REVIEWS.

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

THIS is a small volume, consisting of six separate disquisitions, which, however, as the writer takes care to point out in an introductory chapter, are not entirely unconnected, since the first five of them are devoted to subjects that bear one on another, and have a more or less close relation to that of the first of the series—namely, the “Evolutions of Organisation.” The sixth, if it has no relation in its matter to the others, has at least this connection with the first that it is an academic address; having been delivered at the medical graduation at the end of last session, while the first in the series was the opening address delivered at the commencement of the present session.

The writer accepts the doctrine of an evolution in nature, but differs from those of the present day who are distinctively known as evolutionists, both as regards the character of the evolution, that being in his estimation definite or the evolution of a morphological plan, and as regards its source, which he considers is quite unexplained by natural selection. But he admits that such a thing as natural selection exists, and is inclined to believe that its action may result during long periods in an indefinite amount of variety—

“Development both in the individual and in the totality of life is not only a development from a simple beginning, but a development towards a completed whole. 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.”

The writer gives a short account of the history of evolution, in which he points out that evolution, in the sense of the gradual development of a morphologically complete total, was the doctrine taught by Oken, who is acknowledged by Hæckel to be one of the fathers of evolution. Such an evolution, he shows, was also believed in by St. Hilaire, who, while he recognised an internal unity of plan in animal forms, was among the first to suggest the effect of external influences in producing new species. Lamarck, on the other hand, denies

the presence in living beings of any force other than what operates in the inorganic world, and while putting forward the doctrine of "appetency" to account for the origin of species, consistently believed also in spontaneous generation. It is pointed out that the author of the *Vestiges of Creation*, although believing like Lamarck in spontaneous generation, differed from him in believing that life on the face of the earth had passed through definite stages to a completed condition, precisely as an individual ovum pursues its course to the adult stage. The distinctive characters of the Darwinian theory the author considers to be that it holds evolution to be indefinite, and imputes great importance to natural selection as a factor in bringing the evolution about.

The Darwinian doctrine has, according to our author, "Precisely the same defect as the Lamarckian doctrine of appetency, only to a greater degree; it does not account for the formation of any new organ, nor for new organs appearing symmetrically. No doubt, on the 'je conçois' principle it may be made to lengthen and strengthen to any extent any number of structures already existing, and, potent for degeneration also, may be supposed to dwarf others, when they become incumbrances. Thus it is noticeable that in the series of forms preceding the limbs of the horse, a story on which so much is sometimes founded, no new structure makes its appearance; simply the third digits have enlarged in size, while those on each side have become smaller; and in the horse of the present day both the enlargement and the dwindling have reached a degree beyond which it is difficult to conceive them passing. I notice these circumstances though I am not prepared to dogmatise to the effect that it actually was by the sole agency of natural selection that the series of limb forms alluded to found an appropriate completion in the horse. But that natural selection should give rise to totally new and symmetrical organs is hard to imagine and impossible to prove."

"While the Darwinian system adds the idea of natural selection to the stock of hypotheses for explanation of evolution by external influences, it denies the existence of any definite evolution of organisation dependent on a definite cause. While it has the greatest faith in the power of the ovum to carry down the most minutely determined details of future development, it denies that there is anything apart from the accidents of external circumstances to direct the paths of the whole world-history of life, and thus shuts out of consideration the whole class of phenomena which were not only built on by Oken, but were patent to St. Hilaire, and

Owen, and Goodsir; and it not only leaves both sex and symmetry unaccounted for, but renders them inexplicable, although they are matters obvious to every one, and pervading the whole organic world."

According to the author, "Life is something else than the sum of the chemical and mechanical operations engaged in its manifestation. Its phenomena are no doubt mere movement in space, and therefore allied to those of matter rather than to those of consciousness, but they exhibit two closely connected characters—development and heredity, to which we find nothing analogous in the inorganic world. Crystallisation is not analogous to development, for crystallisation is uniform in its intimate parts; whereas the essence of development is the sequence of a definite series of forms entirely differing one from another, and heredity is the transmission of this remarkable property. While, then, the experiments of Pasteur and Lister conclusively prove that there is no such thing as spontaneous generation in the present; the difference in character between development and the laws of matter makes spontaneous generation an inadequate hypothesis to account for the first appearance of life in the past."

