

# DARWIN CHARLES

THE EXPRESSION OF  
THE EMOTIONS IN MAN  
AND ANIMALS

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Emotions in Man and Animals**

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# Charles Darwin

## The Expression of the Emotions in Man and Animals

### ON THE EXPRESSION OF THE EMOTIONS IN MAN AND ANIMALS. INTRODUCTION

MANY works have been written on Expression, but a greater number on Physiognomy, – that is, on the recognition of character through the study of the permanent form of the features. With this latter subject I am not here concerned. The older treatises,[1] which I have consulted, have been of little or no service to me. The famous 'Conferences'[2] of the painter Le Brun, published in 1667, is the best known ancient work, and contains some good remarks. Another somewhat old essay, namely, the 'Discours,' delivered 1774-1782, by the well-known Dutch anatomist Camper,[3] can hardly be considered as having made any marked advance in the subject. The following works, on the contrary, deserve the fullest consideration.

Sir Charles Bell, so illustrious for his discoveries in physiology, published in 1806 the first edition, and in the third edition of his 'Anatomy and Philosophy of Expression.'[4] He may with justice be said, not only to have laid the foundations of the subject as a branch of science, but to have built up a noble structure. His work is in every way deeply interesting; it includes graphic descriptions of the various emotions, and is admirably illustrated. It is generally admitted that his service consists chiefly in having shown the intimate relation which exists between the movements of expression and those of respiration. One of the most important points, small as it may at first appear, is that the muscles round the eyes are involuntarily contracted during violent expiratory efforts, in order to protect these delicate organs from the pressure of the blood. This fact, which has been fully investigated for me with the greatest kindness by Professors Donders of Utrecht, throws, as we shall hereafter see, a flood of light on several of the most important expressions of the human countenance. The merits of Sir C. Bell's work have been undervalued or quite ignored by several foreign writers, but have been fully admitted by some, for instance by M. Lemoine,[5] who with great justice says: – "Le livre de Ch. Bell devrait être médité par quiconque essaye de faire parler le visage de l'homme, par les philosophes aussi bien que par les artistes, car, sous une apparence plus légère et sous le prétexte de l'esthétique, c'est un des plus beaux monuments de la science des rapports du physique et du moral."

From reasons which will presently be assigned, Sir C. Bell did not attempt to follow out his views as far as they might have been carried. He does not try to explain why different muscles are brought into action under different emotions; why, for instance, the inner ends of the eyebrows are raised, and the corners of the mouth depressed, by a person suffering from grief or anxiety.

In 1807 M. Moreau edited an edition of Lavater on Physiognomy,[6] in which he incorporated several of his own essays, containing excellent descriptions of the movements of the facial muscles, together with many valuable remarks. He throws, however, very little light on the philosophy of the subject. For instance, M. Moreau, in speaking of the act of frowning, that is, of the contraction of the muscle called by French writers the *soucilier* (*corrigator supercillii*), remarks with truth: – "Cette action des sourciliers est un des symptômes les plus tranches de l'expression des affections pénibles ou concentrées." He then adds that these muscles, from their attachment and position, are fitted "à resserrer, à concentrer les principaux traits de la face, comme il convient dans toutes ces passions vraiment oppressives ou profondes, dans ces affections dont le sentiment semble porter l'organisation

a revenir sur elle-meme, a se contracter et a *s'amoindrir*, comme pour offrir moins de prise et de surface a des impressions redoutables ou importunes." He who thinks that remarks of this kind throw any light on the meaning or origin of the different expressions, takes a very different view of the subject to what I do.

The earliest edition of this work, referred to in the preface to the edition of 1820 in ten volumes, as containing the observations of M. Moreau, is said to have been published in 1807; and I have no doubt that this is correct, because the 'Notice sur Lavater' at the commencement of volume i. is dated April 13, 1806. In some bibliographical works, however, the date of 1805 – 1809 is given, but it seems impossible that 1805 can be correct. Dr. Duchenne remarks ('Mecanisme de la Physionomie Humaine,'-8vo edit. 1862, p. 5, and 'Archives Generales de Medecine,' Jan. et Fev. 1862) that M. Moreau "*a compose pour son ouvrage un article important,*" &c., in the year 1805; and I find in volume i. of the edition of 1820 passages bearing the dates of December 12, 1805, and another January 5, 1806, besides that of April 13, 1806, above referred to. In consequence of some of these passages having thus been COMPOSED in 1805, Dr. Duchenne assigns to M. Moreau the priority over Sir C. Bell, whose work, as we have seen, was published in 1806. This is a very unusual manner of determining the priority of scientific works; but such questions are of extremely little importance in comparison with their relative merits. The passages above quoted from M. Moreau and from Le Brun are taken in this and all other cases from the edition of 1820 of Lavater, tom. iv. p. 228, and tom. ix. p. 279. In the above passage there is but a slight, if any, advance in the philosophy of the subject, beyond that reached by the painter Le Brun, who, in 1667, in describing the expression of fright, says: – "Le sourcil qui est abaisse d'un cote et eleve de l'autre, fait voir que la partie elevee semble le vouloir joindre au cerveau pour le garantir du mal que l'ame aperçoit, et le cote qui est abaisse et qui parait enfle, – nous fait trouver dans cet etat par les esprits qui viennent du cerveau en abondance, comme polir couvrir l'aine et la defendre du mal qu'elle craint; la bouche fort ouverte fait voir le saisissement du coeur, par le sang qui se retire vers lui, ce qui l'oblige, voulant respirer, a faire un effort qui est cause que la bouche s'ouvre extremement, et qui, lorsqu'il passe par les organes de la voix, forme un son qui n'est point articule; que si les muscles et les veines paraissent enfles, ce n'est que par les esprits que le cerveau envoie en ces parties-la." I have thought the foregoing sentences worth quoting, as specimens of the surprising nonsense which has been written on the subject.

'The Physiology or Mechanism of Blushing,' by Dr. Burgess, appeared in 1839, and to this work I shall frequently refer in my thirteenth Chapter.

In 1862 Dr. Duchenne published two editions, in folio and octavo, of his 'Mecanisme de la Physionomie Humaine,' in which he analyses by means of electricity, and illustrates by magnificent photographs, the movements of the facial muscles. He has generously permitted me to copy as many of his photographs as I desired. His works have been spoken lightly of, or quite passed over, by some of his countrymen. It is possible that Dr. Duchenne may have exaggerated the importance of the contraction of single muscles in giving expression; for, owing to the intimate manner in which the muscles are connected, as may be seen in Henle's anatomical drawings<sup>[7]</sup>– the best I believe ever published it is difficult to believe in their separate action. Nevertheless, it is manifest that Dr. Duchenne clearly apprehended this and other sources of error, and as it is known that he was eminently successful in elucidating the physiology of the muscles of the hand by the aid of electricity, it is probable that he is generally in the right about the muscles of the face. In my opinion, Dr. Duchenne has greatly advanced the subject by his treatment of it. No one has more carefully studied the contraction of each separate muscle, and the consequent furrows produced on the skin. He has also, and this is a very important service, shown which muscles are least under the separate control of the will. He enters very little into theoretical considerations, and seldom attempts to explain why certain muscles and not others contract under the influence of certain emotions. A distinguished French anatomist, Pierre Gratiolet, gave a course of lectures on Expression at the Sorbonne, and his notes were published (1865) after his death, under the title of 'De la Physionomie et des Mouvements

d'Expression.' This is a very interesting work, full of valuable observations. His theory is rather complex, and, as far as it can be given in a single sentence (p. 65), is as follows: – "Il resulte, de tous les faits que j'ai rappelés, que les sens, l'imagination et la pensée elle-même, si élevée, si abstraite qu'on la suppose, ne peuvent s'exercer sans éveiller un sentiment corrélatif, et que ce sentiment se traduit directement, sympathiquement, symboliquement ou métaphoriquement, dans toutes les sphères des organes extérieurs, qui la racontent tous, suivant leur mode d'action propre, comme si chacun d'eux avait été directement affecté."

Gratiolet appears to overlook inherited habit, and even to some extent habit in the individual; and therefore he fails, as it seems to me, to give the right explanation, or any explanation at all, of many gestures and expressions. As an illustration of what he calls symbolic movements, I will quote his remarks (p. 37), taken from M. Chevreul, on a man playing at billiards. "Si une bille devie légèrement de la direction que le joueur prétend lui imprimer, ne l'avez-vous pas vu cent fois la pousser du regard, de la tête et même des épaules, comme si ces mouvements, purement symboliques, pouvaient rectifier son trajet? Des mouvements non moins significatifs se produisent quand la bille manque d'une impulsion suffisante. Et chez les joueurs novices, ils sont quelquefois accusés au point d'éveiller le sourire sur les lèvres des spectateurs." Such movements, as it appears to me, may be attributed simply to habit. As often as a man has wished to move an object to one side, he has always pushed it to that side when forwards, he has pushed it forwards; and if he has wished to arrest it, he has pulled backwards. Therefore, when a man sees his ball travelling in a wrong direction, and he intensely wishes it to go in another direction, he cannot avoid, from long habit, unconsciously performing movements which in other cases he has found effectual.

As an instance of sympathetic movements Gratiolet gives (p. 212) the following case: – "un jeune chien à oreilles droites, auquel son maître présente de loin quelque viande appétissante, fixe avec ardeur ses yeux sur cet objet dont il suit tous les mouvements, et pendant que les yeux regardent, les deux oreilles se portent en avant comme si cet objet pouvait être entendu." Here, instead of speaking of sympathy between the ears and eyes, it appears to me more simple to believe, that as dogs during many generations have, whilst intently looking at any object, pricked their ears in order to perceive any sound; and conversely have looked intently in the direction of a sound to which they may have listened, the movements of these organs have become firmly associated together through long-continued habit.

Dr. Piderit published in 1859 an essay on Expression, which I have not seen, but in which, as he states, he forestalled Gratiolet in many of his views. In 1867 he published his 'Wissenschaftliches System der Mimik und Physiognomik.' It is hardly possible to give in a few sentences a fair notion of his views; perhaps the two following sentences will tell as much as can be briefly told: "the muscular movements of expression are in part related to imaginary objects, and in part to imaginary sensorial impressions. In this proposition lies the key to the comprehension of all expressive muscular movements." (s. 25) Again, "Expressive movements manifest themselves chiefly in the numerous and mobile muscles of the face, partly because the nerves by which they are set into motion originate in the most immediate vicinity of the mind-organ, but partly also because these muscles serve to support the organs of sense." (s. 26.) If Dr. Piderit had studied Sir C. Bell's work, he would probably not have said (s. 101) that violent laughter causes a frown from partaking of the nature of pain; or that with infants (s. 103) the tears irritate the eyes, and thus excite the contraction of the surrounding muscles. Many good remarks are scattered throughout this volume, to which I shall hereafter refer.

Short discussions on Expression may be found in various works, which need not here be particularised. Mr. Bain, however, in two of his works has treated the subject at some length. He says,<sup>[8]</sup> "I look upon the expression so-called as part and parcel of the feeling. I believe it to be a general law of the mind that along with the fact of inward feeling or consciousness, there is a diffusive action or excitement over the bodily members." In another place he adds, "A very considerable number of the facts may be brought under the following principle: namely, that states of pleasure

are connected with an increase, and states of pain with an abatement, of some, or all, of the vital functions." But the above law of the diffusive action of feelings seems too general to throw much light on special expressions.

Mr. Herbert Spencer, in treating of the Feelings in his 'Principles of Psychology' (1855), makes the following remarks: – "Fear, when strong, expresses itself in cries, in efforts to hide or escape, in palpitations and tremblings; and these are just the manifestations that would accompany an actual experience of the evil feared. The destructive passions are shown in a general tension of the muscular system, in gnashing of the teeth and protrusion of the claws, in dilated eyes and nostrils in growls; and these are weaker forms of the actions that accompany the killing of prey." Here we have, as I believe, the true theory of a large number of expressions; but the chief interest and difficulty of the subject lies in following out the wonderfully complex results. I infer that some one (but who he is I have not been able to ascertain) formerly advanced a nearly similar view, for Sir C. Bell says,<sup>[9]</sup> "It has been maintained that what are called the external signs of passion, are only the concomitants of those voluntary movements which the structure renders necessary." Mr. Spencer has also published<sup>[10]</sup> a valuable essay on the physiology of Laughter, in which he insists on "the general law that feeling passing a certain pitch, habitually vents itself in bodily action," and that "an overflow of nerve-force undirected by any motive, will manifestly take first the most habitual routes; and if these do not suffice, will next overflow into the less habitual ones." This law I believe to be of the highest importance in throwing light on our subject.<sup>[11]</sup>

All the authors who have written on Expression, with the exception of Mr. Spencer – the great expounder of the principle of Evolution – appear to have been firmly convinced that species, man of course included, came into existence in their present condition. Sir C. Bell, being thus convinced, maintains that many of our facial muscles are "purely instrumental in expression;" or are "a special provision" for this sole object.<sup>[12]</sup> But the simple fact that the anthropoid apes possess the same facial muscles as we do,<sup>[13]</sup> renders it very improbable that these muscles in our case serve exclusively for expression; for no one, I presume, would be inclined to admit that monkeys have been endowed with special muscles solely for exhibiting their hideous grimaces. Distinct uses, independently of expression, can indeed be assigned with much probability for almost all the facial muscles.

Sir C. Bell evidently wished to draw as broad a distinction as possible between man and the lower animals; and he consequently asserts that with "the lower creatures there is no expression but what may be referred, more or less plainly, to their acts of volition or necessary instincts." He further maintains that their faces "seem chiefly capable of expressing rage and fear."<sup>[14]</sup> But man himself cannot express love and humility by external signs, so plainly as does a dog, when with drooping ears, hanging lips, flexuous body, and wagging tail, he meets his beloved master. Nor can these movements in the dog be explained by acts of volition or necessary instincts, any more than the beaming eyes and smiling cheeks of a man when he meets an old friend. If Sir C. Bell had been questioned about the expression of affection in the dog, he would no doubt have answered that this animal had been created with special instincts, adapting him for association with man, and that all further enquiry on the subject was superfluous.

Although Gratiolet emphatically denies<sup>[15]</sup> that any muscle has been developed solely for the sake of expression, he seems never to have reflected on the principle of evolution. He apparently looks at each species as a separate creation. So it is with the other writers on Expression. For instance, Dr. Duchenne, after speaking of the movements of the limbs, refers to those which give expression to the face, and remarks:<sup>[16]</sup> "Le createur n'a donc pas eu a se preoccuper ici des besoins de la mecanique; il a pu, selon sa sagesse, ou – que l'on me pardonne cette maniere de parler – par une divine fantaisie, mettre en action tel ou tel muscle, un seul ou plusieurs muscles a la fois, lorsqu'il a voulu que les signes caracteristiques des passions, meme les plus fugaces, lussent ecrits passagerement sur la face de l'homme. Ce langage de la physionomie une fois cree, il lui a suffi, pour le rendre universel et

immuable, de donner a tout etre humain la faculte instinctive d'exprimer toujours ses sendments par la contraction des memes muscles."

Many writers consider the whole subject of Expression as inexplicable. Thus the illustrious physiologist Muller, says,<sup>[17]</sup> "The completely different expression of the features in different passions shows that, according to the kind of feeling excited, entirely different groups of the fibres of the facial nerve are acted on. Of the cause of this we are quite ignorant."

No doubt as long as man and all other animals are viewed as independent creations, an effectual stop is put to our natural desire to investigate as far as possible the causes of Expression. By this doctrine, anything and everything can be equally well explained; and it has proved as pernicious with respect to Expression as to every other branch of natural history. With mankind some expressions, such as the bristling of the hair under the influence of extreme terror, or the uncovering of the teeth under that of furious rage, can hardly be understood, except on the belief that man once existed in a much lower and animal-like condition. The community of certain expressions in distinct though allied species, as in the movements of the same facial muscles during laughter by man and by various monkeys, is rendered somewhat more intelligible, if we believe in their descent from a common progenitor. He who admits on general grounds that the structure and habits of all animals have been gradually evolved, will look at the whole subject of Expression in a new and interesting light.

The study of Expression is difficult, owing to the movements being often extremely slight, and of a fleeting nature. A difference may be clearly perceived, and yet it may be impossible, at least I have found it so, to state in what the difference consists. When we witness any deep emotion, our sympathy is so strongly excited, that close observation is forgotten or rendered almost impossible; of which fact I have had many curious proofs. Our imagination is another and still more serious source of error; for if from the nature of the circumstances we expect to see any expression, we readily imagine its presence. Notwithstanding Dr. Duchenne's great experience, he for a long time fancied, as he states, that several muscles contracted under certain emotions, whereas he ultimately convinced himself that the movement was confined to a single muscle.

