

CHAPTER I

THE HAND

THE hand is one of the most distinctive characteristics of man. Without its special organisation he would be for all practical purposes inferior to many other animals. It is the executive portion of the upper limb whereby the limits of his capacity as "the tool-user" are determined. As such, it is the active agent of the primary sense of touch, the organ of the will, the instrument which works harmoniously with brain and heart, and by means of which imagination and idealism are translated into fact. Without it man's intellectual superiority would be to a large extent abortive. In its combination of strength with delicacy, it is an index of character in all its variations in man and woman

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from childhood to old age. It is an exponent of the refinement of high civilisation, no less than the organ of all dexterity and force of the skilled inventor and mechanician. In the art of the true painter, as in works of Titian and Vandyke, the portraiture of the hand is no less replete with individuality than the face.

In so far as the hand is to be recognised as the organ of touch or feeling, it plays a different part from the other organs of the senses. It is no mere passive recipient of impressions, but selects the objects to be subjected to its discrimination, and communicates the results to the central organ: the seat of intelligence. As a responsive agent of the mind it is the productive artificer. In its independent estimate of form and texture it performs for all of us the function of sight in the darkness; and to the blind it is an eye wherewith they are enabled to receive correct impressions of external nature, and to read for themselves the lettered page. The hand, moreover, has an utterance of its own. The unpremeditated actions of the orator harmoniously emphasise his speech; and in strong emotional excitement, the movements of the hands are scarcely less expressive than the tongue. There are, indeed,

occasions when its symbolic speech needs no audible accompaniment. The repelling action of the outstretched palm, accompanied by the averted head, can dispense with words; and the hand in benediction has no need of them. The imagination realises the amplest significance of such gestures, as in the final parting of Arthur and Guinevere—

She in the darkness o'er her fallen head
Perceived the waving of his hands that blest.

In discussing the specialty of right-handedness, either as an expansion or limitation of the use of the hand, it is not necessary to enlarge on the distinctive anatomical relations of the human hand to the fore-limb of other animals; for if the final results here set forth are correct, the preferential and instinctive employment of one limb and extremity is not an exclusive attribute of man. Nevertheless the hand is one of the most characteristic human features. The practical distinction between man and any approximate living creature lies in the fact that the most highly developed anthropoid, while in a sense four-handed, has no such delicate instrument of manipulation as that which distinguishes man from all other animals. In most monkeys there is a separate and movable

thumb in all the four limbs. The characteristic whereby their hallux, or great toe, instead of being parallel with the others, and so adapted for standing and walking erect, has the power of action of a thumb, gives the prehensile character of a hand to the hind-limb. This is not confined to the arboreal apes. It is found in the baboons and others that are mainly terrestrial in their habits, and employ the four limbs ordinarily in moving on the ground.

The human hand is an organ so delicately fashioned that the biologist has, not unnaturally, turned to it in search of a typical structural significance. By reason of its mobility and its articulated structure, it is specially adapted to be an organ of touch; and the fine sense which education confers on it tends still further to widen the difference between the human hand and that of the ape. Hence Cuvier's long-accepted determination of a separate order for man as bimanous. But this classification is no longer tenable. Man is, indeed, still admitted to form a single genus, *Homo*; but in the levelling process of scientific revolution he has been relegated to a place in the same order with the monkeys and, possibly, the lemurs, which in the development of the thumb

are more manlike than the apes. In reality, looking simply to man as thus compared with the highest anthropoid apes, the order of Quadrumana is more open to challenge than that of the Bimana. The hind-limb of the ape approaches anatomically much more to the human foot than the hand; while the fore-limb is a true though inferior hand. The ape's hind-limb is indeed prehensile, as is the foot of man in some degree; but alike anatomically and physiologically the fore-limb of the ape, like the hand of man, is the prehensile organ *par excellence*; while the primary function of the hind-limb is locomotion.

There are unquestionably traces of prehensile capacity in the human foot; and even of remarkable adaptability to certain functions of the hand. Well-known cases have occurred of persons born without hands, or early deprived of them, learning to use their feet in many delicate operations, including not only the employment of pen and pencil, but the use of scissors, with a facility which demonstrates the latent capacity for separate action of the great toe, and its thumblike apposition to the others. In 1882 I witnessed, in the Museum at Antwerp, an artist without arms skilfully use

