alterations. These repetitions are

easily recognisable in the fish, but much more obscure in higher animals.

3. The definite type of muscular arrangement consists of a series of fibres connecting the component arches of the vertebral segments of the body.

4. These vertebral segments are united by five typical muscle layers most regularly developed in the thoracic paries, and which may be named thus :—

1. Exo-Interneurapophysial or hæmapophysial type.
2. Ento- „ „
3. Spino-neurapophysial or hæmapophysial type.
4. Basio- „ „
5. Interspinal.

5. These segments are most regular in the regions in which the bony skeleton is most typically developed, and vary in the direct ratio of their specialization of function.

6. The muscles of the vertebrate limb are likewise arranged as modification of a type which is not completely represented in either of the human limbs.

7. When the function of any muscle is perfectly executed by another, from the consolidation or alteration of the relative arrangement of segments, the muscle so superseded becomes diminished or suppressed. If the assumption of function be not perfect, the supersedence is not complete, but coalescence takes place.

XXIV.—On the Occurrence of the Number Two in Irish Proper Names. By P. W. Joyce, A.M.

[Read January 13, 1868.]

A careful study of ancient proper names is one of the means by which we may hope to arrive at a solution of that most difficult of all historical questions, the origin of races. In our own country, an examination of this kind may help to throw some light on the much disputed question, where our forefathers came from—whether, as some say, they crossed over from Britain, urged on by the never-ceasing western movement of the great Celtic population, or came direct from Spain, as our own most ancient traditions steadily assert, or from any other part of the Continent.

In pursuing this inquiry, we may either examine and compare the root words of which the names are composed, or investigate the manner in which names were imposed by different races. There are certain general principles common to the nomenclature of all countries; but a careful examination would be pretty sure to show, that the name system of each particular people possesses some special peculiarities of its own. The object of this paper is to draw attention to a curious characteristic of this kind which I have observed in Irish

names, both personal and local, viz., the frequent recurrence of the number Two.

I never saw it stated that the number Two was in Ireland considered more remarkable than any other; but from whatever cause it may have arisen, certain it is, that there existed in the minds of the Irish people a distinctly marked predilection to designate persons or places, where circumstances permitted it, by epithets expressive of the idea of duality, the epithet being founded on some circumstance connected with the object named; and such circumstances were often seized upon to form a name in preference to others equally or more conspicuous.

We have, of course, as they have in all countries, names with combinations of other numbers, and those containing the number Three are pretty numerous; but these do not occur oftener than we might naturally expect beforehand, while the number Two is met with many times more frequently than all the others put together.

The Irish word for Two that occurs in names, is dá, or dhá, both forms being used; dá is pronounced *daw;* but in the other form, dh, which has a peculiar and rather faint guttural sound, is altogether suppressed in modern names; the word dhá being generally represented by the vowel *a,* while in many cases modern contraction has obliterated every trace of a representative letter. It is necessary to bear in mind that dá or dhá generally aspirates the consonant before which it is placed, and that in a few cases it eclipses consonants and prefixes *n* to vowels.

We find names involving the number Two recorded in Irish history, from the most ancient authorities down to the MSS. of the 17th century, and they occur in proportion quite as numerously as at the present day; showing that this curious tendency is not of modern origin, but that it has descended silent and unnoticed, from ages of the most remote antiquity.

There is a village and parish in the N. W. of Tipperary, on the shore of Lough Derg, now called Terryglass; its Irish name, as used in many Irish authorities, is Tir-da-ghlas, the territory of the two streams; and the identity of this with the modern Terryglass is placed beyond all doubt by a passage in the "Life of St. Fintan of Clonenagh," which describes Tir-da-glas as "in terrâ Mumoniæ juxta fluvium Sinna." The great antiquity of this name is proved by the fact that it is mentioned by Adamnan in his "Life of St. Columba" (Lib. II., cap. xxxvi.), written in the end of the seventh century; but according to his usual custom, instead of the Irish name he gives the Latin equivalent: in the heading of this chapter it is called Ager duorum rivorum ("De ecclesiæ Duorum agri rivorum simili reclusione"), and in the text, Rus duum rivulorum ("— in monasterio Duum ruris rivulorum"), either of which is a correct translation of Tir-da-ghlas.* There is a subdivision of the townland of Clogher, in the parish of Kilnoe, Clare,

* For the identification of Tir-da-ghlas with the Ager duorum rivorum of Adamnan we are indebted to the Rev. Dr. Reeves.

called Terryglass, which has the same Irish form and meaning as the other. Several other instances of names of this class, mentioned in very ancient authorities, will be cited as I proceed.

Though this peculiarity is not so common in personal as in local names, yet the numbers of persons mentioned in Irish writings whose names involve the number Two, are sufficiently large to be very remarkable. The greater number of these names appear to me to be agnomina, which described certain peculiarities of the individuals, and which were imposed for the sake of distinction, after a fashion prevalent among most nations before the institution of surnames.

One of the three Collas who conquered Ulster in the fourth century was called Colla-da-chrich, Colla of the two territories. Da-chrich was a favourite soubriquet, and no doubt, in case of each individual, it records the fact of his connexion, either by possession or residence, with two countries or districts; in case of Colla, it most probably refers to two territories in Ireland and Scotland, in the latter of which he lived some years in a state of banishment before his invasion of Ulster. In the Martyrology of Donegal there are nine different persons mentioned, called Ferdachrich, the man of the two territories.

The word Dubh applied to a dark-visaged person is often followed by da; thus the Four Masters mention two persons named Dubh da-bharc, the black (man) of the two ships; four named Dubhdachrich; eight, Dubhdabhoireann (of the two stony districts?); two, Dubhdainbher, of the two estuaries; one, Dubhdaingean, of the two daughters; four, Dubhdaleithe, of the two sides or parties; and two, Dubhdathuath, of the two districts or cantreds. In the genealogy of Corcaluidhe we find Dubhdamhagh, of the two plains; and in the Martyrology of Donegal, Dubhdalocha, of the two lakes.

Fiacha Muilleathan, King of Munster in the third century, was called Fear-da-liach, the man of the two sorrows, because his mother died and his father was killed in the battle of Magh Mocroimhe on the day of his birth. The father of Máine Mor, the ancestor of the Hy Many, was Eochaidh, surnamed Fer-da-ghiall, the man of the two hostages.

Many more names might be cited, if it were necessary, to extend this list; and while the number Two is so common, we meet with very few names involving any other number.

It is very natural that a place should be named from two prominent objects forming part of it, or in connexion with it, and names of this kind are occasionally met with in most countries. The fact that they occur in Ireland would not be considered remarkable were it not for these two circumstances—first, they are, beyond all comparison, more numerous than could be reasonably expected; and, secondly, the word dá is always expressed, and forms part of the names.

Great numbers of places are scattered here and there through the country whose names express position between two physical features, such as rivers, mountains, lakes, &c., those between two rivers being the most numerous. Killederdaowen, in the parish of Duniry, Galway, is called in Irish Coill-eder-da-abhainn, the wood between two rivers; and

Killadrown, in the parish of Drumcullen, King's County, is evidently the same word shortened by local corruption. Drumder*a*own, in Cork, and Drumdir*a*owen, in Kerry, are both modern forms of Druim-'dir-dhá-Abhainn, the ridge between two rivers, where the Irish dhá is represented by *a* in the present names. In Clooneder*o*wen, Galway—the meadow between two rivers—there is no representative of the dha, though it exists in the Irish name; and a like remark applies to Ballyderown (the town between two rivers), an old castle situated in the angle where the rivers Funcheon and Araglin, in Cork, mingle their waters. Coracow, in the parish of Killaha, Kerry, is a name much shortened from its original Comhrac-dhá-abha, the meeting of the two streams. The Four Masters at A. D. 528, record a battle fought at a place called Luachair-mor-etir-da-inbhir, the large rushy place between two river mouths, otherwise called Ailbhe, or Cluain-Ailbhe, now Clonalvy, in the county Meath.

With glaise (a stream), instead of Abhainn, we have Ederdaglass, the name of two townlands in Fermanagh, meaning (a place) between two streams; and Drumederglass, in Cavan, the ridge between two streams. Though all trace of da is lost in this name, it is preserved in the Down Survey, where the place is called Drumaderdaglass.

