PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON.

WITH THE ADDRESSES READ ON THE OCCASION OF THE

DARWIN MEMORIAL MEETING,

MAY 12, 1882.

PUBLISHED WITH THE CO-OPERATION OF THE SMITHSONIAN INSTITUTION.

VOLUME I.

NOVEMBER 19, 1880, TO MAY 26, 1882.

WASHINGTON:
PRINTED FOR THE SOCIETY.
1882.

DARWIN ON THE EXPRESSION OF THE EMOTIONS.

By Frank Baker, M. D.

From the tendency of the imagination to magnify the unknown and remote, arises a popular error that to attain eminence a man of science must be able to gather facts from great distances—from the sources of the Nile, and from polar snows. But the near and commonplace are subject to the same laws as the atoms of interstellar space, and true scientific insight may discover in the very dust under our feet secrets hitherto concealed.

Darwin's work upon the Expression of the Emotions is continuous with and supplementary to his larger and better-known treatise on the Descent of Man. As with other matter bearing directly upon the development hypothesis, its publication was deferred as long as possible, in order that the evidence might be fully weighed. Projected in 1838, it was not published until thirty-five years later. One class of objections to the hypothesis was not considered in the main work. It was generally held that, by his emotional expression, man was widely separated from the lower animals. The eminent anatomist, Duchenne, who remains to-day the best authority on muscular movements, merely expressed the views of the time when he stated that no cause could be assigned for facial expression, except the "divine fantasy" of the Great Artificer.

Having projected his work, how does Darwin proceed? From the gentlemen who have preceded me you have learned of his methods. To test the truth of his conceptions he commences a series of most minute and careful observations, omitting nothing within his reach. His most important field is that which is nearest; his own children, his friends and companions, even the dogs that accompany his daily walks, come under that powerful scrutiny. Where, indeed, can we find so perfect an observer? The calm sanity of his mind keeps him equally aloof from egotism and from self-depreciation. A fact is a *fact*, to be stated with the fairness

and openness of perfect daylight. Here is a man who cares more for the truth than for himself. The black spot in man's sunshine, the shadow of himself, seems non-existent for him. He stands by his work, that is enough; if it has worth, well—if not, still well; the elemental drift of action and reaction will continue, the outcome will still be good. As Carlyle has said, "A noble unconsciousness is in him. He does not engrave *truth* on his watch-seal; no, but he stands by truth, speaks by it, works and lives by it."

But not as a fact gatherer do we find him greatest. Many others have struggled with ant-like toil to amass piles of facts which, like the ant-heap, remain but sand after all. Darwin brings to his work an informing spirit, the genius of scientific hypothesis. Breathed upon by this spirit, the dry bones of fact come together "bone to his bone," the sinews and the flesh come upon them, they become alive and stand upon their feet "an exceeding great army." He searches always for the principles which underlie the facts and make them possible, realizing that the *phenomena*, the things which are seen, are temporal and transitory; the things which are not seen, the cosmical forces which govern and control, are eternal.

In his examination of the expression of the emotions he found that both in man and animals they can be referred to three general principles which may be termed habit, antithesis, and nervous overflow. By habit, or repetition, serviceable movements become fixed—involuntary, or semi-voluntary. By antithesis, opposite frames of mind are expressed by opposite actions, even though those actions may not be serviceable. The theory of nervous overflow is that unusual quantities of force generated by the cerebro-spinal system are discharged by unusual channels of expression when the ordinary channels are insufficient.

He finds that emotional expressions are generally direct consequences of anatomical structure, and clearly shows the interdependence of anatomy and physiology. For structure can no more be divorced from function than matter can be dissociated from force. All the complex expressions of grief—from the twitching of the

eyelids and mouth to the shedding of tears—he has shown to depend upon the necessity for preventing engorgement of the eyes during screaming, an act originally useful solely to attract attention. The steps by which he arrived at this conclusion are typical of his method. Starting first with animals, he finds that their expressions of grief are much less complex and various than those of man. They are confined to noises, such as screaming, barking, whining, in higher forms accompanied by changes in facial expression, particularly by contraction of the muscles surrounding the eye. There is a physiological necessity for this, as otherwise the expiratory effort caused by screaming might engorge and rupture the small ocular blood-vessels. By pressing on the lachrymal gland this causes, in some of the higher animals, a flow of tears. What at first was accidental, merely occasioned by the proximity of the gland, becomes at last habitual, and the nervous force automatically follows the line of its accustomed action, causing a flow of tears after emotional excitement, even though no screaming take place. The correctness of this view is supported by the fact that infants do not shed tears until several weeks old, although they scream violently. The functional activity of the lachrymal gland, in connection with grief, is, therefore, later in phylogenetic development. The laws of heredity and adaptation are found to be operating here, as elsewhere, in the domain of life; the supposed gap between the emotions of man and of other animals is successfully bridged over, and another anthropocentric fallacy is consigned to the limbo of ignorant superstitions.