In order to acquire as good a foundation as possible, and to ascertain, independently of common opinion, how far particular movements of the features and gestures are really expressive of certain states of the mind, I have found the following means the most serviceable. In the first place, to observe infants; for they exhibit many emotions, as Sir C. Bell remarks, "with extraordinary force;" whereas, in after life, some of our expressions "cease to have the pure and simple source from which they spring in infancy."<sup>[18]</sup>

In the second place, it occurred to me that the insane ought to be studied, as they are liable to the strongest passions, and give uncontrolled vent to them. I had, myself, no opportunity of doing this, so I applied to Dr. Maudsley and received from him an introduction to Dr. J. Crichton Browne, who has charge of an immense asylum near Wakefield, and who, as I found, had already attended to the subject. This excellent observer has with unwearied kindness sent me copious notes and descriptions, with valuable suggestions on many points; and I can hardly over-estimate the value of his assistance. I owe also, to the kindness of Mr. Patrick Nicol, of the Sussex Lunatic Asylum, interesting statements on two or three points.

Thirdly Dr. Duchenne galvanized, as we have already seen, certain muscles in the face of an old man, whose skin was little sensitive, and thus produced various expressions which were photographed on a large scale. It fortunately occurred to me to show several of the best plates, without a word of explanation, to above twenty educated persons of various ages and both sexes, asking them, in each case, by what emotion or feeling the old man was supposed to be agitated; and I recorded their answers in the words which they used. Several of the expressions were instantly recognised by almost everyone, though described in not exactly the same terms; and these may, I think, be relied on as truthful, and will hereafter be specified. On the other hand, the most widely different judgments were pronounced in regard to some of them. This exhibition was of use in another way, by convincing me

how easily we may be misguided by our imagination; for when I first looked through Dr. Duchenne's photographs, reading at the same time the text, and thus learning what was intended, I was struck with admiration at the truthfulness of all, with only a few exceptions. Nevertheless, if I had examined them without any explanation, no doubt I should have been as much perplexed, in some cases, as other persons have been.

Fourthly, I had hoped to derive much aid from the great masters in painting and sculpture, who are such close observers. Accordingly, I have looked at photographs and engravings of many well-known works; but, with a few exceptions, have not thus profited. The reason no doubt is, that in works of art, beauty is the chief object; and strongly contracted facial muscles destroy beauty.<sup>[19]</sup> The story of the composition is generally told with wonderful force and truth by skilfully given accessories.

Fifthly, it seemed to me highly important to ascertain whether the same expressions and gestures prevail, as has often been asserted without much evidence, with all the races of mankind, especially with those who have associated but little with Europeans. Whenever the same movements of the features or body express the same emotions in several distinct races of man, we may infer with much probability, that such expressions are true ones, – that is, are innate or instinctive. Conventional expressions or gestures, acquired by the individual during early life, would probably have differed in the different races, in the same manner as do their languages. Accordingly I circulated, early in the year 1867, the following printed queries with a request, which has been fully responded to, that actual observations, and not memory, might be trusted. These queries were written after a considerable interval of time, during which my attention had been otherwise directed, and I can now see that they might have been greatly improved. To some of the later copies, I appended, in manuscript, a few additional remarks: —

(1.) Is astonishment expressed by the eyes and mouth being opened wide, and by the eyebrows being raised?

(2.) Does shame excite a blush when the colour of the skin allows it to be visible? and especially how low down the body does the blush extend?

(3.) When a man is indignant or defiant does he frown, hold his body and head erect, square his shoulders and clench his fists?

(4.) When considering deeply on any subject, or trying to understand any puzzle, does he frown, or wrinkle the skin beneath the lower eyelids?

(5.) When in low spirits, are the corners of the mouth depressed, and the inner corner of the eyebrows raised by that muscle which the French call the "Grief muscle"? The eyebrow in this state becomes slightly oblique, with a little swelling at the Inner end; and the forehead is transversely wrinkled in the middle part, but not across the whole breadth, as when the eyebrows are raised in surprise. (6.) When in good spirits do the eyes sparkle, with the skin a little wrinkled round and under them, and with the mouth a little drawn back at the corners?

(7.) When a man sneers or snarls at another, is the corner of the upper lip over the canine or eye tooth raised on the side facing the man whom he addresses?

(8.) Can a dogged or obstinate expression be recognized, which is chiefly shown by the mouth being firmly closed, a lowering brow and a slight frown?

(9.) Is contempt expressed by a slight protrusion of the lips and by turning up the nose, and with a slight expiration?

(10.) Is disgust shown by the lower lip being turned down, the upper lip slightly raised, with a sudden expiration, something like incipient vomiting, or like something spit out of the mouth?

(11.) Is extreme fear expressed in the same general manner as with Europeans?

(12.) Is laughter ever carried to such an extreme as to bring tears into the eyes?

(13.) When a man wishes to show that he cannot prevent something being done, or cannot himself do something, does he shrug his shoulders, turn inwards his elbows, extend outwards his hands and open the palms; with the eyebrows raised?

(14) Do the children when sulky, pout or greatly protrude the lips?

(15.) Can guilty, or sly, or jealous expressions be recognized? though I know not how these can be defined.

(16.) Is the head nodded vertically in affirmation, and shaken laterally in negation?

Observations on natives who have had little communication with Europeans would be of course the most valuable, though those made on any natives would be of much interest to me. General remarks on expression are of comparatively little value; and memory is so deceptive that I earnestly beg it may not be trusted. A definite description of the countenance under any emotion or frame of mind, with a statement of the circumstances under which it occurred, would possess much value.

To these queries I have received thirty-six answers from different observers, several of them missionaries or protectors of the aborigines, to all of whom I am deeply indebted for the great trouble which they have taken, and for the valuable aid thus received. I will specify their names, &c., towards the close of this chapter, so as not to interrupt my present remarks. The answers relate to several of the most distinct and savage races of man. In many instances, the circumstances have been recorded under which each expression was observed, and the expression itself described. In such cases, much confidence may be placed in the answers. When the answers have been simply yes or no, I have always received them with caution. It follows, from the information thus acquired, that the same state of mind is expressed throughout the world with remarkable uniformity; and this fact is in itself interesting as evidence of the close similarity in bodily structure and mental disposition of all the races, of mankind.

Sixthly, and lastly, I have attended as closely as I could, to the expression of the several passions in some of the commoner animals; and this I believe to be of paramount importance, not of course for deciding how far in man certain expressions are characteristic of certain states of mind, but as affording the safest basis for generalisation on the causes, or origin, of the various movements of Expression. In observing animals, we are not so likely to be biassed by our imagination; and we may feel safe that their expressions are not conventional.

From the reasons above assigned, namely, the fleeting nature of some expressions (the changes in the features being often extremely slight); our sympathy being easily aroused when we behold any strong emotion, and our attention thus distracted; our imagination deceiving us, from knowing in a vague manner what to expect, though certainly few of us know what the exact changes in the countenance are; and lastly, even our long familiarity with the subject, – from all these causes combined, the observation of Expression is by no means easy, as many persons, whom I have asked to observe certain points, have soon discovered. Hence it is difficult to determine, with certainty, what are the movements of the features and of the body, which commonly characterize certain states of the mind. Nevertheless, some of the doubts and difficulties have, as I hope, been cleared away by the observation of infants, – of the insane, – of the different races of man, – of works of art, – and lastly, of the facial muscles under the action of galvanism, as effected by Dr. Duchenne.

But there remains the much greater difficulty of understanding the cause or origin of the several expressions, and of judging whether any theoretical explanation is trustworthy. Besides, judging as well as we can by our reason, without the aid of any rules, which of two or more explanations is the most satisfactory, or are quite unsatisfactory, I see only one way of testing our conclusions. This is to observe whether the same principle by which one expression can, as it appears, be explained, is applicable in other allied cases; and especially, whether the same general principles can be applied with satisfactory results, both to man and the lower animals. This latter method, I am inclined to think, is the most serviceable of all. The difficulty of judging of the truth of any theoretical explanation, and of testing it by some distinct line of investigation, is the great drawback to that interest which the study seems well fitted to excite.

Finally, with respect to my own observations, I may state that they were commenced in the year 1838; and from that time to the present day, I have occasionally attended to the subject. At the above date, I was already inclined to believe in the principle of evolution, or of the derivation of species

from other and lower forms. Consequently, when I read Sir C. Bell's great work, his view, that man had been created with certain muscles specially adapted for the expression of his feelings, struck me as unsatisfactory. It seemed probable that the habit of expressing our feelings by certain movements, though now rendered innate, had been in some manner gradually acquired. But to discover how such habits had been acquired was perplexing in no small degree. The whole subject had to be viewed under a new aspect, and each expression demanded a rational explanation. This belief led me to attempt the present work, however imperfectly it may have been executed. —

I will now give the names of the gentlemen to whom, as I have said, I am deeply indebted for information in regard to the expressions exhibited by various races of man, and I will specify some of the circumstances under which the observations were in each case made. Owing to the great kindness and powerful influence of Mr. Wilson, of Hayes Place, Kent, I have received from Australia no less than thirteen sets of answers to my queries. This has been particularly fortunate, as the Australian aborigines rank amongst the most distinct of all the races of man. It will be seen that the observations have been chiefly made in the south, in the outlying parts of the colony of Victoria; but some excellent answers have been received from the north.

Mr. Dyson Lacy has given me in detail some valuable observations, made several hundred miles in the interior of Queensland. To Mr. R. Brough Smyth, of Melbourne, I am much indebted for observations made by himself, and for sending me several of the following letters, namely: — From the Rev. Mr. Hagenauer, of Lake Wellington, a missionary in Gippsland, Victoria, who has had much experience with the natives. From Mr. Samuel Wilson, a landowner, residing at Langerenong, Wimmera, Victoria. From the Rev. George Taplin, superintendent of the native Industrial Settlement at Port Macleay. From Mr. Archibald G. Lang, of Coranderik, Victoria, a teacher at a school where aborigines, old and young, are collected from all parts of the colony. From Mr. H. B. Lane, of Belfast, Victoria, a police magistrate and warden, whose observations, as I am assured, are highly trustworthy. From Mr. Templeton Bunnett, of Echuca, whose station is on the borders of the colony of Victoria, and who has thus been able to observe many aborigines who have had little intercourse with white men. He compared his observations with those made by two other gentlemen long resident in the neighbourhood. Also from Mr. J. Bulmer, a missionary in a remote part of Gippsland, Victoria.

I am also indebted to the distinguished botanist, Dr. Ferdinand Muller, of Victoria, for some observations made by himself, and for sending me others made by Mrs. Green, as well as for some of the foregoing letters.

In regard to the Maoris of New Zealand, the Rev. J. W. Stack has answered only a few of my queries; but the answers have been remarkably full, clear, and distinct, with the circumstances recorded under which the observations were made.

The Rajah Brooke has given me some information with respect to the Dyaks of Borneo.

Respecting the Malays, I have been highly successful; for Mr. F. Geach (to whom I was introduced by Mr. Wallace), during his residence as a mining engineer in the interior of Malacca, observed many natives, who had never before associated with white men. He wrote me two long letters with admirable and detailed observations on their expression. He likewise observed the Chinese immigrants in the Malay archipelago.

The well-known naturalist, H. M. Consul, Mr. Swinhoe, also observed for me the Chinese in their native country; and he made inquiries from others whom he could trust.

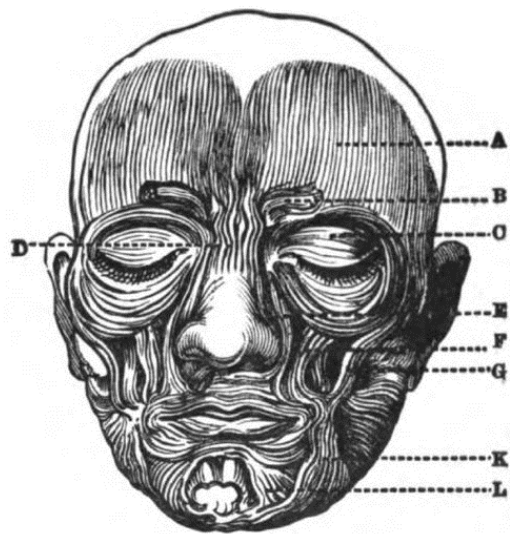
In India Mr. H. Erskine, whilst residing in his official capacity in the Admednugur District in the Bombay Presidency, attended to the expression of the inhabitants, but found much difficulty in arriving at any safe conclusions, owing to their habitual concealment of all emotions in the presence of Europeans. He also obtained information for me from Mr. West, the Judge in Canara, and he consulted some intelligent native gentlemen on certain points. In Calcutta Mr. J. Scott, curator of the Botanic Gardens, carefully observed the various tribes of men therein employed during a considerable period, and no one has sent me such full and valuable details. The habit of accurate observation,

gained by his botanical studies, has been brought to bear on our present subject. For Ceylon I am much indebted to the Rev. S. O. Glenie for answers to some of my queries.

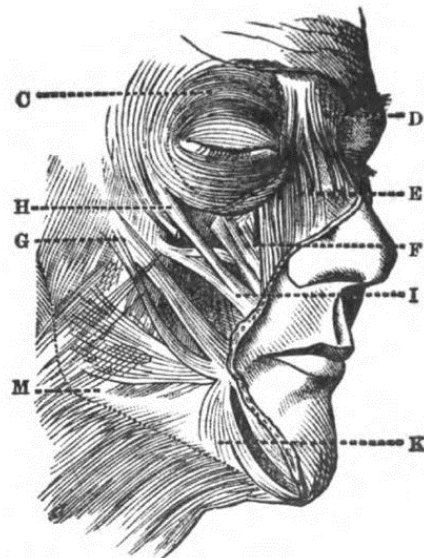
Turning to Africa, I have been unfortunate with respect to the negroes, though Mr. Winwood Reade aided me as far as lay in his power. It would have been comparatively easy to have obtained information in regard to the negro slaves in America; but as they have long associated with white men, such observations would have possessed little value. In the southern parts of the continent Mrs. Barber observed the Kafirs and Fingoes, and sent me many distinct answers. Mr. J. P. Mansel Weale also made some observations on the natives, and procured for me a curious document, namely, the opinion, written in English, of Christian Gaika, brother of the Chief Sandilli, on the expressions of his fellow-countrymen. In the northern regions of Africa Captain Speedy, who long resided with the Abyssinians, answered my queries partly from memory and partly from observations made on the son of King Theodore, who was then under his charge. Professor and Mrs. Asa Gray attended to some points in the expressions of the natives, as observed by them whilst ascending the Nile.

On the great American continent Mr. Bridges, a catechist residing with the Fuegians, answered some few questions about their expression, addressed to him many years ago. In the northern half of the continent Dr. Rothrock attended to the expressions of the wild Atnah and Espyox tribes on the Nasse River, in North-Western America. Mr. Washington Matthews Assistant-Surgeon in the United States Army, also observed with special care (after having seen my queries, as printed in the 'Smithsonian Report') some of the wildest tribes in the Western parts of the United States, namely, the Tetons, Grosventres, Mandans, and Assinaboines; and his answers have proved of the highest value.

Lastly, besides these special sources of information, I have collected some few facts incidentally given in books of travels. —



**FIG. 1.—Diagram of the muscles of the face, from Sir C. Bell.**



**FIG. 2.—Diagram from Henle.**

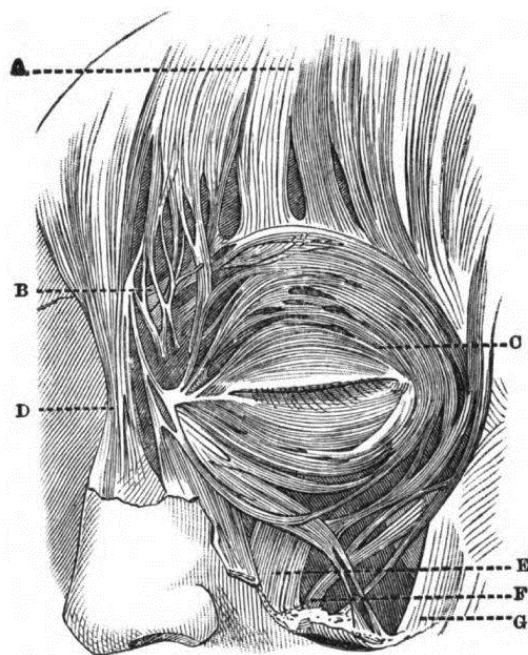


FIG. 3.—Diagram from Henle.