Ederdacurragh, in Fermanagh, means (a place) between two marshes; Aderavoher, in Sligo, is in Irish Eadar-dha-bhothair (a place) between two roads, an idea that is otherwise expressed in Gouldavoher, near Mungret, Limerick, the fork of the two roads. Drumdir*a*lough, in Kerry, the ridge between two lakes; and Drumeder*a*lena, in Sligo, the ridge between the two *lenas*, or meadows; Inchider*a*ille near Inchageelagh, is in Irish Inis-idir-dha-fháill, the island or river holm between two cliffs; a similar position has given name to Derdaoil or Dariel, a little village in the parish of Kilmastulla, Tipperary, which is shortened from the Irish Idir-da-fhaill, between two cliffs; Cloonaderavally, in Sligo, the cloon or meadow between the two *ballies*, or townlands.

Crockada, in the parish of Clones, Fermanagh, is only a part of the Irish name Cnoc-eadar-da-ghreuch, the hill between the two marshy flats; the true form of the present name would be Knockadder. Mogh, the name of a townland in the parish of Rathlynin, Tipperary, is also an abbreviation of a longer name; the inhabitants call it Magh-idir-dha-abhainn, the plain between two rivers.

The well known old church of Aghadoe, near Killarney, which gives name to a parish, is called by the Four Masters, at 1581, Achadh-da-eó, the field of the two yew trees, which must have been growing near each other, and must have been sufficiently large and remarkable to attract general attention. Part of the townland of Drumharkan Glebe, in the parish of Cloone, Leitrim, is called Cooldao, the back of the two yews. In the townland of Cornagee, parish of Killinagh, Cavan, there is a deep cavern, into which a stream sinks; it is called Polla-daossan, the hole of the two bushes.

In the parish of Killashee, Longford, there is a village and townland called Cloondara, containing the ruins of what was once an important

ecclesiastical establishment; it is mentioned by the Four Masters, at 1323, and called Cluain-da-rath, the meadow of the two raths; and there is a townland of the same name in the parish of Tisrara, Roscommon. Near Crossmolina is a townland called Glendavoolagh, the glen of the two boolies, or dairy places.

The parish of Donagh, in Monaghan, takes its name from an old church, the ruins of which are still to be seen near the village of Glasslough; it is mentioned twice by the Four Masters, and its full name, as written by them, is Domhnach-maighe-da-chlaoine, the church of the plain of the two slopes. Dromdaleague, the name of a village and parish in Cork, signifies the ridge of the two stones; and Dadreen in Mayo, is the two *dreens*, or sloe-bushes.

Several places derive their names from two plains: thus Damma, the name of two townlands in Kilkenny, is simply Da-mhagh, two plains; Rosdama, in the parish of Grange, same county, the wood of the two plains. That part of the King's County now occupied by the baronies of Warrenstown and Coolestown, was anciently called Tuath-da-mhaighe, the district of the two plains, by which name it is frequently mentioned in the Annals, and which is sometimes anglicised Tethmoy; the remarkable hill of Drumcaw, giving name to a townland in this locality, was anciently called Druim-da-mhaighe, from the same district. We find Glendavagh, the glen of the two plains, in the parish of Aghaloo, Tyrone.

The valley of Glendalough, in Wicklow, takes its name from the two lakes, so well known to tourists; it is called in Irish authorities Gleann-da-locha, which the author of the Life of St Kevin translates *Vallis duorum stagnorum*. In the parish of Kildysert, Clare, there is an island called, from its shape, Inishdadroum, the island of the two *drums*, or backs; the same form has given name to Inishdavar, in the parish of Derryvullan, Fermanagh; to Cornadarum, Fermanagh, the round hill of the two ridges; and to Corradeverrid, in Cavan, the hill of the two caps; Tuam, in Galway, is called in the Annals, Tuaim-da-ghualann, the tumulus of the two shoulders, evidently from the shape of the ancient sepulchral mound from which the place has its name.

Desertcreat, a townland giving name to a parish in Tyrone, is mentioned by the Four Masters as the scene of a battle between the O'Neills and the O'Donnells, in A. D. 1281, and it is called by them Diseart-da-chrioch, the desert or hermitage of the two territories; they mention also a place called Magh-da-chairneach, the plain of the two carns; Magh da-gabhal, the plain of the two forks; Ailiun-da-bernach, the island of the two gaps; Magh-da-Chainneach, the plain of the two Cainneachs (men). The district between Lough Conn and the river Moy was anciently called An Da Bhac, the two bends, under which name it is frequently mentioned in the Annals.

There is a townland in the parish of Rossinver, Leitrim, called Lisdarush, the fort of the two promontories; and on the side of Hungry Hill, in the parish of Kilcaskan, Cork, is a small lake which is called Coomadavallig, the hollow of the two roads; in Roscommon we find

Cloondacarra, the meadow of the two weirs; and the Four Masters mention Clar-atha-da-charadh, the footboard of the ford of the two weirs; Gubbacrock, in the parish of Killesher, Fermanagh, is written in Irish Gob-dha-chnoc, the beak or point of the two hills.

Dundareirke is the name of an ancient castle in Cork, built by the M'Carthys, signifying the fortress of the two prospects (Dun-da-radharc), and the name is very suitable, for according to Smith, "it is on a hill, and commands a vast extended view west as far as Kerry, and east almost to Cork;" there is a townland of the same name, but written Dundaryark, in the parish of Danesfort, Kilkenny.

The preceeding names were derived from conspicuous physical features, and their origin is therefore natural enough, so far as each individual name is concerned; their great number, as already remarked, is what gives them significance. But those I am now about to bring forward admit in general of no such explanation, and appear to me to prove still more conclusively the existence of this remarkable disposition in the minds of the people, to take things in twos. Here also, as in the preceding class, names crowd upon us with remarkable frequency, both in ancient authorities and in the modern list of townlands.

Great numbers of places have been named from two animals of some kind. If we are to explain these names from natural occurrences, we must believe that the places were so called, because they were the favourite haunt of the two animals commemorated; but it is very strange that so many places should be named from just two, while there are few or none from one, three, or any other number—except in the general way of a genitive singular or a genitive plural. Possibly it may be explained to some extent by the natural pairing of male and female, but this will not explain all, nor even a considerable part, as any one may see from the illustrations that follow. I believe that most or all of these names have their origin in legends or superstitions, and that the two animals were generally supernatural visitants, viz., fairies, or ghosts, or human beings transformed by Tuatha de Danann enchantment.

We very frequently meet with two birds—Dá-én. Part of the Shannon near Clonmacnoise was anciently called Snamh-dá-én, the swimming place of the two birds. The parish of Duneane, in Antrim, has got its present name by a slight contraction from Dun-dá-én, the fortress of the two birds, which is its name in the Irish authorities; among others, the Martyrology of Ængus, which, according to Dr. Todd, is not later than the eleventh century. There is a mountain stretching between Lough Gill and Collooney, Sligo, which the Four Masters mention at 1196 by the name of Sliabh-dá-én, the mountain of the two birds; it is curious that a lake on the north side of the same mountain is called Loch-dá-ghedh, the lake of the two geese, which are probably the two birds that gave name to the mountain. There is a townland in the parish of Kinawly, Fermanagh, called Rossdanean, the peninsula of two birds.

Two birds of a particular kind have also given their names to several localities, and among these, two ravens seem to be favourites.

In the last-mentioned parish is a townland called Aghindaiagh, in Irish Achadh-an-da-fhiach, the field of the two ravens; in the townland of Kilcolman, parish of same name, Kerry, is a pit or cavern called Poll-da-fhiach, the hole of the two ravens; we find in Cavan, Neddaiagh, the nest of the two ravens; in Galway, Cuilleendaeagh, the little wood of the two ravens; and in Kerry Glandaeagh, the glen of the two ravens. With Branóg, another name for the same bird, we have Brannick Island near great Aran Island, Galway bay, which is called in Irish, Oileán-da-bhranóg, the island of the two ravens.

There is a townland in the parish of Killinvoy, Roscommon, whose name is improperly anglicised Lisdaulan; the Four Masters at 1380, call it Lios-da-lon, the fort of the two black-birds; and Aghadachor, in Donegal, means the field of the two herons.

