

LECTURES ON THE VARIETIES IN THE MUSCLES OF MAN.

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THE MUSCLES OF THE UPPER LIMB.

ON THE MUSCLES OF THE FOREARM AND HAND.

IN considering the irregularities in the muscles of the forearm and hand, I will first dispose of the palmaris longus, which is, perhaps, more subject to non-development as well as to irregularities, and to a greater variety of irregularities, than any other muscle in the body. Indeed, it varies in almost every conceivable manner. It is often absent altogether. It is sometimes double, or three muscles are present. The usual disposition of muscle and tendon may be reversed, the latter being nearest the elbow. It may arise from the coronoid process of the ulna, or from the radius in the neighbourhood of the origin of the flexor sublimis digitorum, or displacing a part of that muscle; or it may be joined by slips from either the radius or the ulna. It may arise from, or derive slips from, either of the adjacent muscles—the flexor carpi ulnaris, the flexor carpi radialis, the pronator teres, or the flexor sublimis digitorum. It may be lost in the fascia of the forearm, or be attached to the pisiform bone. It may take a deep course, running to the ulna or to the carpal bones. It may blend with the flexor sublimis or the flexor profundus digitorum, with the flexor carpi ulnaris, or the exterior ossis metacarpi pollicis; or it may run into the muscles of the little finger. In one instance, it arose from the radius and gave off the short flexor of the little finger. Often it varies on the two sides, being present in one arm and absent in the other, or having different connections in the two arms.

This variability is in accordance with the unimportant nature of the functions of the muscle, which can be spared without much detriment. It is in accordance, also, with the instability of the muscle in the lower animals, in the greater number of which it is absent.

The several muscles on the flexor aspect of the forearm and hand are the produce of the segmentation and concentration into groups of the elements of a pronator-flexor mass, the fibres of which are directed downwards with some obliquity towards the radial side, and which is seen in a comparatively simple form in Urodela.^{*} The several muscles lie nearly parallel, harmonise in their action, and are very variable in lower animals. We are not surprised, therefore, that they present many examples of imperfect segmentation, and of want of due concentration within their respective bounds.

One of the number, however, the flexor carpi ulnaris, is an exception to this remark, and presents a striking contrast to the palmaris longus in the importance and definition of its action, in the regularity of its presence, and the uniformity of its disposition in the lower animals, as well as in its immunity from varieties in Man. Indeed, an occasional extension to the fourth metacarpal bone, noted by Wood, and a prolongation to the metacarpo-phalangeal joint of the little finger, noted by Curnow, are the only anomalies that I have seen recorded.

The pronator teres presents in its varieties many instances of imperfect limitation and segmentation from surrounding muscles. Thus, its origin sometimes extends up the humerus, reaching to the supracondyloid process in some of the instances in which that process has been present. Indeed, Gruber associates these two anomalies—the supracondyloid process, and the high, and not infrequently separate, or third, origin of the pronator teres—with one another. They are, however, sometimes dissociated, the one occurring without the other. Occasionally the extended origin of the pronator teres is blended with the brachialis anticus; or it derives a band from the biceps, or the bicipital fascia, or the intermuscular septum. The high origin has, in some instances, been separated from the remainder of the muscle by an irregular branch or branches of the brachial artery, and even by the main trunk with the median nerve, passing between them. The pronator teres is likewise sometimes blended with the muscles below by slips to

^{*} *Observations in Myology*, pp. 37 and 170.

the palmaris longus,* the flexor carpi radialis, the flexor sublimis, and the flexor longus pollicis; or by fusion of its coronoid origin with the coronoid origins of the last two muscles. This origin is sometimes absent, or, as it would seem, relegated to one of those muscles. On the other hand, it is sometimes double. It has, moreover, in several instances, been found separate from the rest of the muscle; and, in some of these cases, it is noted that it was inserted into the radius at a higher point than the remainder of the muscle.†

The flexor carpi radialis is found occasionally to range, at both ends, beyond its normal attachments. Above, it may acquire origins from the coronoid process of the ulna, from the ulna below the coronoid process, from the oblique ridge on the radius, from the tendon of the biceps, or from the deep surface of the semilunar fascia. It may also be blended with the pronator teres, or with the flexor sublimis digitorum; and it may receive the coronoid slip instead of the pronator teres. Below, it may be inserted into the trapezium, the scaphoid bone, and the annular ligament, as well as into the second metacarpal bone. It has been found not to extend beyond the two carpal bones just mentioned. On the other hand, offsets from its tendon have been traced to the third, and even to the fourth, metacarpal bone. These offsets to the carpus and the metacarpus, like the similar extension of the flexor carpi ulnaris to the fourth metacarpal, are remnants of the primitive connection of the pronator-flexor mass with all the carpal and metacarpal bones, as well as with the bones of the forearm.