<p><b>A.</b> Occipito-frontalis, or frontal muscle.</p> <p><b>B.</b> Corrugator supercilli, or corrugator muscle.</p> <p><b>C.</b> Orbicularis palpebrarum, or orbicular muscles of the eyes.</p> <p><b>D.</b> Pyramidalis nasi, or pyramidal muscle of the nose.</p> <p><b>E.</b> Levator labii superioris alæque nasi.</p>	<p><b>F.</b> Levator labii proprius.</p> <p><b>G.</b> Zygomatic.</p> <p><b>H.</b> Malaris.</p> <p><b>I.</b> Little zygomatic.</p> <p><b>K.</b> Triangularis oris, or depressor anguli oris.</p> <p><b>L.</b> Quadratus menti.</p> <p><b>M.</b> Risorius, part of the Platysma myoides.</p>
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As I shall often have to refer, more especially in the latter part of this volume, to the muscles of the human face, I have had a diagram (fig. 1) copied and reduced from Sir C. Bell's work, and two others, with more accurate details (figs. 2 and 3), from Herde's well-known 'Handbuch der Systematischen Anatomie des Menschen.' The same letters refer to the same muscles in all three figures, but the names are given of only the more important ones to which I shall have to allude. The facial muscles blend much together, and, as I am informed, hardly appear on a dissected face so distinct as they are here represented. Some writers consider that these muscles consist of nineteen pairs, with one unpaired;[20] but others make the number much larger, amounting even to fifty-five, according to Moreau. They are, as is admitted by everyone who has written on the subject, very variable in structure; and Moreau remarks that they are hardly alike in half-a-dozen subjects.[21] They are also variable in function. Thus the power of uncovering the canine tooth on one side differs much in different persons. The power of raising the wings of the nostrils is also, according to Dr. Piderit,[22] variable in a remarkable degree; and other such cases could be given.

Finally, I must have the pleasure of expressing my obligations to Mr. Rejlander for the trouble which he has taken in photographing for me various expressions and gestures. I am also indebted to Herr Kindermann, of Hamburg, for the loan of some excellent negatives of crying infants; and to Dr. Wallich for a charming one of a smiling girl. I have already expressed my obligations to Dr. Duchenne for generously permitting me to have some of his large photographs copied and reduced. All these photographs have been printed by the Heliotype process, and the accuracy of the copy is thus guaranteed. These plates are referred to by Roman numerals.

I am also greatly indebted to Mr. T. W. Wood for the extreme pains which he has taken in drawing from life the expressions of various animals. A distinguished artist, Mr. Riviere, has had the

kindness to give me two drawings of dogs – one in a hostile and the other in a humble and caressing frame of mind. Mr. A. May has also given me two similar sketches of dogs. Mr. Cooper has taken much care in cutting the blocks. Some of the photographs and drawings, namely, those by Mr. May, and those by Mr. Wolf of the Cynopithecus, were first reproduced by Mr. Cooper on wood by means of photography, and then engraved: by this means almost complete fidelity is ensured.

## CHAPTER I. – GENERAL PRINCIPLES OF EXPRESSION

The three chief principles stated – The first principle – Serviceable actions become habitual in association with certain states of the mind, and are performed whether or not of service in each particular case – The force of habit – Inheritance – Associated habitual movements in man – Reflex actions – Passage of habits into reflex actions – Associated habitual movements in the lower animals – Concluding remarks.

I WILL begin by giving the three Principles, which appear to me to account for most of the expressions and gestures involuntarily used by man and the lower animals, under the influence of various emotions and sensations.[101] I arrived, however, at these three Principles only at the close of my observations. They will be discussed in the present and two following chapters in a general manner. Facts observed both with man and the lower animals will here be made use of; but the latter facts are preferable, as less likely to deceive us. In the fourth and fifth chapters, I will describe the special expressions of some of the lower animals; and in the succeeding chapters those of man. Everyone will thus be able to judge for himself, how far my three principles throw light on the theory of the subject. It appears to me that so many expressions are thus explained in a fairly satisfactory manner, that probably all will hereafter be found to come under the same or closely analogous heads. I need hardly premise that movements or changes in any part of the body, – as the wagging of a dog's tail, the drawing back of a horse's ears, the shrugging of a man's shoulders, or the dilatation of the capillary vessels of the skin, – may all equally well serve for expression. The three Principles are as follows.

I. *The principle of serviceable associated Habits.* – Certain complex actions are of direct or indirect service under certain states of the mind, in order to relieve or gratify certain sensations, desires, &c.; and whenever the same state of mind is induced, however feebly, there is a tendency through the force of habit and association for the same movements to be performed, though they may not then be of the least use. Some actions ordinarily associated through habit with certain states of the mind may be partially repressed through the will, and in such cases the muscles which are least under the separate control of the will are the most liable still to act, causing movements which we recognize as expressive. In certain other cases the checking of one habitual movement requires other slight movements; and these are likewise expressive.

II. *The principle of Antithesis.* – Certain states of the mind lead to certain habitual actions, which are of service, as under our first principle. Now when a directly opposite state of mind is induced, there is a strong and involuntary tendency to the performance of movements of a directly opposite nature, though these are of no use; and such movements are in some cases highly expressive.

III. *The principle of actions due to the constitution of the Nervous System, independently from the first of the Will, and independently to a certain extent of Habit.* – When the sensorium is strongly excited, nerve-force is generated in excess, and is transmitted in certain definite directions, depending on the connection of the nerve-cells, and partly on habit: or the supply of nerve-force may, as it appears, be interrupted. Effects are thus produced which we recognize as expressive. This third principle may, for the sake of brevity, be called that of the direct action of the nervous system.

With respect to our *first Principle*, it is notorious how powerful is the force of habit. The most complex and difficult movements can in time be performed without the least effort or consciousness. It is not positively known how it comes that habit is so efficient in facilitating complex movements; but physiologists admit[102] "that the conducting power of the nervous fibres increases with the frequency of their excitement." This applies to the nerves of motion and sensation, as well as to those connected with the act of thinking. That some physical change is produced in the nerve-cells or

nerves which are habitually used can hardly be doubted, for otherwise it is impossible to understand how the tendency to certain acquired movements is inherited. That they are inherited we see with horses in certain transmitted paces, such as cantering and ambling, which are not natural to them, – in the pointing of young pointers and the setting of young setters – in the peculiar manner of flight of certain breeds of the pigeon, &c. We have analogous cases with mankind in the inheritance of tricks or unusual gestures, to which we shall presently recur. To those who admit the gradual evolution of species, a most striking instance of the perfection with which the most difficult consensual movements can be transmitted, is afforded by the humming-bird Sphinx-moth (*Macroglossa*); for this moth, shortly after its emergence from the cocoon, as shown by the bloom on its unruffled scales, may be seen poised stationary in the air, with its long hair-like proboscis uncurled and inserted into the minute orifices of flowers; and no one, I believe, has ever seen this moth learning to perform its difficult task, which requires such unerring aim.

When there exists an inherited or instinctive tendency to the performance of an action, or an inherited taste for certain kinds of food, some degree of habit in the individual is often or generally requisite. We find this in the paces of the horse, and to a certain extent in the pointing of dogs; although some young dogs point excellently the first time they are taken out, yet they often associate the proper inherited attitude with a wrong odour, and even with eyesight. I have heard it asserted that if a calf be allowed to suck its mother only once, it is much more difficult afterwards to rear it by hand.[103] Caterpillars which have been fed on the leaves of one kind of tree, have been known to perish from hunger rather than to eat the leaves of another tree, although this afforded them their proper food, under a state of nature;[104] and so it is in many other cases.

The power of Association is admitted by everyone. Mr. Bain remarks, that "actions, sensations and states of feeling, occurring together or in close succession, tend to grow together, or cohere, in such a way that when any one of them is afterwards presented to the mind, the others are apt to be brought up in idea." [105] It is so important for our purpose fully to recognize that actions readily become associated with other actions and with various states of the mind, that I will give a good many instances, in the first place relating to man, and afterwards to the lower animals. Some of the instances are of a very trifling nature, but they are as good for our purpose as more important habits. It is known to everyone how difficult, or even impossible it is, without repeated trials, to move the limbs in certain opposed directions which have never been practised. Analogous cases occur with sensations, as in the common experiment of rolling a marble beneath the tips of two crossed fingers, when it feels exactly like two marbles. Everyone protects himself when falling to the ground by extending his arms, and as Professor Alison has remarked, few can resist acting thus, when voluntarily falling on a soft bed. A man when going out of doors puts on his gloves quite unconsciously; and this may seem an extremely simple operation, but he who has taught a child to put on gloves, knows that this is by no means the case.

When our minds are much affected, so are the movements of our bodies; but here another principle besides habit, namely the undirected overflow of nerve-force, partially comes into play. Norfolk, in speaking of Cardinal Wolsey, says —

"Some strange commotion  
Is in his brain; he bites his lip and starts;  
Stops on a sudden, looks upon the ground,  
Then, lays his finger on his temple: straight,  
Springs out into fast gait; then, stops again,  
Strikes his breast hard; and anon, he casts  
His eye against the moon: in most strange postures  
We have seen him set himself." —*Hen. VIII.*, act 3, sc. 2.

A vulgar man often scratches his head when perplexed in mind; and I believe that he acts thus from habit, as if he experienced a slightly uncomfortable bodily sensation, namely, the itching of his head, to which he is particularly liable, and which he thus relieves. Another man rubs his eyes when perplexed, or gives a little cough when embarrassed, acting in either case as if he felt a slightly uncomfortable sensation in his eyes or windpipe.[106]

From the continued use of the eyes, these organs are especially liable to be acted on through association under various states of the mind, although there is manifestly nothing to be seen. A man, as Gratiolet remarks, who vehemently rejects a proposition, will almost certainly shut his eyes or turn away his face; but if he accepts the proposition, he will nod his head in affirmation and open his eyes widely. The man acts in this latter case as if he clearly saw the thing, and in the former case as if he did not or would not see it. I have noticed that persons in describing a horrid sight often shut their eyes momentarily and firmly, or shake their heads, as if not to see or to drive away something disagreeable; and I have caught myself, when thinking in the dark of a horrid spectacle, closing my eyes firmly. In looking suddenly at any object, or in looking all around, everyone raises his eyebrows, so that the eyes may be quickly and widely opened; and Duchenne remarks that[107] a person in trying to remember something often raises his eyebrows, as if to see it. A Hindoo gentleman made exactly the same remark to Mr. Erskine in regard to his countrymen. I noticed a young lady earnestly trying to recollect a painter's name, and she first looked to one corner of the ceiling and then to the opposite corner, arching the one eyebrow on that side; although, of course, there was nothing to be seen there.

In most of the foregoing cases, we can understand how the associated movements were acquired through habit; but with some individuals, certain strange gestures or tricks have arisen in association with certain states of the mind, owing to wholly inexplicable causes, and are undoubtedly inherited. I have elsewhere given one instance from my own observation of an extraordinary and complex gesture, associated with pleasurable feelings, which was transmitted from a father to his daughter, as well as some other analogous facts.[108]

Another curious instance of an odd inherited movement, associated with the wish to obtain an object, will be given in the course of this volume.

There are other actions which are commonly performed under certain circumstances, independently of habit, and which seem to be due to imitation or some sort of sympathy. Thus persons cutting anything with a pair of scissors may be seen to move their jaws simultaneously with the blades of the scissors. Children learning to write often twist about their tongues as their fingers move, in a ridiculous fashion. When a public singer suddenly becomes a little hoarse, many of those present may be heard, as I have been assured by a gentleman on whom I can rely, to clear their throats; but here habit probably comes into play, as we clear our own throats under similar circumstances. I have also been told that at leaping matches, as the performer makes his spring, many of the spectators, generally men and boys, move their feet; but here again habit probably comes into play, for it is very doubtful whether women would thus act.[109]

*Reflex actions*— Reflex actions, in the strict sense of the term, are due to the excitement of a peripheral nerve, which transmits its influence to certain nerve-cells, and these in their turn excite certain muscles or glands into action; and all this may take place without any sensation or consciousness on our part, though often thus accompanied. As many reflex actions are highly expressive, the subject must here be noticed at some little length. We shall also see that some of them graduate into, and can hardly be distinguished from actions which have arisen through habit? Coughing and sneezing are familiar instances of reflex actions. With infants the first act of respiration is often a sneeze, although this requires the co-ordinated movement of numerous muscles. Respiration is partly voluntary, but mainly reflex, and is performed in the most natural and best manner without the interference of the will. A vast number of complex movements are reflex. As good an instance as can be given is the often-quoted one of a decapitated frog, which cannot of course feel, and cannot consciously perform, any movement. Yet if a drop of acid be placed on the lower surface of the thigh

of a frog in this state, it will rub off the drop with the upper surface of the foot of the same leg. If this foot be cut off, it cannot thus act. "After some fruitless efforts, therefore, it gives up trying in that way, seems restless, as though, says Pfluger, it was seeking some other way, and at last it makes use of the foot of the other leg and succeeds in rubbing off the acid. Notably we have here not merely contractions of muscles, but combined and harmonized contractions in due sequence for a special purpose. These are actions that have all the appearance of being guided by intelligence and instigated by will in an animal, the recognized organ of whose intelligence and will has been removed."[\[110\]](#)

We see the difference between reflex and voluntary movements in very young children not being able to perform, as I am informed by Sir Henry Holland, certain acts somewhat analogous to those of sneezing and coughing, namely, in their not being able to blow their noses (i. e. to compress the nose and blow violently through the passage), and in their not being able to clear their throats of phlegm. They have to learn to perform these acts, yet they are performed by us, when a little older, almost as easily as reflex actions. Sneezing and coughing, however, can be controlled by the will only partially or not at all; whilst the clearing the throat and blowing the nose are completely under our command.

When we are conscious of the presence of an irritating particle in our nostrils or windpipe – that is, when the same sensory nerve-cells are excited, as in the case of sneezing and coughing – we can voluntarily expel the particle by forcibly driving air through these passages; but we cannot do this with nearly the same force, rapidity, and precision, as by a reflex action. In this latter case the sensory nerve-cells apparently excite the motor nerve-cells without any waste of power by first communicating with the cerebral hemispheres – the seat of our consciousness and volition. In all cases there seems to exist a profound antagonism between the same movements, as directed by the will and by a reflex stimulant, in the force with which they are performed and in the facility with which they are excited. As Claude Bernard asserts, "L'influence du cerveau tend donc a entraver les mouvements reflexes, a limiter leur force et leur etendue."[\[111\]](#)

The conscious wish to perform a reflex action sometimes stops or interrupts its performance, though the proper sensory nerves may be stimulated. For instance, many years ago I laid a small wager with a dozen young men that they would not sneeze if they took snuff, although they all declared that they invariably did so; accordingly they all took a pinch, but from wishing much to succeed, not one sneezed, though their eyes watered, and all, without exception, had to pay me the wager. Sir H. Holland remarks[\[112\]](#) that attention paid to the act of swallowing interferes with the proper movements; from which it probably follows, at least in part, that some persons find it so difficult to swallow a pill.

Another familiar instance of a reflex action is the involuntary closing of the eyelids when the surface of the eye is touched. A similar winking movement is caused when a blow is directed towards the face; but this is an habitual and not a strictly reflex action, as the stimulus is conveyed through the mind and not by the excitement of a peripheral nerve. The whole body and head are generally at the same time drawn suddenly backwards. These latter movements, however, can be prevented, if the danger does not appear to the imagination imminent; but our reason telling us that there is no danger does not suffice. I may mention a trifling fact, illustrating this point, and which at the time amused me. I put my face close to the thick glass-plate in front of a puff-adder in the Zoological Gardens, with the firm determination of not starting back if the snake struck at me; but, as soon as the blow was struck, my resolution went for nothing, and I jumped a yard or two backwards with astonishing rapidity. My will and reason were powerless against the imagination of a danger which had never been experienced.

The violence of a start seems to depend partly on the vividness of the imagination, and partly on the condition, either habitual or temporary, of the nervous system. He who will attend to the starting of his horse, when tired and fresh, will perceive how perfect is the gradation from a mere glance at some unexpected object, with a momentary doubt whether it is dangerous, to a jump so rapid and

violent, that the animal probably could not voluntarily whirl round in so rapid a manner. The nervous system of a fresh and highly-fed horse sends its order to the motory system so quickly, that no time is allowed for him to consider whether or not the danger is real. After one violent start, when he is excited and the blood flows freely through his brain, he is very apt to start again; and so it is, as I have noticed, with young infants.

A start from a sudden noise, when the stimulus is conveyed through the auditory nerves, is always accompanied in grown-up persons by the winking of the eyelids.[113] I observed, however, that though my infants started at sudden sounds, when under a fortnight old, they certainly did not always wink their eyes, and I believe never did so. The start of an older infant apparently represents a vague catching hold of something to prevent falling. I shook a pasteboard box close before the eyes of one of my infants, when 114 days old, and it did not in the least wink; but when I put a few comfits into the box, holding it in the same position as before, and rattled them, the child blinked its eyes violently every time, and started a little. It was obviously impossible that a carefully-guarded infant could have learnt by experience that a rattling sound near its eyes indicated danger to them. But such experience will have been slowly gained at a later age during a long series of generations; and from what we know of inheritance, there is nothing improbable in the transmission of a habit to the offspring at an earlier age than that at which it was first acquired by the parents.

From the foregoing remarks it seems probable that some actions, which were at first performed consciously, have become through habit and association converted into reflex actions, and are now so firmly fixed and inherited, that they are performed, even when not of the least use,[114] as often as the same causes arise, which originally excited them in us through the volition. In such cases the sensory nerve-cells excite the motor cells, without first communicating with those cells on which our consciousness and volition depend. It is probable that sneezing and coughing were originally acquired by the habit of expelling, as violently as possible, any irritating particle from the sensitive air-passages. As far as time is concerned, there has been more than enough for these habits to have become innate or converted into reflex actions; for they are common to most or all of the higher quadrupeds, and must therefore have been first acquired at a very remote period. Why the act of clearing the throat is not a reflex action, and has to be learnt by our children, I cannot pretend to say; but we can see why blowing the nose on a handkerchief has to be learnt.