Several places are called from two hounds; there are two townlands in Clare called Cahiracon, in Irish Cathair-dhá-chon, the Caher or stone fortress of the two hounds; and Lisdachon, in Westmeath is the fort of the two hounds. The parish of Moyacomb, in Wicklow, is called by the Four Masters Magh-dá-chon, the plain of the two hounds, the present name being formed by a change of *n* to *m*, and the addition of *b*, both usual corruptions. In the parish of Devenish, Fermanagh; there are two conterminous townlands called Big Dog and Little Dog; these singular appellations derive their origin from the modern division into two parts, of an ancient tract which is called in the annals Sliabh-dá-chon, the mountain of the two hounds. We find also Cloondacon, in Mayo, the meadow of the two hounds.

In several other places we have two oxen commemorated, as in Cloondadauv, in Galway, which the annalists write Cluain-dá-damh, the meadow of the two oxen; Rossdagamph, in Fermanagh, and Aughadanove, Armagh, the promontory and the field of the two oxen; in the first, *d* is changed to *g* by a usual corruption, and in the second, da prefixes *n* to the vowel. At the year 606, the Four Masters mention a lake in which a crannoge was built, situated in Oriel, but not now known, called Loch-da-damh, the lake of the two oxen.

Two bucks are commemorated in such names as Ballydavock, Cappadavock, Glendavock, Lisdavock (town, plot, glen, fort), and Attidavock, the site of the house of the two bucks.

The parish of Cloonyhurk, in King's County, takes its name from a townland which the Four Masters call Cluain-dá-thorc, the meadow of the two boars; Glendahork, in Mayo, is the glen of the two boars; and Lisdavuck, in King's County, the fort of the two pigs.

Cloondanagh, in Clare, is in Irish Cluain-da-neach, the meadow of the two horses; we find the same two animals in Tullylonghdaugh, in Fermanagh, and Aghadaugh, in Westmeath; the second meaning the field, and the first the hill of the lake of the two horses; and Cloondelara, near Clonmacnoise, is the meadow of the two mares. Clondalee in the parish of Killyon, Meath, is called in Irish Cluain-da-laogh, the meadow of the two calves. Aghadavoyle in Armagh is the field of the two *maols*, or hornless cows; two animals of the same kind have given name to a

little island in Mayo, viz., Inishdaweel; while we have two yellow cows in Inishdawee, the name of two townlands in Galway. The small river Owendalulagh, flowing from the slopes of Slieveaughty, in Galway, into Lough Cutra, near Gort, is called in the old authorities, Abhainn-da-laoilgheach, the river of the two milch cows, which name is accounted for by a legend in the Dinnseanchus.

There is a legend also concerning the origin of Clondagad, in Clare, the Cloon of the two gads or withes. Jocelin recounts another legend accounting for the name Dun-da-leath-glas, anciently applied to the great rath at Downpatrick, and the first syllable of which has originated the name of Down, St. Patrick's name being added in consequence of his connexion with the place; the ancient name signifies, according to the Latin writers, the fortress of the two broken locks, or fetters. The two remarkable mountains in Kerry now called the Paps, were anciently called, and are still, in Irish, Da-chích-Danainne; the two paps of Danann, a celebrated lady of the Tuatha De Dananns, from whom they derived their name; and the plain on which they stand is called Bun-a'-da-chich, the bottom or foundation of the two paps.

A very singular name is Dromahaire, which is that of a village in Leitrim; the Four Masters sometimes call it Baile-ui-Ruairc, because it was formerly the property of the O'Rourkes; but generally they give it the more ancient name of Druim-da-ethiar, which O'Donovan translates, the ridge of the two air-spirits or demons. Tradition has lost all memory of the two evil spirits that haunted the place and originated the name, and we should be in ignorance of the true ancient form if our Annals had not preserved it.

In this great diversity it must be supposed that two persons would find a place, and accordingly we find Kildaree, the church of the two kings, the name of two townlands in Galway (for which see Sir William Wilde's "Lough Corrib"), and of another near Crossmolina, Mayo. There is a fort one mile south of the village of Killoscully, Tipperary, called Lisdavraher, the fort of the two friars; and there is another of the same name in the south of Ballymoylan townland, parish of Youghalarra, in the same county: in both these cases it is likely that the two friars were two ghosts.

There is a parish called Toomore, in the county Mayo, taking its name from an old church standing near the river Moy; it is also the name of a townland in the parish of Aughrim, Roscommon, and of a townland and parish in Sligo. This is a very curious, and a very ancient name. Toomore, in Mayo, is written Tuaim-da-bhodhar by Duald Mac Firbis and the Four Masters; and Tuaim-da-bhodar in a poem in the "Book of Lecan," transcribed in 1416 or 1417, by Giolla Iosa Mor Mac Firbis. The pronunciation of the original is Tooma-our, which easily sank into Toomore. The name signifies the tomb of the two deaf persons; but who they were neither history nor tradition records.

The memory of the two venerable people who gave name to Cordalea, in the parish of Kilmore, Cavan, has quite perished from the face of the earth, except only so far as it is preserved in the name Cor-da-liath, the hill of the two grey persons. Two people of a different complexion are commemorated in Glendaduff in Mayo, the glen of the two black visaged persons. Meendacalliagh, in the parish of Lower Fahan, Donegal, means the *meen*, or mountain flat of the two *calliaghs*, or hags, probably a pair of those old witches who used to turn themselves into hares, and suck the cows.

It must occur to any one who glances through these names to ask himself the question—what was the origin of this curious custom? I cannot believe that it is a mere accident of language, or that it sprung up spontaneously, without any particular cause. I confess myself wholly in the dark, unable to offer any explanation: I have never met anything that I can call to mind in the whole range of Irish literature tending in the least degree to elucidate it. Is it the remnant of some ancient religious belief, or some dark superstition, dispelled by the light of Christianity? or does it commemorate some wide-spread social custom, prevailing in times beyond the reach of history or tradition, leaving its track on the language as the only manifestation of its existence? We know that among some nations certain numbers were accounted sacred, like the number seven among the Hebrews. Was two a sacred number with the primitive people of this country? I refrain from all conjecture, though the subject is sufficiently tempting; I give the facts, and leave to others the task of accounting for them.

XXV. — On Chinese Porcelain Seals found in Ireland, with Remarks on their alleged Antiquity. By Dr. W. Frazer, M. R. I. A. Dublin, 1868.

[Read January, 1868.]

Certain seals of porcelain, bearing Chinese inscriptions, have been picked up from time to time in different parts of Ireland during the past century, and Mr. Joseph Huband Smith deserves the credit of having first directed attention to these seals, and their alleged claims to a venerable antiquity (see "Proceedings Royal Irish Academy," vol. i., p. 381). My interest was excited by accidentally obtaining two of these seals and being rather sceptical about their age, I was led for some years to pursue the inquiry at intervals, with the results now laid before the reader.

Mr. Smith's ideas having influenced more or less those who have written on this subject, it is just to state them in his own words: "An extract from the Grammar of Abel Remusat showed that the inscriptions on those seals are those of a very ancient class of Chinese characters in use since the time of Confucius, who is supposed to have flourished in the middle of the sixth century B. C. The remote period to which

those characters are assigned leaves open a wide field for conjecture as to the time in which these porcelain seals found their way into this country. From the extreme degree of heat to which they appear to have been subjected, and their consequent vitrification, which has in some measure taken place, they are quite as capable of resisting the attacks of time as the glass and porcelain deities and ornaments found in the mummy-cases of Egypt, and may have been for an indefinite period beneath the surface of the earth. It is, therefore, at least possible that they may have arrived hither from the East along with the weapons, ornaments, and other articles of commerce which were brought to these islands by the ships of the first merchant princes of antiquity, the Phœnicians, to whom our ports and harbours were well known."

The late Mr. Edward Getty, with great industry and zeal, gathered all the scattered information bearing on the discovery of these seals in different localities. He read a paper on the subject before the Belfast Literary Society in 1850; and afterwards published a 4to volume with copies of the inscriptions in Chinese characters, translations of them by competent authorities, and brief statements of the circumstances under which they were found. The work is illustrated by an enlarged drawing of one of the seals, and is a trustworthy *resumè* of the entire question up to the time it appeared.

