

## S E C T. VIII.

*Of the Senses in general.*

**A**NIMAL bodies are composed of different substances; some of which, as the bones, the fat, the blood, the lymph, &c. are insensible; and others, as the membranes and nerves, seem to be active substances, which give spring and vivacity to all the members. The nerves are the immediate instruments of feeling: Their nature, indeed, is diversified by a difference in their disposition: According to their arrangement, position, and quality, they convey to the mind different species of feeling, which have been distinguished by the name of *sensations*, and which seem, in effect, to have no resemblance to each other. If we consider, however, that all the external senses proceed solely from nervous expansions differently arranged and situated; that the nerves are the general organ of feeling; and that no other substance in the animal body is endowed with this faculty; we shall be inclined to believe, that the senses have one common origin, and that, as all nerves are only various forms of

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the same individual substance, the sensations which result from them differ not so essentially from each other as they at first appear.

The body of the eye is, perhaps, an expansion of the optic nerve only. Its situation is more external than that of any other nerve; and it likewise conveys the most lively and the most delicate sensation. It must, therefore, be affected by the smallest particles of matter, as those of light, and, of course, convey to the mind sensations of all distant bodies which either emit or reflect light. The situation of the ear is more internal than that of the eye; neither is it furnished with so large an expansion of nervous substance, and must, of course, be endowed with a less degree of sensibility, and cannot be affected with particles of matter so minute as those of light. But it is capable of being affected by grosser particles; and it transmits to the mind sensations of such distant bodies as are endowed with the faculty of putting these particles in motion. As these particles are grosser, and have less velocity than those of light, they can move a short way only, and, consequently, the sensations conveyed to us by the ear are much more limited, as to distance, than those afforded by the eye. The membrane which is the seat of smell, is still less supplied with nerves than the ear, and can give us sensations only by the intervention of particles of matter which are grosser and nearer the organ, as those that issue from odorous bodies. These particles

particles probably consist of the essential oils, which exhale and float in the air, as light bodies swim in water: And, as the nerves are still fewer and more divided on the tongue and palate, odoriferous particles are too weak to affect them. To produce the sensation of *taste*, the oily or saline parts must be detached from other bodies, and applied to the tongue. This sense differs greatly from that of smelling. The latter conveys sensations of bodies at a certain distance; but the former requires actual contact, and perhaps the solution of particular parts of bodies, as their salts, oils, &c. before any sensation is communicated. Lastly, as the nerves are minutely divided, and thinly spread over the skin, it cannot be affected by the particles of which light, sound, or odours, are composed. Nothing less than contact can give us the ideas which are proper to the sense of touching; and, of course, it conveys to us no information with regard to distant objects.

Hence the difference between the senses appears to proceed from the situation of the nerves being more or less external, and from the greater or smaller quantity of them bestowed on the different organs. It is for this reason that a nerve, when irritated by a blow, or laid bare by a wound, frequently gives us the sensation of light without the intervention of the eye; and, from the same cause, we often feel the sensation

of sound, when the ear is not affected by any thing from without.

When the particles of light or of sound are collected in great quantities, they form a kind of solid mass, and produce sensations of different species, which seem to have no analogy with the original sensations: A very great assemblage of luminous particles affect not only the eyes, but the nerves of the skin, in which they excite the sensation of heat, which is a feeling different from that of vision, though it be produced by the same cause. Heat, therefore, is a sensation proceeding from contact with light, which acts as a solid body, or as a mass of matter in motion. This action of light, like other bodies in motion, is apparent when light substances are exposed to the focus of a burning glass: Before they are heated, the action of the light communicates to them a motion, by which they are driven from their former station. Here heat acts like solid bodies upon each other, since it is capable of displacing light substances, and of communicating to them a motion by actual impulse.

In the same manner, when the particles of sound are collected in great quantities, they produce a sensible agitation on the body, which is very different from the action of sound on the ear. A violent explosion, or a clap of thunder, produces a concussion in us, and in every neighbouring body. Here sound likewise acts as a

solid body. This tremulous motion is not occasioned by the agitation of the air; for we perceive not that it is accompanied with wind; and besides, even the strongest wind does not produce such violent concussions. It is owing to this action of the sonorous particles, that the vibrations excited in one string are communicated to the others; and the tremulous sensation we feel from a violent noise is very different from the sensation of sound in the ear, though it be an effect of the same cause.

All the varieties in our sensations proceed from the greater or lesser quantity of nerves, and from their position being more or less external. This is the reason why some of the senses, as the eye, the ear, the nose, are affected by the minute particles which issue from particular substances; and why others, as the senses of tasting and touching, require actual contact, or emanations of the grossest kind, by the latter of which we receive the sensations of the solidity, or fluidity, and of the heat of bodies.