Examples of the persistence of this connection are afforded by the instances of the flexor carpi radialis brevis, described by Fans, Gruber,‡ Wood,§ and others. This anomalous muscle, when present, arises from the palmar surface of the radius, above the pronator quadratus, external to the flexor longus pollicis and beneath the flexor sublimis digitorum, and is inserted into the scaphoid bone, the trapezium, or the os magnum, or into the base of the third or of the second metacarpal bone, or the annular ligament, or the deep process of the annular ligament, or to the deep process of the annular ligament and the os magnum. Zaaijer traced it from the lower end of the radius to the carpal ligament, the trapezium, and the second, third, and fourth metacarpals. Macalister|| found the same muscle deriving a second origin from the internal condyle, so exemplifying the retention of superficial as well as of deep relations.

In each of these forms the muscle is evidently a remnant of the primitive deep stratum of the pronator-flexor mass, which in Urodela^s covers the bones of the forearm, the carpus, and the metacarpus, and is attached to most or all of them. In Man, the components of this mass are normally segmented into the flexor profundus digitorum, the flexor longus pollicis, and the pronator quadratus, avoiding the carpus and the metacarpus altogether. We are not surprised to find this disposition now and then departed from, and to meet occasionally with some elements of the stratum which present a resemblance to the primitive form, and which stray upon, and attach themselves to, the carpus and the metacarpus. We should, however, scarcely have expected to find so much definiteness in this variation as the muscle in question presents. It is a little remarkable to meet with so much order in this comparative disorder. We should rather have anticipated, in accordance with what we usually find in anomalous muscles, that bundles would have been found more irregularly passing between the several bones with a direction from above downwards and towards the radial side, than that they should be commonly arranged in the form of a definite muscle arising at a given point in the radius, and inserted into one or other of the carpal or metacarpal bones near the radial side of the hand, as was the case in each of the several instances in which this flexor carpi radialis brevis has been observed.

This regularity in the anomalous muscle is the more remarkable, because the direction of the fibres of the muscle does not quite accord with that of the deep layer of the primitive pronator flexor mass, which is from above downwards and to the radial side¶—that is, less in the axis of the limb than the flexor carpi radialis brevis; and further, there is no distinct corresponding muscle among the lower animals, the nearest resemblance to it being the deep head of the flexor carpi radialis described by Wood** as arising in Monotremes from the radius in the

^{*} In some cases, the palmaris longus derived its origin entirely from the pronator teres. (Macalister, *Journal of Anatomy*, xi, 9.)

† Macalister, *loc. cit.*; and Bradley, *BRITISH MEDICAL JOURNAL*, 1868, p. 478.

‡ Under the name "cubito-carpeus" and "radio-cubito-carpeus" (*Mélanges Biologiques de l'Acad. Imp. de St. Petersburg*, 1859, iii, p. 184; vi, 493; and 1871, viii, p. 147). A similar muscle had been previously described by Fans (*Bull. de la Soc. Anat. de Paris*, 1851).

§ *Journal of Anatomy and Physiology*, i, 58; and *Proceedings of the Royal Society*, 1866.

|| *Journal of Anatomy and Physiology*, v, 33.

¶ This, it may be observed, is the direction of the fibres of the cubito-carpeus of Gruber.

** *Journal of Anatomy*, i, 58.

situation occupied by the flexor longus pollicis in ourselves. The cause, therefore, of the occurrence of this muscle, with a certain regularity and similarity of form and disposition in the several instances in which it has been observed, is not apparent. Its muscular portion occupies the place of a part of the flexor longus pollicis; and it must have the effect of diverting to the flexion of the wrist some of the force which is usually employed in acting upon the last phalanx of the pollex.