his brushes with his right foot. He employed it with great ease, arranging his materials, opening his box of colours, selecting and compressing his tubes, and "handling" his brush, seemingly with a dexterity fully equal to that of his more favoured rivals. At an earlier date, during a visit to Boston, I had an opportunity of observing a woman, under similar disadvantages, execute elaborate pieces of scissor-work, and write not only with neatness, but with great rapidity. Nevertheless the human foot, in its perfect natural development, is not a hand. The small size of the toes as compared with the fingers, and the position and movements of the great toe, alike point to diverse functions and a greatly more limited range of action. But the capacity of the system of muscles of the foot—scarcely less elaborate than that of the hand,—is obscured to us by the rigid restraints of the modern shoe. The power of voluntary action in the toes manifests itself not only in cases where early mutilation, or malformation at birth, compels the substitution of the foot for the hand; but among savages, where the unshackled foot is in constant use in climbing and feeling its way through brake and jungle, the free use of the toes, and the power of separating

the great toe from the others, are retained in the same way as may be seen in the involuntary movements of a healthy child. When camping out in long vacation holidays in the Canadian wilds, repeated experience has proved to me that the substitution for a few weeks of the soft, yielding deerskin moccasin of the Indian, in place of the rigid shoe, restores even to the unpractised foot of civilised man a freedom of action in the toes, a discriminating sense of touch, and a capacity for grasping rock or tree in walking or climbing, of which he has had no previous conception. The Australian picks up his spear with the naked foot; and the moccasin of the American Indian scarcely diminishes the like capacity to take hold of stick or stone. The Hindu tailor, in like manner, sits on the ground holding the cloth tightly stretched with his toes, while both hands are engaged in the work of the needle.

Such facts justify the biologist in regarding this element of structural difference between man and the apes as inadequate for the determination of a specific zoological classification. Nevertheless man still stands apart as the tool-maker, the tool-user, the manipulator. A comparison between the fore

and hind limbs of the Chimpanzee, or other ape, leaves the observer in doubt whether to name them alike as hands or feet, both being locomotive as well as prehensile organs; whereas the difference between the hand and foot of man is obvious, and points to essentially diverse functions. The short, weak thumb, the long, nearly uniform fingers, and the inferior play of the wrist in the monkey, are in no degree to be regarded as defects. They are advantageous to the tree-climber, and pertain to its hand as an organ of locomotion; whereas the absence of such qualities in the human hand secures its permanent delicacy of touch, and its general adaptation for many manipulative purposes.

The hand of man is thus eminently adapted to be the instrument for translating the conceptions of intelligent volition into concrete results. Dr. George Wilson in his fine prose poem: "The Five Gateways of Knowledge," speaks of it as giving expression "to the genius and the wit, the courage and the affection, the will and the power of man. . . . The term handicraftsman or hand-worker belongs to all honest, earnest men and women, and is a title which each should covet. For the Queen's hand there is the sceptre, and for the soldier's hand the sword; for

the carpenter's hand the saw, and for the smith's hand the hammer; for the farmer's hand the plough, for the miner's hand the spade, for the sailor's hand the oar, for the painter's hand the brush, for the sculptor's hand the chisel, for the poet's hand the pen, and for the woman's hand the needle. If none of these, or the like, will fit us, the felon's chain should be round our wrist, and our hand on the prisoner's crank. But for each willing man and woman there is a tool they may learn to handle; for all there is the command: 'Whatsoever thy hand findeth to do, do it with all thy might.'

Other animals have their implements for constructive skill, and their weapons, offensive and defensive, as parts of their organic being; and are armed, equipped, clad, and mailed by no effort of their own. But man, inferior to all in offensive and defensive appliances, is a match for his most formidable assailants by means of appliances furnished by his dexterous hand in obedience to the promptings of intelligent volition.

The matured capacity of the hand is the necessary concomitant of man's intellectual development; not only enabling him to fashion all needful tools, and to place at a disadvantage the fiercest of his assailants

armed by nature with formidable weapons of assault ; but also to respond no less effectually to every prompting of the æsthetic faculty in the most delicate artistic creations. The very arts of the ingenious nest-makers, the instinctive weavers or builders, the spider, the bee, the ant, or the beaver, place them in striking contrast to man in relation to his handiwork. He alone, in the strict sense of the term, is a manufacturer. The *Quadrumana*, though next to man in the approximation of their fore-limbs to hands, claim no place among the instinctive architects, weavers, or spinners. The human hand, as an instrument of constructive design or artistic skill, ranks wholly apart from all the organs employed in the production of analogous work among the lower animals. The hand of the ape accomplishes nothing akin to the masonry of the swallow, or the damming and building of the beaver. But, imperfect though it seems, it suffices for all requirements of the forest-dweller. In climbing trees, in gathering and shelling nuts or pods, opening shell-fish, tearing off the rind of fruit, or pulling up roots ; in picking out thorns or burs from its own fur, or in the favourite occupation of hunting for each other's parasites : the monkey