A fluid differs from a solid, because its particles have no coherence, or are not gross enough to admit of being laid hold of on different sides at the same time. The particles of fluids touch one another but in one, or so few points, that none of them can have any great degree of adhesion with another. Solid bodies, even when reduced to an insensible powder, do not absolutely lose their solidity; because their particles,

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by touching each other in many points, still preserve a degree of cohesion; and this is the reason why we can squeeze them together, and form them into large tangible masses.

The sense of feeling extends over the whole body; but its exertions are different in different parts. The sensation of touching is excited by the application of foreign bodies to some part of our own body. If a foreign body be applied to the breast or shoulders, we feel it; but we have no idea of its figure, because the breast or shoulder touches the foreign body on one side only. The same remark is applicable to other parts which are incapable of folding round, or embracing at one time, several sides of foreign bodies. The idea of figure can only be acquired by the flexible parts of the body, as the hands, which, from their structure, are enabled to feel different parts of surfaces at the same time.

The hand is not the principal object of touch because the extremities of the fingers are furnished with a great quantity of nervous papillæ, but because it is divided into several parts, which are all flexible, all act at the same time, and are all obedient to the will. This alone is the source of all our ideas of figure and of magnitude. The surface of the hand and fingers is greater, in proportion, than any other part of the body, because no other part is so much divided. This advantage, when joined to the flexibility of the fingers, renders the hand the most perfect instrument

ment for conveying ideas of the figures of bodies. If the hand were divided into 20 or more fingers, these ideas would be still more precise and exact; if, on the contrary, their present number were diminished, or if the hand were totally deprived of fingers, our ideas of figure would be very confused and indetermined.

Those animals which are furnished with hands appear to have most sagacity. Apes imitate the mechanical actions of man so completely, that they seem to be excited by the same sensations. But all animals which are deprived of hands can have no distinct idea of the figure or magnitude of objects; because none of their parts are sufficiently flexible and divided, to enable them to twist round the substances of bodies. This is the reason why animals are often terrified at objects which ought to be familiar to them. The muzzle is their principal organ of feeling, because it is divided into two parts by the mouth, and because the tongue serves both for touching bodies, and for turning them over, which they often do, before they seize them with their teeth. It is likewise probable, that animals which are furnished with many instruments of feeling, as the cuttle-fish, the polypus, and other insects, have a superior faculty of distinguishing and of choosing what is agreeable or convenient for them. Hence fishes whose bodies are covered with scales, ought to be the most stupid of animals, because they can have no knowledge of the

the form of objects; and a very obtuse sense of feeling must be conveyed through the scales. Hence also all animals which have not divided extremities, as arms, legs, paws, &c. must have a more obtuse sense of feeling than those that are furnished with these instruments of sensation. Serpents, however, are less stupid than fishes; because, though their skin is hard and scaly, they have the faculty of twisting round bodies, and of obtaining by this means more accurate conceptions of the forms and qualities of these bodies.

Thus the two chief obstacles to the exercise of the sense of feeling proceed, first, from the uniformity of the bodies of animals, or from their want of flexible and divided extremities; and, secondly, from the materials which cover the skin, as hair, feathers, scales, shells, &c. The harder and more solid this covering is, the sense of feeling will be less acute, and the finer and more delicate the skin, the sensation of feeling will be the more lively and exquisite. Women, among other advantages over the men, have a finer skin, and a more delicate perception of feeling.

The skin of a fetus, while in the womb of the mother, is extremely delicate. It ought, therefore, to have a lively sense of external impressions. But, as it swims in a liquor, and as fluids blunt the action of every shock from without, the fetus is rarely hurt, and never without some violence received by the mother.

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Thus the sense of feeling, though it depends on the fineness of the skin, and is extended over the whole body, can have little exercise in the foetus-state: A foetus, therefore, though it may touch different parts of its own body with its hands, can have no distinct sensations arising from the sense of feeling.

To a new-born infant, the hands are equally useless as they are to a foetus; because, by the absurd practice of swaddling, they are not allowed to employ them during six or seven weeks after birth. The improvement of the sense of feeling, from which we derive all our knowledge, is by this means unquestionably retarded. If a child had the free use of its hands the moment it came into the world, it would sooner acquire ideas of the figure and magnitude of objects: And who can determine the influence which our first ideas have upon those that are afterwards acquired? One man, perhaps, excels another in genius and ability, only because he has been permitted, at a more early period, to make an unrestrained use of the sense of feeling. Infants, as soon as they are allowed to employ their hands, endeavour to touch every object they see. They delight in handling every thing they can seize: By feeling every part of bodies, they seem to be desirous of acquiring exact ideas of their form. It is in this manner they amuse, or rather instruct, themselves with new objects: And this passion for novelty continues to be our amusement during life.