It is scarcely credible that the movements of a headless frog, when it wipes off a drop of acid or other object from its thigh, and which movements are so well coordinated for a special purpose, were not at first performed voluntarily, being afterwards rendered easy through long-continued habit so as at last to be performed unconsciously, or independently of the cerebral hemispheres.

So again it appears probable that starting was originally acquired by the habit of jumping away as quickly as possible from danger, whenever any of our senses gave us warning. Starting, as we have seen, is accompanied by the blinking of the eyelids so as to protect the eyes, the most tender and sensitive organs of the body; and it is, I believe, always accompanied by a sudden and forcible inspiration, which is the natural preparation for any violent effort. But when a man or horse starts, his heart beats wildly against his ribs, and here it may be truly said we have an organ which has never been under the control of the will, partaking in the general reflex movements of the body. To this point, however, I shall return in a future chapter.

The contraction of the iris, when the retina is stimulated by a bright light, is another instance of a movement, which it appears cannot possibly have been at first voluntarily performed and then fixed by habit; for the iris is not known to be under the conscious control of the will in any animal. In such cases some explanation, quite distinct from habit, will have to be discovered. The radiation of nerve-force from strongly-excited nerve-cells to other connected cells, as in the case of a bright light on the retina causing a sneeze, may perhaps aid us in understanding how some reflex actions originated. A radiation of nerve-force of this kind, if it caused a movement tending to lessen the primary irritation,

as in the case of the contraction of the iris preventing too much light from falling on the retina, might afterwards have been taken advantage of and modified for this special purpose.

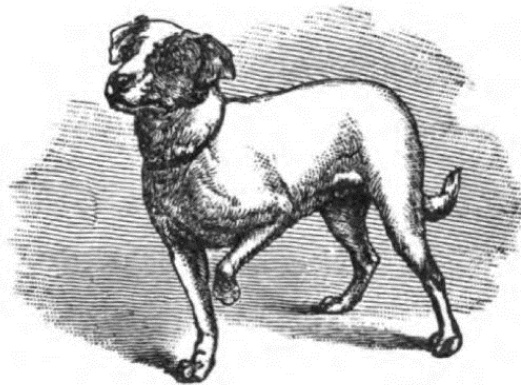
It further deserves notice that reflex actions are in all probability liable to slight variations, as are all corporeal structures and instincts; and any variations which were beneficial and of sufficient importance, would tend to be preserved and inherited. Thus reflex actions, when once gained for one purpose, might afterwards be modified independently of the will or habit, so as to serve for some distinct purpose. Such cases would be parallel with those which, as we have every reason to believe, have occurred with many instincts; for although some instincts have been developed simply through long-continued and inherited habit, other highly complex ones have been developed through the preservation of variations of pre-existing instincts – that is, through natural selection.

I have discussed at some little length, though as I am well aware, in a very imperfect manner, the acquirement of reflex actions, because they are often brought into play in connection with movements expressive of our emotions; and it was necessary to show that at least some of them might have been first acquired through the will in order to satisfy a desire, or to relieve a disagreeable sensation.

*Associated habitual movements in the lower animals.* – I have already given in the case of Man several instances of movements associated with various states of the mind or body, which are now purposeless, but which were originally of use, and are still of use under certain circumstances. As this subject is very important for us, I will here give a considerable number of analogous facts, with reference to animals; although many of them are of a very trifling nature. My object is to show that certain movements were originally performed for a definite end, and that, under nearly the same circumstances, they are still pertinaciously performed through habit when not of the least use. That the tendency in most of the following cases is inherited, we may infer from such actions being performed in the same manner by all the individuals, young and old, of the same species. We shall also see that they are excited by the most diversified, often circuitous, and sometimes mistaken associations.

Dogs, when they wish to go to sleep on a carpet or other hard surface, generally turn round and round and scratch the ground with their fore-paws in a senseless manner, as if they intended to trample down the grass and scoop out a hollow, as no doubt their wild parents did, when they lived on open grassy plains or in the woods. Jackals, fennecs, and other allied animals in the Zoological Gardens, treat their straw in this manner; but it is a rather odd circumstance that the keepers, after observing for some months, have never seen the wolves thus behave. A semi-idiotic dog – and an animal in this condition would be particularly liable to follow a senseless habit – was observed by a friend to turn completely round on a carpet thirteen times before going to sleep.

Many carnivorous animals, as they crawl towards their prey and prepare to rush or spring on it, lower their heads and crouch, partly, as it would appear, to hide themselves, and partly to get ready for their rush; and this habit in an exaggerated form has become hereditary in our pointers and setters. Now I have noticed scores of times that when two strange dogs meet on an open road, the one which first sees the other, though at the distance of one or two hundred yards, after the first glance always lowers its head, generally crouches a little, or even lies down; that is, he takes the proper attitude for concealing himself and for making a rush or spring although the road is quite open and the distance great. Again, dogs of all kinds when intently watching and slowly approaching their prey, frequently keep one of their fore-legs doubled up for a long time, ready for the next cautious step; and this is eminently characteristic of the pointer. But from habit they behave in exactly the same manner whenever their attention is aroused (fig. 4). I have seen a dog at the foot of a high wall, listening attentively to a sound on the opposite side, with one leg doubled up; and in this case there could have been no intention of making a cautious approach.



**FIG. 4.—Small dog watching a cat on a table. From a photograph taken by Mr. Rejlander.**

{illust. caption = for making a rush or FIG. 4. – Small dog watching a cat on a table. From a photograph taken by Mr. Rejlander.}

Dogs after voiding their excrement often make with all four feet a few scratches backwards, even on a bare stone pavement, as if for the purpose of covering up their excrement with earth, in nearly the same manner as do cats. Wolves and jackals behave in the Zoological Gardens in exactly the same manner, yet, as I am assured by the keepers, neither wolves, jackals, nor foxes, when they have the means of doing so, ever cover up their excrement, any more than do dogs. All these animals, however, bury superfluous food. Hence, if we rightly understand the meaning of the above cat-like habit, of which there can be little doubt, we have a purposeless remnant of an habitual movement, which was originally followed by some remote progenitor of the dog-genus for a definite purpose, and which has been retained for a prodigious length of time.

Dogs and jackals<sup>[115]</sup> take much pleasure in rolling and rubbing their necks and backs on carrion. The odour seems delightful to them, though dogs at least do not eat carrion. Mr. Bartlett has observed wolves for me, and has given them carrion, but has never seen them roll on it. I have heard it remarked, and I believe it to be true, that the larger dogs, which are probably descended from wolves, do not so often roll in carrion as do smaller dogs, which are probably descended from jackals. When a piece of brown biscuit is offered to a terrier of mine and she is not hungry (and I have heard of similar instances), she first tosses it about and worries it, as if it were a rat or other prey; she then repeatedly rolls on it precisely as if it were a piece of carrion, and at last eats it. It would appear that an imaginary relish has to be given to the distasteful morsel; and to effect this the dog acts in his habitual manner, as if the biscuit was a live animal or smelt like carrion, though he knows better than we do that this is not the case. I have seen this same terrier act in the same manner after killing a little bird or mouse.

Dogs scratch themselves by a rapid movement of one of their hind-feet; and when their backs are rubbed with a stick, so strong is the habit, that they cannot help rapidly scratching the air or the ground in a useless and ludicrous manner. The terrier just alluded to, when thus scratched with a stick, will sometimes show her delight by another habitual movement, namely, by licking the air as if it were my hand.

Horses scratch themselves by nibbling those parts of their bodies which they can reach with their teeth; but more commonly one horse shows another where he wants to be scratched, and they then nibble each other. A friend whose attention I had called to the subject, observed that when he rubbed his horse's neck, the animal protruded his head, uncovered his teeth, and moved his jaws, exactly as if nibbling another horse's neck, for he could never have nibbled his own neck. If a horse is much tickled, as when curry-combed, his wish to bite something becomes so intolerably strong,

that he will clatter his teeth together, and though not vicious, bite his groom. At the same time from habit he closely depresses his ears, so as to protect them from being bitten, as if he were fighting with another horse.

A horse when eager to start on a journey makes the nearest approach which he can to the habitual movement of progression by pawing the ground. Now when horses in their stalls are about to be fed and are eager for their corn, they paw the pavement or the straw. Two of my horses thus behave when they see or hear the corn given to their neighbours. But here we have what may almost be called a true expression, as pawing the ground is universally recognized as a sign of eagerness.

Cats cover up their excrements of both kinds with earth; and my grandfather[116]{sic} saw a kitten scraping ashes over a spoonful of pure water spilt on the hearth; so that here an habitual or instinctive action was falsely excited, not by a previous act or by odour, but by eyesight. It is well known that cats dislike wetting their feet, owing, it is probable, to their having aboriginally inhabited the dry country of Egypt; and when they wet their feet they shake them violently. My daughter poured some water into a glass close to the head of a kitten; and it immediately shook its feet in the usual manner; so that here we have an habitual movement falsely excited by an associated sound instead of by the sense of touch.

Kittens, puppies, young pigs and probably many other young animals, alternately push with their forefeet against the mammary glands of their mothers, to excite a freer secretion of milk, or to make it flow. Now it is very common with young cats, and not at all rare with old cats of the common and Persian breeds (believed by some naturalists to be specifically extinct), when comfortably lying on a warm shawl or other soft substance, to pound it quietly and alternately with their fore-feet; their toes being spread out and claws slightly protruded, precisely as when sucking their mother. That it is the same movement is clearly shown by their often at the same time taking a bit of the shawl into their mouths and sucking it; generally closing their eyes and purring from delight. This curious movement is commonly excited only in association with the sensation of a warm soft surface; but I have seen an old cat, when pleased by having its back scratched, pounding the air with its feet in the same manner; so that this action has almost become the expression of a pleasurable sensation.

Having referred to the act of sucking, I may add that this complex movement, as well as the alternate protrusion of the fore-feet, are reflex actions; for they are performed if a finger moistened with milk is placed in the mouth of a puppy, the front part of whose brain has been removed.[117] It has recently been stated in France, that the action of sucking is excited solely through the sense of smell, so that if the olfactory nerves of a puppy are destroyed, it never sucks. In like manner the wonderful power which a chicken possesses only a few hours after being hatched, of picking up small particles of food, seems to be started into action through the sense of hearing; for with chickens hatched by artificial heat, a good observer found that "making a noise with the finger-nail against a board, in imitation of the hen-mother, first taught them to peck at their meat." [118]

I will give only one other instance of an habitual and purposeless movement. The Sheldrake (*Tadorna*) feeds on the sands left uncovered by the tide, and when a worm-cast is discovered, "it begins patting the ground with its feet, dancing as it were, over the hole;" and this makes the worm come to the surface. Now Mr. St. John says, that when his tame Sheldrakes "came to ask for food, they patted the ground in an impatient and rapid manner." [119] This therefore may almost be considered as their expression of hunger. Mr. Bartlett informs me that the Flamingo and the Kagu (*Rhinochetus jubatus*) when anxious to be fed, beat the ground with their feet in the same odd manner. So again Kingfishers, when they catch a fish, always beat it until it is killed; and in the Zoological Gardens they always beat the raw meat, with which they are sometimes fed, before devouring it.

We have now, I think, sufficiently shown the truth of our first Principle, namely, that when any sensation, desire, dislike, &c., has led during a long series of generations to some voluntary movement, then a tendency to the performance of a similar movement will almost certainly be excited, whenever the same, or any analogous or associated sensation &c., although very weak, is experienced;

notwithstanding that the movement in this case may not be of the least use. Such habitual movements are often, or generally inherited; and they then differ but little from reflex actions. When we treat of the special expressions of man, the latter part of our first Principle, as given at the commencement of this chapter, will be seen to hold good; namely, that when movements, associated through habit with certain states of the mind, are partially repressed by the will, the strictly involuntary muscles, as well as those which are least under the separate control of the will, are liable still to act; and their action is often highly expressive. Conversely, when the will is temporarily or permanently weakened, the voluntary muscles fail before the involuntary. It is a fact familiar to pathologists, as Sir C. Bell remarks,[\[120\]](#) "that when debility arises from affection of the brain, the influence is greatest on those muscles which are, in their natural condition, most under the command of the will." We shall, also, in our future chapters, consider another proposition included in our first Principle; namely, that the checking of one habitual movement sometimes requires other slight movements; these latter serving as a means of expression.

## CHAPTER II. – GENERAL PRINCIPLES OF EXPRESSION —*continued*

The Principle of Antithesis – Instances in the dog and cat – Origin of the principle – Conventional signs – The principle of antithesis has not arisen from opposite actions being consciously performed under opposite impulses.

WE will now consider our second Principle, that of Antithesis. Certain states of the mind lead, as we have seen in the last chapter, to certain habitual movements which were primarily, or may still be, of service; and we shall find that when a directly opposite state of mind is induced, there is a strong and involuntary tendency to the performance of movements of a directly opposite nature, though these have never been of any service. A few striking instances of antithesis will be given, when we treat of the special expressions of man; but as, in these cases, we are particularly liable to confound conventional or artificial gestures and expressions with those which are innate or universal, and which alone deserve to rank as true expressions, I will in the present chapter almost confine myself to the lower animals.

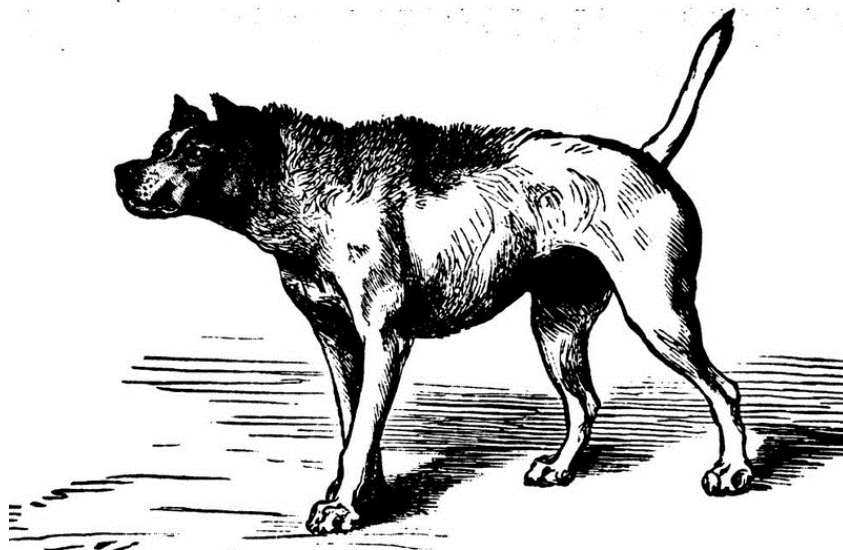
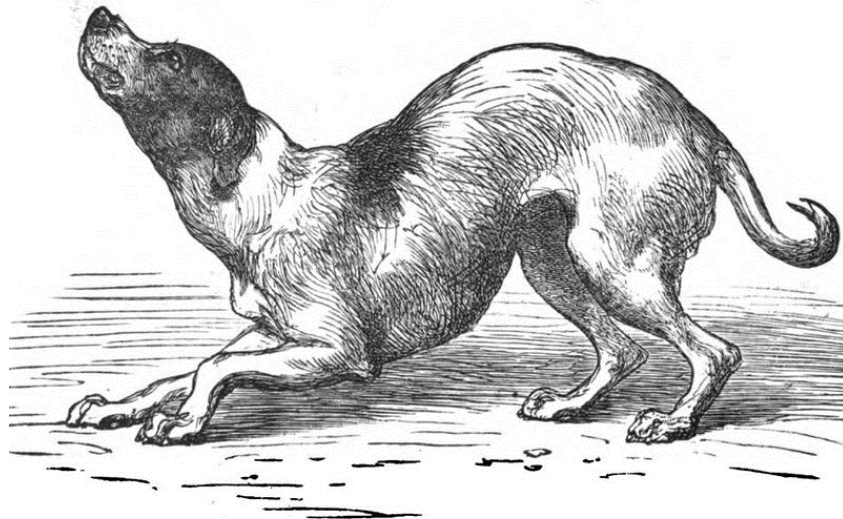


FIG. 5.—Dog approaching another dog with hostile intentions. By Mr. Riviere.