The general outline of the characters of the evolutions of living beings is summed up in the following sentences:—"It is a legitimate position to take up, that all the evolutions of nature are definite, but that the series of such evolutions is indefinite in number and kind; that individual evolutions, like other individuals, are finite, but form members of a larger total. So, in the evolutions of organisation we see vortic units, the textural elements, receiving and rejecting currents of material, while they maintain, during a finite lifetime, their individuality, and these united into larger individuals subject to the same law. In the evolution of vegetation, which everywhere exhibits definite individuals, or organs, structurally united in indefinite series, the highest groups are composed of compound individuals, in whose structure the most complex and in every way highest evolution occurs in connection with the highest vegetable function, the perpetuity of the series of finite individuals; and, the flower once perfected, evolution has ceased, though variation continues. In the animal kingdom, as has been long appreciated, even from the ovum the part devoted to vegetal function has its surface turned inwards, and the complexity of the animal sphere, which is wrapped around the vegetal, takes place in connection with the conscious faculties. By the ministry of sensation and voluntary movement, the food is introduced into the specially vegetal

parts, while, in connection with the perfecting of those animal functions, a process takes place such as in the vegetable kingdom is seen only in the flower—namely, that the portions, whether segments or organs, become more definite in number, more fused and compact. Thus, the largest feature in the evolution of both plants and animals consists in that which is simple passing into the manifold, and the manifold being compacted together in a higher unity. These evolutions are subjected, in the vegetable kingdom, to the service of nutrition and reproduction; while, in the animal kingdom, nutrition and reproduction give way in importance to the development of intelligence. And, however imperfectly zoologists may yet agree as to the evolutions in detail in different parts of the animal kingdom, it is plain that, in the human form, an organism has at last appeared, constituting an abode of intelligence such as exists in no other, and that in man alone intelligence reaches the capability of ascending beyond the wants of the physical organism in the contemplation of abstract truth."

Among the evidences of the place occupied by spirit in nature, the author counts that which is afforded by what he terms symbolic correlation as highly important, and the demonstration of the existence of symbolic correlation he seeks to establish by an analysis of human expression.

Speaking of C. G. Carus, he says:—"He so far appreciated the relation of the segmented invertebrata to the vertebrata as to perceive that, while in certain lower forms the nervous system completed a circle round the mouth, in the invertebrate segmentata the nervous centres were concentrated on the under, and in the vertebrata on the upper side; seeing in this what Oken had already observed through the organic world, and what so skilled and accurate an observer as Dana has more recently recognised in this very matter, a system of expression in nature, according to which things of highest dignity are placed uppermost."

The second article in the book is entitled "Symbolic Correlation in Expression," and the meaning of the term is explained thus:—"I observe, first, that words indicating position and quantity represent ideas relating to both the physical and mental world. Secondly, emotions expressible by such words are indicated by the attitudes, gestures, and movements of body expressed by the same words. Thirdly, the same principle is applicable to movement of feature."

The following, from among the illustrations given of the two latter propositions, make the meaning clear:—"If an

artist wished to express sympathy, he would bend the figure forwards toward the object of the emotion, with the fingers stretched in the same direction, as if ready to help, and the palm probably inclined downwards, as if in token of protection, but not because there is anything actually to be covered by them.

"In exercising authority, the body is raised to its full height, because the moral attitude is one of superiority, and the hand may be brought down to indicate that opposition will be dealt with in the way which, in the symbolism of language, is expressed as 'put down.' Again, a speaker, in explaining his views, may bring the fingers of one hand down on the other, as if he were producing a visible object and placing it on his hand before you, or were pointing to a visible statement on paper, the downward movement not now giving the idea of destruction, but of that which is symbolically called 'laying down' his propositions."