A similar instance of derivation from the digital flexors is furnished by a muscle described in *Guy's Hospital Reports*, vol. xvi, as arising from the oblique line of the radius, just below the flexor sublimis, and inserted into the annular ligament.

The flexors of the digits rival the palmaris longus in the frequency, though not in the extent, of their irregularities. Neither of them is ever, so far as I know, absent; but their component fibres are variously disposed in different persons. Indeed irregularity appears to be rather the rule than the exception. This accords with the great variety of their disposition in lower animals. In Man, they are, in the normal state, more removed from the simple form than in any other animal, and are more distinctly divided into the three parts—the flexor sublimis, flexor profundus, and flexor longus pollicis. Even in Man the division and specialisation is scarcely attained; for the coronoid origin of the flexor pollicis adds somewhat of a pronator function to the special flexor office of that muscle, and remains as a connecting link with the other muscles, which is frequently observed to be extended. That is to say, we often find that the flexor longus pollicis has failed to acquire the human feature of nearly complete isolation, and remains more or less blended, by means of its coronoid origin or by other slips, with the pronator teres, or the flexor profundus, or the flexor sublimis. Sometimes it is connected by slips with both of these flexors; and sometimes it is united to one or other of them, or to the pronator teres by an origin derived from the inner condyle of the humerus. Sometimes it is united with the indicial part of the flexor profundus, which in such cases is commonly more separate than usual from the rest of that muscle; and sometimes a slip of the flexor longus pollicis runs on into the indicial lumbricalis. Or there may be a separate additional muscle derived from the other flexors or one of them—"an accessorius ad flexorem pollicis longum"—which may pass to the flexor of the thumb, or may be divided between it and the flexor tendon of the index finger. Macalister found the coronoid origin in one instance large and supplanting the coronoid origin of the pronator teres.

The coronoid part of the ulna, indeed, like the internal condyle of the humerus, is a common starting point for the several muscles of this region; and any of the muscles descending from the elbow may retain their connection with either or both of these bony points. The pronator teres and the flexor digitorum sublimis usually arise from both. The flexor carpi ulnaris may be said to do the same. We have found that the flexor carpi radialis and the palmaris longus occasionally retain the coronoid in addition to the condyloid origin; and the flexor longus pollicis and the flexor profundus digitorum occasionally retain the condyloid in addition to the coronoid origin. It may be said, indeed, that the coronoid is a more common starting point than the condyle; for the deeper layer of muscles—the flexor pollicis and the flexor profundus—are usually so segmented as to be excluded from the condyle, and only occasionally remain in connection with it; whereas three of the members of the superficial or condyloid layer of muscles commonly retain their connection with the coronoid process, and the other two do so as a variety. This clinging of the muscles to the common starting points—to the coronoid process more particularly, requiring, as it were, a forcible segmenting effort in development to separate them from it and from one another, and often withstanding that effort—affords the key to the explanation of most of the muscular irregularities in this region.

The flexor sublimis and the flexor profundus digitorum present, as we might anticipate, numerous and various examples of imperfect segmentation. Comparative anatomy indicates the profundus to be the basal or fundamental muscle, and the sublimis to be segmented from it; and the connection between the two in Man is often maintained by larger or smaller portions or slips passing from the one to the other. The most frequent form of union is by means of slips passing from the coronoid origin of the sublimis to the profundus, so illustrating the remark just made respecting the coronoid process as the meeting point of the several muscles of this region. Sometimes the cleavage of the parent mass takes place in such a way as to leave an intermediate or accessory coronoid portion, or muscle, which connects itself with both the sublimis and the profundus digitorum, and, perhaps, in addition, with the flexor pollicis. Thus it resembles, as remarked by Wood, the chief bulk of the combined flexor muscles in the carnivora and some other Mammalia.

