THE PRINCIPLES OF ANATOMY

AS SEEN IN THE HAND

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TO MY WIFE

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PREFACE TO SECOND EDITION

No excuse is made for the appearance of this—the second—edition of the " Principles of Anatomy as seen in the Hand." The first edition was prepared during the troublous times of the 1914 war. It was written, in the intervals of military service and air raids, because the many war injuries that involved the functional use of the hands in civilian life formed at that time an outstanding problem in the passage of discharge from military service to peace time civilian employment. It seemed obvious that no proper assessment of military disablement could be translated into terms of civilian disability unless the functional anatomy of the hand was properly realised. For this reason a series of lectures was given as a part of the course of instruction to officers of the R.A.M.C. at the Special Military Surgical Hospital, Shepherd's Bush. At the outbreak of the present war the first edition was out of print and was already twenty years old, and in some regards many years out of date. It seemed obvious that if the book was to have a continued existence into the corresponding phase of the present war, no mere reprint of the original text would be satisfactory. A new edition, thanks to the enterprise of Messrs. Baillière, Tindall and Cox, was therefore embarked upon. As was the case with the first issue in 1920, the new edition has been prepared for the most part during the intervals between routine duties and air-raid signals. In order to bring the work more nearly up to date six new chapters have been added and the original illustrations have been supplemented by the addition of twenty new figures in the text. In addition to that, the whole of the original text has been revised. It is hoped that one new feature of the book—a chapter bibliography—will be useful to the

student who wishes to proceed further in his studies. It is not claimed that this bibliography is in any way complete, but a real attempt has been made to include references to fundamental sources, no matter if these are of the sixteenth century or of the last decade.

F. W. J.

MANCHESTER,
July, 1941.

PREFACE TO FIRST EDITION

THIS volume owes its inception to several circumstances First, it is the result of attempting to teach medical students such principles of anatomy as may be expected to interest them in their school work and assist them in their after-life as practitioners of medicine. But more immediately its origin is due to the necessity of choosing some circumscribed study in applied anatomy as a subject for a series of lectures. These lectures were given as a part of the Course of Instruction to officers of the R.A.M.C. at the Special Military Surgical Hospital, Shepherd's Bush. The product of these circumstances is not designed, as were the lectures, for qualified medical men, for it is hoped that the student of anatomy, no matter if he be definitely following a career of medicine or not, may obtain some help from its pages.

F. W. J.

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CHAPTER I

THE HAND AS AN ANATOMICAL STUDY

SOME years ago it was by no means uncommon to hear medical men express the opinion that Human Anatomy, as a subject for scientific research, had been exhausted long ago. And indeed, when one compares many modern works upon the subject with the products of the Golden Age of Anatomy as Andreas Vesalius established it in 1543, it seems that the intervening centuries have produced but little save the invention of the colour process for the reproduction of illustrations. Human anatomy has appeared to many as a subject in which advance was impossible, and it must be owned that compared with the younger branches of Physiology, Pathology, and Biology, it offered but few attractions in the way of unsolved problems to any man determined to devote his energies to the scientific side of medicine. Anatomy has suffered in consequence, and in England especially there has been a tendency for it to fall behind in the wonderful march of progress that medicine has made during the last half-century. Some, not content with regarding it as an exhausted subject, have attempted to minimise its utility to the medical practitioner, and even its most enthusiastic teachers must admit that from legislative neglect, and from failure to appreciate its importance by those responsible for the ordering of education in this country, its practice and its proper advancement have been very seriously hampered.