**FIG. 6.**—The same in a humble and affectionate frame of mind. By Mr. Riviere.



**FIG. 7.**—Half-bred Shepherd Dog in the same state as in Fig. 5. By Mr. A. May.

When a dog approaches a strange dog or man in a savage or hostile frame of mind he walks upright and very stiffly; his head is slightly raised, or not much lowered; the tail is held erect, and quite rigid; the hairs bristle, especially along the neck and back; the pricked ears are directed forwards, and the eyes have a fixed stare: (see figs. 5 and 7). These actions, as will hereafter be explained, follow from the dog's intention to attack his enemy, and are thus to a large extent intelligible. As he prepares to spring with a savage growl on his enemy, the canine teeth are uncovered, and the ears are pressed close backwards on the head; but with these latter actions, we are not here concerned. Let us now suppose that the dog suddenly discovers that the man he is approaching, is not a stranger, but his master; and let it be observed how completely and instantaneously his whole bearing is reversed. Instead of walking upright, the body sinks downwards or even crouches, and is thrown into flexuous movements; his tail, instead of being held stiff and upright, is lowered and wagged from side to side; his hair instantly becomes smooth; his ears are depressed and drawn backwards, but not closely to the head; and his lips hang loosely. From the drawing back of the ears, the eyelids become elongated,

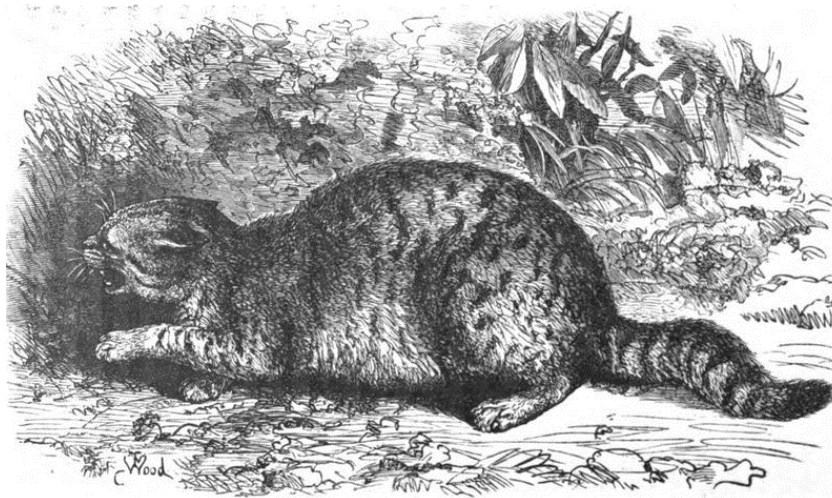
and the eyes no longer appear round and staring. It should be added that the animal is at such times in an excited condition from joy; and nerve-force will be generated in excess, which naturally leads to action of some kind. Not one of the above movements, so clearly expressive of affection, are of the least direct service to the animal. They are explicable, as far as I can see, solely from being in complete opposition or antithesis to the attitude and movements which, from intelligible causes, are assumed when a dog intends to fight, and which consequently are expressive of anger. I request the reader to look at the four accompanying sketches, which have been given in order to recall vividly the appearance of a dog under these two states of mind. It is, however, not a little difficult to represent affection in a dog, whilst caressing his master and wagging his tail, as the essence of the expression lies in the continuous flexuous movements.



**FIG. 8.—The same caressing his master. By Mr. A. May.**

We will now turn to the cat. When this animal is threatened by a dog, it arches its back in a surprising manner, erects its hair, opens its mouth and spits. But we are not here concerned with this well-known attitude, expressive of terror combined with anger; we are concerned only with that of rage or anger. This is not often seen, but may be observed when two cats are fighting together; and I have seen it well exhibited by a savage cat whilst plagued by a boy. The attitude is almost exactly the same as that of a tiger disturbed and growling over its food, which every one must have beheld in menageries. The animal assumes a crouching position, with the body extended; and the whole tail, or the tip alone, is lashed or curled from side to side. The hair is not in the least erect. Thus far, the

attitude and movements are nearly the same as when the animal is prepared to spring on its prey, and when, no doubt, it feels savage. But when preparing to fight, there is this difference, that the ears are closely pressed backwards; the mouth is partially opened, showing the teeth; the fore feet are occasionally struck out with protruded claws; and the animal occasionally utters a fierce growl. (See figs. 9 and 10.) All, or almost all these actions naturally follow (as hereafter to be explained), from the cat's manner and intention of attacking its enemy.



**Fig. 9.—Cat, savage, and prepared to fight, drawn from life by Mr. Wood.**

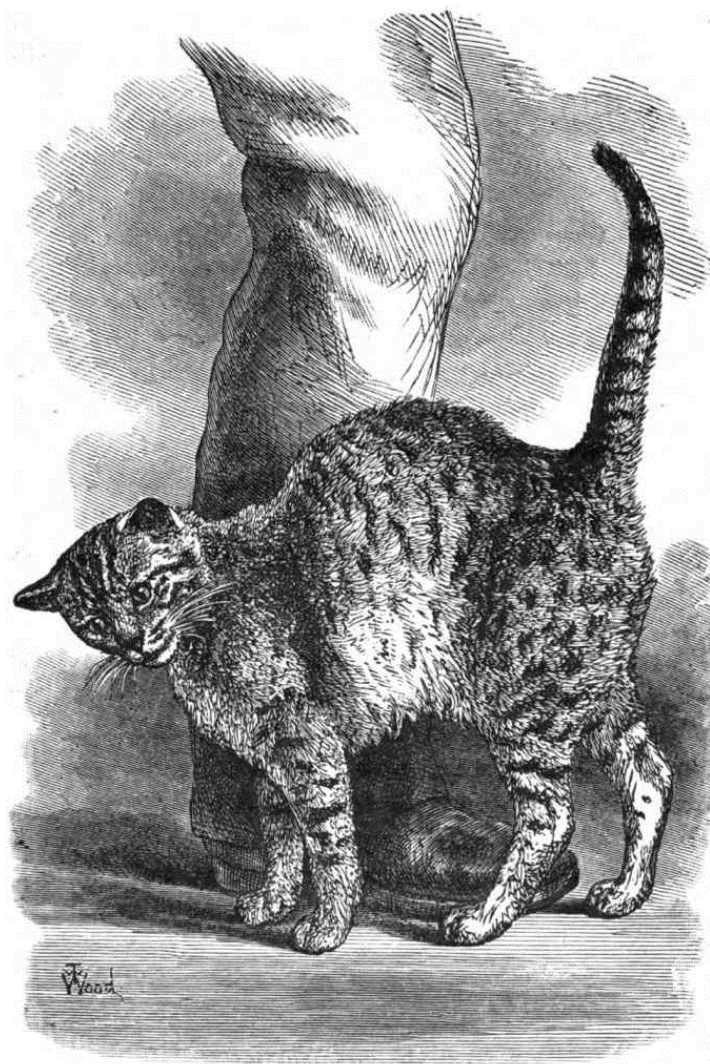


FIG. 10.—Cat in an affectionate frame of mind, by Mr. Wood.

Let us now look at a cat in a directly opposite frame of mind, whilst feeling affectionate and caressing her master; and mark how opposite is her attitude in every respect. She now stands upright with her back slightly arched, which makes the hair appear rather rough, but it does not bristle; her tail, instead of being extended and lashed from side to side, is held quite still and perpendicularly upwards; her ears are erect and pointed; her mouth is closed; and she rubs against her master with a purr instead of a growl. Let it further be observed how widely different is the whole bearing of an affectionate cat from that of a dog, when with his body crouching and flexuous, his tail lowered and wagging, and ears depressed, he caresses his master. This contrast in the attitudes and movements of these two carnivorous animals, under the same pleased and affectionate frame of mind, can be explained, as it appears to me, solely by their movements standing in complete antithesis to those which are naturally assumed, when these animals feel savage and are prepared either to fight or to seize their prey.

In these cases of the dog and cat, there is every reason to believe that the gestures both of hostility and affection are innate or inherited; for they are almost identically the same in the different races of the species, and in all the individuals of the same race, both young and old.

I will here give one other instance of antithesis in expression. I formerly possessed a large dog, who, like every other dog, was much pleased to go out walking. He showed his pleasure by trotting gravely before me with high steps, head much raised, moderately erected ears, and tail carried aloft

but not stiffly. Not far from my house a path branches off to the right, leading to the hot-house, which I used often to visit for a few moments, to look at my experimental plants. This was always a great disappointment to the dog, as he did not know whether I should continue my walk; and the instantaneous and complete change of expression which came over him as soon as my body swerved in the least towards the path (and I sometimes tried this as an experiment) was laughable. His look of dejection was known to every member of the family, and was called his *hot-house face*. This consisted in the head drooping much, the whole body sinking a little and remaining motionless; the ears and tail falling suddenly down, but the tail was by no means wagged. With the falling of the ears and of his great chaps, the eyes became much changed in appearance, and I fancied that they looked less bright. His aspect was that of piteous, hopeless dejection; and it was, as I have said, laughable, as the cause was so slight. Every detail in his attitude was in complete opposition to his former joyful yet dignified bearing; and can be explained, as it appears to me, in no other way, except through the principle of antithesis. Had not the change been so instantaneous, I should have attributed it to his lowered spirits affecting, as in the case of man, the nervous system and circulation, and consequently the tone of his whole muscular frame; and this may have been in part the cause.

We will now consider how the principle of antithesis in expression has arisen. With social animals, the power of intercommunication between the members of the same community, – and with other species, between the opposite sexes, as well as between the young and the old, – is of the highest importance to them. This is generally effected by means of the voice, but it is certain that gestures and expressions are to a certain extent mutually intelligible. Man not only uses inarticulate cries, gestures, and expressions, but has invented articulate language; if, indeed, the word INVENTED can be applied to a process, completed by innumerable steps, half-consciously made. Any one who has watched monkeys will not doubt that they perfectly understand each other's gestures and expression, and to a large extent, as Rengger asserts,<sup>[201]</sup> those of man. An animal when going to attack another, or when afraid of another, often makes itself appear terrible, by erecting its hair, thus increasing the apparent bulk of its body, by showing its teeth, or brandishing its horns, or by uttering fierce sounds.

As the power of intercommunication is certainly of high service to many animals, there is no *a priori* improbability in the supposition, that gestures manifestly of an opposite nature to those by which certain feelings are already expressed, should at first have been voluntarily employed under the influence of an opposite state of feeling. The fact of the gestures being now innate, would be no valid objection to the belief that they were at first intentional; for if practised during many generations, they would probably at last be inherited. Nevertheless it is more than doubtful, as we shall immediately see, whether any of the cases which come under our present head of antithesis, have thus originated.

With conventional signs which are not innate, such as those used by the deaf and dumb and by savages, the principle of opposition or antithesis has been partially brought into play. The Cistercian monks thought it sinful to speak, and as they could not avoid holding some communication, they invented a gesture language, in which the principle of opposition seems to have been employed.<sup>[202]</sup> Dr. Scott, of the Exeter Deaf and Dumb Institution, writes to me that "opposites are greatly used in teaching the deaf and dumb, who have a lively sense of them." Nevertheless I have been surprised how few unequivocal instances can be adduced. This depends partly on all the signs having commonly had some natural origin; and partly on the practice of the deaf and dumb and of savages to contract their signs as much as possible for the sake of rapidity?<sup>[203]</sup> Hence their natural source or origin often becomes doubtful or is completely lost; as is likewise the case with articulate language.

Many signs, moreover, which plainly stand in opposition to each other, appear to have had on both sides a significant origin. This seems to hold good with the signs used by the deaf and dumb for light and darkness, for strength and weakness, &c. In a future chapter I shall endeavour to show that the opposite gestures of affirmation and negation, namely, vertically nodding and laterally shaking the head, have both probably had a natural beginning. The waving of the hand from right to left, which is used as a negative by some savages, may have been invented in imitation of shaking the

head; but whether the opposite movement of waving the hand in a straight line from the face, which is used in affirmation, has arisen through antithesis or in some quite distinct manner, is doubtful.

If we now turn to the gestures which are innate or common to all the individuals of the same species, and which come under the present head of antithesis, it is extremely doubtful, whether any of them were at first deliberately invented and consciously performed. With mankind the best instance of a gesture standing in direct opposition to other movements, naturally assumed under an opposite frame of mind, is that of shrugging the shoulders. This expresses impotence or an apology, – something which cannot be done, or cannot be avoided. The gesture is sometimes used consciously and voluntarily, but it is extremely improbable that it was at first deliberately invented, and afterwards fixed by habit; for not only do young children sometimes shrug their shoulders under the above states of mind, but the movement is accompanied, as will be shown in a future chapter, by various subordinate movements, which not one man in a thousand is aware of, unless he has specially attended to the subject.

Dogs when approaching a strange dog, may find it useful to show by their movements that they are friendly, and do not wish to fight. When two young dogs in play are growling and biting each other's faces and legs, it is obvious that they mutually understand each other's gestures and manners. There seems, indeed, some degree of instinctive knowledge in puppies and kittens, that they must not use their sharp little teeth or claws too freely in their play, though this sometimes happens and a squeal is the result; otherwise they would often injure each other's eyes. When my terrier bites my hand in play, often snarling at the same time, if he bites too hard and I say GENTLY, GENTLY, he goes on biting, but answers me by a few wags of the tail, which seems to say "Never mind, it is all fun." Although dogs do thus express, and may wish to express, to other dogs and to man, that they are in a friendly state of mind, it is incredible that they could ever have deliberately thought of drawing back and depressing their ears, instead of holding them erect, – of lowering and wagging their tails, instead of keeping them stiff and upright, &c., because they knew that these movements stood in direct opposition to those assumed under an opposite and savage frame of mind.

Again, when a cat, or rather when some early progenitor of the species, from feeling affectionate first slightly arched its back, held its tail perpendicularly upwards and pricked its ears, can it be believed that the animal consciously wished thus to show that its frame of mind was directly the reverse of that, when from being ready to fight or to spring on its prey, it assumed a crouching attitude, curled its tail from side to side and depressed its ears? Even still less can I believe that my dog voluntarily put on his dejected attitude and "*hot-house face*," which formed so complete a contrast to his previous cheerful attitude and whole bearing. It cannot be supposed that he knew that I should understand his expression, and that he could thus soften my heart and make me give up visiting the hot-house.

Hence for the development of the movements which come under the present head, some other principle, distinct from the will and consciousness, must have intervened. This principle appears to be that every movement which we have voluntarily performed throughout our lives has required the action of certain muscles; and when we have performed a directly opposite movement, an opposite set of muscles has been habitually brought into play, – as in turning to the right or to the left, in pushing away or pulling an object towards us, and in lifting or lowering a weight. So strongly are our intentions and movements associated together, that if we eagerly wish an object to move in any direction, we can hardly avoid moving our bodies in the same direction, although we may be perfectly aware that this can have no influence. A good illustration of this fact has already been given in the Introduction, namely, in the grotesque movements of a young and eager billiard-player, whilst watching the course of his ball. A man or child in a passion, if he tells any one in a loud voice to begone, generally moves his arm as if to push him away, although the offender may not be standing near, and although there may be not the least need to explain by a gesture what is meant. On the other hand, if we eagerly

desire some one to approach us closely, we act as if pulling him towards us; and so in innumerable other instances.

As the performance of ordinary movements of an opposite kind, under opposite impulses of the will, has become habitual in us and in the lower animals, so when actions of one kind have become firmly associated with any sensation or emotion, it appears natural that actions of a directly opposite kind, though of no use, should be unconsciously performed through habit and association, under the influence of a directly opposite sensation or emotion. On this principle alone can I understand how the gestures and expressions which come under the present head of antithesis have originated. If indeed they are serviceable to man or to any other animal, in aid of inarticulate cries or language, they will likewise be voluntarily employed, and the habit will thus be strengthened. But whether or not of service as a means of communication, the tendency to perform opposite movements under opposite sensations or emotions would, if we may judge by analogy, become hereditary through long practice; and there cannot be a doubt that several expressive movements due to the principle of antithesis are inherited.

## CHAPTER III. – GENERAL PRINCIPLES OF EXPRESSION —*concluded*

The principle of direct action of the excited nervous system on the body, independently of the will and in part of habit – Change of colour in the hair – Trembling of the muscles – Modified secretions – Perspiration – Expression of extreme pain – Of rage, great joy, and terror – Contrast between the emotions which cause and do not cause expressive movements – Exciting and depressing states of the mind – Summary.

WE now come to our third Principle, namely, that certain actions which we recognize as expressive of certain states of the mind, are the direct result of the constitution of the nervous system, and have been from the first independent of the will, and, to a large extent, of habit. When the sensorium is strongly excited nerve-force is generated in excess, and is transmitted in certain directions, dependent on the connection of the nerve-cells, and, as far as the muscular system is concerned, on the nature of the movements which have been habitually practised. Or the supply of nerve-force may, as it appears, be interrupted. Of course every movement which we make is determined by the constitution of the nervous system; but actions performed in obedience to the will, or through habit, or through the principle of antithesis, are here as far as possible excluded. Our present subject is very obscure, but, from its importance, must be discussed at some little length; and it is always advisable to perceive clearly our ignorance.