Mr. J. W. Murphy, of Belfast, and Mr. Robert Ball, of this city, both laboured in investigating this subject with much ability. I possess wax or plaster copies of the inscriptions of several of the seals, made by Mr. Ball, and entrusted to me by his son. He wrote, however, nothing regarding them; and Mr. Murphy's observations were transferred to Mr. Getty. The earliest intimation of Chinese seals being found in Ireland is, perhaps, a brief query in the "Anthologia" for 1793. This is merely a copy of a Chinese inscription, similar to what occurs on the seals, and a request for its translation: there is no history or clue by which it can be traced.

So far as I can ascertain, records exist, more or less complete, of about sixty-one seals, which appear to have been sown broadcast over the country in some strange way that I cannot offer a solution of. Thus I find that, whilst more than half have either no authentic history, or are roughly ascribed to localities in the south of Ireland, the

County of Antrim affords	1	County of Kilkenny	1
,, Down ,,	3	,, Tipperary	3
,, Dublin ,,	3	,, Wexford	1
,, Carlow ,,	2	,, Limerick	1
,, Queen's ,,	1	,, Cork	6
,, Westmeath	1	,, Waterford	4

The history of these seals, if investigated, presents one common point of agreement that seems of much importance. They have never yet, in a single instance, been discovered associated with other objects of antiquarian interest, in burrows or mounds, with bronze or stone weapons, Celtic remains, or works of art—never with Danish or Anglo-

Norman coins, nor even with modern articles of manufacture. The invariable story of their find is what we might expect if they had been accidentally dropped, at no very distant period, in or near the localities whence they were afterwards unearthed. Thus they have been picked up by labourers, as the plough-share passed over an old untilled field: one was extracted from the uprooted fibres of an aged pear tree; another obtained on or near the situation of a disused road; two in caves; one in a potato garden; others in heaps of rubbish or clay near human dwellings—in a word, under circumstances that at once raise a conjecture they cannot possibly be of any extremely ancient date. There also seems to be satisfactory evidence that similar seals have never yet been found in England or on the Continent.

The peculiar characters on these seals are admittedly of great antiquity; but this signifies little. It is the common seal-writing employed by the Chinese for centuries, and still seen on their ordinary seals made and used in the present day; somewhat resembling our own *black letter*, which is practically obsolete, though in daily use for legal writings, deeds, &c.

Mr. Getty collated the circumstances under which these seals were found in Ireland, and obtained the aid of educated Chinese and scholars in that language, hoping thus to unravel the problem of their importation here, and wide dispersion over the country. Following out his ideas (which appear to present the only reasonable hope of success), I believe their alleged claim to a venerable antiquity can be disproved, though I am still unable to offer any suggestion as to how they reached our shores, or were scattered broadcast through so many counties.

An inquiry of a similar nature was worked out a few years ago respecting certain Chinese porcelain bottles obtained in Egypt, and asserted to have been found in ancient Egyptian tombs by travellers. Like our porcelain seals, they were supposed to point to a distant era, when Pharaoh's subjects traded with China, and several interesting speculations were based on this slender substructure. There were in all twelve of these bottles discovered. They fortunately presented five different poetic inscriptions that could be deciphered, and Mr. W. H. Medhurst decided they were extracts from the writings of Chinese poets that, at the farthest, lived under dynasties dating from A. D. 700 to 1100. The bottles, therefore, might be so old: in all probability they were much more recent; indeed Mr. Medhurst's Chinese teacher referred them to the period of the "Ming" dynasty, to which there are good grounds for concluding our porcelain seals also belong. (See "Trans. Chinese Branch of Royal Asiatic Society," part 3, for 1851–2).

My inquiries in China were for a long time unsuccessful; for in that vast Empire circumstances and objects which are familiar to persons in one district may be quite unknown elsewhere; thus my correspondents in Hong Kong, Ningpo, and Pekin, could give me no aid, and I finally got satisfactory results at Canton.

In the Catalogue of the Academy's Museum, Sir W. Wilde describes those seals as "cubical portions of white porcelain about five-eighths

of an inch upon each side of the square, embossed on the under surface with characters which are proved to be a very ancient form of Chinese writing, and surmounted by the figure of an *ape*." Mr. Getty also considered the image on the top of the seals represented a baboon, and his enlarged view brings out the likeness in a pointed manner. In the unique oval seal in the collection of the Royal Irish Academy, found at Rathkeale, the figure is supposed to be a Guinea pig's. Both conjectures are excusable; but on appeal to the Chinese—who are, perhaps, the best authorities as to what they intend by those designs—it seems they ought to be "lions," for they are termed "lion-head seals;" and in one seal sent me from Canton the animal is well represented in a spirited position, half seated, in a manner resembling some of our own heraldic figures.

Sir W. Wilde further states—"It is said that no porcelain seal of a similar shape and size can be procured in China." I lay before the Academy three such seals, identical with our Irish ones, sent from Canton by Rev. James Legge, of the London Missionary Society, with two others, differing in the position of the animal on their top. Mr. Legge says—"They are obtainable, but can hardly be said to be in use; they are kept, so far as I can learn, simply as nick-nacks or ornaments." Thus far it appears clear:—

1. That the seals are of undoubted Chinese manufacture.
2. That they are known in Canton as "lion-head seals."
3. They are purchaseable as objects of curiosity, but not used at the present day.

The idea of their antiquity originated in the peculiar characters used by the Chinese for seal impressions. On this point Mr. Legge states—"Every question about the history of porcelain seals in China could be answered if one had access to a large library. I consulted a Chinese scholar of extraordinary research upon this subject, and he assures me that porcelain seals were first made during the 'Sung' dynasty, A. D. 975 to A. D. 1279; no mention of them can be found before that time. Previous to the 'Tsin' dynasty (B. C. 220) seals were made of jade and other precious stones, and also of gold and silver. Under the 'Han' dynasty (B.C. 201) seals made of brass came into vogue, and were long used, till towards the end of the 'Yuen' dynasty (A.D. 1367) they were in a great measure superseded by soapstone seals.

"Under the 'Sung' dynasty, however, porcelain seals had been made: the name of a pottery where many were produced between the years A. D. 1111 and A. D. 1118 is still famous. But it was under the 'Ming' dynasty, immediately preceding the present, that these seals were most in vogue. The 'Green kiln,' with more than 300 furnaces, was constantly at work in the last quarter of the fourteenth century, producing all sorts of small articles. Since the 'Ming' dynasty porcelain seals have very much fallen into disuse. Such," says Dr. Legge, "is the substance of a short treatise which my Chinese friend has composed on this subject. Porcelain seals are also, it appears, still

manufactured in the province of Fuh-Keen, and sold under the name of 'seals from the Fuh-Keen potteries;' but the best of them are spoken of in Chinese books as very inferior to those made in former times."

The concluding part of Rev. Dr. Legge's letter contains an ingenious conjecture, which I must confess myself unable either to verify or disprove. He says—"The question as to how these seals found their way to Ireland will probably ever remain a problem not fully solved. The above detail throws a little light on it. It was during the 'Ming' dynasty that such articles came to be 'the rage' in China, and it was at the same time that European commerce with the Empire commenced; Queen Elizabeth sent an envoy to the Emperor in 1596. Some of the early visitors from England and Ireland must have taken the seals back with them from China. How they came to be sown over so large a tract of Ireland we shall never be able to discover."

The settled point, so far, appears to be, that these seals cannot be older than the end of the fourteenth or commencement of the fifteenth century; how much later than this era they came to Ireland we have as yet no evidence. The antiquity of the seal inscriptions is of no moment; seal writing, like "black letter," is a remnant of past times which has not yet entirely disappeared; indeed the Chinese, eminently conservative in their ideas, still employ for their seals those extremely ancient characters, which are well understood by the learned of that land. At all events porcelain seals have turned up in Ireland from time to time during about eighty years past; and even if we fancy that a hatful was once imported by some *savant* anxious to puzzle posterity, and scattered broadcast over the surface of the kingdom, still it seems he must have been uncommonly diligent to deposit them in almost every county, with perhaps such a preponderance of southern localities that we might fancy their original owner had his habitation there. At all events, almost half a hatful have been already picked up. The evidence, so far, we must conclude, fails to establish any ancient Irish traffic with the flowery land, and these seals were neither known to or imported by "Phœnician or Milesian, or the plundering Norman peers."

