in cloaking ignorance in a cloud of sounding words. From some of the sentences of our ingenious author it is sometimes exceedingly difficult to extract a meaning; and it occasionally happens that when the meaning has been got at, the mind feels that it has not got any further into the secrets of cerebral action. This may be partly due to the subject, which is a decidedly difficult one; or perhaps to the style, which is involved. We take it for granted that this book is a translation, and this may account for some of the sentences being long and difficult of comprehension. Mistakes are few, but they do occur. Thus at page 69 we have "accidents" for symptoms; at page 95 "coming to bring;" "function" is occasionally used as a verb; and we are not quite sure that "perfectionment" is as yet an English word.

It will be seen that our notice is largely composed of extracts from the book itself. This has been done for a definite object—to excite to the perusal of the whole work. Physicians engaged in asylum practice, and interested in something beyond administrative details, will find much to interest them and much food for reflection. The whole of Book II. must be specially attractive to them, and they will also study carefully the chapters which treat of the genesis of pathological states; the genesis of the notion of personality; the explanation of somnambulism; and the perturbations of automatic activity in insanity.

T. W. McD.

Evolution, Expression, and Sensation, Cell Life and Pathology. By JOHN CLELAND, M.D., F.R.S.

The merit of this little book by the Professor of Anatomy in the University of Glasgow may be said to be in inverse ratio to its size. Dr. Cleland holds that the evolutions of organization are definite in their character, and that the highest evolution of animal life completes itself in our race. Development marches forward to a completed whole. Professor Cleland does not, however, scruple to recognise design in development. Thus he writes: "There is morphological design, and when in any line of development the design is completed, the evolution ceases, although by the operation of environment or external circumstances variations may continue to occur, and degenerations of diverse kinds may take place."

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Let us take as more especially related to mental science his analysis of human expression, upon which the author grounds one of his proofs of the existence of symbolic correlation, such correlation being evidence in his opinion of the place occupied by the underlying element which design presupposes.

The question at the root of this inquiry is, "By what means do movements of the body, or more widely, conditions of matter, afford an index to conditions of the mind?"

It is by what we see and hear that we form a judgment of another's mental condition. We see his expression; we hear the tones of his voice.

The origin of language at once becomes a problem for solution. How have certain ideas become associated with certain words, and how have certain gestures and features become associated with certain emotions and thoughts?

The author does not expect philology to throw further light on expression by feature and gesture than that afforded by the recognition of the fact that language is a symbolic mechanism, like any other outward expression. This recognition is, however, important in supporting Professor Cleland's views; for he argues that if, as is not denied, the complex symbols of language have arisen during man's existence on the globe, it is not necessary to suppose that gesture-language, which is less complex, has been inherited from the lower animals.

Here, of course, we come into immediate collision with the well-known theory of Darwin as expounded, more especially, in his remarkable work on the Expression of the Emotions. We regret with our author that Darwin did not pass beyond the emotions to the expression of thought by language and to *permanent* expression—physiognomy in addition to pathognomy; the wonder, however, is that he found time to enter upon this field of inquiry as fully as he did. In the obituary notice of Mr. Darwin we gave the three great principles advanced by him to explain in voluntary expressions and gestures, namely, serviceable associated habits, the principle of antithesis, and that of actions due to the constitution of the nervous system, independently of the will. Now permanent expression, in the opinion of Professor Cleland, is not explained by these principles. For example, he maintains that it is not merely in consequence of our desire to be near to what we like, or to avoid what we dislike, that we bend the body towards what pleases us, and

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retreat from that which displeases us; such movements are frequently made not to achieve a purpose, still less from an inherited habit based upon their usefulness to human or animal ancestors, but simply, as the author holds, "from the close connection subsisting between movement towards an object and mental attraction to it, or between movement away from an object and a feeling of repulsion" (p. 50). So also with our movement of the arms in receiving or rejecting an object, by calling into play the pectoralis major and the latissimus dorsi. The same gesture is applied when no object is present, in order to express metaphorically a corresponding mental state. In connection with our use of words, again, mataphor, as every one knows, comes largely into play. Emotions find their expression in gestures which are in marked correlation to them.

There are, the author does not deny, certain muscular movements and sounds which do not fall within the explanation afforded by the correlation established between certain physical movements and certain mental actions, such as laughter, crying, and sobbing. Here there is excess of emotion; the centres of the nervous system are deranged. The breathing is convulsive.

The symbolic explanation of the way in which we express our emotions in gestures and our feelings or thoughts by words is nothing new. It has been carefully studied and lucidly illustrated by several writers both in Germany, France, and England, probably by no one so clearly as Gratiolet. We should have been glad if Professor Cleland had occupied less space in repeating what has been already said by these authors, and more in attempting to prove that none of our emotional expressions are derived from the no longer needed actions employed by ancestral savages or by animals before man.

