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NOTICES OF BOOKS.

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The Expression of the Emotions in Man and Animals. By CHARLES DARWIN, M.A., F.R.S., &c. London: Murray. 1872.

An insatiable longing to discover the causes of the varied and complex phenomena presented by living things seems to be the prominent characteristic of Mr. Darwin's mind. Nothing is so insignificant as to escape his notice or so common as not to demand of him an explanation. The restless curiosity of the child to know the "what for," the "why," and the "how" of everything (a wholesome curiosity which our educational system represses, and which rarely survives to manhood) seems with him never to have abated its force; but he is by no means satisfied, as the child is, with mere verbal explanations which really explain nothing, or, as many writers on this particular subject have been, with purely speculative explanations which are wholly unsupported by evidence.

The present work exhibits these characteristics of the author's mind in an eminent degree, since we here find systematised and explained by means of acknowledged physiological and psychological facts all the immense variety of complex movements and minute muscular contractions, by the observation of which we unconsciously interpret, with more or less certainty, the almost infinitely varied passions and emotions of men and animals. How few of us have ever thought of asking for a reason why infants shut their eyes tightly while screaming; why we shrug our shoulders or stand erect, blush or grow pale under different emotions; why a dog crouches and a cat arches its back when affectionate; or have even imagined that satisfactory reasons for these things could be given? Yet we can hardly help being interested in so novel an enquiry, and one which throws so much light on actions and movements which constitute a kind of universal language, but which have hitherto appeared arbitrary and inexplicable to us.

The result of Mr. Darwin's study of this subject is the establishment of three general principles, which explain and give a meaning to almost all those involuntary gestures and movements by which men and animals express their emotions. The first of these principles is that of Serviceable Associated Habits. When any action has been useful or necessary under a certain state of mind, it will from association continue to be performed whenever the same state of mind recurs, even if of no use. As an instance we may take the case of dogs turning round several times before they lay down to sleep even on a carpet or floor, and sometimes giving a few scratches, a practice which was no doubt useful when the wild animal slept among herbage out of doors; and which

is continued now as a habit when of no such use. The second is the principle of Antithesis, which is, that certain actions or attitudes being the natural accompaniment of a given emotion or state of mind, the opposite state of mind will be expressed by actions or attitudes which are, as far as possible, the exact opposites of the former. A good example of this is given by the case of the dog and cat. The former crouches down and holds down its tail when licking its master's hands or jumping on his knees; but the cat while rubbing against its master's leg, stands erect with somewhat arched back and tail up on end. These attitudes are explained by their being in each case the opposite of those assumed when the animals prepare to fight. The dog stands erect, holds up his tail and bristles up the hairs on his back and shoulders; the cat crouches down with paws out and the tail laid flat on the ground, and gently waved from side to side. When the opposite emotions of gentleness, submission, and affection occur, the attitudes assumed are as remote as possible from those associated with anger and pugnacity.

The third principle is, that certain actions expressive of certain states of mind are the direct results of the constitution of the nervous system, being almost wholly independent of the will and of habit. Trembling under the influence of fear, or rage, or joy, is an example of this. It is of no use and it is quite involuntary; it cannot, therefore, have been acquired by the means already pointed out. It may be said that this is merely a confession of ignorance, and so it is in some cases; but in others Mr. Darwin traces the causes in the known action of certain nerves or muscles, and so gives a valid explanation. Such is the case with the firm closure of the eyes by screaming infants. This is quite involuntary, and does not occur later in life, but the whole mechanism by which it is produced has been traced out, and it is found that it is a provision to prevent injury to the delicate vessels of the eyes by the increased flow of blood to the head during violent screaming.

By means of a series of questions sent to correspondents in various parts of the world, Mr. Darwin has ascertained that many well-known modes of expression are almost universal. Even such an apparently conventional action as the shrug of helplessness or apologetic refusal has been observed among various savage races. Being thus proved to be a natural, not an acquired, expression, it becomes necessary to account for it, and this is done on the principle of antithesis; every part of the expression being the opposite of that which implies determination and action. Comparatively few human expressions, on the other hand, can be distinctly recognised in animals, that of sneering by raising the upper lip on one side, and thus showing the canine teeth, being one of the most curious. There is a very elaborate discussion on blushing. This is a peculiarly human attribute, being observed in almost every race of man, but not in the lower

animals. It has been thought by some to be a special endowment for the purpose of expressing modesty or shame, but Mr. Darwin objects to this view, because it occurs in dark races, when it is hardly visible, and also because shyness is the most frequent cause of blushing, and this is of no use, and makes both the actor and spectator equally uncomfortable. The theory adopted is, that blushing is caused by self-consciousness directed chiefly to our personal appearance, and is therefore generally exhibited in the face, to which attention is most directed, and the skin of which is very sensitive. Much evidence is adduced to show that attention directed to any part or organ can affect its condition or action, and this is the physiological fact on which the explanation rests. Great confusion of mind often accompanies blushing, and is supposed to be caused by it. But it seems more probable that it is caused by the whole attention being so powerfully directed to ourselves as to interfere with the action of the mind in any other direction. A remarkable instance of this confusion is given by Mr. Darwin on the authority of an eyewitness:—