But the war of 1914 brought great changes. Those who imagined that the structure of the human body presented few problems received their awakening with the arrival of the very first convoy of wounded men. A great demand

for knowledge of anatomy arose, and the demand was made not only by those in whose surgical care the wounded were placed in our hospitals, but by the very large number of enthusiastic medical helpers that the war brought into existence. The 1914 war did away, and, let us hope, for ever, with that type of medical man who, knowing but

FIG. 1.—In this drawing the right foot is placed upon the left leg, and the right arm shows anatomical peculiarities.

little anatomy, affected to despise it as useless knowledge. It relegated to well-deserved obscurity the surgeon who boasted—even if he did not believe—that a knowledge of anatomy was of but little use to the skilled operator. War surgery is practical anatomy, and the medical man whose knowledge of anatomy was so slender that it might not be turned to practical use was forced either to learn more,

or to turn his hand to some auxiliary mode of treatment of the wounded in which he did not tamper with, nor need he understand, the structure of the human body. Now with a new war, and with its inevitable accompaniment of maimed civilians caused by air raids, there is a recrudescence of this desire for a knowledge of precise human topographical anatomy. The 1914 war produced much that was merely ephemeral in anatomical literature, but also much more that was permanent in our knowledge of, especially, neural and neuro-muscular anatomy. In the interval some of these very useful investigations have been allowed to lapse in favour of other lines of inquiry, and at times the anatomist has almost strayed into the domain of the physiologist, maybe because the physiologist himself has tended to stray over-far into the realms of the chemist. But human topographical and functional anatomy will inevitably come into its own again in this war as it did in the last, and moreover it is much to be hoped that in whatever phase it may be that succeeds the present war it will be the major preoccupation of the British human anatomist. Gross topographical anatomy combined with an understanding of function has ever been the best contribution to anatomical science made by British anatomists, and it is much to be hoped that this tradition is not permitted to lapse—for it was the guiding principle of John Hunter and of all the great British masters of anatomy.

There are problems in human anatomy and methods in human anatomy, and it may be that, without a complete examination of the human body, these problems and methods may be illustrated by the study of a single member. Anatomy can only be studied completely in the dissecting room, or in the operating theatre; but much may be learned elsewhere. The medical student, with the special advantages afforded by the schools of anatomy, is apt to forget how important is that study of the human body that can be made without the aid of scalpel and forceps. Surface Anatomy is always rather a tender spot with the examination

candidate. But Surface Anatomy may be studied at all times and in all places. All that is needed is an aptitude for observing. There is a danger that in the complexity of modern medical education the hope of the older educationalists may not be fulfilled, and that the curriculum may tend to produce a well-taught, but wholly unlearning, individual. Education that does not beget a power of observation is of little use in practical medicine. Although the multitude of modern instruments of precision has rather set in the background that older type of physician who, depending upon his own powers of observation alone, developed the mixed attributes of a Sherlock Holmes and a Boy Scout, the man who seeks success in Medicine does so in vain if he remains unobservant. But conspicuous powers of observation are none too commonly displayed by medical students. It is in the Anatomy Department that whatever gift of observation the student may possess should receive its fullest cultivation. The student must be taught to learn, and to learn anything that is useful in the practice of medicine a faculty for accurate observation is essential. There are very few parts of the human body in health or in disease that repay observation better than the hand. To one who is observant the hands of his fellow-men are a source of perpetual interest, and there is no reason why a monopoly in this interest should be permitted to pass into the keeping of those folks who regard the hand merely as an object by which fortunes may be told. The casual way in which some artists regard hands and feet finds its expression in the work not only of the lesser ones, nor even in connection with illustrations altogether devoid of any attempt at reproducing precise anatomy. Rembrandt himself is among the culprits, wonderful anatomist though he was, for in his famous " Lesson in Anatomy " Nicholas Tulp is represented displaying the superficial flexor muscles of the fingers arising from the radial condyle of the humerus (see *Frontispiece*). It would appear that Rembrandt must have drawn the details of anatomy from a right arm, and