"It is palpable that, in feelings of elation, the angles of the mouth are raised; the upper eyelid also is drawn well up, the eyebrows are lifted, though not sufficiently to produce the slightest wrinkle of the brow, and even the lower eyelid is raised, partly by contraction of fibres of the *orbicularis*, partly pushed by the rising cheek. Nor is elevation the only movement; but nature expresses the expansive feeling, the tendency of gladness to widen its scope, by an outward movement. The angles of the mouth spread more outwards than upwards, and as elation is carried further the mouth begins to open. The apertures of the eyes are not as capable as the mouth of outward enlargement; but to them also the appearance of greater breadth is given by the formation of lines spreading outwards and upwards from the outer angles."

"Under the influence of the depressing emotions, the same parts are depressed which were raised in smiling; and the apertures of the face, the openings of communication with the world, are diminished as the soul retires from its disagreeable surroundings. The brows, the eyelids, the alæ of the nose, but most of all the angles of the mouth, are lowered in all expressions of sadness."

The third and fourth essays of the series are devoted to sensation. One, entitled "Vision," is published for the first time; the other, "On the Physical Relations of Consciousness, and the Seat of Sensation," was read some years ago at the Liverpool Meeting of the British Association, and afterwards published in the *Journal of Anatomy and Physiology*. In it the author distinctly declares his opinion that the ordinary

theory of sensation is controverted by anatomical facts, and that it is not possible that irritation conveyed to the brain can be referred by the mind to parts at the periphery, inasmuch as such arrangement would necessitate separate communications between the brain and every separately appreciated point of the surface of the body, a state of matters which, in his opinion, is demonstrably not the case. But we need not here discuss the matter, as those who would understand the argument must read the whole papers, and form their own conclusions, whatever these may be. The lecture on "Vision" is written in a style less technical—more adapted, perhaps, to those who, while interested in the subject of sensation from a philosophic point of view, are yet not professedly familiar with biological detail.

We need not here trace the argument of the writer to prove that "the ideas of time and space become the means of unifying the results of sensations incomparable in their own nature; so that the hand, the eye, and the ear combine to increase the common stock of information." But it may be mentioned that, among questions purely biological, the physical antecedents of sensation are dwelt on; also, the rise of vision in the animal kingdom, the comparative anatomy of the eye in various invertebrate animals, and the relation of the vertebrate to the invertebrate forms of eye; and, in treating this last subject, he finds opportunity again to animadvert on the inadequacy of the Darwinian explanation of evolution. In reference to the appreciation of the inverted images on the retinae, as an upright landscape outside the body, the following passage occurs:—"In the case of touch, the sensation is referred to the spot where the stimulus is applied. In the case of vision it is referred, not to the spot where the ray of light falls on the inverted picture in the back of the eye, but to a point outside the body, and placed in the direction from which the ray has come. That is certainly the case, however inexplicable; although it is true that the recognition of distance is learned slowly by experience. Were the landscape at birth perceived as a pair of minute inverted pictures lying inside the head, it would be impossible for a new born animal to learn that they were indices of a world outside; and it is curious that physiological writers have not always noticed this, but have tried to explain how two inverted pictures, spoken of as if they were outside the body, are rectified and made one."

In the fifth article the author treats of the changes that have taken place in our conception of nucleated cells; or, as

he prefers calling them, nucleated corpuscles, showing how the importance of the cell wall was formerly over-estimated, while the protoplasm was the last part to attract attention. At the present time he thinks that the importance of the protoplasm may be exaggerated; and alluding, no doubt, to the celebrated definition, "Life is the chemistry of protoplasm," he says:—"To speak of life, as is sometimes done, as if it were an inherent property of a particular chemical substance, is surely going too far, and is a view which has nothing true in it which is not more than thirty years old; for it has long been familiar to every one that life never exists without the presence of nitrogenous substance of an albuminoid character; and, though it has since been discovered that life, in various instances, exists in non-nucleated structureless masses of protoplasm, that is a very different thing from life being a property of protoplasm."

