THE NOMENCLATURE OF THE CARPAL BONES

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One of the most striking differences between the Basel Nomenclator Anatomicus and the terminology employed in English text-books lies in the names applied to the carpal bones. It seemed therefore that it might prove of some interest to trace back to its sources the terminology of the bones and to determine the origin of the differences that became established between the German usage (which was adopted) and that of French and English authors. The inaccessibility of certain works has prevented a perfect review of the literature, but I have nevertheless been able to reconstruct the history of the terminology with sufficient thoroughness to make the presentation of the results seem worth while, if only as matters of historical interest.

In contrast with the tarsal bones, whose names, with the exception of those of the three cuneiform bones,¹ date back to classical times, the carpals were late in receiving a definite terminology. By the older authors they were either described very superficially, without any attempt at a characterization of the individual bones, or else they were numbered, usually from the radial to the ulnar side and beginning with the radial bone of the proximal row. This was the mode of designation employed by Vesalius and was the mode in general use for over a century after the publication of the "*De Fabricâ*."

In 1653, however, definite names were for the first time applied to the bones by Michael Lyser, who was prosector to Thomas Bartholin in the anatomical theater at Copenhagen and published in that year the first edition of his "*Culter anatomicus*," a work that passed through five editions and whose scope is sufficiently indicated by its subtitle, "*Methodus brevis, facilis ac perspicua*

¹ The term cuneiform was first applied to these bones by Fallopius.

artificiose et compendiose humana incidendi cadavera; cum nonnullorum instrumentorum iconibus." The work is divided into five books, the fifth being devoted to the technique to be adopted in preparing and mounting skeletons, and it is in connection with this that a nomenclature for the carpal bones is suggested. It may be of interest to quote in full the passage in which the terminology is proposed:

Carpi ossa, si *Columbi* consilium arripueris, facile metacarpo annectere poteris; is enim in purificatione ligamenta hujus intacta dimittit, ut laboriosâ operâ ea iterum colligendi supersedere possit, quod et in pedii ossibus observare consuevit, scilicet taediosum nimis ista ossa in situ naturali colligere, quod vix effectum dare licet, si non aliud sceleton exemplaris loco imitandum tibi proponas, ex quo positum ossium horum dignoscas: impossibile enim est oratione eum manifestare, cum propriis nominibus ossa ista careant. Tentabo tamen an aliquali descriptione, quo ordine conjungenda sint, indicare possim, impositis nominibus a forma eorum depromptis. Pollici subjacet cubiformi simile, sed valde inaequalibus lateribus; trapezoides rectius diceret: Indici trapezium: Medius pro fundamento habet os omnium in carpo maximum et crassissimum, in postica parte capitulum obtinens: Anulari et minimo substat os unciforme, quia interius in manu unci in modum est incurvatum, huic adjacet in latere externo aliud ossiculum, cujus latera quatuor triangula conficiunt, cuneiforme dici posset; cui iterum adhaeret minus adhuc ossiculum pisi sativi magnitudine, parte ea, quae priori objicitur, depressum. Sex illa ossa ordine recensito connectenda. Ideoque singula bis acu pertundes, ac filum sicuti per summa metacarpi capita traduces: non tamen in recta linea conjunguntur, sed obliquè nonnihil et arcuatim. Bina adhuc supersunt ossa, quorum alterum *κοτυλοειδές* appello, obsinum, quo capitulum maximi ossis recipit: alterum lunatum nomino, quia sinum nactum est semilunarem, quo eidem capitulo occurrit.

From this it will be seen that Lyser termed the first or radial bone of the proximal row the cotyloid, the second lunatum, the third cuneiforme, while the fourth he merely describes as ossiculum magnitudine pisi sativi. In the distal row the first bone is named trapezoides, the second trapezium and the fourth unciforme, while the third receives no special designation but is described as "os maximum et crassissimum, in posticâ parte capitulum obtinens."