then have transferred them to the left arm of his wonderfully realistic subject. There are many who admire this great work and yet fail to notice this very strange anatomical error. Our text-books of anatomy could also be made to stand in the pillory, but the subject is a delicate one, and it will be enough to mention that the phalangeal formula of 2 . 3 . 3 . 3 . 3 . (which is discussed later) has notoriously been altered to 3 . 3 . 3 . 3 . 3 . and alternatively to 2 . 2 . 2 . 2 . 2 . with very striking pictorial results (see Plates 39 and 40 in Sir Henry Morris's " Anatomy of the Joints of Man." London, 1878). The pages of our magazines and the illustrated advertisements teem with the most curious anomalies, and anyone can find them for himself with but little trouble. The samples reproduced here (Figs. 1, 2, and 3) are taken at random, and I am unable to acknowledge their source, which is, perhaps, a fact not altogether to be regretted. But, quite apart from such glaring instances as these, minor evidences of lack of observation will be found with astonishing frequency.

FIG. 2.—Seated figure with crossed legs in which the right and left feet are reversed.

The hand as the expressor of emotional states affords a study in itself; it is a study that the physician cannot afford to neglect, and it is one to which some artists have given insufficient attention. The " expression " of the hand is a thing impossible to define, and yet it is a very real factor. It is more easily noticed by its absence; and it is often very astonishing to see how utterly unlike the real hand is even the most perfect plaster cast.

The hand then presents excellent opportunities for the student of human nature and of human anatomy to exercise his powers of observation, and to study the outward form

of a portion of the body. But more to our purpose is the fact that in probing deeper into the anatomy of the hand we are immediately brought face to face with some of the most important biological problems and some of the most striking exhibitions of general vital principles. It is for this reason that the hand has been selected as a limited and self-contained study from which the student may learn more of principles and less of details than is usual in complete text-books of anatomy. We cannot go far in the study of the hand, even if we limit ourselves to a mere examination of its surface, before we are forced to notice some facts that bear upon that ever-present problem, the question of our own origin. Man's place in nature is largely writ upon his hand, and many of the simplest and most familiar details of homely knowledge become important when we examine our hands with the critical spirit we would adopt towards the members of some strange and uncommon beast. In the hand are bones, joints, muscles, arteries, veins, and nerves, and in connection with each of these we may find, within a limited compass, evidences of those general principles that prevail throughout the animal body. One other thing will strike the student who considers with any real attention the many-sided complex of structure and function as it is displayed in this one small member. He will realise that, despite the accumulated work of the past four centuries, much is

FIG. 3.—The right hand is placed upon the left arm.

uncertain, much remains unsolved, and much remains absolutely unguessed at, even when we consider the most familiar features of our most familiar member.

Here we cannot enter into the pathological conditions of the hand, nor even discuss the hand as revealing general pathological states, for we are concerned solely with normal anatomy.

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(*c*) *Surgical anatomy of the hand*

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(*d*) *Characters of the hand from the point of view of palmistry*

LAFFAN, M. N. (Mrs.) (1932). Hand-reading, a study of character and personality. London.

(*e*) *Folk-lore of the hand*

JONES, W. (1877). Finger-ring lore, historical, legendary, and anecdotal.

THOMPSON, C. J. S. (1932). The hand of destiny, the folk-lore and superstitions of everyday life. London.

(*f*) *As a companion to any of the text-books of anatomy*

LE GROS CLARK, W. E. (1939). The tissues of the body, an introduction to the study of anatomy. Oxford. Which is a necessary antidote to formal topographical anatomy.

CHAPTER II

PENTADACTYLISM

It might seem unnecessary to make comment upon the fact that both the human hand and foot possess five digits ; and yet this condition of complete pentadactylism is one of great interest and some distinction.

In discussing the problems connected with the numerical digital series it will be necessary to adhere to a precise system of nomenclature for the five elements, and in all cases in which they are alluded to merely as digits, and without regard to their distinction as special members of either the hand or the foot, they will be numbered from 1 to 5, counting from the middle line of the body outwards when the limb is placed with the nails directed upwards, or, in more precise language, counting from the preaxial to the postaxial margin of the limb.