Again he says:—"Protoplasm is simply a convenient name to use in speaking of the pulpy nitrogenous substance of vital corpuscles; but it is not to be forgotten that the substance referred to is variable in appearance and behaviour, as is well illustrated by Heidenhain's observations on the differences in both salivary and gastric secreting corpuscles in states of activity and rest. How, then, shall we say that, in its different conditions, the material which constitutes the mass of such corpuscles is one and the same chemical substance? We shall, indeed, take a very imperfect view of the living units, to which an unhappy chance has given the unfortunate name of cells, if we say that because neither cell wall nor nucleus is an essential element, therefore life is a property of protoplasm. It was recognised by observers long ago that the bond of connection between the bodies which they described lay not in a detail of structure, but in the possession of one or more of the vital properties—irritability, growth, or reproduction; and the observations of later years do not overthrow that conception, but afford it additional support."

The possession of vital properties he considers to be a very different matter from mere chemical composition. "The vital powers may be enumerated as irritability or sensibility, contractility, nutrition or elaboration of substance, and reproduction. All these properties are possessed by an amœba and by amœboid corpuscles. But every separate living organism does not possess them all; there are individuals without reproductive power. In like manner, all the vital units do not possess, throughout life, all vital properties; but, *in the process of differentiation, one property becomes exalted, while another*

is lost. Muscular fibres, nerve corpuscles, the corpuscular elements of peripheral nerve terminations, and secreting corpuscles illustrate this. All of them have lost the reproductive power; muscular fibres have exalted contractility, nerve terminations exalted sensibility, and secreting corpuscles a highly developed elaborating power. In brain corpuscles the proliferating power may reappear in pathological circumstances, but it does so at the expense of the specially developed properties. In muscular fibre it appears to be lost altogether."

He distinguishes between the life of the tissue element and the life of the organism, and believes that this distinction is not sufficiently recognised. "The mere tissue-life in individual corpuscles will not account for the phenomena of development without the addition of a larger life or a formative principle common to the whole individual; and it would be of incalculable advantage in the just conception of pathological phenomena, if the central and tissue lives were more generally distinguished than they are. No one has yet reduced, in a satisfactory way, any of the properties above mentioned as belonging to corpuscles—namely, irritability, contractility, nutrition, and reproduction, to the laws of unorganised matter; and having regard to that circumstance, and to the complicated phenomena of development of higher organisms, exhibiting series of changes unlike anything in the organic world, it is legitimate to conclude that, in living beings, there is a superadded element acting on the textural unit individually, and that such an element controls likewise the development of the organism. The neoplasms of the pathologist afford abundant examples of corpuscular life breaking loose from the central control, by means of which it is utilised in health for the construction and continuance of definite organs.

"Still proceeding on the principle of life within life, we may go further, and assert that a larger life, or series of developmental changes from a simple origin to a definite goal, may be observed in the evolution of all animal forms in the history of the globe. Such a doctrine alone is capable of explaining all the facts of morphology, and giving to the speculations of Darwin the backbone which they require."

The last article of the book, a graduation address, entitled "Truth, Pathology, and the Public," after discussing the greatness of the difficulty of arriving at the goal of perfect truth, either in social affairs or in the form of scientific accuracy, takes up specially the difficulty of arriving at a

sound pathology, and the impossibility of a practitioner keeping up his efficiency without frequent correction of his errors and corroboration of his diagnosis when correct, by means of *post-mortem* examinations. In this matter the author considers public health at stake, and legislation as well as public sentiment greatly to blame for the mistakes which may be made by medical men. The returns made by the Registrar-General, of the causes of mortality throughout the country, are, in the eyes of our author, a mere hollow delusion, a manifest hypocrisy and a waste of public money, being compiled from the imaginative statements of practitioners who have not, in the great majority of cases, ascertained by *post-mortem* examination if their ideas are founded on fact. But he not only believes that encouragement should be given to much more frequent *post-mortem* examination, but he thinks that the results of such examinations should be much more frequently and methodically preserved than they are, and cherishes the pardonable ambition that the University with which he is connected, situated as it is in the centre of a large population, should become a great centre both for pathological teaching and for a pathological collection that might do honour to Scotland. We may conclude this summary by quoting the sentences in which those various opinions are briefly put forward. "The public has to learn that an unskilful practitioner is simply a waster of human life, and that the public itself is but a bad judge of the waste of its own life which may take place. The popular prejudice against a custom thousands of years old in royal families is the cause of an enormous annual slaughter among all ranks, not the less real because it is impossible to compute.