Mr. Kaye, of the Chartered Bank of India, Australia, and China, deserves my best acknowledgments, in the first instance, for the interest he took in these inquiries. Residing in Hong Kong, he made diligent inquiries for any information that could be procured. He failed altogether to get porcelain seals at that city; and though he sent to Canton, and had the shops searched, he could obtain none there but specimens of recent soapstone seals. At last he learned that a gentleman had once got some of them, which he picked up at Macao. By his exertions Rev. Dr. Legge was enlisted in carrying on the search; and to him I owe the successful results, not alone of getting me authentic Chinese specimens exactly similar to our Irish ones, but also for the satisfactory account he drew up of their history, and of which I have so largely availed myself. I will append to these remarks the list that is subjoined, of all the authentic "finds" of porcelain seals in Ireland, so far as I can complete it:—

List *of* Chinese Seals *found in Ireland to* 1865.

1	In Museum of Royal Irish Academy.	Got near Kilmainham, Co. Dublin. Presented by Thos. Young, Esq.
2	Do.	No history. Presented by Miss Murphy.
3	Do.	Turned up in a ploughed field, near Borrisokane, Co. Tipperary, 1832. (From Dean Dawson's Collection.) This is No. 26 of Mr. Getty's list.
4	Do.	(No. 4 of Mr. Getty's list.) Formerly in possession of R. Fannin, Esq.
5	Do.	Unique oval Seal, found at Rathkeale, Co. Limerick, and presented by Rev. Dr. Todd.
6	Not to be traced.	(No. 1 of Mr. Getty's list.) Found in North of Ireland. Formerly in possession of Dr. Stokes, Merrion-square.
7	.. .. ..	(No. 2, do.) Described by J. H. Smith, Esq., Dublin.
8	In Belfast Museum.	(No. 3, do.) Found in a piece of ground never apparently cultivated, parish of Killileagh, Co. Down, in 1842.
9	.. .. ..	(No. 5, do.) Got on north side of Carlow, on or about the site of an old road, closed up since 1798, that led from an extensive quarry to the Roman Catholic burial ground. It was found at an inconsiderable depth from the surface, when removing some clay, by a workman in Mr. Montgomery's employment.
10	.. .. ..	(No. 6, do.) Belonged to Mr. Vigors, Carlow.
11	.. .. ..	(No. 7, do.) Found about eighty-five years ago near Mountrath, Queen's County, in a bog, by a turf cutter, who gave it to his employer. In 1840 it was in the possession of Miss Beaufort, Hatch-street, Dublin.
12	.. .. ..	(No. 8, do.) Described by J. H. Smith, Esq., Dublin.
13	.. .. ..	(No. 9, do.) do. do.
14	Not to be traced.	(No. 10, do.) Got in Westmeath. Belonged to the late R. Ball, Esq., Dublin.
15	.. .. ..	(No. 11, do.) Described by J. H. Smith, Esq., Dublin.
16	.. .. ..	(No. 12, do.) Owned by Mr. Christie. Dug up at Kircassock, Co. Down, about fifty or fifty-five years ago, in an orchard, in taking up the roots of an old pear tree.
17	Do.	(No. 13, do.) In the possession of the family of the late P. Boylan, Esq., Grafton-street, for at least eighty-five or ninety years.
18	In Belfast Museum.	(No. 14, do.) Found in Co. Down. Formerly in possession of the late Mr. Clewlow, near Belfast.
19	In possession of [the late] J. Windele, Esq., Blair's Castle, Co. Cork.	(No. 15, do.) Found in a potato garden whilst being ploughed, at Knocknamoriff, about eight miles west of Cork.
20	Formerly in the Piltown Museum (now sold).	(No. 16, do.) Got near Clonmel, Co. Tipperary.
21	Do.	(No. 17, do.) Found at Ballyhack, Co. Wexford, under an ancient quarry.
22	.. .. ..	(No. 18, do.) Found about 1841 in the parish of Ballyvourney, Co. Cork. Owned by [the late] A. Abell, Esq.
23	.. .. ..	(No. 19, do.) Sent to Mr. J. W. Murphy, by T. Crofton Croker, Esq., on a visiting card of the late Colonel Vallancey.

24	.. .. ..	(No. 20, do.) Got by J. W. Murphy, Esq., in an old curiosity shop in London, and probably one of four sold out of a private collection in Dublin.
25	Not to be traced.	(No. 21, do.) Property of the late R. Ball, Esq., Dublin.
26	.. .. ..	(No. 22, do.) Property of [the late] Dr. Petrie.
27	.. .. ..	(No. 23, do.) Found at Clonliffe Parade, near the Circular-road, Dublin, in 1816. Property of Th. Singleton, Esq., Aughnacloy.
28	Formerly in Piltown Museum.	(No. 25, do.) Got in the Co. of Cork.
29	No trace to be obtained.	(No. 27, do.) This Seal is the engraved inscription in "Anthologia Hibernica" for 1793. No history appended.
30	.. .. ..	(No. 43, do.) In 1850 in the possession of Mr. Henry Jacob, Clonmel.
31	Formerly in Piltown Museum.	(No. 44, do.)
32	.. .. ..	(No. 45, do.) Found about 1805 in a cave on the coast at Myrtleville, near mouth of Cork Harbour. In 1850, the property of T. Crofton Croker, Esq.
33	.. .. ..	(No. 46, do.) Exhibited in 1847 at the British Archæological Association, and presented by Mr. George Isaacs to T. C. Croker, Esq.
34, 35	.. .. ..	(No. 47–48, do.) Purchased from Mr. Evans, Maddox-street, London, by T. C. Croker, Esq.
36	.. .. ..	(No. 49, do.) Believed to be in possession of Miss Jacobs, Waterford, in 1850.
37	.. .. ..	(No. 50, do.) Lady Glengall. Found in 1840 or 1841 immediately outside of Cahir Castle, at west side, when removing some clay. With the Seal were found some human bones, which crumbled into dust on exposure.
38, 39	.. .. ..	(No. 51, 52, do.) Belonged to Miss Jacobs, Clonmel.
40	.. .. ..	(No. 53, do.) Belonged to Lady Louisa Kerr, found at Glenarm Castle, in her grandfather, Lord Antrim's drawer, and supposed to have been found on the Antrim estates.
41–51	No information can be procured respecting those Seals.	(Nos. 24, 28, 29, 54, 55, 56, 57, 58, 59, 60, 61, of do.)
52	Dr. W. Frazer, Dublin.	Obtained some years before 1860 at Miltown, Co. Dublin, in some excavations in clay.
53	Dr. Belcher, Dublin.	Received about 1857 from a friend, Dr. Browne, to whom it had been presented by some person in Youghal, where it was said to have been found in a cave on the sea shore.
54	Miss Deborah Moore, Quay, Waterford.	Impression sent me by Dr. Briscoe, Piltown. The Seal was obtained in rubbish whilst repairing an old house on the quay at Waterford, about twenty-four years back.
55	.. .. ..	A second Seal was found in another place in Waterford, and since lost by a child, to whom it was given as a plaything. (Dr. Briscoe).
56	.. .. ..	Some years since one or more of these Seals were found at Rosbercon, near New Ross. Impressions were sent to Dr. Petrie at the time. (Dr. Briscoe.)

57	J. Windele, Esq., Cork.	Found on breaking up an untilled field near Riverstown, about seven miles from Cork city.
58	.. .. ..	A Seal in possession of a lady at Kingstown (given on the statement of Dr. M'Gowan).
59	Kilkenny Archæological Museum.	Found at Thomastown many years ago, and presented by Rev. James Graves (Vol. ii. "Kilkenny Archæological Journal").
60	In the collection of James G. Robertson, Esq.	An impression exhibited by G. Robertson, Esq., Kilkenny, to the Kilkenny Archæological Society, of a Seal in his possession January, 1855. (*See* Vol. ii. "Kilkenny Archæological Journal.")
61	.. .. ..	Mention made of *some* in the collection of the Duke of Northumberland. One inscription translated by Rev. R. T. Browne, Southwick Vicarage, Northumberland.

