

D.—EXPRESSION OF THE EMOTIONS.

CHAPTER LI.

(1) *Introduction.*

THE evolutionist has to explain not only bodily structure and the lines along which that structure has evolved towards greater and greater complexity. He has also to discuss the manner of evolution of function. And while it is his duty to endeavor to explain how such functions as digestion or as circulation have arrived at the condition that is theirs to-day, with their manifold relationships and subdivisions, especially does it behove him to deal with those most remarkable of functions—the mental ones. To explain how the excessively simple mind functions of lower animals have gradually passed on to higher and more complex conditions is his duty. And the outward expression of these emotions that are part of the mental behavior of the higher animals must, if it be possible, be accounted for by him on the principle of Evolution, and not of Special Creation of particular modes of communicating to the outside world our inward feelings. The Special Creationist can say that every mode of expression of every emotion has been designed and given to man by god. The Evolutionist has to show how given certain muscles and certain outward body-forms in man and the lower animals, all the infinite variety of gestures and glances whereby we speak our inmost feelings are explainable. To this task, the last work of Darwin to be considered by us is devoted.

The Expression of the Emotions consists of an introduction, an enumeration of certain general principles, the study of expression in animals other than man, the study of expression in man himself.

(1.) Introduction. Herein is enumeration of other works

on the subject and an explanation of the method adopted in the investigation. (a) Other works. These are as follows :

DATE.	AUTHOR.	WORK.
1667	Le Brun	Conférences sur l'expression.
1774—82	Camper	Discours sur le moyen de représenter les divers passions.
1806	Sir Charles Bell	Anatomy and Philosophy of Expression.
1807	Lavater	L'Art de connaître les hommes.
1839	Burgess	Physiology or Mechanism of Blushing.
1862	Duchenne	Mécanisme de la physionomie humaine.
1865	Gratiolet	De la physionomie et des mouvements d'expression.
1867	Piderit	Wissenschaftliches system der mimik, und physiognomist.

All the above authors have written from the point of view of believers in Special Creation. To none of them had the light come. Herbert Spencer, in "The Principles of Psychology," is the only man who has dealt with this subject as an evolutionist. But it has been reserved for the foremost of evolutionists to treat the subject in full detail in the book now under consideration.

(b) Methods of Observation. (i.) On infants. In these the original forms of expression are least likely to be masked by conventionalities. (ii.) On the insane. These are liable to strong emotions and give unrestrained expression to them. (iii.) On faces the muscles of which are stimulated by galvanism. (iv.) On the great works of art, paintings and sculptures. Little aid came hence. The artist depends so largely for his effects upon accessories that his productions are of little value to the evolutionist. (v.) On various races. A paper of sixteen questions sent to Europeans in different parts of the world, and enquiring as to method of expression in savage races received such answers as demonstrated that "the same state of mind is expressed throughout the world with remarkable uniformity." (vi.) On animals other than man.

CHAPTER LII.

(2) *General Principles.*

(2.) **GENERAL PRINCIPLES.** These are three.
 (a) 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, etc.; and whenever the 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 be of the least use."

(b) 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."

(c) The principle of the direct action of the nervous system. When we studied Sexual Selection, and the colors and forms whose evolution was referable to that principle, we found certain arrangements of hues that could not be satisfactorily explained upon the hypothesis of Sexual Selection. These, we were obliged to say, were due to the inherent chemical nature of the tissues of the animal. So, in the study of the expressions, we encounter certain movements and outward manifestations not explainable by either of the two former principles. These we ascribe to the direct action of the nervous system, to the inherent nature of the nervous structures.

(a) Serviceable associated habits. It is a fact well-known to physiologists "that the conducting power of the nervous fibres increases with the frequency of their excitement."

When our minds are greatly moved by any emotion the movements of our bodies are affected, and these movements readily become associated with the mind-conditions that precede or accompany them. In time the movements come to

be performed as often as the same causes arise, even though the movements are not of the least use. Thus if we are falling back on a feather-bed we, none the less, stretch out our arms. The start at something novel or surprising is another illustration. In our earlier condition and in large measure even in the condition of man to-day the unexpected is the dangerous. The start at a novelty or a wonder is the remnant of the leap away from the dangerous. It is no longer of use, but on the principle now under discussion it remains with us as a form of expression.