The most striking case, though a rare and abnormal one, which can be adduced of the direct influence of the nervous system, when strongly affected, on the body, is the loss of colour in the hair, which has occasionally been observed after extreme terror or grief. One authentic instance has been recorded, in the case of a man brought out for execution in India, in which the change of colour was so rapid that it was perceptible to the eye.[\[301\]](#)

Another good case is that of the trembling of the muscles, which is common to man and to many, or most, of the lower animals. Trembling is of no service, often of much disservice, and cannot have been at first acquired through the will, and then rendered habitual in association with any emotion. I am assured by an eminent authority that young children do not tremble, but go into convulsions under the circumstances which would induce excessive trembling in adults. Trembling is excited in different individuals in very different degrees and by the most diversified causes, – by cold to the surface, before fever-fits, although the temperature of the body is then above the normal standard; in blood-poisoning, delirium tremens, and other diseases; by general failure of power in old age; by exhaustion after excessive fatigue; locally from severe injuries, such as burns; and, in an especial manner, by the passage of a catheter. Of all emotions, fear notoriously is the most apt to induce trembling; but so do occasionally great anger and joy. I remember once seeing a boy who had just shot his first snipe on the wing, and his hands trembled to such a degree from delight, that he could not for some time reload his gun; and I have heard of an exactly similar case with an Australian savage, to whom a gun had been lent. Fine music, from the vague emotions thus excited, causes a shiver to run down the backs of some persons. There seems to be very little in common in the above several physical causes and emotions to account for trembling; and Sir J. Paget, to whom I am indebted for several of the above statements, informs me that the subject is a very obscure one. As trembling is sometimes caused by rage, long before exhaustion can have set in, and as it sometimes accompanies great joy, it would appear that any strong excitement of the nervous system interrupts the steady flow of nerve-force to the muscles.[\[302\]](#)

The manner in which the secretions of the alimentary canal and of certain glands – as the liver, kidneys, or mammae are affected by strong emotions, is another excellent instance of the direct action of the sensorium on these organs, independently of the will or of any serviceable associated habit.

There is the greatest difference in different persons in the parts which are thus affected, and in the degree of their affection.

The heart, which goes on uninterruptedly beating night and day in so wonderful a manner, is extremely sensitive to external stimulants. The great physiologist, Claude Bernard,[303] has shown how the least excitement of a sensitive nerve reacts on the heart; even when a nerve is touched so slightly that no pain can possibly be felt by the animal under experiment. Hence when the mind is strongly excited, we might expect that it would instantly affect in a direct manner the heart; and this is universally acknowledged and felt to be the case. Claude Bernard also repeatedly insists, and this deserves especial notice, that when the heart is affected it reacts on the brain; and the state of the brain again reacts through the pneumo-gastric nerve on the heart; so that under any excitement there will be much mutual action and reaction between these, the two most important organs of the body.

The vaso-motor system, which regulates the diameter of the small arteries, is directly acted on by the sensorium, as we see when a man blushes from shame; but in this latter case the checked transmission of nerve-force to the vessels of the face can, I think, be partly explained in a curious manner through habit. We shall also be able to throw some light, though very little, on the involuntary erection of the hair under the emotions of terror and rage. The secretion of tears depends, no doubt, on the connection of certain nerve-cells; but here again we can trace some few of the steps by which the flow of nerve-force through the requisite channels has become habitual under certain emotions.

A brief consideration of the outward signs of some of the stronger sensations and emotions will best serve to show us, although vaguely, in how complex a manner the principle under consideration of the direct action of the excited nervous system of the body, is combined with the principle of habitually associated, serviceable movements.

When animals suffer from an agony of pain, they generally writhe about with frightful contortions; and those which habitually use their voices utter piercing cries or groans. Almost every muscle of the body is brought into strong action. With man the mouth may be closely compressed, or more commonly the lips are retracted, with the teeth clenched or ground together. There is said to be "gnashing of teeth" in hell; and I have plainly heard the grinding of the molar teeth of a cow which was suffering acutely from inflammation of the bowels. The female hippopotamus in the Zoological Gardens, when she produced her young, suffered greatly; she incessantly walked about, or rolled on her sides, opening and closing her jaws, and clattering her teeth together.[304] With man the eyes stare wildly as in horrified astonishment, or the brows are heavily contracted. Perspiration bathes the body, and drops trickle down the face. The circulation and respiration are much affected. Hence the nostrils are generally dilated and often quiver; or the breath may be held until the blood stagnates in the purple face. If the agony be severe and prolonged, these signs all change; utter prostration follows, with fainting or convulsions.

A sensitive nerve when irritated transmits some influence to the nerve-cell, whence it proceeds; and this transmits its influence, first to the corresponding nerve-cell on the opposite side of the body, and then upwards and downwards along the cerebro-spinal column to other nerve-cells, to a greater or less extent, according to the strength of the excitement; so that, ultimately, the whole nervous system maybe affected.[305] This involuntary transmission of nerve-force may or may not be accompanied by consciousness. Why the irritation of a nerve-cell should generate or liberate nerve-force is not known; but that this is the case seems to be the conclusion arrived at by all the greatest physiologists, such as Muller, Virchow, Bernard, &c.[306] As Mr. Herbert Spencer remarks, it may be received as an "unquestionable truth that, at any moment, the existing quantity of liberated nerve-force, which in an inscrutable way produces in us the state we call feeling, MUST expend itself in some direction – MUST generate an equivalent manifestation of force somewhere;" so that, when the cerebro-spinal system is highly excited and nerve-force is liberated in excess, it may be expended in intense sensations, active thought, violent movements, or increased activity of the glands.[307] Mr. Spencer further maintains that an "overflow of nerve-force, undirected by any motive, will manifestly

take the most habitual routes; and, if these do not suffice, will next overflow into the less habitual ones." Consequently the facial and respiratory muscles, which are the most used, will be apt to be first brought into action; then those of the upper extremities, next those of the lower, and finally those of the whole body.[308]

An emotion may be very strong, but it will have little tendency to induce movements of any kind, if it has not commonly led to voluntary action for its relief or gratification; and when movements are excited, their nature is, to a large extent, determined by those which have often and voluntarily been performed for some definite end under the same emotion. Great pain urges all animals, and has urged them during endless generations, to make the most violent and diversified efforts to escape from the cause of suffering. Even when a limb or other separate part of the body is hurt, we often see a tendency to shake it, as if to shake off the cause, though this may obviously be impossible. Thus a habit of exerting with the utmost force all the muscles will have been established, whenever great suffering is experienced. As the muscles of the chest and vocal organs are habitually used, these will be particularly liable to be acted on, and loud, harsh screams or cries will be uttered. But the advantage derived from outcries has here probably come into play in an important manner; for the young of most animals, when in distress or danger, call loudly to their parents for aid, as do the members of the same community for mutual aid.

Another principle, namely, the internal consciousness that the power or capacity of the nervous system is limited, will have strengthened, though in a subordinate degree, the tendency to violent action under extreme suffering. A man cannot think deeply and exert his utmost muscular force. As Hippocrates long ago observed, if two pains are felt at the same time, the severer one dulls the other. Martyrs, in the ecstasy of their religious fervour have often, as it would appear, been insensible to the most horrid tortures. Sailors who are going to be flogged sometimes take a piece of lead into their mouths, in order to bite it with their utmost force, and thus to bear the pain. Parturient women prepare to exert their muscles to the utmost in order to relieve their sufferings.

We thus see that the undirected radiation of nerve-force from the nerve-cells which are first affected – the long-continued habit of attempting by struggling to escape from the cause of suffering – and the consciousness that voluntary muscular exertion relieves pain, have all probably concurred in giving a tendency to the most violent, almost convulsive, movements under extreme suffering; and such movements, including those of the vocal organs, are universally recognized as highly expressive of this condition.

As the mere touching of a sensitive nerve reacts in a direct manner on the heart, severe pain will obviously react on it in like manner, but far more energetically. Nevertheless, even in this case, we must not overlook the indirect effects of habit on the heart, as we shall see when we consider the signs of rage.

When a man suffers from an agony of pain, the perspiration often trickles down his face; and I have been assured by a veterinary surgeon that he has frequently seen drops falling from the belly and running down the inside of the thighs of horses, and from the bodies of cattle, when thus suffering. He has observed this, when there has been no struggling which would account for the perspiration. The whole body of the female hippopotamus, before alluded to, was covered with red-coloured perspiration whilst giving birth to her young. So it is with extreme fear; the same veterinary has often seen horses sweating from this cause; as has Mr. Bartlett with the rhinoceros; and with man it is a well-known symptom. The cause of perspiration bursting forth in these cases is quite obscure; but it is thought by some physiologists to be connected with the failing power of the capillary circulation; and we know that the vasomotor system, which regulates the capillary circulation, is much influenced by the mind. With respect to the movements of certain muscles of the face under great suffering, as well as from other emotions, these will be best considered when we treat of the special expressions of man and of the lower animals.

We will now turn to the characteristic symptoms of Rage. Under this powerful emotion the action of the heart is much accelerated,[309] or it may be much disturbed. The face reddens, or it becomes purple from the impeded return of the blood, or may turn deadly pale. The respiration is laboured, the chest heaves, and the dilated nostrils quiver. The whole body often trembles. The voice is affected. The teeth are clenched or ground together, and the muscular system is commonly stimulated to violent, almost frantic action. But the gestures of a man in this state usually differ from the purposeless writhings and struggles of one suffering from an agony of pain; for they represent more or less plainly the act of striking or fighting with an enemy.

All these signs of rage are probably in large part, and some of them appear to be wholly, due to the direct action of the excited sensorium. But animals of all kinds, and their progenitors before them, when attacked or threatened by an enemy, have exerted their utmost powers in fighting and in defending themselves. Unless an animal does thus act, or has the intention, or at least the desire, to attack its enemy, it cannot properly be said to be enraged. An inherited habit of muscular exertion will thus have been gained in association with rage; and this will directly or indirectly affect various organs, in nearly the same manner as does great bodily suffering.

The heart no doubt will likewise be affected in a direct manner; but it will also in all probability be affected through habit; and all the more so from not being under the control of the will. We know that any great exertion which we voluntarily make, affects the heart, through mechanical and other principles which need not here be considered; and it was shown in the first chapter that nerve-force flows readily through habitually used channels, – through the nerves of voluntary or involuntary movement, and through those of sensation. Thus even a moderate amount of exertion will tend to act on the heart; and on the principle of association, of which so many instances have been given, we may feel nearly sure that any sensation or emotion, as great pain or rage, which has habitually led to much muscular action, will immediately influence the flow of nerve-force to the heart, although there may not be at the time any muscular exertion.

The heart, as I have said, will be all the more readily affected through habitual associations, as it is not under the control of the will. A man when moderately angry, or even when enraged, may command the movements of his body, but he cannot prevent his heart from beating rapidly. His chest will perhaps give a few heaves, and his nostrils just quiver, for the movements of respiration are only in part voluntary. In like manner those muscles of the face which are least obedient to the will, will sometimes alone betray a slight and passing emotion. The glands again are wholly independent of the will, and a man suffering from grief may command his features, but cannot always prevent the tears from coming into his eyes. A hungry man, if tempting food is placed before him, may not show his hunger by any outward gesture, but he cannot check the secretion of saliva.

Under a transport of Joy or of vivid Pleasure, there is a strong tendency to various purposeless movements, and to the utterance of various sounds. We see this in our young children, in their loud laughter, clapping of hands, and jumping for joy; in the bounding and barking of a dog when going out to walk with his master; and in the frisking of a horse when turned out into an open field. Joy quickens the circulation, and this stimulates the brain, which again reacts on the whole body. The above purposeless movements and increased heart-action may be attributed in chief part to the excited state of the sensorium,[310] and to the consequent undirected overflow, as Mr. Herbert Spencer insists, of nerve-force. It deserves notice, that it is chiefly the anticipation of a pleasure, and not its actual enjoyment, which leads to purposeless and extravagant movements of the body, and to the utterance of various sounds. We see this in our children when they expect any great pleasure or treat; and dogs, which have been bounding about at the sight of a plate of food, when they get it do not show their delight by any outward sign, not even by wagging their tails. Now with animals of all kinds, the acquirement of almost all their pleasures, with the exception of those of warmth and rest, are associated, and have long been associated with active movements, as in the hunting or search for food, and in their courtship. Moreover, the mere exertion of the muscles after long rest or confinement is

in itself a pleasure, as we ourselves feel, and as we see in the play of young animals. Therefore on this latter principle alone we might perhaps expect, that vivid pleasure would be apt to show itself conversely in muscular movements.

With all or almost all animals, even with birds, Terror causes the body to tremble. The skin becomes pale, sweat breaks out, and the hair bristles. The secretions of the alimentary canal and of the kidneys are increased, and they are involuntarily voided, owing to the relaxation of the sphincter muscles, as is known to be the case with man, and as I have seen with cattle, dogs, cats, and monkeys. The breathing is hurried. The heart beats quickly, wildly, and violently; but whether it pumps the blood more efficiently through the body may be doubted, for the surface seems bloodless and the strength of the muscles soon fails. In a frightened horse I have felt through the saddle the beating of the heart so plainly that I could have counted the beats. The mental faculties are much disturbed. Utter prostration soon follows, and even fainting. A terrified canary-bird has been seen not only to tremble and to turn white about the base of the bill, but to faint;<sup>[311]</sup> and I once caught a robin in a room, which fainted so completely, that for a time I thought it dead.

Most of these symptoms are probably the direct result, independently of habit, of the disturbed state of the sensorium; but it is doubtful whether they ought to be wholly thus accounted for. When an animal is alarmed it almost always stands motionless for a moment, in order to collect its senses and to ascertain the source of danger, and sometimes for the sake of escaping detection. But headlong flight soon follows, with no husbanding of the strength as in fighting, and the animal continues to fly as long as the danger lasts, until utter prostration, with failing respiration and circulation, with all the muscles quivering and profuse sweating, renders further flight impossible. Hence it does not seem improbable that the principle of associated habit may in part account for, or at least augment, some of the above-named characteristic symptoms of extreme terror.

That the principle of associated habit has played an important part in causing the movements expressive of the foregoing several strong emotions and sensations, we may, I think, conclude from considering firstly, some other strong emotions which do not ordinarily require for their relief or gratification any voluntary movement; and secondly the contrast in nature between the so-called exciting and depressing states of the mind. No emotion is stronger than maternal love; but a mother may feel the deepest love for her helpless infant, and yet not show it by any outward sign; or only by slight caressing movements, with a gentle smile and tender eyes. But let any one intentionally injure her infant, and see what a change! how she starts up with threatening aspect, how her eyes sparkle and her face reddens, how her bosom heaves, nostrils dilate, and heart beats; for anger, and not maternal love, has habitually led to action. The love between the opposite sexes is widely different from maternal love; and when lovers meet, we know that their hearts beat quickly, their breathing is hurried, and their faces flush; for this love is not inactive like that of a mother for her infant.

A man may have his mind filled with the blackest hatred or suspicion, or be corroded with envy or jealousy, but as these feelings do not at once lead to action, and as they commonly last for some time, they are not shown by any outward sign, excepting that a man in this state assuredly does not appear cheerful or good-tempered. If indeed these feelings break out into overt acts, rage takes their place, and will be plainly exhibited. Painters can hardly portray suspicion, jealousy, envy, &c., except by the aid of accessories which tell the tale; and poets use such vague and fanciful expressions as "green-eyed jealousy." Spenser describes suspicion as "Foul, ill-favoured, and grim, under his eyebrows looking still askance," &c.; Shakespeare speaks of envy "as lean-faced in her loathsome case;" and in another place he says, "no black envy shall make my grave;" and again as "above pale envy's threatening reach."

Emotions and sensations have often been classed as exciting or depressing. When all the organs of the body and mind, – those of voluntary and involuntary movement, of perception, sensation, thought, &c., – perform their functions more energetically and rapidly than usual, a man or animal may be said to be excited, and, under an opposite state, to be depressed. Anger and joy are from the

first exciting emotions, and they naturally lead, more especially the former, to energetic movements, which react on the heart and this again on the brain. A physician once remarked to me as a proof of the exciting nature of anger, that a man when excessively jaded will sometimes invent imaginary offences and put himself into a passion, unconsciously for the sake of reinvigorating himself; and since hearing this remark, I have occasionally recognized its full truth.

Several other states of mind appear to be at first exciting, but soon become depressing to an extreme degree. When a mother suddenly loses her child, sometimes she is frantic with grief, and must be considered to be in an excited state; she walks wildly about, tears her hair or clothes, and wrings her hands. This latter action is perhaps due to the principle of antithesis, betraying an inward sense of helplessness and that nothing can be done. The other wild and violent movements may be in part explained by the relief experienced through muscular exertion, and in part by the undirected overflow of nerve-force from the excited sensorium. But under the sudden loss of a beloved person, one of the first and commonest thoughts which occurs, is that something more might have been done to save the lost one. An excellent observer,<sup>[312]</sup> in describing the behaviour of a girl at the sudden death of her father, says she "went about the house wringing her hands like a creature demented, saying 'It was her fault;' 'I should never have left him;' 'If I had only sat up with him,'" &c. With such ideas vividly present before the mind, there would arise, through the principle of associated habit, the strongest tendency to energetic action of some kind.