I have already mentioned the blendings of the flexor profundus with

the flexor longus pollicis, whereby the former muscle derives fibres from the radius; and it now and then has a direct slip from the radius. Thus the tendency of the irregularities is to increase the range of attachment of this muscle. I have not observed any instance in which it was deficient or contracted within its proper area; whereas in the case of its segmented or supplemental coadjutor—the flexor sublimis—the area of attachment and of distribution is not unfrequently curtailed. For instance, either the radial or the coronoid origin of the flexor sublimis may be wanting. It is interesting, also, to note that the tendon to the little finger is often wanting, or it may be present on the radial side only, which is owing to a failure in the segmentation of the superficial muscle from the flexor profundus with regard to this finger. An interesting illustration of this view is furnished by an example given by Macalister,* in which a small muscle detached from the flexor sublimis and constituting the division to the little finger was inserted into—in other words, was not fully segmented from—the tendon of the flexor profundus to that finger. It should be observed, however, that the place of this absent division of the flexor sublimis is sometimes supplied by a muscle arising from the annular ligament, or from the palmar fascia, or by the lumbricalis.

On the other hand, the relations of the flexor sublimis may extend beyond—that is, may not be limited to—its normal area. Mr. Beswick-Perrin† found a double coronoid origin on each side, the ulnar artery passing between them. It may have a partial origin from the pronator teres; and it may send a slip to the palmar fascia, or, as observed by Turner,‡ it may send a slip, beneath the palmaris longus, to the supinator longus. The excesses in this muscle are, however, rare in comparison with the deficiencies.

In estimating the nature of the varieties of the lumbricales, it is necessary to bear in mind that they are segments from the sides of the divisions of the flexor digitorum; that there is, therefore, where they are in their full complement, as in the Scinc, one on each side of each division—that is, one on each side of the several digits. One of the forms of irregularity in Man consists in the retention, on the ulnar side of the digit or digits, of some of the bundles which, for some not very obvious reason, are obsolete, or are concentrated upon the radial side in most Mammals. This irregularity happens most frequently in the third interspace, the third lumbricalis being divided, and one portion passing to the ulnar side of the third finger, while the remainder is directed, as usual, to the radial side of the fourth finger. A similar variety may occur in the interspaces between the other fingers. Occasionally, also, the muscular fibres in the interspace are concentrated upon the ulnar side, the muscle of the radial side being abortive. This variety also is found most frequently in the third interspace; but not exclusively, for the fourth lumbricalis sometimes passes to the ulnar side of the fourth finger.

I have said that the lumbricales are segments from the sides of the divisions of the flexor digitorum. They are usually found only upon the flexor profundus, their office being apparently to regulate and give steadiness to the terminal phalanges at the same time that these distal bones are being acted upon by the tendons of the flexor profundus. Still, bearing in mind the relations of the flexor sublimis and the flexor profundus to one another, and remembering that the flexor sublimis and the flexor longus pollicis are parts of, or detachments from, the flexor profundus, we are prepared to find that the lumbricales occasionally present relations to one or other of these detachments. Thus, in the right hand of an idiot, Carver|| found that the lumbricales consisted of a large fleshy mass arising from the front and sides of the tendons of the flexor profundus digitorum, completely concealing them. This mass ended in five tendons, four of which had the ordinary distribution; whereas the fifth joined the radial side of the flexor sublimis of the ring-finger. Sometimes the relation of the lumbricales to the flexor sublimis and the flexor pollicis is presented in the forearm; and this is more frequent in the case of the first lumbricalis than of the others. Thus, the first lumbricalis is sometimes derived from, or receives slips from, the flexor sublimis or the flexor longus pollicis, and more particularly from the coronoid origins of these muscles¶—that is, from the common centre of origin of the flexor muscles. In one instance, men-

* *Journal of Anatomy*, i, 318.

† *Medical Times and Gazette*, December 14th, 1872.

‡ *Transactions of the Royal Society, Edinburgh*, xxiv, 150.

§ I use the expression "concentrated," upon the one or the other side, because the fibres often may be seen to arise from the two approximated sides of contiguous tendons, and evidently represent segments from the two sides, which are combined or concentrated in the one muscle. This is sometimes rendered more apparent from the fact that the fibres derived from the ulnar sides of the adjacent tendons occasionally arise from them as separate bundles, forming "additional heads".

|| *Journal of Anatomy*, iii, 260.

¶ In one of these cases, mentioned by Wood, the first lumbricalis, arising from the coronoid origin of the flexor sublimis, sent a slip to the indicial tendon of the flexor sublimis. (*Proceedings of the Royal Society*, 1866, p. 235.)

tioned by Henle, the first lumbricalis extended to the radius near the origin of the flexor pollicis.