(b) Antithesis. A given state of mind is accompanied by certain outward expressions that are serviceable. On the principle of antithesis when exactly the opposite state of mind supervenes, exactly the opposite outward expressions to the former are shown, though they are in no way serviceable. Compare the aspect of a dog advancing towards a strange dog on battle bent with that of the same animal fawning on his master. Or compare a cat softly purring against the silk-dress of an elderly maiden lady what time the aroma of tea is in the air with the same cat surveying an advancing terrier.

The deaf and dumb are largely taught by "opposites." The shrug of the shoulders that says "I can't" is another illustration. When a man, greatly daring, looks that he *can* and will do something, the shoulders are firmly set and squared and the head is erect, the ears at their furthest from the shoulders. Impotence is expressed by the raising of the shoulders, the half-droop of the head and the shoulders and ears are as close together as possible.

And generally as actions of a given kind have grown into association with certain emotions, opposite actions have grown into association with opposite emotions, although the actions are in no sense of use.

(c) Direct action of nervous system. Take, as examples, the change of color in the hair under strong emotion. This is not to be explained on either of the two former principles. Or again, trembling, which is palpably of no service, under strong emotion. This last may be understood if we remember that in the normal condition of the body there is a certain definite flow of nerve energy along the nerve-fibres to the muscles. Now, any strong excitement of the nervous system may interrupt that flow of nerve-energy, may render

it intermittent instead of constant. This would mean intermittent action of the muscles instead of their regular, normal tonic contraction. Hence trembling. It is well-known that almost any function of the body is liable to alteration under strong emotion. The secretions of the alimentary canal, of the liver, of the kidneys, of the skin, are all liable to be affected in their nature by emotion, and it is not remarkable, therefore, that under strong emotion other functions than those of secretion should be interfered with and the unwonted action of the muscles known as trembling occur.

An overflow of nerve-force as under strong emotion will, unless the will be exercised, travel along the most usual routes, and if these are not sufficient, it will overflow into those that are less customary. Hence the muscles of the face and of respiration are the first to come into action, then those of the arms, then those of the legs, then those of the body.

As it is known that violent muscular actions often relieve or remove us out of the reach of pain, we can understand the contortions of one in agony. "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 recognised as highly expressive of this condition." In the exhibition of rage we have less of the purposeless than in the last case. All the gestures suggest the act of fighting. And here principle (*c*) blends with principle (*a*).

CHAPTER LIII.

(3.) *Expression in animals other than man.* (4.) *In man.*

(3.) **T**HIS falls into the study of general methods of expression and then expression in special animals.

(a) General methods of expression. (i.) Vocal. We have seen that when the nervous system is excited all body-muscles are likely to be convulsed. The muscles pertaining to the voice-organs will not be excepted. Hence outcries. Further, if it be granted that the habit of uttering music-sounds arose in connexion with courtship in the earlier ages, we can understand why love, rivalry, triumph are all expressed in song.

On the other hand, consider the universal "pooh!" A man is disgusted. There is a tendency to blow from the mouth because so often has the disagreeable object attacked him *viâ* the mouth. The Oh! of wonder is due to a tendency under astonishment, when one knows not what the next moment may bring forth, to prepare for emergencies. The mouth is opened widely for prolonged expiration. When the next expiration comes the mouth is slightly closed, the lips protruded. The voice issuing now must be in the form of the Oh! that wells up from the crowd at the Crystal Palace on a firework night.

If pain is felt as well as surprise all the muscles contract. Those of the face contract and the lips are retracted. Fear also sets all the muscles, including those of the voice-apparatus a-tremble. The mouth is dry, as the salivary-glands cease to act and the husky, tremulous, hard "Ah" breaks forth.