Many expressions of the lower emotions are found to be disfiguring vestiges of acts useful to lower animals for offense and defense, or for obtaining food. These survive—relics of the previous history of our race—as rudimentary organs are preserved long after their use has ceased. The erection of the hair during fear is remotely derived from the same cause that makes puss bristle when attacked and the puff adder swell out when approached. Originally used for the purpose of exciting fear in an enemy by an increase of

size, it now involuntarily accompanies the somewhat changed emotion of which some of the phases are extinct. It is not very rare to find persons who can make the hair over the front of the head bristle at will. Rage is habitually expressed by uncovering the teeth, which is, in the lower animals, an attempt to frighten their enemies by a show of weapons. This expression may become softened and modified to express the milder emotions of contempt and disdain. I have met a lady who has to perfection the rather rare accomplishment mentioned by Darwin of drawing up the upper lip in a triangular notch directly over the canine teeth so as to display them alone, usually on one side at a time. This most expressive gesture of disdain can be performed under the influence of the emotion by many who cannot do it at will.

Of an opposite class are certain higher expressions, which, having arisen later, are not yet entirely fixed. Blushing is one of the most curious of these. It is not found in infants, and varies greatly in frequency and amount in adults, accompanying the sentiment of modesty, almost unknown among animals. The reddening is usually confined to the face and neck. Darwin suggests an ingenious explanation for this. The blood-vessels most exposed to variations of temperature acquire the habit of expanding and contracting—their vaso-motor nerves become more sensitive. The chief expression of personal appearance is in the face; the attention of the mind is, therefore, directed there whenever the emotion of modesty is aroused. This interferes with the ordinary tonic contraction of the blood-vessels, and an excess of blood suffuses the surface.

A remarkable confirmation of Darwin's views is the recent discovery of localized centers in the brain which control emotional expression, and exist in animals as well as in man. It may sometime be possible to read the currents and counter-currents of the brain by means of feature-play with a precision approaching that by which we estimate the force of a distant battery by the play of a galvanometer needle. Many phenomena of expression, which

were obscure before this discovery, can now be satisfactorily explained. Among these are the phenomena of associated movements. It has been stated that the variety and complexity of the movements involved in the simple act of walking are such that it would be impossible ever to perform it were it necessary to *think* what had to be done, and weigh in the judgment the precise amount of force necessary to distribute to each muscle at each moment of the act. It is now known that the cerebral centers which control the separate muscles put in action are closely contiguous in the brain, and that they probably intercommunicate and excite each other in a definite manner, predetermined by habit and heredity. The conscious mind has only to set in motion the subordinate apparatus, when it goes on, and works out the problem with matchless skill, like the system of cogs and eccentrics that produce the intricate pattern in an engraver's lathe. All have noticed the uncouth manner in which children and untrained persons follow with lips and tongue the motions of their hands when using a tool of any kind. Darwin ascribes this to unconscious imitation, but it can be explained more strictly in accordance with his own principles. The facial muscles are actuated from a cerebral center in close proximity to those which move the arms and hands. In the lower animals this is necessary, for the mouth is an organ of prehension, used in strict association with the fore-limbs in seizing prey, and in other acts. As this associated movement became strongly fixed by long habit, it survives with great obstinancy, and though it has not been useful to the race since the historical period, we have yet to caution our children not to put their tongues out when they write.

My limit of time forces me to conclude this hasty and imperfect summary. The practical bearing of these views is not without importance. Physicians have always depended greatly upon emotional expression as a means of diagnosis. Unconsciously the face of the patient reveals his physical state. Yet too much has been left in the empirical border-land of science. *Why* a certain pathologi-

cal state should be indicated by a definite combination of expressions has not always been clearly shown. To-day the whole subject is studied from the point of view of anatomy and physiology. No occult force is admitted, the correlative nerve-supply of muscles and the effect of excitation of nerve-centers are rationally investigated.

Aside from the great special value of the work, of what tremendous import to the race are Darwin's deductions! For he has shown us that our every thought and act mold our physical frames, and through them the generations yet unborn, either to beauty and grace, or to uncouth ugliness and deformity. As the struggle for existence filled the rocks with organisms forever extinct, because not for the highest use, so may we, too, fossilize and outgrow habits and desires of ignoble birth, ascending by the "power of leasts," by that wondrous calculus of nature, to purer and nobler existence. Darwin has taught us that the forces which, acting through countless cycles, have brought us up from formless slime, now remain in our hands to use for good or ill—

> "That life is not as idle ore,
> But iron dug from central gloom,
> And heated hot with burning fears,
> And dipt in baths of hissing tears,
> And battered with the shocks of doom
> For shape and use."

A DARWINIAN BIBLIOGRAPHY.

By Frederick W. True,

Librarian of the U. S. National Museum.

The complete bibliography of Darwinism should contain, not alone the works which emanated from the busy brain and ready pen of Darwin himself, but the many other productions which these called into life. The aquiescences of friends, the objections of critics, the censures of foes, should all be enrolled in their proper places as representing the ripples and counter-ripples in the sea of