The primitive connection of the flexor muscle with the interossei is in like manner shown by the instance recorded by Wood of a connecting slip between the first lumbricalis and the first palmar interosseus.

The especial liability in the fifth finger to failure in the development of the segmented appendages of the flexor muscle, to which I have before alluded, is shown by the occasional absence of the fourth lumbricalis, as well as by the occasional absence, before mentioned, of the flexor sublimis of this digit. Several instances of this have been recorded. It is probable that the other lumbricales also are sometimes wanting.

The pronator quadratus is now and then absent, and is occasionally in two strata; and it sometimes illustrates the primitive relations of the pronator-flexor mass by sending a prolongation upon the carpus and metacarpus, which may blend with the muscles of the thumb.*

In the ball of the thumb, the most frequent irregularities are in the abductor pollicis, which sometimes extends upon the styloid process of the radius, and comes into connection with the extensores carpi radiales and the extensors of the thumb, deriving origin from them. It is sometimes united by slips with the opponens pollicis; and it is not infrequently double.

The flexor brevis pollicis is often united with the adductor, and the lower portion of the latter is liable to variation. It is sometimes separated from the upper part, forming a "transversus manus," the similarity of which to the transversus pedis is rendered more marked in the instances, now and then occurring, in which it takes origin from the fourth and fifth metacarpals, as well as from the third. This lower part is sometimes absent; sometimes it is divided into two or more parts.

On the ulnar side of the hand, the abductor minimi digiti, like the abductor pollicis, is sometimes found spreading up the forearm, but it usually does so on the flexor rather than on the extensor aspect. It extends to variable distance upon the fascia of the forearm, and has relations, more or less intimate, with the flexor carpi ulnaris, the palmaris longus, and the annular ligament. Sometimes it is joined by a slip from one of these sources. Occasionally it is directed more dorsally, and is connected with the posterior annular ligament or with the extensor carpi ulnaris. The flexor brevis minimi digiti also sometimes takes a partial origin from the palmaris longus, or from the fascia of the forearm, or the flexor carpi ulnaris, or the ulna; and there is sometimes an accessory portion passing from the unciform bone to the first phalanx of the little finger. This was the case in the Bushwoman dissected by Flower and Murie; and in that instance the opponens minimi digiti was largely developed, and was in two portions.†

The account of the irregularities of the interosseal muscles I will leave till I come to speak of those in the foot.

On the dorsum of the forearm, the blending of the superficial with the deep muscles is not so frequent a source of irregularity as it is on the palmar aspect, because the components of the two layers are more separate from one another, and are more distinct in their action, as well in the direction of their fibres. This, at least, is the case with the muscles on the radial side; and we obtain more decided evidence from these muscles than we did from the flexors that the liability to imperfection of segmentation is proportionate to the harmony of action of the several muscles—in other words, that it is greatest where it will least interfere with the function of the parts.

For instance, the extensores carpi radiales effect one movement and act together. No great advantage is gained by their separateness. In many of the lower animals they are not separate; and we accordingly find that in Man they are very often blended. The modes of their blending correspond in some respects with those of the superficial and deep flexors of the fingers. Sometimes slips pass from one to the other, or they are interchanged between the two muscles. Sometimes their two tendons are not separate; or the two muscles are united, and their tendons are separate.‡ Sometimes the cleavage has taken place in such a manner as to leave an intermediate portion more or less connected with both of them, and inserted into the second or third metacarpal. Moreover, the longus, in some cases, sends a slip to the third metacarpal; or the brevis sends a slip to the second metacarpal; or the two tendons cross on their way to their termination at the metacarpals, with which they are respectively not connected in the normal disposition; or a slip from the longus crosses beneath the brevis on its way to the ulnar side of the third metacarpal. Now and then there is an "accessorius" portion inserted into the base of the first metacarpal.

Other varieties also occur. There may be too much cleavage. The longus may have two tendons both inserted into the second metacarpal; or the brevis may have two tendons both inserted into the third metacarpal. The cleavage may extend up either muscle, forming an accessory muscle connected with either; and this accessory muscle or the cleft tendons may extend beyond the usual range. Thus the brevis may be inserted by a slip, or by means of an accessory muscle, into the fourth metacarpal, as well as into the third; and the longus may be inserted into the metacarpal of the pollex, as well as into that of the index finger,* or it may send a slip into the abductor pollicis; and either longus or brevis, or both, may send slips to the posterior annular ligament; and slips have been traced on into the interossei.