“A small dinner party was given in honour of an extremely shy man, who, when he rose to return thanks, rehearsed the speech, which he had evidently learnt by heart, in absolute silence, and did not utter a single word; but he acted as if he were speaking with much emphasis. His friends perceiving how the case stood, loudly applauded the imaginary bursts of eloquence whenever his gestures indicated a pause; and the man never discovered that he had remained the whole time completely silent. On the contrary, he afterwards remarked to my friend with much satisfaction that he thought he had succeeded uncommonly well.”

It has been an objection to Mr. Darwin's theory of the “Origin of Species,” that the rattlesnake warns its prey of its vicinity, and that such a habit could not possibly have been acquired by natural selection. In a very interesting discussion on the means of exciting fear in an enemy, Mr. Darwin gives a fuller statement of his views on this subject than he has done in any of his former works. He finds that various kinds of reptiles inflate themselves, hiss, open their mouths, and assume a ferocious aspect as a means of protection against attack. “The cobra dilates its hood when alarmed or excited, and the puff adder swells and hisses with a sound hardly distinguishable from the rattle of the rattlesnake. He believes, therefore, that all these various sounds and appearances are warnings to would-be devourers that the creatures who produce them are dangerous. The rattle of the rattlesnake is said to imitate closely the sound of a cicada inhabiting the same region, and it has been supposed that it serves the purpose of attracting insect-eating birds as the snake's prey; but this view is rendered improbable by the fact that the snake rattles when alarmed or threatened. If it is proved to be a warning to

enemies, it becomes useful to the creature itself, and could, therefore, have been acquired by natural selection.

In some cases the explanations given seem far-fetched, or simpler ones appear to be overlooked. I can hardly believe that when a cat, lying on a shawl or other soft material, pats or pounds it with its feet, or sometimes sucks a piece of it, it is the persistence of the habit of pressing the mammary glands and sucking during kittenhood; nor that the frequent practice of cats rubbing against their master's legs is derived from the habit of fondling their young. The habits and ideas of infancy seem to be completely lost in adult life, and to be replaced by others widely different; and it seems hardly likely that they should persist so strongly in one or two isolated instances without leaving more frequent and less equivocal traces behind them.

When a horse breaks into a gallop, at full speed, he always lowers his tail, and this is said to be done in order that as little resistance as possible may be offered to the air. This reason seems very fanciful, when the obvious explanation occurs, that, as the whole available nervous energy is being expended in locomotion, all special muscular contractions not aiding in the motion cease. It also seems very unsatisfactory to refer the vague and undefined yet deep emotions often excited by music to a recalling or survival of "strong emotions felt during long past ages, when, as is probable, our early progenitors courted each other by the aid of vocal tones," although it is very difficult to suggest any other explanation.

The open mouth, and raised arms with open hands turned outwards, is an expression of astonishment very general all over the world. Mr. Darwin explains the open mouth by a complication of causes, but he omits to notice, what seems to me a very probable one, that it represents an incipient cry of alarm or fear, or call for help. The raising of the arms and the open hands are explained by antithesis, they being the opposite of a state of indifference or listlessness. But this seems very unsatisfactory. The attitude is too definite, too uniform, and too widespread, to be derived from such a vague and variable cause as the opposite of a position of unconcernedness. There seems, however, to be a very obvious and natural explanation of the gesture. Astonishment, among our savage ancestors, would most frequently be excited by the sudden appearance of enemies or wild beasts, or by seeing a friend or a child in imminent danger. The appropriate movement, either to defend the observer's face or body, or to prepare to give assistance to the person in danger, is to raise the arms and open the hands, at the same time opening the mouth to utter a cry of alarm or encouragement. It is the protective attitude of an unarmed man to be ready to ward off attack of some uncertain or undefined kind; and very nearly the same attitude is that which we adopt as we rush to the assistance of some one in danger, our hands

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ready to grasp and save him. When used by us as a mere sign of astonishment, at some strange but harmless phenomenon, it has become to a great extent conventional, but the origin here advocated is rendered probable by a remark of Mr. Darwin himself, that, as one of the expressions of fear, "the arms may be protruded as if to avert some dreadful danger;" and among savages almost every source of astonishment would excite more or less fear.