But notwithstanding the evident popularity of Lyser's book, it was many years before his carpal terminology began to find

favor among anatomists. For so far as I have been able to ascertain, it was not until 1726 that it received any definite recognition, the anatomical text-books published before that date, and to some extent even after it, continuing to adhere to the numerical designation of the bones, or else failing to consider them individually. Thus Bidloo (1685) adopts the former plan, and Cowper (1698) in his reissue of Bidloo's plates with an English text, naturally does the same, while Verheyen (1699) follows the latter, as do also Heister (1717) in his "Compendium" and the English Cheselden in his "Anatomie of humane bodies" (1713). Both these works passed through numerous editions, that of Cheselden appearing in sixteen and that of Heister, the prototype of the modern quiz-compend, as many as twelve Latin editions, as well as in five German, four French, two English and a Russian translation. From their popularity it may be presumed that they represent fairly accurately the scope of anatomical instruction in their day, but a hint at a knowledge of the fact that names had been bestowed upon the bones is to be found only in the second edition of the "Compendium" (1727), in which in a footnote the author remarks, "There are some who give names to the ossicles of the carpus, a thing which I regard as unnecessary and useless (*supervacaneum et inutile*). If, however, they are to be distinguished and named, I think it should be by number." This, however, is not necessarily a reference to Lyser's work, since it followed the publication (1726) of other works in which a definite nomenclature was adopted.

But the lack of acceptance of Lyser's suggestions is shown even more clearly in the fact that works dealing exclusively with osteology, published between 1653 and 1733, make no mention of his nomenclature. Thus, in the "*Osteologia corporis humani*" of Senguerius (1662) the carpal bones are dismissed with little more than the statement that there are "eight bones, vary varied in form," and Palfijn of Ghent in his osteology, written in the Dutch language (1702), gives a very superficial account of them without names and in his "*Anatomie du corps humain*," published at Paris in 1726, they are numbered from the ulnar side, beginning with the distal row, and but three bones are assigned

to the proximal row, the pisiform being mentioned as the eighth bone "hors du rang." Lancisi in his editions of the "Tabulae anatomicae" of Eustachius (1714, 1722) gives no designations to the bones and in the elaborately illustrated "Osteographia" of Cheselden (1733) they are also unnamed. Several other osteological treatises, of this period, such as those of de Pauw (1615) and Guilleméau (1618), I have not been able to consult, but from what has been said above it seems clear that Lyser's suggestions had been rather barren of results until 1726, even although his book was in sufficient demand to warrant the publication of its fifth edition in 1731.

In 1726, however, two osteologies appeared which have had an important influence on the nomenclature of the carpal bones. One of these was "The anatomy of the humane bones," by Alexander Monro, the first of that name in the University of Edinburgh, in which the description of the carpus is introduced as follows:

Carpus is composed of eight, small spongy bones situated at the upper part of the Hand. Each of these Bones I shall describe with Lyserus under a proper name, taken from their figure because the method of ranging them by Numbers, leaves Anatomists too much Liberty to debate very idly, which ought to be preferred to the first Number: or, which is worse, several, without explaining the order they observe, differently apply the same Numbers, and so confound their Readers' ideas.

The names adopted by Monro are, with one slight exception, those that have become familiar to students of English textbooks and are as follows, alternative names, which he assigns to footnotes, being placed within brackets: scaphoides (naviculare), lunare, cuneiforme, pisiforme (cartilagosum), trapezia, Trapezoides, magnum, unciforme.

It will be seen from this list that while professing to follow Lyser, Monro has departed from his suggestions in certain respects. Thus he substitutes for Lyser's cotyloides the more familiar term scaphoid, giving the Latin equivalent as an alternative; instead of lunatum he uses lunare; a definite name is given to the pisiform with an alternative in cartilagosum; the Lyserian

names for the two radial bones of the distal row are transposed; and the third bone of that row is given a definite name, magnum however being used instead of the superlative maximum found in Lyser's description. Monro gives no explanation of his modification of Lyser's terms, the transposition of trapezoid and trapezium being especially noteworthy; possibly as Blumenbach has suggested, the original source was not consulted at the time of writing, the terms being applied from memory. But, however that may be, it was Monro's application of trapezium and trapezoid and not Lyser's that was adopted by later writers.