XXV.—Catalogue of 101 Drawings of Coats of Arms from Original Sketches from Tombstones. By George V. Du Noyer, Esq., M. R. I. A., District Surveyor, Her Majesty's Geological Survey of Ireland; presented by him to the Library of the Royal Irish Academy, to form Vol. X. of "Antiquarian Sketches."

[Read 10th of February, 1868.]

No.	Name.	Date.	Place.	County.
1	Allen, ...	1770	Larne,	Antrim.
2	Baillie, ...	1624	Donaghenry,	Tyrone.
3	Blair, ...	1776	Raloo and Ballygally,	Antrim.
4	Blair, ...		Raloo,	Antrim.
5	Boyd, ...		Coleraine,	Derry.
6	Browne, ...	1763	Ballygally,	Antrim.
7	Bryan, ... Brynnan, ... Brenan, ... Brannion, ...	1802	Island Magee,	Antrim.
8	Buchannan, ...	1697	Dungiven,	Derry.
9	Bull, ...	1690	Donahenry,	Tyrone.
10	Burney, ...	1800	Larne,	Antrim.
11	Burns, ...	1729	Larne,	Antrim.
12	Byrne, ...		Donahenry,	Tyrone.
13	Cahan, ...		Dungiven,	Derry.
14	Do.		ditto,	Derry.
15	Caldwell, ... Callwell, ...	1811	Ballygally,	Antrim.
16	Campbell, ...	1780	Ballygally,	Antrim.
17	Do.	1823	Larne,	Antrim.
18	Cary, ...	1716	Dungiven,	Derry.
19	Chad, ...	1696	Oldbridge, Belfast,	Antrim.
20	Retannsnody, . . .	1807	Larne,	Antrim.
21	Clark, ...	1780	Ballycarry,	Antrim.
22	Cochrane, ...	1780	Ballywilliam,	Derry.
23	Cooper, ...	1614	Carrickfergus,	Antrim.
24	Craig, ...	1739	Raloo,	Antrim.

No.	Name.	Date.	Place.	County.
25	Dawson,		Coleraine,	Derry.
26	O'Donaghy,	1776	Coleraine.	Derry.
	M'Donachy,	1801		
27	M'Donald,	1740	Larne,	Antrim.
28	Donel,	1761	Glynn,	Antrim.
	Donald,			
29	Dunlop,	1731	Killowen,	Derry.
30	Dunlop,		Coleraine,	Derry.
31	Fannin,		Dungiven,	Derry.
32	Fisher,		Larne,	Antrim.
33	Gardiner,	1682	Carrickfergus,	Antrim.
34	Gavin,	1727	Ballyrashrane,	
35	Getty,	1780	Ballygally,	Antrim.
36	Given,		Coleraine,	Derry.
37	Glasgow,	1799	Larne,	Antrim.
38	Graig,	1800	Raloo,	Antrim.
39	Haddan,	1791	Larne,	Antrim.
40	O'Hagan,		Ballynascreen,	Derry.
41	Hamilton,		Dungiven,	Derry.
42	Do.	1716	Coleraine,	Derry.
43	Do.	1782	Raloo and Ballygally,	Antrim.
44	Hay,	1780	Ballycary,	Derry.
45	Holliday,		Killowen,	Derry.
46	Holliday, ?		Dungiven,	Derry.
47	Holmes,	1799	Larne and Ballygahan,	Antrim.
48	Houston,	1755	Larne,	Antrim.
49	Irvine,	1738	Templemaghery,	Fermanagh.
50	Irwin,	1778	Donaghenry,	Tyrone.
51	Jaffray,	1775	Raloo,	Antrim.
52	Johnston, ?		Dungiven,	Derry.
53	Johnston,	1757	Templemaghery,	Fermanagh.
54	Kein,	1782	Island Magee,	Antrim.
	Kain,	1792		
	Cain,			
55	Kincaid,	1697	Island Magee,	Antrim.
56	M'Knight,		Coleraine,	Derry.
57	Knox,	1820	Raloo,	Antrim.
58	Learmouth,	1725	Larne,	Antrim.
59	Lecky,	1634	Coleraine,	Derry.
		1694		
60	Legg,		Carrigfergus,	Antrim.
61	Loan,	1779	Templemaghery,	Fermanagh.
62	Loughridge,	1815	Larne,	Antrim.
63	Magill,	1780	Ballygally,	Antrim.
64	Manfod,	1750	Larne,	Antrim.
65	Martin,	1786	Larne,	Antrim.
66	Mitchell,	1788	Glynn,	Antrim.
67	Montgomeri,	1614	Ardbrackan,	Meath.
68	Mountgomery,	1780	Larne,	Antrim.
69	Moore,	1737	Larne,	Antrim.
70	M'Munn,	1770	Larne,	Antrim.
71	Munro,	1772	Larne,	Antrim.
72	Munroe,		Coleraine,	Derry.

No.	Name.	Date.	Place.	County.
73	M'Neal,	1757	Larne,	Antrim.
74	Parke,	1791	Ballygally,	Antrim.
75	Patterson,	1762	Ballygally,	Antrim.
76	Patrick,	1735	Coleraine,	Derry.
77	Percy,		Coleraine,	Derry.
78	Rammage,		Coleraine,	Derry.
79	Rea,	1771	Glynn,	Antrim.
80	Robinson,		Larne,	Antrim.
81	Robinson,	1765	Raloo,	Antrim.
82	Shaw,		Ballygally,	Antrim.
83	Shaw and Burns ?	1625	Ballygally Castle,	Antrim.
84	Shutter,		Larne,	Antrim.
85	Smith,	1786	Larne,	Antrim.
86	M'Sparran,		Dungiven,	Derry.
87	Steele,	1800	Ballygally,	Antrim.
88	Stephenson,	1722	Dungiven,	Derry.
89	Symington,	1737	Ballycarry,	Antrim.
90	Templeton,	1770	Donaghenry,	Tyrone.
91	Thom,	1793	Larne,	Antrim.
92	Todd,	1736	Coleraine,	Antrim.
93	Thompson,	1769	Raloo,	Antrim.
94	Wate, / Watt,	1751 / 1758	Larne,	Antrim.
95	Watson,		Coleraine,	Derry.
96	Wilson,		Coleraine,	Derry.
97	Wilson,		Donaghenry,	Tyrone.
98	Willson,	1800	Ballygally,	Antrim.
99	Wilie,	1777	Ballygally,	Antrim.
100	Young ?	1750	Ballyrashrane,	
101	Young,	1799	Ballygally,	Antrim.

Description of the foregoing 101 Coats of Arms.

No. 1. Allen. Per bend engrailed; in chief, two crescents; in base, a mullet or estoile. Crest, a pelican or swan; motto, *Virescit vulnere.*

No. 2. Baillie. Party per fesse; chief in tierce, each charged with three mullets in tierce; in base, the moon decrescent, between letters A. B.; motto, *Amor, honor, et justicia.*

No. 3. Blair. Three mascles on a chief engrailed over saltier engrailed, charged with the same. Crest, a stag segant; motto, *Amo probus.*

No. 4. Blair. A saltier charged with four mascles; in chief, a mullet; dexter and sinister side, the moon increscent; in base, a garb or wheat sheaf. Crest, a stag at speed on wreath over helmet in profile; plain for esquire; motto, *Amo probus.*

No. 5. Boyd. Party per fesse, chequée, three crescents—two and one. Crest, a hand in benediction appaumée; motto, *Confido.*

No. 6. Browne. Party per cheveron; three *fleur-de-lys*—two and one. Crest, quatre foil slipped with two leaves—over helmet in profile; plain for esquire.

No. 7. Brynan, Brynnan, Brenan, Brannion. In bordure, two swords en saltier; erect or combattant. Crest, a helmet on a wreath in profile; barred, for baron or knight.

No. 8. Buchanan. In a tressure fleury, a lion rampant. Crest, a hand appaumée holding a fish over wreath on helmet in profile; plain for esquire.

No. 9. Bull. A tower embattled, bearing three bulls—one and two—supporters, dogs. Crest, a mounted knight at speed, sword in hand, combattant.