The supinator longus has now and then a muscular connection with the extensor carpi radialis longior, but less frequently than with the biceps, which indicates that in its action it is associated with the latter rather than with the former. I have mentioned its occasional continuity with the deltoid. It has been absent in both arms; but its irregularities are more often in the direction of excess. Thus it is sometimes double in its muscular or in its tendinous part, or in its whole length, or it receives an accessory slip from the humerus; and its insertion sometimes extends to the scaphoid bone or the trapezium.

The extensor digitorum often receives from the extensor carpi ulnaris a slip which passes to the tendon of the little finger, and which is the counterpart of a slip still more frequently received from the peronei by the extensor digitorum pedis. The extensor digitorum also now and then, though much more rarely, shows evidence of imperfect segmentation from the radial extensors and from the members of the subjacent stratum by deriving slips from them, or sending slips to them. Such connections with the extensor secundi internodii and the extensor indicis, as well as with the extensores carpi radiales, have been described by Wood. Its more frequent irregularities are, however, in the direction of over-segmentation. Thus each of its tendons is sometimes continued upwards into a separate belly. Or there may be a separate muscle to certain of the fingers, as to the index or the third. Or there may be a supernumerary muscle or a supernumerary tendon to certain of the fingers. It is most common in the case of third and fourth fingers. The tendons derived from these supernumerary muscles always, or usually, pass into the ulnar side of the normal extensor tendons; and in the instances in which they cross either of the normal tendons on the way to their destination, they pass on the deeper aspect of those tendons. Such supernumerary muscles are regularly present in some of the lower animals, and constitute a series to which I have given the name of extensor secundus or intermedius,† the latter term indicating that they are intermediate between the extensors of the superficial and those of the deep stratum. They resemble the supplementary slips from the peronei in the lower limb.

The extensor minimi digiti may be regarded as a standing, or regular example, of such a supplementary muscle. It may be said to correspond accordingly with the aberrant, though frequently present, slip from the peroneus tertius; and it corresponds still more closely with the representative of that muscle in the lower animals which has no connection with the metatarsus, but runs straight from the fibula to the fifth toe, or to the extensor tendon of that toe. Its character as a supplementary muscle is evinced by its instability and its many varieties. Thus, sometimes it is wanting, and sometimes it splits into two tendons, which reunite into one; or (and this occurs in ten per cent.), the two may remain separate and pass to the fourth and the fifth fingers. In this case the tendon to the fourth finger follows the course I have mentioned as that taken by the tendons of the other supplementary extensors, viz., it passes beneath the division of the extensor longus to the little finger, and joins the ulnar side of the extensor longus to the ring finger. Sometimes there are two tendons, or even three, passing to the little finger.‡ Sometimes the tendon traverses the same channel as that of the extensor digitorum. Sometimes it occupies a separate channel, and sometimes it takes different courses in the two hands of the same subject. The extensor carpi ulnaris is often, as just mentioned, imperfectly segmented from the extensor digitorum; and it is sometimes double, both portions passing to the fifth metacarpal.

In my *Observations in Myology*, and in my lectures last year, I have given the name "supinator manus," to the extensor ossis metacarpi pollicis, because this muscle is often in man attached to the trapezium as well as to the metacarpal bone; and in other mammals it is usually, and often exclusively, inserted into the carpal bones. It is sometimes

* J. Beswick-Perrin found a prolongation of part of such a slip to the outer head of the flexor brevis pollicis.

† *Observations in Myology*, p. 182; *Journal of Anatomy*, ii, 307.

‡ Mr. J. Beswick Perrin remarks (*Medical Times and Gazette*, December 7th, 1872), "that the single tendon of the extensor minimi digiti is less frequent by far than the double tendon, and the latter is more frequent than the treble or further differentiated tendon."

* Hallett, *Edinburgh Medical and Surgical Journal*, 1848, p. 15.

† *Journal of Anatomy*, i, 202.