It is rather curious that an author who is not usually satisfied with anything less than a real and intelligible explanation, should yet be so ready, in some cases, to admit innate ideas or feelings. Among the numerous, and often most interesting, observations on his own children, Mr. Darwin tells us that a child six months old was distressed at seeing its nurse pretend to cry. He thinks, in this case, that "an innate feeling must have told him that the pretended crying of his nurse expressed grief; and this, through the instinct of sympathy, excited grief in him." Now, although I imagined myself much more disposed to believe in innate ideas than Mr. Darwin, I cannot see the necessity for them here. A child at that age often cries or is distressed at any strange face, or even at the sight of a friend in a strange dress. The nurse's attitude and expression were strange; they made her look unlike herself, and the child got afraid, and was about to cry. That seems to me a better explanation than that the child had an innate knowledge that the nurse was grieved.

Somewhat akin to this is a readiness to accept the most marvellous conclusions or interpretations of physiologists on what seem very insufficient grounds. In discussing the subject of reflex action Mr. Darwin quotes the well-known experiment of the decapitated frog, which is said to wipe off a drop of acid from its thigh by a motion of the foot of the same leg. But if this foot is cut off it makes several fruitless efforts, then stops a while, as if restless and seeking some other way, and then, by using the other foot, succeeds in wiping off the drop of acid. Now this is imputed to pure reflex action, and not a word of doubt is thrown either on the experiment or on the inference from it. Yet it seems to me absolutely certain, either that the experiment is not correctly recorded, or that, if correct, it demonstrates volition and not reflex action. For surely reflex action cannot produce, in a decapitated frog, movements which were probably never once performed by the living frog. The action of drawing up the leg in swimming or leaping is one which the frog performs incessantly during its whole life; it would therefore probably be performed under any suitable stimulus by reflex action, and might, as a consequence of the usual motions, wipe off the drop of acid from a place which the foot, during contraction, would naturally reach. But the action of crossing one foot over to the thigh of the other leg is one which was very rarely, if ever, performed, because during life the frog possessed

but a bit more understood K² MR. DARWIN

both its feet. Again, reflex action cannot be set up without a suitable stimulus. The stimulus applied to one leg set up reflex action in that leg, or perhaps, by co-ordination, of the muscular movements in the two legs; but, when one foot was cut off, what caused the nature of the motion to change, and a new set of muscles to be called into action, with such precision as to apply the foot to an unaccustomed part of the body? This is the work of consciousness; first to know that the one motion failed to produce an effect aimed at, next to change the motion so as to produce the desired effect. The experiment is described as if all this were really done by reflex action; but, if so, then what need have we of consciousness in animals at all, and why may not all their motions and actions during life be so produced? If the experiment, as recorded, is strictly accurate, it appears to me to demonstrate consciousness and volition, on the part of the frog, without a brain,—a fact by no means incredible in itself, but one which, if established, might have important consequences.

The book is admirably illustrated, both by woodcuts and by a number of photographs representing the most characteristic expressions. It is written with all the author's usual clearness and precision; and although some parts are a little tedious, from the amount of minute detail required, there is throughout so much of acute observation and amusing anecdote as to render it perhaps more attractive to general readers than any of Mr. Darwin's previous works.

ALFRED R. WALLACE.

The Hygiene of Air and Water: being a Popular Account of the Effects of the Impurities of Air and Water, their Detection, and the Modes of Remedying them. By WILLIAM PROCTER, M.D., F.C.S., Surgeon to the York Dispensary, and formerly Lecturer on Chemistry and Forensic Medicine in the York School of Medicine. London: R. Hardwicke. York: Sampson, Pickering, Johnson, and Tesseyman. 1872. 79 pp.

THE Science of Health in these days is making great advance, and asserts increasing claims for recognition. Its position is a difficult one, for whilst it of necessity lays under contribution the latest discoveries and most abstruse doctrines of modern thought, it must be translated for the comprehension of the bulk of people of the world who have themselves to carry out the precepts which it inculcates. Unfortunately the efforts of the interpreters between Science and the Public are not always successful, and frothy phrases often constitute a large part of so-called popular manuals,—there is a minute morsel of bread to a prodigious quantity of sack. It is a relief to turn to Dr. Procter's little book, which seems to give us exactly what we want; it is