No. 10. Burney. Party per fesse; in chief, a bended bow, with arrow strung; in base, three boots or human legs coupée below the knee. Crest, a lion's head erased; motto, *Sapere aude indipe* [*sic* on tombstone].

No. 11. Burns. In chief, two mullets over a bugle horn. Crest, the moon increscent over wreath on helmet in profile; plain for esquire.

No. 12. Byrne. In dexter chief, the moon decrescent; in fesse, a mermaid; in base, a garb, with three birds pecking—one dexter and two sinister. Crest, a hand appaumée over wreath; motto, *Rubra manus duorum bonum.*

No. 13. Cahan. Party per cross; in first, a lion rampant; in second, a garb; in third, a fish; in fourth, a lymphad or gally. Crest, a lion passant on a wreath.

No. 14. Cahan. In bordure, party per cross; in first, a lion rampant; in second, a garb; in third, a fish; in fourth, a boat and man. Crest, a lion passant over wreath on sovereign helmet affrontée, barred.

No. 15. Calwell, Caldwell. Three piles in chief, or a chief daucette, over a field wavey or undée. Crest, an eaglet displayed over wreath; motto, *In domino confido.*

No. 16. Campbell. Gyroney, in a bordure, charged with crescents. Crest, head of sauglier, or wild boar, over a wreath.

No. 17. Campbell. In bordure engrailed, a mullet on a canton; in fesse, head of sauglier coupée; in base, two swords en saltier inverted. Crest, a wolf's or dog's head and neck erased, over a wreath on helmet in profile; plain for esquire.

No. 18. Cary. In bordure a bend charged with three cinque foils; in chief, a swan. Crest, a swan on wreath over helmet in profile; plain for esquire; motto, *Sine macule.*

No. 19. Chad. On a bend, three cinque foils; in chief, two; in base, one cinque foil.

No. 20. Chichester and Retannsnody. Impaled, in dexter, a chief vert over a field chequée, for Chichester; sinister, three wolves' heads erased—two and one—for Retannsnody. Crest, a bird with snake in bill on a helmet in profile; plain for esquire; motto, *Invitem sequiter bonos;* or, *Honor sequiter fugientem.*

No. 21. Clark. In chief, a leopard's or lioness's face between two books, over a *fleur-de-lys.* Crest, arm and hand holding a book.

No. 22. Cochrane. Party per cross; first, party per pale, gyrony on sinister side; second and third, boar's head erased; fourth, a canton gyrony. Crest, boar's head erased on a wreath; motto, *Ne oblivisick.*

No. 23. Cooper. Impaled dexter, party per fesse; in chief, three annulets; in base, a crescent over three martlets—two and one; sinister party per bend engrailed; in chief, an escallop. Crest, a lion's head erased on wreath over helmet in profile; barred, for baronet or knight.

No. 24. Craig. Party per fesse charged with three crescents, a chief vivre, ermined in the points, or a chief indented of two lines, ermined in the points. Crest, mailed arm and hand, with sword erect combattant.

No. 25. Dawson. A bend engrailed, three martlets. Crest, a mullet.

No. 26. O'Donaghy and M'Donachy. In a bordure a chevron; in chief, two lions rampant facing; in base, a sauglier. Crest, arm coupée at the elbow, with hand and dagger.

No. 27. M'Donald. In bordure three eastern crowns—two and one; mullet in honor point. Crest, mailed arm, hand with scimitar combattant, on a wreath over helmet in profile, barred, for baronet or knight; supporters, savage men clubbed.

No. 28. Donel, or Donald. In bordure a lion rampant; in dexter chief, a hand coupée at the wrist. Crest, a castle on wreath; motto, *My hope is centred in thee.*

No. 29. Dunlop. In bordure an imperial eagle, or eagle with two heads respectively looking to the dexter and sinister side. Crest, a hand holding a pennon over wreath on helmet in profile, barred, for baron or knight; motto, *Merito.*

No. 30. Dunlop. Three bugle horns—two and one; party per chevron chequée. Crest, imperial eagle on wreath; motto, *Suivey raison.*

No. 31. Fannin. In bordure three martlets—two and one, party per chevron. Crest, a martlet on wreath over helmet in profile; plain for esquire; motto, *Solo in deo spes.*

No. 32. Fisher. Three fish. Crest, horse's head and neck coupée, on a wreath; motto, *Gaudiam adferro.*

No. 33. Gardner. Three wolves' or dogs' heads erased—two and one; party per chevron charged with two lioncells. Crest, a demi Wyvern.

No. 34. Gavin. In bordure a saltier engrailed over a sword in pale. Crest, mullet in middle chief.

No. 35. Getty. Three boars' heads coupée, with escutcheon of pretence—void.

No. 36. Given. Party per chevron, gules; in chief, three mullets; in base, a lion rampant. Crest, mailed arm and hand holding a mullet pierced.

No. 37. Glasgow. In pale, a tree in leaf rising from a mound; dexter side a fish, with ring in mouth; sinister side, a bell suspended from a branch. Crest, the dove with olive branch on wreath over helmet in profile; plain for esquire.

No. 38. Graig. Lion rampant. Crest, demi lion rampant crowned royal, with dagger erect in dexter paw; motto, *Pro rege in tyrannos.*

No. 39. Haddan. Party per chevron—two and one; three garbs. Crest, a wreath.

No. 40. O'Hagan. Party per fesse; base, party per pale; in chief, an imperial eagle. Crest, a square pennon on a helmet in profile; plain for esquire.

No. 41. Hamilton. Impailed dexter side, three cinque foils—two and one, with lozenge in honor point; sinister side three bends sinister, with crescent in dexter chief. Crest, an oak tree fructed and penetrated transversely in the main stem by a frame saw on wreath over helmet in profile, barred, for baron or knight.

No. 42. Hamilton. In bordure three cinque foils—two and one. Crest, oak tree and frame saw; motto, *Through.**

No. 43. Hamilton. Three martlets—two and one; party per fesse, erminée. Crest, a garb on wreath; motto, *God feeds the crows.*

No. 44. Hay. Three inescutcheons, void—two and one. Crest, bicorn head and neck erased, over helmet in profile; plain for esquire; motto, *Malum bone unice.*

No. 45. Holliday. In bordure a saltier in a canton, or quarter cut off; in sinister side a sword in pale erect over a crescent. Crest, boar's head on wreath over helmet in profile; barred, for baron or knight.

No. 46. Holliday? In bordure, three mullets in chief over a bugle horn. Crest, wolf's or dog's head erased on wreath over helmet in profile; barred, for baron or knight.

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* See "English Heraldry," by Boutell, p. 152. London: Cassell, Petter, and Galpin, 1867.

No. 47. Holmes. Lion rampant of the field. Crest, stag's head and neck coupée on a wreath.

No. 48. Houston. Three quatrefoils, two and one; party per chevron; erminée. Crest, an hour-glass on wreath over helmet in profile; barred, for baronet or knight.

No. 49. Irvine. Three goblets or garbs—two and one; party per chevron. Crest, a hand coupée, at the wrist holding a thistle, slipped, on helmet in profile; plain for esquire.

No. 50. In bordure. Three estoiles of eight rays—one and two; party per fesse. Crest, arm coupée at the elbow; hand holding a thistle, slipped. Motto, *Sub soli, sub umbra vir.*

No. 51. Jaffray. Paly of three; second, fourth, and sixth, erminée. Over all a fesse, charged with three mullets. Crest, the sun in splendour, on a wreath, over a helmet, in profile; plain for esquire. Motto, *Post nubiba Phœbus.*

No. 52. Johnston. In bordure. Three human hearts—two and one. Crest, hand coupée at the wrist, with dagger.

No. 53. Johnston. In chief, three wool sacks; in base, a saltier, in bordure. Crest, a rouelle spur, winged on a wreath, over helmet in profile; barred for baronet or knight. Motto, *Nunquam non paratus.*

No. 54. Kein, Kain, Cain. On a chief, three mullets; a hand coupée at the wrist. Crest, a garb on wreath, over helmet, in profile; plain for esquire. Motto, *Amor probus.*

No. 55. Kinkaid. In bordure, a fesse erminée; in chief, two mullets; in base, a tower. Crest, naked arm coupée, at the wrist, with hand holding dagger erect on helmet; in profile; barred for baron or knight.