As soon as the sufferer is fully conscious that nothing can be done, despair or deep sorrow takes the place of frantic grief. The sufferer sits motionless, or gently rocks to and fro; the circulation becomes languid; respiration is almost forgotten, and deep sighs are drawn.

Pain, if severe, soon induces extreme depression or prostration; but it is at first a stimulant and excites to action, as we see when we whip a horse, and as is shown by the horrid tortures inflicted in foreign lands on exhausted dray-bullocks, to rouse them to renewed exertion. Fear again is the most depressing of all the emotions; and it soon induces utter, helpless prostration, as if in consequence of, or in association with, the most violent and prolonged attempts to escape from the danger, though no such attempts have actually been made. Nevertheless, even extreme fear often acts at first as a powerful stimulant. A man or animal driven through terror to desperation, is endowed with wonderful strength, and is notoriously dangerous in the highest degree.

On the whole we may conclude that the principle of the direct action of the sensorium on the body, due to the constitution of the nervous system, and from the first independent of the will, has been highly influential in determining many expressions. Good instances are afforded by the trembling of the muscles, the sweating of the skin, the modified secretions of the alimentary canal and glands, under various emotions and sensations. But actions of this kind are often combined with others, which follow from our first principle, namely, that actions which have often been of direct or indirect service, under certain states of the mind, in order to gratify or relieve certain sensations, desires, &c., are still performed under analogous circumstances through mere habit although of no service. We have combinations of this kind, at least in part, in the frantic gestures of rage and in the writhings of extreme pain; and, perhaps, in the increased action of the heart and of the respiratory organs. Even when these and other emotions or sensations are aroused in a very feeble manner, there will still be a tendency to similar actions, owing to the force of long-associated habit; and those actions which are least under voluntary control will generally be longest retained. Our second principle of antithesis has likewise occasionally come into play.

Finally, so many expressive movements can be explained, as I trust will be seen in the course of this volume, through the three principles which have now been discussed, that we may hope hereafter to see all thus explained, or by closely analogous principles. It is, however, often impossible to decide how much weight ought to be attributed, in each particular case, to one of our principles, and how much to another; and very many points in the theory of Expression remain inexplicable.

## CHAPTER IV. – MEANS OF EXPRESSION IN ANIMALS

The emission of Sounds – Vocal sounds – Sounds otherwise produced – Erection of the dermal appendages, hairs, feathers, &c., under the emotions of anger and terror – The drawing back of the ears as a preparation for fighting, and as an expression of anger – Erection of the ears and raising the head, a sign of attention.

IN this and the following chapter I will describe, but only in sufficient detail to illustrate my subject, the expressive movements, under different states of the mind, of some few well-known animals. But before considering them in due succession, it will save much useless repetition to discuss certain means of expression common to most of them.

*The emission of Sounds.* – With many kinds of animals, man included, the vocal organs are efficient in the highest degree as a means of expression. We have seen, in the last chapter, that when the sensorium is strongly excited, the muscles of the body are generally thrown into violent action; and as a consequence, loud sounds are uttered, however silent the animal may generally be, and although the sounds may be of no use. Hares and rabbits for instance, never, I believe, use their vocal organs except in the extremity of suffering; as, when a wounded hare is killed by the sportsman, or when a young rabbit is caught by a stoat. Cattle and horses suffer great pain in silence; but when this is excessive, and especially when associated with terror, they utter fearful sounds. I have often recognized, from a distance on the Pampas, the agonized death-bellow of the cattle, when caught by the lasso and hamstrung. It is said that horses, when attacked by wolves, utter loud and peculiar screams of distress.

Involuntary and purposeless contractions of the muscles of the chest and glottis, excited in the above manner, may have first given rise to the emission of vocal sounds. But the voice is now largely used by many animals for various purposes; and habit seems to have played an important part in its employment under other circumstances. Naturalists have remarked, I believe with truth, that social animals, from habitually using their vocal organs as a means of intercommunication, use them on other occasions much more freely than other animals. But there are marked exceptions to this rule, for instance, with the rabbit. The principle, also, of association, which is so widely extended in its power, has likewise played its part. Hence it follows that the voice, from having been habitually employed as a serviceable aid under certain conditions, inducing pleasure, pain, rage, &c., is commonly used whenever the same sensations or emotions are excited, under quite different conditions, or in a lesser degree.

The sexes of many animals incessantly call for each other during the breeding-season; and in not a few cases, the male endeavours thus to charm or excite the female. This, indeed, seems to have been the primeval use and means of development of the voice, as I have attempted to show in my 'Descent of Man.' Thus the use of the vocal organs will have become associated with the anticipation of the strongest pleasure which animals are capable of feeling. Animals which live in society often call to each other when separated, and evidently feel much joy at meeting; as we see with a horse, on the return of his companion, for whom he has been neighing. The mother calls incessantly for her lost young ones; for instance, a cow for her calf; and the young of many animals call for their mothers. When a flock of sheep is scattered, the ewes bleat incessantly for their lambs, and their mutual pleasure at coming together is manifest. Woe betide the man who meddles with the young of the larger and fiercer quadrupeds, if they hear the cry of distress from their young. Rage leads to the violent exertion of all the muscles, including those of the voice; and some animals, when enraged, endeavour to strike terror into their enemies by its power and harshness, as the lion does by roaring, and the dog by growling. I infer that their object is to strike terror, because the lion at the same time erects the hair of its mane, and the dog the hair along its back, and thus they make themselves appear as large and terrible as possible. Rival males try to excel and challenge each other by their voices, and

this leads to deadly contests. Thus the use of the voice will have become associated with the emotion of anger, however it may be aroused. We have also seen that intense pain, like rage, leads to violent outcries, and the exertion of screaming by itself gives some relief; and thus the use of the voice will have become associated with suffering of any kind.

The cause of widely different sounds being uttered under different emotions and sensations is a very obscure subject. Nor does the rule always hold good that there is any marked difference. For instance with the dog, the bark of anger and that of joy do not differ much, though they can be distinguished. It is not probable that any precise explanation of the cause or source of each particular sound, under different states of the mind, will ever be given. We now that some animals, after being domesticated, have acquired the habit of uttering sounds which were not natural to them.<sup>[401]</sup> Thus domestic dogs, and even tamed jackals, have learnt to bark, which is a noise not proper to any species of the genus, with the exception of the *Canis latrans* of North America, which is said to bark. Some breeds, also, of the domestic pigeon have learnt to coo in a new and quite peculiar manner.

The character of the human voice, under the influence of various emotions, has been discussed by Mr. Herbert Spencer<sup>[402]</sup> in his interesting essay on Music. He clearly shows that the voice alters much under different conditions, in loudness and in quality, that is, in resonance and *timbre*, in pitch and intervals. No one can listen to an eloquent orator or preacher, or to a man calling angrily to another, or to one expressing astonishment, without being struck with the truth of Mr. Spencer's remarks. It is curious how early in life the modulation of the voice becomes expressive. With one of my children, under the age of two years, I clearly perceived that his humph of assent was rendered by a slight modulation strongly emphatic; and that by a peculiar whine his negative expressed obstinate determination. Mr. Spencer further shows that emotional speech, in all the above respects is intimately related to vocal music, and consequently to instrumental music; and he attempts to explain the characteristic qualities of both on physiological grounds – namely, on "the general law that a feeling is a stimulus to muscular action." It may be admitted that the voice is affected through this law; but the explanation appears to me too general and vague to throw much light on the various differences, with the exception of that of loudness, between ordinary speech and emotional speech, or singing.

This remark holds good, whether we believe that the various qualities of the voice originated in speaking under the excitement of strong feelings, and that these qualities have subsequently been transferred to vocal music; or whether we believe, as I maintain, that the habit of uttering musical sounds was first developed, as a means of courtship, in the early progenitors of man, and thus became associated with the strongest emotions of which they were capable, – namely, ardent love, rivalry and triumph. That animals utter musical notes is familiar to every one, as we may daily hear in the singing of birds. It is a more remarkable fact that an ape, one of the Gibbons, produces an exact octave of musical sounds, ascending and descending the scale by halftones; so that this monkey "alone of brute mammals may be said to sing."<sup>[403]</sup> From this fact, and from the analogy of other animals, I have been led to infer that the progenitors of man probably uttered musical tones, before they had acquired the power of articulate speech; and that consequently, when the voice is used under any strong emotion, it tends to assume, through the principle of association, a musical character. We can plainly perceive, with some of the lower animals, that the males employ their voices to please the females, and that they themselves take pleasure in their own vocal utterances; but why particular sounds are uttered, and why these give pleasure cannot at present be explained.

That the pitch of the voice bears some relation to certain states of feeling is tolerably clear. A person gently complaining of ill-treatment, or slightly suffering, almost always speaks in a high-pitched voice. Dogs, when a little impatient, often make a high piping note through their noses, which at once strikes us as plaintive;<sup>[404]</sup> but how difficult it is to know whether the sound is essentially plaintive, or only appears so in this particular case, from our having learnt by experience what it means! Rengger, states<sup>[405]</sup> that the monkeys (*Cebus azaroe*), which he kept in Paraguay, expressed

astonishment by a half-piping, half-snarling noise; anger or impatience, by repeating the sound *hu hu* in a deeper, grunting voice; and fright or pain, by shrill screams. On the other hand, with mankind, deep groans and high piercing screams equally express an agony of pain. Laughter maybe either high or low; so that, with adult men, as Haller long ago remarked,<sup>[406]</sup> the sound partakes of the character of the vowels (as pronounced in German) *O* and *A*; whilst with children and women, it has more of the character of *E* and *I*; and these latter vowel-sounds naturally have, as Helmholtz has shown, a higher pitch than the former; yet both tones of laughter equally express enjoyment or amusement.

In considering the mode in which vocal utterances express emotion, we are naturally led to inquire into the cause of what is called "expression" in music. Upon this point Mr. Litchfield, who has long attended to the subject of music, has been so kind as to give me the following remarks: – "The question, what is the essence of musical 'expression' involves a number of obscure points, which, so far as I am aware, are as yet unsolved enigmas. Up to a certain point, however, any law which is found to hold as to the expression of the emotions by simple sounds must apply to the more developed mode of expression in song, which may be taken as the primary type of all music. A great part of the emotional effect of a song depends on the character of the action by which the sounds are produced. In songs, for instance, which express great vehemence of passion, the effect often chiefly depends on the forcible utterance of some one or two characteristic passages which demand great exertion of vocal force; and it will be frequently noticed that a song of this character fails of its proper effect when sung by a voice of sufficient power and range to give the characteristic passages without much exertion. This is, no doubt, the secret of the loss of effect so often produced by the transposition of a song from one key to another. The effect is thus seen to depend not merely on the actual sounds, but also in part on the nature of the action which produces the sounds. Indeed it is obvious that whenever we feel the 'expression' of a song to be due to its quickness or slowness of movement – to smoothness of flow, loudness of utterance, and so on – we are, in fact, interpreting the muscular actions which produce sound, in the same way in which we interpret muscular action generally. But this leaves unexplained the more subtle and more specific effect which we call the MUSICAL expression of the song – the delight given by its melody, or even by the separate sounds which make up the melody. This is an effect indefinable in language – one which, so far as I am aware, no one has been able to analyse, and which the ingenious speculation of Mr. Herbert Spencer as to the origin of music leaves quite unexplained. For it is certain that the MELODIC effect of a series of sounds does not depend in the least on their loudness or softness, or on their ABSOLUTE pitch. A tune is always the same tune, whether it is sung loudly or softly, by a child or a man; whether it is played on a flute or on a trombone. The purely musical effect of any sound depends on its place in what is technically called a 'scale;' the same sound producing absolutely different effects on the ear, according as it is heard in connection with one or another series of sounds.

"It is on this RELATIVE association of the sounds that all the essentially characteristic effects which are summed up in the phrase 'musical expression,' depend. But why certain associations of sounds have such-and-such effects, is a problem which yet remains to be solved. These effects must indeed, in some way or other, be connected with the well-known arithmetical relations between the rates of vibration of the sounds which form a musical scale. And it is possible – but this is merely a suggestion – that the greater or less mechanical facility with which the vibrating apparatus of the human larynx passes from one state of vibration to another, may have been a primary cause of the greater or less pleasure produced by various sequences of sounds."

But leaving aside these complex questions and confining ourselves to the simpler sounds, we can, at least, see some reasons for the association of certain kinds of sounds with certain states of mind. A scream, for instance, uttered by a young animal, or by one of the members of a community, as a call for assistance, will naturally be loud, prolonged, and high, so as to penetrate to a distance. For Helmholtz has shown<sup>[407]</sup> that, owing to the shape of the internal cavity of the human ear and its consequent power of resonance, high notes produce a particularly strong impression. When male

animals utter sounds in order to please the females, they would naturally employ those which are sweet to the ears of the species; and it appears that the same sounds are often pleasing to widely different animals, owing to the similarity of their nervous systems, as we ourselves perceive in the singing of birds and even in the chirping of certain tree-frogs giving us pleasure. On the other hand, sounds produced in order to strike terror into an enemy, would naturally be harsh or displeasing.

Whether the principle of antithesis has come into play with sounds, as might perhaps have been expected, is doubtful. The interrupted, laughing or tittering sounds made by man and by various kinds of monkeys when pleased, are as different as possible from the prolonged screams of these animals when distressed. The deep grunt of satisfaction uttered by a pig, when pleased with its food, is widely different from its harsh scream of pain or terror. But with the dog, as lately remarked, the bark of anger and that of joy are sounds which by no means stand in opposition to each other; and so it is in some other cases.

There is another obscure point, namely, whether the sounds which are produced under various states of the mind determine the shape of the mouth, or whether its shape is not determined by independent causes, and the sound thus modified. When young infants cry they open their mouths widely, and this, no doubt, is necessary for pouring forth a full volume of sound; but the mouth then assumes, from a quite distinct cause, an almost quadrangular shape, depending, as will hereafter be explained, on the firm closing of the eyelids, and consequent drawing up of the upper lip. How far this square shape of the mouth modifies the wailing or crying sound, I am not prepared to say; but we know from the researches of Helmholtz and others that the form of the cavity of the mouth and lips determines the nature and pitch of the vowel sounds which are produced.

It will also be shown in a future chapter that, under the feeling of contempt or disgust, there is a tendency, from intelligible causes, to blow out of the mouth or nostrils, and this produces sounds like *poo* or *pish*. When any one is startled or suddenly astonished, there is an instantaneous tendency, likewise from an intelligible cause, namely, to be ready for prolonged exertion, to open the mouth widely, so as to draw a deep and rapid inspiration. When the next full expiration follows, the mouth is slightly closed, and the lips, from causes hereafter to be discussed, are somewhat protruded; and this form of the mouth, if the voice be at all exerted, produces, according to Helmholtz, the sound of the vowel *O*. Certainly a deep sound of a prolonged *Oh!* may be heard from a whole crowd of people immediately after witnessing any astonishing spectacle. If, together with surprise, pain be felt, there is a tendency to contract all the muscles of the body, including those of the face, and the lips will then be drawn back; and this will perhaps account for the sound becoming higher and assuming the character of *Ah!* or *Ach!* As fear causes all the muscles of the body to tremble, the voice naturally becomes tremulous, and at the same time husky from the dryness of the mouth, owing to the salivary glands failing to act. Why the laughter of man and the tittering of monkeys should be a rapidly reiterated sound, cannot be explained. During the utterance of these sounds, the mouth is transversely elongated by the corners being drawn backwards and upwards; and of this fact an explanation will be attempted in a future chapter. But the whole subject of the differences of the sounds produced under different states of the mind is so obscure, that I have succeeded in throwing hardly any light on it; and the remarks which I have made, have but little significance.

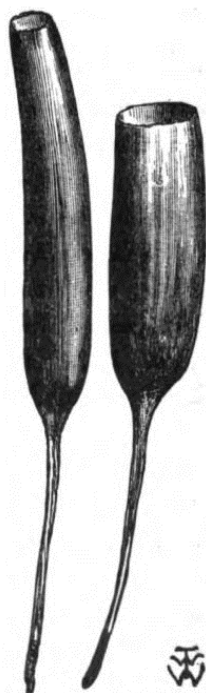


FIG. 11. — Sound - producing quills from the tail of the Porcupine.

All the sounds hitherto noticed depend on the respiratory organs; but sounds produced by wholly different means are likewise expressive. Rabbits stamp loudly on the ground as a signal to their comrades; and if a man knows how to do so properly, he may on a quiet evening hear the rabbits answering him all around. These animals, as well as some others, also stamp on the ground when made angry. Porcupines rattle their quills and vibrate their tails when angered; and one behaved in this manner when a live snake was placed in its compartment. The quills on the tail are very different from those on the body: they are short, hollow, thin like a goose-quill, with their ends transversely truncated, so that they are open; they are supported on long, thin, elastic foot-stalks. Now, when the tail is rapidly shaken, these hollow quills strike against each other and produce, as I heard in the presence of Mr. Bartlett, a peculiar continuous sound. We can, I think, understand why porcupines have been provided, through the modification of their protective spines, with this special sound-producing instrument. They are nocturnal animals, and if they scented or heard a prowling beast of prey, it would be a great advantage to them in the dark to give warning to their enemy what they were, and that they were furnished with dangerous spines. They would thus escape being attacked. They are, as I may add, so fully conscious of the power of their weapons, that when enraged they will charge backwards with their spines erected, yet still inclined backwards.