‡ In one case (*Journal of Anatomy*, iii, 261), there was a single muscle with three tendons—one to the radial border of the second metacarpal, and the others to the contiguous borders of the second and third metacarpals. In short, there may be every variety of coalescence from union by slight slips to complete fusion.

extended in man to the abductor pollicis, and the opponens pollicis, which thus derive origin from it, and are continuous with it. It may thus terminate in three portions, passing respectively to the scaphoid bone, to the metacarpal bone and to the abductor, or opponens, pollicis. Sometimes its fibres, or some of them, run over the radial edge of the forearm into the anterior annular ligament. Henle and Wood have found the outer fibres of the muscle separated from the remainder, and arising from the fascia which lies over the supinator radii longus and the extensores carpi radiales. This interesting variety brings the muscle into relation with the superficial strata of the radial sector, and reminds us that, whereas, in the upper limb those strata form the supinator and the radial extensors, yet, in the lower limb, they pass into the tibialis anticus, the tendon of which, at any rate, is the serial homologue of the tendon of the extensor ossis metacarpi. The tendon derived from their superficial fibres in Wood's case, passed to the front of the outer border of the base of the first metacarpal; and extraction upon it showed that it had a flexor and abductor, rather than an extensor action.*

In the human forearm, as ordinarily constructed, the extensors of the thumb are definitely segmented in such a manner as to divide between them the work of moving the several bones of the thumb, the insertion of each being restricted to the base of the particular bone assigned to it; and this arrangement is specially human. We have already seen that it is often deviated from by the extensor ossis metacarpi failing to be restricted to the base of its bone, and indicating a tendency to the animal type by retaining a connection with the carpus. The same muscle shows also, in some instances, the lack of concentration, by spreading in the opposite direction, viz., downwards, upon the metacarpal bone, and being attached, by one or two tendons, to the middle of the shaft of that bone. In some of these cases the want of proper concentration may be associated with, or regarded as, a want of proper subdivision, forasmuch as this disposition is liable to be accompanied by an absence of the special extensor primi internodii pollicis.

Indeed, the developmental processes often fail to evolve the last-named muscle, which is found in no other animal besides man, and for the evolution of which the stimulus of utility cannot be a very cogent influence, judging from the little movement of the first phalanx of the thumb, which we are able to effect. It is absent in about five per cent., and in about the same proportion its muscular part is united with that of the extensor ossis metacarpi. When thus united, it commonly consists of a delicate slip only, detached to the first phalanx from the extensor ossis metacarpi. In some instances it has been found inserted, wholly or partially, into the metacarpal bone; in more it has sent a slip to the terminal phalanx. Now and then it sends a slip to the extensor secundi internodii, and occasionally one to the extensor indicis. In two instances† it was a mere tendinous slip, connecting the styloid process of the radius with the first phalanx; and in one* it was blended with the extensor ossis metacarpi, its tendon being divided at the wrist into three, one to the scaphoid bone, and one to each of the phalanges of the pollex.

The extensor secundi internodii is not free from the like irregularities. Though rarely absent, it often wants its proper isolation, or concentration upon its phalanx. It frequently sends a slip to the first phalanx, or it may send a slip to, or receive one from, either the extensor ossis metacarpi, or the extensor indicis, or the extensor communis digitorum. Sometimes it is a double muscle.

The extensor indicis is occasionally absent, and, like some of its neighbours, especially the extensor minimi digiti, it is liable to irregularities from excess. Thus its tendon is sometimes double, both portions passing to the index finger; or one portion passing to the middle finger; and there may even be a slip to the fourth finger. Two tendons have been given to the middle finger, and one to the index; or there may have been two muscles as well as two tendons. Sometimes the division to the middle finger is separate in its whole length, and terminates at the first phalanx. There may also be a separate muscle to the fourth finger, arising from the ulna below the extensor indicis; and each of these short extensors to the third and fourth fingers has been seen to give two tendons to its finger. Curnow* found an extensor annularis arising from the ulna, near the extensor indicis, and passing to the ulnar side of the extensor tendon of the fourth finger.