The other work of 1726 referred to above was the "*De ossibus corporis humani*" of B. S. Albinus in which an almost entirely different set of terms is used, the bones, in the order in which they are taken above, being named: *naviculare*, *lunatum*, *triquetrum*, *subrotundum*, *multangulum majus*, *multangulum minus*, *capitatum* and *cuneiforme*. This gives us the source of the B. N. A. terms, the only difference being in the use of *subrotundum* for the pisiform and *cuneiforme* for the hamatum. I have not been able to examine Albinus' "*Tabulae sceleti et musculorum corporis humani*" (1747), but in his earliest edition of the "*Tabulae anatomicae*" of Eustachius (1744) the terms used are the same as those given above.

We have thus in these works of Monro and Albinus the source of the usages adopted by English and German anatomists respectively for the nomenclature of the carpal bones. The French usage appears to date back directly to Winslow, that curious compound of keen observation and mysticism; the son of a Danish clergyman, destined to follow his father's profession, but later relinquishing theology for medicine and coming to Paris where he became a convert to Catholicism under the tutelage of Bossuet, the Bishop of Meaux, and eventually succeeded Hanault in the chair of Anatomy and Surgery in the Jardin du Roi. The names he employed in his "*Exposition anatomique de la structure du corps humain*" (1732) are based on those used by Monro. Winslow professes to quote Lyser, but in reality the terms he gives are Monro's; thus he says:

Lyserus a donné des noms à chacun de ces os. Il a nommé du premier Rang le premier Os Scaphoïde ou Naviculaire; le second Os Lunaire; le troisième Os cunéiforme; le quatrième qui est hors du Rang os pisiforme ou Lenticulaire. Dans le second Rang il a nommé le premier os Tra-pèze; le second os Trapezoïde; le troisième le Grand os et le quatrième l'os Crochu ou Unciforme.

In the description of the individual bones, however, he modifies certain of these terms, substituting 'semilunaire' for lunare and 'orbiculaire' for pisiform or lenticular and suggesting the appropriateness of the term 'pyramidal' for the trapezoid. Tarin in his "Osteographia" (1753) substitutes naviculare for scaphoïde and cuboides for cuneiforme and employs the semilunare of Winslow instead of lunare, but otherwise he follows the terminology of Monro, and Sabatier in his "Traité complet d'anatomie," which had considerable vogue, follows Monro exactly, except that he uses semilunaire instead of lunare. So too Bichât in his "Traité d'anatomie descriptive" (1801). The "Traité d'ostéologie" of Bertin (Paris, 1754) I have not seen.

It is unnecessary to trace in detail the further history of the terms in Great Britain and Germany. For the former it is sufficient to state that Monro's terms were quickly adopted, although later, probably owing to French influence, semilunare began to supplant lunare. In German text-books towards the close of the eighteenth century it became the custom to employ the vernacular in naming the various bones, these appearing as Kahn-bein, Mondbein, etc., the terms employed being, however, in all cases translations of the Latin ones of Albinus. But the synonymy is always given more or less fully, and sometimes new synonyms were suggested. Thus Soemmerring (1791) suggests triangulare as a synonym for das drei-eckige Bein, lentiforme for das runde Bein, rhomboides for das grosse vieleckige Bein and hamatum for the Hackenbein, this last term later replacing the cuneiform of Albinus, probably from the fact that this name was also a synonym for das dreieckige Bein. It may also be mentioned that Hildebrandt (3d ed., 1804) gives pyramidale as one of the synonyms for the cuneiform and os extra ordinem for the pisiform, latinizing the expression os (hors) du rang applied to it

by Sabatier (3d ed., 1791) and before him by Palfijn (1726). It is worthy of note, however, that while the German authors thus generally adopted the terminology of Albinus, Jacob Henle, one of the greatest anatomists that the country has produced, preferred a set of terms more nearly resembling those of Monro. His terms (3d ed., 1871) are as follows: Kahnbein, os scaphoideum; Mondbein, os lunatum; Pyramidenbein, os pyramidale; Erbsenbein, os pisiforme; Trapezbein, os trapezium; Trapezoidbein, os trapezoides; Kopfbein, os capitatum; Hakenbein, os hamatum.

From what has been said it is evident that the terms for the carpal bones employed in the B. N. A. are open to criticism on several counts. They do not represent the usage of the majority of those who are obliged to employ such terms; if we may allow some weight to priority, they are with one exception antedated by the Lyserian names; and two of them, *multangulum majus* and *minus*, are cumbersome and, being binominals, are little suited for the formation of derivative words. It is unfortunate that the Commission did not see fit to adopt the nomenclature used by Henle, substituting perhaps *triquetrum* for his *pyramidale*, cuneiform being thus left for application solely to the tarsal bones. We should then have had a set of terms of convenient brevity and form and recognizing the historical development of the terminology.