No. 56. M'Knight. In bordure. Party per cross, first and fourth; a hand and wrist coupée, holding a cross patée fitchée; second and third, a tower. Crest, a tower.

No. 57. Knox. Three boars' heads coupée—two and one; in pale, a battle axe. Crest, hand and wrist coupée, with battle-axe, combattant on a wreath.

No. 58. Learmouth. Per cross, first and fourth; a chevron, charged with three mascles; second and third, a fesse, charged with three cinque foils. Crest, quartre foil, slipped, with leaves; on a wreath over helmet, in profile; plain, for esquire.

No. 59. Lecky. Three mullets—two and one; party per chevron.

No. 60. Legg. Stag's head, cabossed. Crest, coronet with four plumes. Motto, *Gaudit tentamine virtus.*

No. 61. Loan. Three swords, paily, erect, of the field; two mullets in chief. Crest, demi-lion rampant, holding a mullet in the dexter paw, on wreath, over helmet, in profile; plain for esquire. Motto, *Virtute et fides.*

No. 62. Loughridge. In chief, three mullets; in base, a stag tripping. Crest, a martlet on a wreath.

No. 63. Magill. Three martlets—two and one.

No. 64. Manfod. Lion rampant; queue fourchée. Crest, a garb, on wreath, over helmet, in profile; barred for baron or knight.

No. 65. Martin. Three crescents; party per chevron. Crest, a lion rampant, with crescent in dexter paw, on wreath.

No. 66. Mitchell. Three greyhounds running, in pale. Crest, hand and open book on a wreath, over helmet in profile; plain for esquire. Motto, *Press forward to the mark for the prize.*

No. 67. Montgomeri. In bordure. Sword and club in saltier (sword erect from sinister, club depressed from dexter side), in middle chief, and dexter and sinister side, a fleur-de-lys; in base, three signet rings—one and two. Crest, hand holding fleur-de-lys, slipped, over wreath on sovereign helmet affrontée of six bars.

No. 68. Mountgomery. Party per fesse, sword erect in pale—first and fourth; three fleur-de-lys—two and one—second and third; three roundells or annulets, two and one. Crest, a ship in full sail on wreath over helmet in profile; barred for baron or knight. Motto, *Garde bien.*

No. 69. Moore. Party per fesse, charged with three mullets. Crest, a garb on wreath over helmet in profile; plain for esquire.

No. 70. M'Munn. Party per chevron; three anchors—two and one. Crest, a lymphad on wreath, over a sovereign helmet affrontée of six bars. Motto, *Hold sure.*

No. 71. Munro. A sovereign helmet affrontée of six bars crested with eagle displayed. Crest, cocatrice, head erased on wreath over helmet in profile; barred for baron or knight.

No. 72. Munroe. Impailed; dexter side, a helmet in profile; plain for esquire, crested with a raven; sinister side, lion rampant. Crest, helmet in profile; plain for esquire.

No. 73. M'Neal. In bordure, party per pale; dexter side, party per fesse charged with a fish, in chief, a hand coupée at the wrist; in base, a lion rampant; sinister side, party per fesse, charged with three mullets; in chief, a lion rampant; in base, a lymphad. Crest, mailed arm, with hand holding dagger combattant on a wreath.

No. 74. Park. Per fesse counter componey; three stags' heads, cabossed. Motto, *Providentia me committo.*

No. 75. Paterson. In chief, three mullets, on base embattled; three pelicans. Crest, hand with dagger erect on wreath over helmet in profile; plain for esquire. Motto, *Pro rege et grege.*

No. 76. Patrick. Three greyhounds running—two and one. Crest, a stag tripping; on wreath over helmet in profile; plain for esquire.

No. 77. Percy. Three towers—two and one. Crest, a tower with demi-lion rampant, holding a pennon; supporters, wingless wyverns; tails; nowdless.

No. 78. Rammage. In bordure; ragged staff in fesse; three unicorn heads, neck coupée—two and one. Crest, unicorn's head and neck coupée, on wreath over helmet in profile; barred for baron or knight.

No. 79. Rea. In bordure; three stags at speed. Crest, a stag at gaze on a wreath. Motto, *In omnia promptus.*

No. 80. Robinson. In bordure; three wyvern heads erased—two and one, with three moons incressent in fesse. Crest, hand supporting earl's coronet on wreath; over helmet in profile; plain for esquire.

No. 81. Robinson. Three wolves' heads erased—two and one, with three crescents—one and two. Crest, a crown royal over helmet in profile; plain for esquire.

No. 82. Shaw. Three covered cups, jewelled—two and one.

No. 83. Shaw and Burns? In bordure party per pale; dexter side, three covered cups—two and one, with mullet in honor point for cadency, for Shaw; on sinister side three tablets—two and one. With hunting horns in fesse for Burns? Motto, *Gods providens is my inheritans.**

No. 84. Shutter. Three bars wavey, in middle chief, a demi-lion rampant. Crest, a ship in full sail, on wreath over helmet, in profile; plain for esquire.

No. 85. Smith. Party per saltier, charged with a garb in fesse, in chief, dexter and sinister side, a crescent. Crest, hand holding a pen, on wreath.

No. 86. M'Sparron. In bordure, a garb over a sickle. Crest, dove with olive branch; supporters, dexter side, a lion rampant; sinister side, an eagle folded. Motto, *Pro patria.*

No. 87. Steele. On a fesse three mascles; in dexter chief a mullet.

No. 88. Stephenson. In bordure, a crescent in middle chief; in fesse, a rose or cinque foil; on dexter and sinister sides, two martlets, in pale; in base, three javelin heads, in pale, depressed. Crest, swan or eagle; in profile, displayed, on wreath, over helmet in profile; plain for esquire.

No. 89. Symington. Party per pale; dexter side, a sword erect, per bend, with mullet in chief, and base; sinister side, an eaglet displayed. Crest, a unicorn head with neck coupée, on wreath, over helmet, in profile; barred for baron or knight.

No. 90. Templeton. A cock in chief on a cross, saltier, with club erect in sinister chief. Crest, a church. Motto, *Pietas.*

No. 91. Thom. A bend, charged with two crescents, and mullet in fesse. Crest, a stag's head and neck erased; on a wreath.

No. 92. Todd. Per bend; three human hearts—two and one. Crest, mailed arm with hand holding dagger, combattant.

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* From the lintel of the doorway to the old castle of Ballygally, Larne, now used as a coast-guard station.

No. 93. Thompson. Per fesse; engrailed, charged with three mullets; in dexter chief, the sun in splendour. Crest, a garb on a helmet, in profile; plain for esquire. Motto, *Amor probus.*

No. 94. Wate or Watt. On a chief, the moon increscent between two mullets; in base, a tree in leaf on a mound. Crest, a crescent on wreath, over helmet, in profile; barred for baronet or knight. Motto, *Gradatim.*

No. 95. Watson. Per chevron; three martlets—two and one, and three crescents—one and two. Crest, wolf's head erased, with neck coroneted, on wreath. Motto, *Esse quam videre.*

No. 96. Wilson. In bordure, per chevron; in chief, two mullets; in base, a crescent. Crest, mailed arm with hand and dagger erect.

No. 97. Wilson. Per chevron; three crescents—two and one.

No. 98. Willson. Per chevron; three mullets—two and one. Crest, demi-lion rampant, on wreath. Motto, *Semper vigilans.*

No. 99. Wilie. Impaled; dexter side, party per fesse; in chief, a fox passant; in base, two mullets; sinister side, parte per cross; first and fourth, three mullets—two and one; second and third, three signet rings—two and one. Crest, an hour-glass, on wreath, over helmet, in profile; plain for esquire.*

No. 100. Young. Party, per fesse; in chief three lions rampant; in fesse. Crest, a wolf's or leopard's head erased over a coronet.

No. 101. Young. A trellis. Over all a fesse; charged with three roses.

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* Arms on sinister side, possibly for Montgomeri.

Note.—The mottoes are given as they are cut on the tombstones.

In almost every instance the form of the shield adopted in the drawings is conventional, as it would have occupied too much time to have copied that given on the carvings.—G. V. D.