(ii.) Dermal. Under fear or anger hairs are erected, feathers ruffled, scales raised, the body inflated. In every case the apparent size, and therefore the awe-inspiring qualities, of the animal are increased. Accompanying this dermal erection are voluntary gestures, as opening the

mouth, showing the teeth, utterance of harsh sounds, threatening movements.

(iii.) Ear-movements. These are either the retraction of the ears close to the head, or their erection. The former is intelligible as a safeguard against the seizure of the ear by the toothed foe, the latter as necessary to hunted animals, as enabling them to judge whence danger threatens.

(b) In special animals. (i.) Dog. When a dog is angry, the stiff gait and tension of the muscles are understandable on our first principle. Anger has led to struggles, in which every muscle has had to be at its fullest tension. That in anger, under this general tension, the tail should be raised rather than depressed, follows from the elevator muscles being probably more powerful than the depressors of the tail.

The licking of the hand, or even, on the part of great favorites, of the face of master or mistress, is connected with the parental habit of licking the young for the purpose of cleansing them.

The rubbing of the body against the owner has to do with the fact that the contact of the mother's body with the puppy's has associated the sense of contact with the emotion of love.

Finally, dogs laugh.

(ii.) Cats. The attitude of an angry cat is connected with its mode of fighting. Where dogs use teeth, cats use fore-legs for striking. A crouching position is, for her, the best. The lashing of the tail under the emotion of anger may be due to the fact that nerve-energy is liberated in large quantity. Hence an uncontrollable desire for some kind of movement, and that of the tail is the least disturbful to the general position of the body. The erection of the back, of the fur and of the base of the tail serves the old purpose of making the animal look more terrific and more dangerous.

(iii.) Horses. The nostril is in these animals the most expressive feature. In the throat of the horse is a valve. When the animal breathes rapidly, or pants, expiration and inspiration only occur through the nostrils, not the mouth. The nostrils have, therefore, become very expansible. The expansion of them, the heart-palpitations that you can feel through the saddle, the snorting, are only special forms of that general muscular action that takes place when a horse, terrified, leaps and flies away from danger.

(iv.) Ruminants. The pawing of a bull in anger is not

quite understandable. These animals do not fight with their fore-feet. But this pawing throws up clouds of dust and drives away irritable flies. Hence the habit may, on our first principle, be indulged in under any irritation.

(v.) Monkeys. Every expression of man is to be seen in these, his allies. They chuckle or laugh when pleased. They weep when grieved. They are dejected when out of health. They turn red when angry. They protrude their lips in a pout when sulky. "When we try to perform some little action which is difficult and requires precision, for instance, to thread a needle, we generally close our lips firmly, for the sake, I presume, of not disturbing our movements by breathing, and I noticed the same action in a young Orang. The poor little creature was sick, and was amusing itself by trying to kill the flies on the window-panes with its knuckles; this was difficult, as the flies buzzed about, and at each attempt the lips were firmly compressed, and at the same time slightly protruded."

(4.) Expression in man. Various forms of expression exhibited by man under various mental conditions are now dealt with in detail, and, where it is possible, explanation of each is given.

(a) Suffering and weeping. In the expression of suffering an exceedingly general movement takes place. It is the firm closing of the eyelids and compression of the eyeball. This action serves to protect the eyes from becoming overcharged with blood. If the student will observe the series of muscular actions on the part of a person who is first asked to raise the eyebrows and then gradually to contract the muscles round the eyes with as much force as it is possible, he will see that the movements take place in the following order. The corrugators of the eyebrow contract first after the eyebrows have been raised. These draw the eyebrows downwards and inwards. Almost simultaneously the orbicular muscles contract, producing wrinkles round the eye. Then the pyramidal muscles of the nose draw the eyebrows and the skin of the forehead still lower down. Next, those running to the upper lip contract and raise the lip, and if the suffering take expression in screaming, as the upper lip is thus drawn up, the depressor muscle of the angle of the mouth is contracted so as to keep the mouth wide open and allow the issue of a full volume of sound.