Another variety of these multiplications is furnished by a muscle occasionally found between the extensor secundi internodii pollicis and the extensor indicis, and dividing to each of the adjacent digits, so constituting an "extensor pollicis et indicis." Its exact destination varies, being sometimes to the tendons of these digits, and sometimes to one or

other of their phalanges. In one instance, described by Wood,* its origin was more superficial than usual, being, not from the ulna, but from the intermuscular septum between the extensor communis and the extensor ossis metacarpi pollicis, so that it formed an intermediate muscle, segmented from between the superficial and deep strata of muscles, and resembling the other intermediate muscles, which I have before described. Its insertion into the pollex was through the tendon of the extensor secundi internodii; and its indicial tendon joined the outermost of the tendons of a double indicator, to be inserted into the base of the first phalanx.

The numerous irregularities just mentioned are, perhaps, to be in part explained by regarding this deep stratum of muscles as a broken, or much modified series, having its representative in the lower limb in the more simply and regularly disposed extensor brevis, better called extensor profundus digitorum; and that, being more divergent than that muscle from the simple primitive form, its components are more liable to irregularities in their development. Their greater divergence from the simple type is apparently for the purpose of concentrating a greater variety of motor power upon the pollex and the index digits than is necessary in the corresponding parts of the lower limb, and the exact manner in which this is done is scarcely stamped with precision upon the formative mould, probably because such precision, though on the whole advantageous, and therefore evinced in the best-formed limbs, would not here conduce to utility, in a sufficiently definite and positive manner, to render it fast binding upon the developmental processes.

The view that the members of this deep stratum of the forearm, or some of them, are to be regarded as representatives of the extensor profundus in the foot, is confirmed by certain other irregularities, which constitute a closer link of resemblance to that muscle, forasmuch as they are remnants of muscular elements arising lower still in the limb than any of those yet mentioned. Thus the extensor indicis was found by Moser to be replaced by a muscle arising from the carpal ligaments, and inserted into the dorsum and radial side of the second phalanx. Various specimens have been described by Wood and others, of short muscles, arising from the back of the carpus, and sometimes of the metacarpus, in which latter situation they have been commonly blended with the interossei, and have appeared like extensions of these muscles, which, by the way, is the case with the extensor brevis, naturally found here in some animals. The short supernumerary extensors arising from the carpus have been variously disposed. Most frequently they joined the ulnar sides of the extensor tendons of the third or fourth, or third and fourth fingers. Sometimes they joined the extensor tendon of the index finger, and in one of Wood's cases they were inserted on each side of the fifth digit with the interossei and the abductor respectively.

* *Proceedings of the Royal Society*, 1868, p. 512.

THE MONKWEARMOUTH AND SOUTHWICK DISPENSARY has just been opened. The following have been appointed the medical officers: Luke Blumer, M.D.; James Smith, L.R.C.P.Ed.; William H. Dixon, M.D.; Robert Ayre Smith, M.D; and George Bolton, L.R.C.P.Ed.

MEDICAL TREATMENT AT SEA.—*Frazer's Magazine* points out that the mortality return owes its origin not so much to any desire to ascertain the cause of death, as to the circumstance that the Government administer to the unpaid wages and effects of the deceased. The function of executor is found to be rather profitable, as the State realises some £8,144 a year, after discharging all claims. Instead of applying this sum to the remission of taxation, it might, with equal justice and humanity, be applied to the reduction of mortality at sea. This might be done by appointing medical officers to attend the shipping offices when crews are being discharged, to ascertain and certify the causes of death of any of their number, and to advise the captain and mates on the medicinal and other treatment which should have been adopted. The value of such advice was recently illustrated, when a high official of the Board of Trade was examining a very careful statement in the 'official log', signed by the captain and mate, of the sickness, treatment, and death of a seaman. The unusual care exhibited in the statement had first attracted attention, which was sustained by the apparent humanity exercised. A medical friend, however, dropping in at the moment, pointed out that the captain had both mistaken the malady and had administered doses such as would have killed at least three healthy men, so that there was no wonder the patient had died. This counsel came, however, too late, for the captain and mate had already gone to sea again, under the impression that they had treated the case wisely, and prepared to poison in the same way any other seaman who exhibited somewhat similar symptoms. Such cases of ignorance are believed to be not uncommon.

* *Proceedings of the Royal Society*, 1866, p. 236.

† Wood, *Proceedings of the Royal Society*, 1868, p. 518.

‡ Carver, *Journal of Anatomy*, ii, 260.

§ *Journal of Anatomy*, vii, 307.