However, Professor Cleland follows, with slight exception, those who have held that the real clue to most of the expressions of the emotions is the correlation of movements and gestures with ideas.

In his chapter on "Vision," Professor Cleland endeavours to show that the evolution of the organs of sense is not the same thing as the evolution of sensation; natural selection does not in his opinion furnish an adequate explanation of the origin of the organ of vision as a structure, and it is urged that the existence of vision and the other senses is an indication that there is a region other than the material world

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from which they proceed. The author believes that the idea of vision existed before it formed part of the consciousness of any animals, and recognises in the simpler forms of evolution of sight-organs the early stages of a morphological design, advancing definitely to secure the necessary contact between the external world and animal consciousness, of which the idea before existed. "Is it," he asks, "in accordance with anything that we know of the laws of nature that such contact should be of an arbitrary and purely artificial kind? Consider that while we are without experience of spiritual life, except in connection with the body, it would be credulity to suppose that no spirits exist save those enchained by matter. Suppose them to exist, and suppose them to appreciate the material universe in that intrinsic character which reason and not sense informs us of, namely, as so many centres of force exhibiting space, it is plain that they cannot have vision in the sense in which we have it—a sensation artificially produced through affected nerves. They cannot have any of our senses. But must they necessarily be devoid of the ideas which they represent? Is it necessary to suppose that things which we possess in common with the majority of animals exist nowhere else in the whole universe?"

In Professor Cleland's chapter on "The Physical Relations of Consciousness and the Seat of Sensation," he calls in question the theory of sensation in vogue, too familiar to our readers to need description. He complains of the unfounded assumption made "particularly by medical authors," who speak as if mental impressions were lodged in the brain, imagining that in an act of consciousness the cerebral corpuscles "undergo a change other than that of passing into the impressed condition studied in nerves." He approaches the main question when he insists upon a nervous impression being a physical state of a uniform nature, while a mental impression is the presence of a notion in the mind, whose variety is infinite. And the special point on which he dwells is the inconceivableness of supposing that the sites of irritation over the whole body should be minutely indicated, and the vaguer sense of the positions of internal irritations should be obtained "by differences in the cerebral termini of the impressions conveyed from different parts." He points out the difficulty, on this hypothesis, that there is no way in which a child's mind could ever learn to associate the changes taking place at the

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cerebral termini with those occurring at different parts of the surface. Ignorant of the surface of the body at the beginning, consciousness must always remain so. The received doctrine of sensation assumes "that the functional union of the parts of the periphery with different termini in the brain is primordial, and that the surface of the body is minutely represented or repeated by a number of points in the brain, which, however, confusedly massed together, derive their properties from their connections."

Other difficulties are forcibly brought forward by Professor Cleland, and he proposes to escape from them by the theory that consciousness extends from its special seat so far as there is continuity of the impressed condition; that "when any irritation is applied to a nerve extremity, the impression travels as generally supposed, but exists for at least a moment along the whole length of the nerve; and that as soon as there is continuity of the impression from the external surface to the brain, the consciousness is in connection with the nerve, and is directly aware of the irritation of the nerve extremity." Distinct routes of communication between this nerve extremity and brain are, it is maintained, highly improbable.

But we must, to render this proposition clearer, give the author's opinion of the connection between mind and brain, consciousness and the hemispheres. To him nothing in their structure suggests different functions in different regions, for he explains in another way the differences in the cells in different lobes first accurately described by Lockhart Clarke. The corpora striata appear to form one organ with the hemispheres; they may in mammals be damaged by vivisection without either motion or sensation being injured; while in birds slicing them away produces the same effect as slicing away the hemispheres in mammals. Comparative anatomy leads to the conclusion that the hemisphere is a single organ divisible in the first instance into a root-part, which includes the corpus striatum and island of Reil, the remainder being included in the "mantle," which Professor Cleland holds is only a multiplier of the function of the root-part. Combining this view with that already expressed that the hemispherical corpuscles pass into the impressed condition studied in nerves and have no additional active conditions, he concludes that the hemispheres are so connected, functionally, with the mind that "the total amount of mental action at one time is dependent on the total amount

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in the hemispheres of that physical state which we call the impressed condition" (p. 102).