As to the cause of the contraction of these muscles around the eyes during the utterance of screams, it should be noted that similar contraction takes place in loud laughter, and coughing, and sneezing, and in shouting. The greatest exertion of the body muscles, as in gymnastic exercises, does also lead to the contraction that is under consideration. The experiments of Professor Donders show that during any violent expiratory movements the arteries and the veins of the eye are distended. Now the firm closure of the eyelids will prevent this distension of the blood-vessels from causing pain and inconvenience to the eye.

(b) Secretion of tears. It is to be noted that young infants do not weep, and on the other hand that many animals lower in the scale, as, for example, the Indian elephant, do indulge in tears. To explain the reason why tears are secreted, not only during a screaming fit, but when any violent expiratory effort is being made, we have the following suggestions:—

(i.) The spasmodic contraction of the eyelids pressing strongly upon the eyeball would be liable to cause tears to be secreted in the same way as a slight blow on the eyelid does.

(ii.) It is known that the internal parts of the eye act in a reflex manner on the lachrymal gland. Further, it is known that during violent expiratory efforts the vessels of the eye are filled with blood, and there is pressure within the eye. This distension of the eye vessels may act in a reflex manner on the lachrymal glands.

(c) Grief. One of the most noticeable movements of the face in the expression of grief is the raising of the inner ends of the eyebrows, so that those parts become oblique. They assume this position because the contraction of the muscles named orbicular, the corrugator of the eyebrow and the pyramidal of the nose, whose conjoint action is to lower and contract the eyebrows, is partially checked by the more powerful action of the muscles of the forehead. Still the question comes why should grief cause the central part of the frontal muscle, and also those that surround the eyes, to contract? The answer would appear to be that as in infants these muscles have been repeatedly contracted for the protection of the eye in screaming, the same action was performed by our progenitors generations ago; and that

as we grow out of childhood we prevent when grief settles down upon us the utterance of screams, but habit is so strong that we cannot prevent a slight contraction of the above-named muscles. The depression of the corner of the mouth, so characteristic of grief, is effected by one principal muscle on each side, and according to Duchenne this is one of the facial muscles that is least under the control of the will.

(*d*) Joy. Under this emotion the mouth is acted on by the great zygomatic muscles which draw the corners of the mouth backwards and upwards. At the same time some of the muscles to the upper lip contract to a certain extent and the orbicular muscles of the eye are also contracted. The brightness of the eye under the emotion of joy is partially due to the condition of tension of the organ, a consequence of the contraction of the orbicular muscles and a consequence of the eye-balls being well filled with blood at the time. Under pleasurable emotions sounds of some kind are usually emitted, and this is probably the result of the fact that throughout a large part of the animal kingdom vocal sounds are employed as a call or as a charm by one sex to the other. Perhaps the habit of uttering loud and repeated sounds from a sense of pleasure first led to the retraction of the mouth corners and to the contraction of the muscles around the eye, and when we smile to-day, the smile being an incipient laugh, the same muscles are brought into slight play.

(*e*) Love. With this emotion there is always a strong desire to touch the object of affection, and we notice the same principle of pleasure derived from contact in the lower animals.

(*f*) Reflexion. Men of all races frown when they are perplexed in thought. Now the earliest expression noticed during the first days of infancy is that displayed during screaming. In this expression the muscles round the eyes are contracted. Screaming is caused at first by any unpleasant sensation, and so the habit of contracting the brows or frowning, has been followed by children during many generations whenever unpleasant sensation has been their lot. This habit has become associated with the sense of that which is disastrous or disagreeable. Another cause of the frowning in meditation is that vision is the most

important of the senses and in the primeval times the closest attention must often have been directed towards distant objects, and such close attention would involve the contraction of the muscles ultimating in a frown. When the reflexion becomes abstraction the lines of vision of the two eyes are usually slightly divergent. The eyes are not really fixed upon any object in deep abstraction, and this divergence of the lines of vision is due to the complete relaxation of certain muscles of the eye.