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It is by the sense of feeling alone that we acquire real knowledge. The innumerable errors into which we are led by the illusions of the other senses are corrected by feeling. But how is this important sense originally unfolded? How do primary ideas arrive at the mind? Have we forgot every trace of what passes in the darkness of infancy? How shall we recal the first impressions of thought? Do not inquiries of this nature imply presumption and temerity? If the subject were less momentous, we might be liable to censure. But the mind cannot, perhaps, be occupied with a subject more worthy of research; and every effort ought to be exerted in the contemplation of great objects.

Let us suppose, then, a man in the same situation with him who first received existence; a man whose organs were perfectly formed, but who was equally new to himself and to every external object which surrounded him: What would be this man's first sensations, and his first judgments concerning himself, and the objects of his sensations? Were he to give a history of his thoughts, and of the manner in which he received impressions, what information would he convey? To give perspicuity to facts, I shall attempt to make him speak for himself; and this short philosophical detail may not, perhaps, be an useless digression.



I remember the moment when my existence commenced: It was a moment replete with joy, amazement, and anxiety. I neither knew what I was, where I was, nor from whence I came. I opened my eyes; what an increase of sensation! The light, the celestial vault, the verdure of the earth, the transparency of the waters, gave animation to my spirits, and conveyed pleasures which exceed the powers of expression.

I at first believed that all these objects existed within me, and formed a part of myself. When totally absorbed in this idea, I turned my eyes to the Sun: His splendor overpowered me. I involuntarily shut out the light, and felt a slight degree of pain. During this moment of darkness, I imagined that I had lost the greatest part of my being.

When reflecting, with grief and astonishment, upon this great change, I was roused with a variety of sounds. The singing of birds, and the murmuring of the breezes, formed a concert, which excited the most sweet and enchanting emotions. I listened long, and was convinced that these harmonious sounds existed within me.

Totally occupied with this new species of existence, I had already forgot the light, though the first part of my being that I had recognised. I again, by accident, opened my eyes, and was

delighted to find myself recover the possession of so many brilliant objects. This pleasure surpassed every former sensation, and suspended, for a time, the charming melody of sound.

I fixed my eyes on a thousand objects: I soon perceived that I had the power of losing and of recovering them, and that I could, at pleasure, destroy and renew this beautiful part of my existence.

I could now see without astonishment, and hear without anxiety, when a gentle breeze wafted perfumes to my nostrils. This new and delightful sensation, agitated my frame, and gave a fresh addition to my self-love.

When totally occupied by all these sensations, and loaded with pleasures so delicate and so extensive, I suddenly arose, and was transported by the perception of an unknown power.

I had made but a single step, when the novelty of my situation rendered me immovable. My surprise was extreme. I thought my being fled from me: The movement I had made confounded the objects of vision; and the whole creation seemed to be disorder.

I raised my hand to my head; I touched my forehead and my eyes; and I felt every part of my body. The hand now appeared to be the principal organ of my existence. The perceptions afforded by this instrument were so distinct and so perfect; the pleasures conveyed by it, were so superior to those of light and sound,

that, for some time, I attached myself entirely to this substantial part of my being, and I perceived that my ideas began to assume a consistence and a reality which I had never before experienced. Every part of my body, which I touched with my hand, reflected the sensation, and produced in my mind a double idea.

By this exercise I soon learned, that the faculty of feeling was expanded over every part of my frame; and I began to recognise the limits of my existence, which till now seemed to be of an immense extent.

I surveyed my body, and I judged it to be of a size so immense, that all other objects, in comparison, seemed to be luminous points only. I followed my hand with my eyes, and observed all its motions. Of all these objects my ideas were confused and fallacious. I imagined that the motion of my hand was a kind of fugitive existence, a mere succession of similar causes; I brought my hand near my eye; it then seemed to be larger than my whole body; for it concealed from my view almost every other object.

I began to suspect that there was some illusion in the sensation conveyed by the eyes. I distinctly perceived my hand was only a small part of my body; but I was unable to comprehend how it should appear so enormously large. I therefore resolved to depend for information upon the sense of feeling alone, which had never deceived me, and to be on

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my guard against all the other modes of sensation.

This precaution was extremely useful to me. I renewed my motions, and walked with my face turned toward the heavens. I struck against a palm tree, and felt a slight degree of pain. Seized with terror, I ventured to lay my hand upon the object, and discovered it to be a being distinct from myself, because it gave me not, like touching my own body, a double sensation: I turned from it with horror, and perceived, for the first time, that there was something external, something which did not constitute a part of my own existence.