Now comes the Professor's central idea—a position certainly not a little startling. As he says, it is in direct opposition to the views which find favour with many physicians of mental disease; he might have gone further, and said all. It may be thus stated. The consciousness which is the concomitant of the brain's impressed condition is always of the same nature, while memory, observation, reason, volition, emotion are of endless variety. *Thus the hemispheres, including the corpora striata, form merely an organ of attention, which may be occupied with these various mental actions, but "the brain can have nothing to do" with the specific nature of what occupies the attention—whether memory, reason, or the other mental states above mentioned.*

This is really the view of cerebral function which lies at the root of the writer's opinions of the several points, including sensation, to which we have referred, and we therefore direct our readers' attention more especially to it, as food for thought and discussion. We are by no means convinced of its truth, and before it is adopted its ingenious author will have to adduce many more facts in its support than he has hitherto done. He could not devote his abilities and the knowledge with which his anatomical and physiological studies have furnished him to a better purpose than carefully working out his theory; he has a wide field before him, and many very serious objections to meet before he can gain success. He does not do himself justice in a small fragmentary work like this, and in endeavouring to compress what he has to say into a very limited space, he sometimes becomes obscure, and is obliged to content himself with answers to the difficulties which present themselves to his theory, which disappoint by their brevity, and perplex by their imperfection. When Professor Cleland again comes before the public in defence of his views, as we sincerely hope he will, we shall expect a detailed and thoroughly worked-out production. To no department could he better devote his life as a physiologist; and if crowned with success, he may rest assured that his name will not be forgotten. His task is arduous, but if truth be on his side, it will become easier and easier as he proceeds.

"*The Relations of Brain to Mind.*"—Since the foregoing was written we have read a Lecture by the same author,

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delivered to the Dialectic Society of the University of Glasgow, entitled, "The Relations of Brain to Mind." It is characterised by the same originality of thought as the previous work. In it he says:—

> I find myself forced to a conclusion not hitherto held, namely, that the mind, non-material though it be, is affected by physical change in brain-substance, and that in the initial mental process—to wit, the sensation—the cerebral is the antecedent of the mental change; while in the whole train of mental phenomena succeeding the sensation, the mental changes are the antecedents of the cerebral changes which accompany them. It is not sufficient to say that the mental and physical actions are simultaneous, for in the case of sensation you come to a stage—a transition point—at which the purely physical changes are followed by change both physical and mental; and in the origin of voluntary and emotional actions of the body, there is a point of converse transition at which mental plus physical change is followed by purely physical change. Therefore the question remains, What is the relation of the mental part of the action during the mixed or intervening process to the purely physical actions before and after?

Has then, asks the lecturer, the conservation of energy a larger range at this transition point than the mere material universe? and he sees no escape from answering affirmatively. As at any moment volition can initiate or stop physical operations, and must therefore start the accompanying brain changes, he puts forward what he admits is a startling conclusion, that "a certain minute amount of energy in the production of sensation quits the physical for the psychical world instantaneously to return again in the excitation effected by the sentient mind on the substance of the brain." Thought and physical energy are deemed mutually convertible—a statement not likely long to continue startling to those "who grasp that spirit is the one substratum of everything." Not the least plausible argument employed by Professor Cleland is that mental action is either prior or subsequent to the physical change with which it is associated, however inconceivably short the interval may be. This granted, it follows that "there is an element of mental existence independent of the body, namely, that on which nerve change acts in the case of sensation, and from which that volition comes whose action is linked with the brain." It is in this sphere—not in the potential vibrations laid by in nerve-cells—that latent memories, and much more, it is argued, are stored. The Professor again "strenuously

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denies that the cerebral hemispheres are the only parts of the system connected with the mind, and reasserts his belief that to produce sensation consciousness must work in connection with as much of the nervous apparatus as is at any time united to the brain by nerve-channels in the active state."

The purposive actions of pigeons deprived of their cerebral hemispheres, or the decapitated frog, indicate, it is maintained, some remains of consciousness. "It may be left to yourselves to judge whether such things are explained by calling them automatic, or whether that word so used is not rather mere pedantic cant pawned on the world as wisdom." The peculiar function of the hemispheres is asserted to be that in them alone the will can originate action unstimulated by external irritation. The lecturer grants that he is in a minority in the profession in his disbelief "that different mental functions are carried on in connection with different parts of the cerebral hemispheres," and candidly admits the question is a difficult one, and the data as yet insufficient to disprove this fundamental doctrine of the phrenologists. In relation to mental pathology, it may be said that of all the Professor says this is the sum, that as the total amount of mental manifestation at any one moment is limited by the total amount of possible brain action, there is no reason why, if habitually this activity has been occupied exclusively with particular sets of intellectual ideas or impulses, the mind, "so long as it is limited in its gross operations, should not be distraught in ways otherwise totally independent of the brain," that is, we presume, otherwise than by the limit determined by the amount of possible brain action.

Further comment would lead us into a repetition of what we have already said, and we will therefore only add, in conclusion, that we see nothing in this lecture to allow us to acquit Professor Cleland of the duty we have laid upon him of working out the profound and vitally important problem in the solution of which he has so hardily engaged, in a much more definite and exhaustive manner. It is needless to say that, however widely his conclusions may differ from our own, the columns of this Journal will be always open to him. A calm and full consideration of the bearing of the researches of Hitzig and Ferrier upon his theory (researches so hastily dismissed in these pages) would alone form material for an article.

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