(g) Ill-temper. The methods of expressing ill-temper are very identical throughout the human race and the members of the groups most nearly allied to it. The tendency to protrude the lips when sulky is a universal characteristic, and is observed in all the man-like apes. It is more marked in savage races than in civilised.

(h) Decision. The firm closing of the mouth is the most remarkable method of expression in this connexion. Now the mouth is generally closed firmly before and during muscular exertion and by the principle of association the mouth would also be closed when a decision was made that involved exertion. As to the causes of the closing of the mouth during muscular exertion we have the following suggestions. Sir Charles Bell holds that the chest must be distended with air and kept distended to form a fixed support for the muscles that are to contract. Gratiolet holds that muscular exertion necessitates a retarded circulation, that arrested respiration retards the circulation, and hence that the closing of the mouth is necessary for the arrested respiration, for the retarded circulation, for the muscular exertion. Piderit holds that the closing of the mouth during strong muscular exertion is explained by the principle of the influence of the will spreading from one set of muscles to another.

(i) Rage. In this emotion the heart and circulation are always affected. The respiration is in like manner modified, and the excited brain gives greater strength to the muscles and larger energy to the will. The protrusion of the lips during rage and the tendency to bite in young children under this emotion are only explicable on the view of descent from a lower form.

(j) Sneering. The characteristic expression here is due to the retraction of the upper lip and the exposure of the

canine teeth on one side of the face. A trace of this expression is seen in the smile of derision. Now it would seem that this uncovering of the canine teeth reveals the animal descent of man. Our semi-human progenitors in the act of defiance preparatory to battle uncovered their canine teeth as we still do when the feeling of ferocity is strong upon us, or even when merely sneering at or defying our fellows without the least intention of attacking them with the teeth.

(*k*) Disdain. The movement referred to in the last paragraph is also met with here. But in scorn and disdain, other expressions also are used. The partial closure of the eyes would seem to imply that the despised person is not worthy of regard. Movements about the mouth and nose are all of the kind that we employ when an offensive odor is perceived and there is desire to shut it out from our consciousness. The snapping of the fingers is intelligible if we remember that the sign of flipping away an object with thumb nail and fore finger is well-known amongst deaf and dumb gestures as denoting the insignificant and contemptible.

(*l*) Disgust. The vomiting that is apt to follow upon especially disgusting objects gives rise to the belief in the possibility that our progenitors had at one time the power, which is still possessed by the ruminants, of voluntarily ejecting food. The protrusion of the tongue in letting a disagreeable object fall out of the mouth may also be explained why the putting out of that organ is regarded as the sign of contempt and dislike.

(*m*) Signs of affirmation and negation. How are we to explain the fact that the nod almost universally implies "Yes," the shake of the head "No"? With infants, the first act of denial consists in refusing food, and the observer of children will see that they invariably refuse the food by moving their heads laterally away from the breast of the mother, or from anything offered to them with a spoon. On the other hand, in accepting food they bend their heads forward. There seems little reason to doubt that these two primary movements of rejection and acceptance are at the root of the negative shake of the head and the affirmative nod.

(*n*) Surprise. The wide opening of the eyes and elevation

of the eyebrows would be connected with the desire to see as much as possible of the object that is strange and unusual. Why the mouth should be opened is a more complex question, but when we listen intently to any sound, we either stop breathing or breathe as quietly as possible by opening the mouth widely. Surprise, therefore, and attention would involve the mouth being open; and, again, as there is only a certain amount of nerve energy in the body, and as in astonishment that would be largely concentrated on particular organs, the nerve supply to the muscles of the jaw would be lessened, and the jaw would drop from its own weight.

(*o*) Fear. The attitude and gestures of fear are easily explained, with the exception perhaps of the dilatation of the pupil. This dilatation may be connected with the fact that the fears of man have more frequently been excited in the presence of lessened light, or no light at all, when the pupil would be dilated, than in other conditions.