It was with difficulty that I could reconcile myself to this discovery; but, after reflecting on the event which had happened, I concluded that I ought to judge concerning external objects in the same manner as I had judged concerning the parts of my body; and the sense of feeling alone could ascertain their existence. I resolved, therefore, to feel every object that I saw. I had a desire of touching the Sun; I accordingly stretched forth my hands to embrace the heavens; but they met, without feeling any intermediate object.

Every experiment I made served only to increase my astonishment; for all objects appeared to be equally near; and it was not till after an infinite number of trials, that I learned to use my eye as a guide to my hand. As the

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hand gave me ideas totally different from the impressions I received by the eye, my sensations were contradictory; the judgments I formed were imperfect; and my whole existence was disorder and confusion.

Reflecting deeply on the nature of my being, the contradictions I had experienced filled me with humility: The more I meditated, my doubts and difficulties increased. Fatigued with so many uncertainties, and with anxious emotions which successively arose in my mind, my knees bended, and I soon found myself in a situation of repose. This state of tranquillity added fresh force to my senses. I was seated under the shade of a beautiful tree. Fruit of a vermilion hue hung down, in the form of grapes, within reach of my hand. These fruits I gently touched, and they instantly separated from the branch. In laying hold of one of them, I imagined I had made a great conquest; and I rejoiced in the faculty of containing in my hand an entire being which made no part of myself. Its weight, though trifling, seemed to be an animated resistance, which I had a pleasure in being able to conquer.

I held the fruit near my eye: I examined its form and its colours. A delicious odour allured me to bring it near my lips, and I inhaled long draughts of its perfumes. When entirely occupied with the sweetness of its fragrance, my mouth opened, and I discovered that I had an  
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internal sense of smelling, which was more delicate and refined than that conveyed by the nostrils. In fine, I tasted the fruit. The novelty of the sensation, and the exquisiteness of the flavour, filled me with astonishment and transport. Till now I had only enjoyed pleasures; but taste gave me an idea of voluptuousness. The enjoyment was so congenial and intimate, that it conveyed to me the notion of possession or property. I thought that the substance of the fruit had become part of my own, and that I was endowed with the power of transforming bodies.

Charmed with this idea of power, and with the pleasures I felt, I continued to pull and to eat. But an agreeable languor gradually impaired my senses; my limbs grew heavy; and my mind seemed to lose its natural activity. I perceived this inaction by the feebleness of my thoughts: The dullness of my sensations rounded all external objects, and conveyed only weak and ill-defined ideas. At this instant my eyes shut, and my head reclined upon the grass.

Every thing now disappeared: Darkness and confusion reigned. The train of my ideas was interrupted; and I lost the consciousness of my existence. My sleep was profound; but, having no mode of measuring time, I knew nothing of its duration. My awakening appeared to be a second birth; for I only perceived that I had ceased to exist. This temporary annihi-



lation gave me the idea of fear, and made me conclude that my existence was not permanent.

Another perplexity arose: I suspected that sleep had robbed me of some part of my powers: I tried my different senses, and endeavoured to recognise all my former faculties. When surveying my body, in order to ascertain its identity, I was astonished to find at my side another form perfectly similar to my own! I conceived it to be another *self*; and, instead of losing by sleep, I imagined myself to be doubled.

I ventured to lay my hand upon this new being: With rapture and astonishment I perceived that it was not myself, but something much more glorious and desirable; and I imagined that my existence was about to dissolve, and to be wholly transfused into this second part of my being.

I perceived her to be animated by the touch of my hand: I saw her catch the expression in my eyes; and the lustre and vivacity of her own made a new source of life thrill in my veins. I ardently wished to transfer my whole being to her; and this wish completed my existence; for now I discovered a sixth sense.

At this instant the Sun had finished his course; I perceived, with pain, that I lost the sense of seeing; my enjoyment was too exquisite to allow me to dread annihilation; and the present obscurity recalled in vain the idea of my former sleep.

## S E C T. IX.

### *Of the Varieties of the Human Species.*

WHAT we have hitherto remarked concerning the generation of man and the structure of his body, constitutes the history of the individual only: That of the species requires a separate detail, the principal facts of which must be collected from the varieties that appear among men in different regions of the earth. These varieties may be reduced to three heads: 1. The colour; 2. The figure and stature; and, 3. The dispositions of different people. Each of these heads, if extensively considered, might afford materials for a volume; but we shall confine ourselves to those which are most general and best ascertained.

With this view we shall survey the surface of the earth, commencing with the northern regions.

In Lapland, and on the northern coasts of Tartary, we find a race of men of an uncouth figure, and small stature. Their countenances are equally savage as their manners. These men, who appear to be a degenerated species, are very numerous,