The following is a list of the synonyms of the carpal bones, so far as I have been able to trace them, together with the name of the author who first used them and the date. In certain cases I have not been able to determine the date exactly, owing to the fact that I have had access only to a later edition of the work in which they occur; in such cases the number of the edition consulted is inserted before the date. The bones are arranged in the usual order.

Cotyloides, Lyser (1653); scaphoides, Monro (1726); naviculare, Albinus (1726).

Lunatum, Lyser (1653); lunare, Monro (1726); semilunare, Winslow (1732).

Cuneiforme, Lyser (1653); triquetrum, Albinus (1726); cuboides, Tarin (1753); triangulare, Soemmerring (1791); pyramidale, Hildebrandt (3d ed., 1804).

Pisiforme, Monro (1726); cartilagosum, Monro (1726); subrotundum, Albinus (1726); os hors du rang, Palfijn (1726); orbiculare, Winslow (1732); lenticulare, Winslow (1732); lentiforme, Soemmerring (1791); os extra ordinem, Hildebrandt (3d ed., 1804); rectum Kirby (in Monro 4th ed., 1828).

Trapezoides, Lyser (1653); cubiforme, Lyser (1653); trapezium, Monro (1726); multangulum majus, Albinus (1726); rhomboides, Soemmerring (1791); rhomboideus, Hildebrandt (3d ed., 1804).

Trapezium, Lyser (1653); trapezoides, Monro (1726); multangulum minus, Albinus (1726); pyramidale, Winslow (1732); magnum, Monro (1726); capitatum, Albinus (1726).

Unciforme, Lyser (1653); cuneiforme, Albinus (1726); hamatum, Soemmerring (1791).

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- CHESELDEN, WILLIAM 1713 *The anatomy of the human body*, London. Other editions appeared in 1722, 1726, 1730, 1740, 1741, 1756, 1773, 1778, 1784 and 1792, and apparently two others between 1756 and 1773, that of 1792 being the thirteenth. Two American editions were brought out in Boston 1795 and 1806, and a German translation at Göttingen in 1790.
1733 *Osteographia or the anatomy of the bones*, London. Later editions appeared in 1811, 1813, 1822.
- COWPER, WILLIAM 1698 *The anatomie of humane bodies*. Oxford. Choulant gives 1697 as the date of this, but the copy I examined was dated as above. A second edition appeared from Leyden in 1737, and a Latin edition in 1739 and again from Utrecht in 1750. This work was the cause of a bitter controversy between Bidloo and Cowper on the ground that the latter had used Bidloo's plates without sufficient acknowledgment. In his advice to the reader he does state, however, in reference to the plates, "These figures were Drawn after the Life, by the Masterly Painter G. de Lairese, and engrav'd by no less a Hand, and Represent the Parts of Humane Bodies far beyond any Exstant; and were some time since Publish'd by Dr. Bidloo, now Professor of Anatomy at the University of Leyden."
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- SABATIER, M. 1774 *Traité d'anatomie descriptive*. Paris. Other editions were Paris 1781, 1791.
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- SOEMMERRING, SAMUEL THOMAS 1791-1796 *Vom Baue des menschlichen Körpers*. Frankfort. A second edition appeared at Frankfort 1800, and a third at Leipzig 1839-1845. A Latin translation was also published at Frankfort 1794-1801, and one into Italian at Cremona 1818-1823.
- TARIN, M. 1753 *Ostéographie ou description des os de l'adulte, du foetus, etc.* Paris.
- VERHEYEN, PHILIP 1699 *Corporis humani anatomia*. Leipzig. This was the text-book most in favor in the early part of the eighteenth century, until it was replaced by Heister's *Compendium*. I find a reference to a quarto edition, Louvain 1693, but this I have not seen. Other editions were Brussels 1710, Cologne 1712, Naples 1717, Leipzig 1718, Brussels 1726, Amsterdam 1731, Leipzig 1731. A German translation was published at Leipzig 1704 and again in 1714, and one into Dutch appeared at Brussels in 1711.
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