Many of the digits, however, have familiar distinguishing names. Considerable interest attaches to these familiar names as they were employed by the older anatomists, for they convey a functional connotation that is lost in a pure numerical nomenclature. These specialised functions of individual digits will be dealt with later on ; but here it is worth while to note the old names for the digits even if we have to resist the temptation to stray into the realms of the folk lore associated with the subject. Diemerbrœck records the familiar names of the digits as follows : " The first, which is the thickest, and equals all the rest for strength, is called pollex or the thumb. The second is the forefinger from the use, called the index, or demonstrator, the pointer, because it is used in the demonstration of things. The third or middle-finger is called impudicus, famosus, and obscœnus, the obscene and infamous, because

it is usually held forth at men pointed at for infamy and in derision. The fourth, the ring-finger, or annularis and medicus, the physician's finger, because that persons formerly admitted doctors of physic were wont to wear a gold ring upon that finger. The fifth, called the little finger, in Latin auricularis, or the ear-finger, for that men generally pick their ears with it."

Upon the foot only two digits are familiarly named, the first being the hallux, or great toe, and the fifth being the little toe. It is of real importance that the confusion between first finger or toe and first digit be avoided, and to this end the expressions " first finger " and " first toe " will never be used.

Familiarity with human pentadactylism has not lessened the speculative interest of the morphologist in the great question of the primitive or secondary nature of this arrangement. This is a subject upon which there is room for much speculation and debate.

Are we to assume that the oft-recurring presence of five digits in the manus and pes of the vertebrate series represents the most primitive type of digitate member, or has the number five been evolved by the reduction, or the increase, of some more primitive formula? Upon this point there is great diversity of opinion. No one, so far as I know, has ever suggested that the digitate member formerly possessed a smaller number of digits than five, and, indeed, there are no grounds, anatomical or paleontological, for imagining that the five fingers and five toes of man have developed from an originally more limited series. Yet, despite this fact, anatomists have sometimes regarded the five-rooted limb plexus of the human fore limb as a development from the simpler type prevailing in those animals, such as the Ungulates, which, being truly quadrupedal, have a reduced digital series. Such a line of argument is quite illogical, and is merely the outcome of that mental bias that regards all human structure as the perfected type the imperfect stages of which are to be seen in lower

mammals. Arguments based upon such reasoning are often attended by poor success, and doubtless will be subjected to a more rigid scrutiny with the passage of time.

That the pentadactylous condition has been derived from some form in which the digits were originally more numerous is, however, a widely held opinion. Certain facts appear to lend support to this view. It is true that five digits is the normal maximum for all the existing Amniota, but some forms possess rudiments of what is usually regarded as an extra digit. Again, certain elements not rising to the dignity of rudimentary free digits are commonly present in the carpus and tarsus of all classes of Amniota. Extinct forms showing more than five rays in the extremities are known, and these lend weight to the supposition that some number greater than five may have constituted the ancestral type. Then, too, abnormal supernumerary digits have been recorded in a wide range of animal types from man downwards.

Finally, if the higher vertebrate limb has been derived from the many-rayed fins of fish, then it is natural to suppose that a considerable numerical reduction has taken place in the evolutionary story of the digits.

How many digits were present upon the ideal prototype of the manus and pes is by no means agreed upon by the supporters of primitive polydactylism ; but most authorities (Bardeleben, Wiedersheim, etc.) are inclined to the belief that seven represents the ancestral number, and there are good grounds for this choice. But before we may reach agreement upon the precise number it is necessary to review the facts that lend support to any belief in the theory of ancestral polydactylism.

(1) In addition to the more stable elements of the carpus, there are other, smaller, bones that occur upon the radial and ulnar sides of the wrist. These bones, though commonly termed the radial and ulnar sesamoids, are often regarded as true carpal bones, despite the fact that they are associated with the tendons of the radial and ulnar flexors