(*p*) Blushing. That the young blush more frequently than the old, and women more than men is self-evident; but it must be remembered that infants do not blush at all. Accompanying the blush of shame is the turning away of the body as though one would hide one's face from the gaze of others, and there is also a certain amount of confusion of mental power. This last is explainable on the ground of the intimate sympathy existing between the circulation in the surface of the head and more deeply placed organs, such as the brain. The essential element in all cases of blushing is self-attention, and the fundamental element in the acquirement of the habit has been self-attention to personal appearance, not to moral conduct. Hence, it is the face that is especially subject to this expression of emotion. It is only in a secondary fashion, through the force of association and habit, that we blush on account of the opinion of others on our conduct. Attention closely directed to any part of the body interferes with the ordinary condition of the blood vessels of the part. Consciousness strongly concentrated on any part of the body produces direct physical effect thereon, and it would seem that the consciousness directed primarily to the face of the person has determined an abnormal condition of the blood vessels in the face, the expansion of these blood vessels ultimating in blushing.

CHAPTER LIV.

Conclusion.

MY task is accomplished. It has been a pleasurable and an onerous one. Very pleasurable to have had some hand, however feeble, in the making the thoughts of a great thinker more readily known; very onerous, because there is a dread of having perhaps, in some wise, misinterpreted him. It has been my desire to present his work to others in its true light. Here and there, I am aware that I have pushed some of his conclusions further than perhaps he himself would be willing to believe they go, but I have done so under a strict and stern sense of duty. Whilst he himself writes habitually as the purely scientific man I have taken his facts and generalisations and looked at them in the light of Free-thought. I believe that I have been justified in doing so. Science, if I understand it rightly, is to be regarded as face to face, as antagonistic with the belief in the supernatural, and I hold it legitimate to take the teachings of our greatest and push them to what seems to me their logical conclusion. Every great discovery in science of fact or of large general truth has been antagonistic to religious belief. I am not of those who consider that the business of the scientific man is simply to state scientific facts, and to be silent as to the inductions from them. Indeed, it is impossible to do so. The statement of the facts must lead to the making of such induction on the part of all that hear them, and it is best to state honestly along what lines and antagonistic to what views they work.

Looking back over the list of works of this remarkable man that have been our study we are struck with the vastness of the monument he has raised. "The Naturalist's Voyage round the World," with its wonderful accuracy of observation, and suggestions deeply interesting of the thoughts enlarged in future volumes; "Geological Observations on

South America and the Volcanic Islands," and the "Coral Reefs," with their contributions to geological science, and their broaching of new and daring hypotheses that are to-day facts; the "Climbing Plants," in which we have the first evidence of his pertinacity and patience in experimental research; the "Fertilisation of Orchids," wherein the structure and functions of all the genera of the most complex vegetable order are worked out to the minutest detail; the "Cross and Self-fertilisation of Plants," and the "Forms of Flowers," with all their accumulated evidence showing the advantage of cross-fertilisation, the disadvantage of self-fertilisation, the greater possibility of variation under the one than under the other; the "Movements of Plants," for ever slaying one of the old world distinctions between plants and animals; the solitary zoological work "Cirripedia," in itself a volume that might have been the product of a life time; the "Origin of Species," wherein the great theory of Natural Selection is clearly stated with all the arguments on its behalf and almost more than all the arguments against it; the "Animals and Plants under Domestication," an encyclopædia of the facts upon which his conclusions in the preceding volume were based; the "Descent of Man," in which the most interesting instance of Evolution is specially dealt with and the great theory of Sexual Selection enunciated; the "Expression of the Emotions," with its close analysis of the muscular movements accompanying certain mental conditions, and its explanation of the meaning and development of them: all these are from the pen of one man.

Looking back over them again we cannot fail to be impressed with those two large attributes of genius that are especially his—unrivalled powers of observation, unrivalled powers of generalisation. And the homage that we pay him to-day is, I am assured, but the feeblest of utterances as compared with the heartfelt gratitude and wondering praise that will be the reward of this great thinker in those future times when the very lowliest in the land shall have full grasp of the meaning of his teaching, as to-day have only the most thoughtful, and when the most thoughtful of those after times shall have passed on to stages of thought as far in advance of his, as his is in advance of the past and present.