Many birds during their courtship produce diversified sounds by means of specially adapted feathers. Storks, when excited, make a loud clattering noise with their beaks. Some snakes produce a grating or rattling noise. Many insects stridulate by rubbing together specially modified parts of their hard integuments. This stridulation generally serves as a sexual charm or call; but it is likewise used to express different emotions.[408] Every one who has attended to bees knows that their humming changes when they are angry; and this serves as a warning that there is danger of being stung. I have made these few remarks because some writers have laid so much stress on the vocal and respiratory organs as having been specially adapted for expression, that it was advisable to show that sounds otherwise produced serve equally well for the same purpose.

*Erection of the dermal appendages.* — Hardly any expressive movement is so general as the involuntary erection of the hairs, feathers and other dermal appendages; for it is common throughout

three of the great vertebrate classes. These appendages are erected under the excitement of anger or terror; more especially when these emotions are combined, or quickly succeed each other. The action serves to make the animal appear larger and more frightful to its enemies or rivals, and is generally accompanied by various voluntary movements adapted for the same purpose, and by the utterance of savage sounds. Mr. Bartlett, who has had such wide experience with animals of all kinds, does not doubt that this is the case; but it is a different question whether the power of erection was primarily acquired for this special purpose.

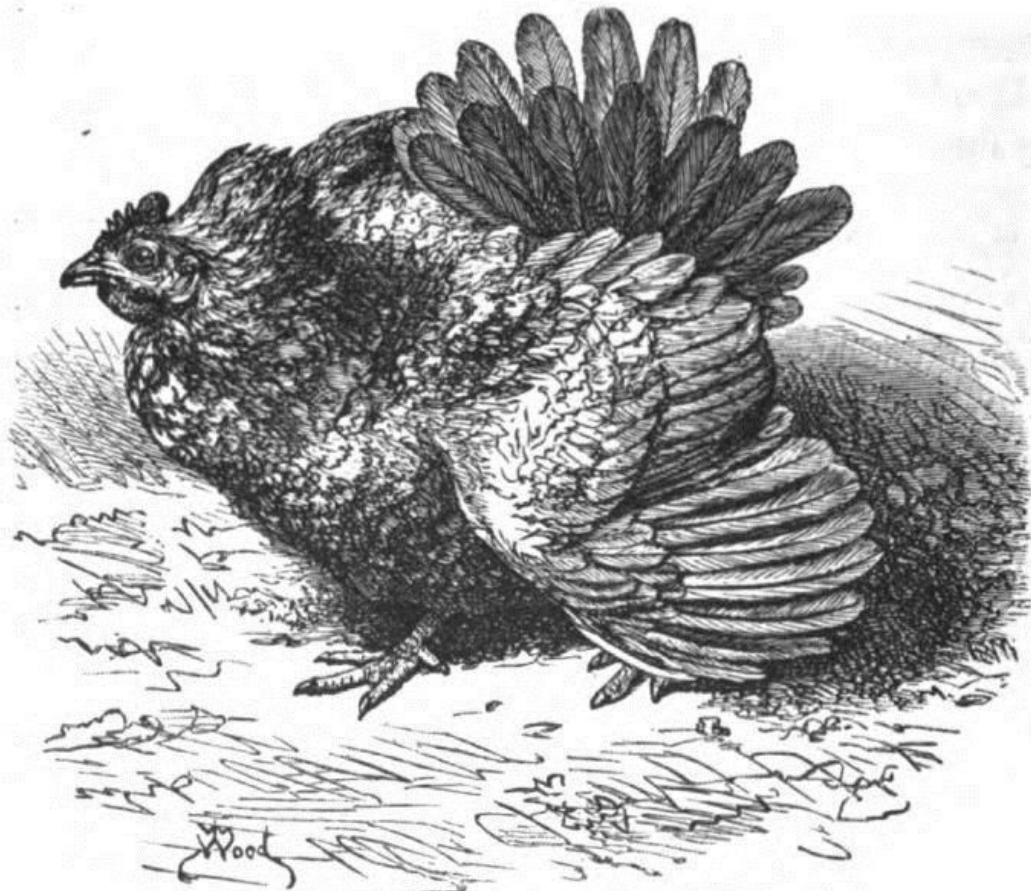
I will first give a considerable body of facts showing how general this action is with mammals, birds and reptiles; retaining what I have to say in regard to man for a future chapter. Mr. Sutton, the intelligent keeper in the Zoological Gardens, carefully observed for me the Chimpanzee and Orang; and he states that when they are suddenly frightened, as by a thunderstorm, or when they are made angry, as by being teased, their hair becomes erect. I saw a chimpanzee who was alarmed at the sight of a black coalheaver, and the hair rose all over his body; he made little starts forward as if to attack the man, without any real intention of doing so, but with the hope, as the keeper remarked, of frightening him. The Gorilla, when enraged, is described by Mr. Ford<sup>[409]</sup> as having his crest of hair "erect and projecting forward, his nostrils dilated, and his under lip thrown down; at the same time uttering his characteristic yell, designed, it would seem, to terrify his antagonists." I saw the hair on the Anubis baboon, when angered bristling along the back, from the neck to the loins, but not on the rump or other parts of the body. I took a stuffed snake into the monkey-house, and the hair on several of the species instantly became erect; especially on their tails, as I particularly noticed with the *Cereopithecus nictitans*. Brehm states<sup>[410]</sup> that the *Midas aedipus* (belonging to the American division) when excited erects its mane, in order, as he adds, to make itself as frightful as possible.

With the Carnivora the erection of the hair seems to be almost universal, often accompanied by threatening movements, the uncovering of the teeth and the utterance of savage growls. In the Herpestes, I have seen the hair on end over nearly the whole body, including the tail; and the dorsal crest is erected in a conspicuous manner by the Hyaena and Proteles. The enraged lion erects his mane. The bristling of the hair along the neck and back of the dog, and over the whole body of the cat, especially on the tail, is familiar to every one. With the cat it apparently occurs only under fear; with the dog, under anger and fear; but not, as far as I have observed, under abject fear, as when a dog is going to be flogged by a severe gamekeeper. If, however, the dog shows fight, as sometimes happens, up goes his hair. I have often noticed that the hair of a dog is particularly liable to rise, if he is half angry and half afraid, as on beholding some object only indistinctly seen in the dusk.

I have been assured by a veterinary surgeon that he has often seen the hair erected on horses and cattle, on which he had operated and was again going to operate. When I showed a stuffed snake to a Peccary, the hair rose in a wonderful manner along its back; and so it does with the boar when enraged. An Elk which gored a man to death in the United States, is described as first brandishing his antlers, squealing with rage and stamping on the ground; "at length his hair was seen to rise and stand on end," and then he plunged forward to the attack.<sup>[411]</sup> The hair likewise becomes erect on goats, and, as I hear from Mr. Blyth, on some Indian antelopes. I have seen it erected on the hairy Ant-eater; and on the Agouti, one of the Rodents. A female Bat,<sup>[412]</sup> which reared her young under confinement, when any one looked into the cage "erected the fur on her back, and bit viciously at intruding fingers."

Birds belonging to all the chief Orders ruffle their feathers when angry or frightened. Every one must have seen two cocks, even quite young birds, preparing to fight with erected neck-hackles; nor can these feathers when erected serve as a means of defence, for cock-fighters have found by experience that it is advantageous to trim them. The male Ruff (*Machetes pugnax*) likewise erects its collar of feathers when fighting. When a dog approaches a common hen with her chickens, she spreads out her wings, raises her tail, ruffles all her feathers, and looking as ferocious as possible, dashes at the intruder. The tail is not always held in exactly the same position; it is sometimes so much

erected, that the central feathers, as in the accompanying drawing, almost touch the back. Swans, when angered, likewise raise their wings and tail, and erect their feathers. They open their beaks, and make by paddling little rapid starts forwards, against any one who approaches the water's edge too closely. Tropic birds[413] when disturbed on their nests are said not to fly away, but "merely to stick out their feathers and scream." The Barn-owl, when approached "instantly swells out its plumage, extends its wings and tail, hisses and clacks its mandibles with force and rapidity." [414] So do other kinds of owls. Hawks, as I am informed by Mr. Jenner Weir, likewise ruffle their feathers, and spread out their wings and tail under similar circumstances. Some kinds of parrots erect their feathers; and I have seen this action in the Cassowary, when angered at the sight of an Ant-eater. Young cuckoos in the nest, raise their feathers, open their mouths widely, and make themselves as frightful as possible.



**FIG. 12.—Hen driving away a dog from her chickens.  
Drawn from life by Mr. Wood.**

{ illust. caption = FIG. 12 – Hen driving away a dog from her chickens. Drawn from life by Mr. Wood. }

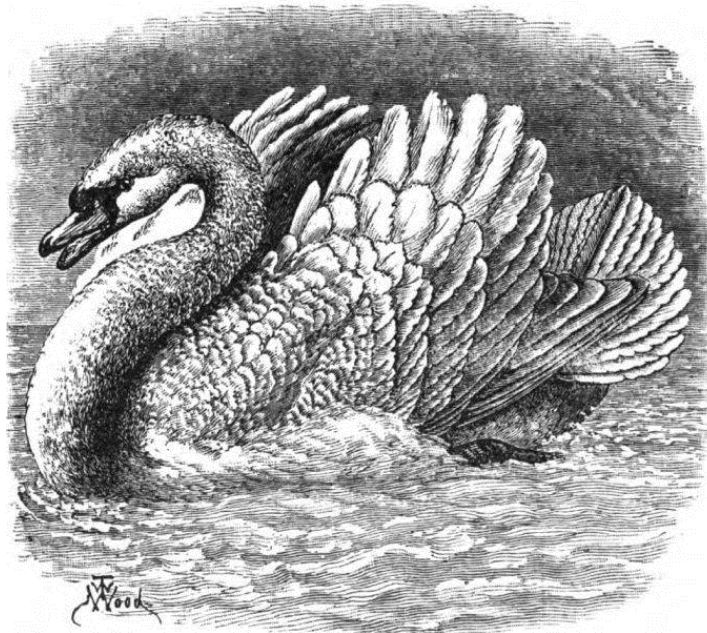


Fig. 13.—Swan driving away an intruder. Drawn from life by Mr. Wood.

{ illust. caption = FIG. 13. – Swan driving away an intruder. Drawn from life by Mr. Wood. }

Small birds, also, as I hear from Mr. Weir, such as various finches, buntings and warblers, when angry, ruffle all their feathers, or only those round the neck; or they spread out their wings and tail-feathers. With their plumage in this state, they rush at each other with open beaks and threatening gestures. Mr. Weir concludes from his large experience that the erection of the feathers is caused much more by anger than by fear. He gives as an instance a hybrid goldfinch of a most irascible disposition, which when approached too closely by a servant, instantly assumes the appearance of a ball of ruffled feathers. He believes that birds when frightened, as a general rule, closely adpress all their feathers, and their consequently diminished size is often astonishing. As soon as they recover from their fear or surprise, the first thing which they do is to shake out their feathers. The best instances of this adpression of the feathers and apparent shrinking of the body from fear, which Mr. Weir has noticed, has been in the quail and grass-parrakeet.[415] The habit is intelligible in these birds from their being accustomed, when in danger, either to squat on the ground or to sit motionless on a branch, so as to escape detection. Though, with birds, anger may be the chief and commonest cause of the erection of the feathers, it is probable that young cuckoos when looked at in the nest, and a hen with her chickens when approached by a dog, feel at least some terror. Mr. Tegetmeier informs me that with game-cocks, the erection of the feathers on the head has long been recognized in the cock-pit as a sign of cowardice.

The males of some lizards, when fighting together during their courtship, expand their throat pouches or frills, and erect their dorsal crests.[416] But Dr. Gunther does not believe that they can erect their separate spines or scales.

We thus see how generally throughout the two higher vertebrate classes, and with some reptiles, the dermal appendages are erected under the influence of anger and fear. The movement is effected, as we know from Kolliker's interesting discovery, by the contraction of minute, unstriped, involuntary muscles,[417] often called *arrectores pili*, which are attached to the capsules of the separate hairs, feathers, &c. By the contraction of these muscles the hairs can be instantly erected, as we see in a dog, being at the same time drawn a little out of their sockets; they are afterwards quickly depressed. The vast number of these minute muscles over the whole body of a hairy quadruped is astonishing. The erection of the hair is, however, aided in some cases, as with that on the head of a man, by the

striped and voluntary muscles of the underlying *panniculus carnosus*. It is by the action of these latter muscles, that the hedgehog erects its spines. It appears, also, from the researches of Leydig[418] and others, that striped fibres extend from the panniculus to some of the larger hairs, such as the vibrissae of certain quadrupeds. The *arrectores pili* contract not only under the above emotions, but from the application of cold to the surface. I remember that my mules and dogs, brought from a lower and warmer country, after spending a night on the bleak Cordillera, had the hair all over their bodies as erect as under the greatest terror. We see the same action in our own *goose-skin* during the chill before a fever-fit. Mr. Lister has also found,[419] that tickling a neighbouring part of the skin causes the erection and protrusion of the hairs.

From these facts it is manifest that the erection of the dermal appendages is a reflex action, independent of the will; and this action must be looked at, when, occurring under the influence of anger or fear, not as a power acquired for the sake of some advantage, but as an incidental result, at least to a large extent, of the sensorium being affected. The result, in as far as it is incidental, may be compared with the profuse sweating from an agony of pain or terror. Nevertheless, it is remarkable how slight an excitement often suffices to cause the hair to become erect; as when two dogs pretend to fight together in play. We have, also, seen in a large number of animals, belonging to widely distinct classes, that the erection of the hair or feathers is almost always accompanied by various voluntary movements – by threatening gestures, opening the mouth, uncovering the teeth, spreading out of the wings and tail by birds, and by the utterance of harsh sounds; and the purpose of these voluntary movements is unmistakable. Therefore it seems hardly credible that the co-ordinated erection of the dermal appendages, by which the animal is made to appear larger and more terrible to its enemies or rivals, should be altogether an incidental and purposeless result of the disturbance of the sensorium. This seems almost as incredible as that the erection by the hedgehog of its spines, or of the quills by the porcupine, or of the ornamental plumes by many birds during their courtship, should all be purposeless actions.

We here encounter a great difficulty. How can the contraction of the unstriped and involuntary *arrectores pili* have been co-ordinated with that of various voluntary muscles for the same special purpose? If we could believe that the *arrectores* primordially had been voluntary muscles, and had since lost their stripes and become involuntary, the case would be comparatively simple. I am not, however, aware that there is any evidence in favour of this view; although the reversed transition would not have presented any great difficulty, as the voluntary muscles are in an unstriped condition in the embryos of the higher animals, and in the larvae of some crustaceans. Moreover in the deeper layers of the skin of adult birds, the muscular network is, according to Leydig,[420] in a transitional condition; the fibres exhibiting only indications of transverse striation.

Another explanation seems possible. We may admit that originally the *arrectores pili* were slightly acted on in a direct manner, under the influence of rage and terror, by the disturbance of the nervous system; as is undoubtedly the case with our so-called *goose-skin* before a fever-fit. Animals have been repeatedly excited by rage and terror during many generations; and consequently the direct effects of the disturbed nervous system on the dermal appendages will almost certainly have been increased through habit and through the tendency of nerve-force to pass readily along accustomed channels. We shall find this view of the force of habit strikingly confirmed in a future chapter, where it will be shown that the hair of the insane is affected in an extraordinary manner, owing to their repeated accesses of fury and terror. As soon as with animals the power of erection had thus been strengthened or increased, they must often have seen the hairs or feathers erected in rival and enraged males, and the bulk of their bodies thus increased. In this case it appears possible that they might have wished to make themselves appear larger and more terrible to their enemies, by voluntarily assuming a threatening attitude and uttering harsh cries; such attitudes and utterances after a time becoming through habit instinctive. In this manner actions performed by the contraction of voluntary muscles might have been combined for the same special purpose with those effected by involuntary muscles.

It is even possible that animals, when excited and dimly conscious of some change in the state of their hair, might act on it by repeated exertions of their attention and will; for we have reason to believe that the will is able to influence in an obscure manner the action of some unstriped or involuntary muscles, as in the period of the peristaltic movements of the intestines, and in the contraction of the bladder. Nor must we overlook the part which variation and natural selection may have played; for the males which succeeded in making themselves appear the most terrible to their rivals, or to their other enemies, if not of overwhelming power, will on an average have left more offspring to inherit their characteristic qualities, whatever these may be and however first acquired, than have other males.

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