"It may be further mentioned, that it is at least supposed that the government statistics, made at considerable expense, of the causes of mortality, are of some use; yet it is an obvious fact, of which I have had abundant experience, that the returns which medical men have, under compulsion, filled up, stating causes of death, are in large part utterly worthless, not from any wilful dereliction of duty on the part of members of the profession, but because information is asked which they are not in a position to give. The schedules sent out by the registrar for certification of cause of death ought to demand whether or not a *post-mortem* examination has been made, and the sanitary department ought to keep the results obtained in cases where such examination has taken place, completely separate from the comparatively worthless returns of cases in which there has been none.

“Moreover, when it is considered what pains are taken to secure accurate returns of causes of death in the army, and when it is remembered what a very large number of the practitioners engaged in civil practice hold appointments in a great variety of public institutions, one would think that it only required a proper knowledge of the issues at stake to rouse the public to the consideration of its own safety, and to extend in some measure military methods to civil practice, so as to develop a more thorough knowledge of their profession among all ranks of medical men, and save the lives of rich and poor.

“I desire to use this opportunity to say one word about pathological museums. They are the means of furnishing permanent and accessible records of remarkable phenomena, and are even more useful in affording comparison of different stages and varieties of disease one with another. There are no doubt certain matters connected with the general appearance of morbid textures which are better observed in the recent condition; but there is much more which cannot be seen to advantage, nor indeed studied at all, except in carefully designed preparations permanently preserved.

“Now, the great promoters of the art of displaying structure without desiccation were William and John Hunter, two Lanarkshire brothers. The museum of John Hunter, the property of the College of Surgeons, London, is continually and abundantly added to in a manner which would be highly satisfactory to its founder. The museum of William Hunter, a wonderful collection, embracing books, engravings, paintings, coins, and objects of natural history, was bequeathed to this University, and finds in Professor Young an enthusiastic curator; but its circumstances are most unfortunate as regards its anatomical and pathological department, the department which is most closely connected with the reputation of its founder. This interesting collection, made by the elder of the two brothers, who had the merit of teaching to his younger brother the art, is not, like the collection of John Hunter, a living centre which gathers to itself the best of present work; and this University is at the present moment almost powerless to make it so. But there can be no doubt that Glasgow ought to be the seat of one of the finest, most actively increasing, and most useful pathological collections in the world; and when I think of the public spirit of this great city, and the enlightened character of those who have it in their power to bring this about, I cannot doubt that the time will rapidly come when a great and successful effort will be made, by the

supply of funds and by proper combination, to give to a science so important for the direct interests of the public as pathology is, the support in Glasgow which it ought to enjoy. We require much extension of accommodation in our medical school, so rapidly do the wants of medical teaching develop; and a special representation of pathology on our staff is greatly to be desired, as well as an united medical museum, to which not only students may have liberal admission for purposes of study, but medical men may resort from all parts, both for their own immediate benefit and also to help them in work by which they may enlighten others."

Lectures on Syphilis of the Larynx. By W. MACNEILL WHISTLER, M.D., M.R.C.P. London: J. & A. Churchill. 1879.

THIS work consists of two lectures on the secondary and intermediate stages of syphilitic lesions of the larynx, and it includes tables of cases observed. It is well written: and if it be somewhat minute and in places seemingly redundant in detail, this is accounted for by the nature of the investigation, the object of which is to define if possible the limits and points of distinction between simple and syphilitic lesions in these stages of the disease. The author justly observes that it is only since the introduction of laryngoscopy into medical practice that these lesions have been exactly studied, and their course and tendencies defined; for *post-mortem* research in such cases is only capable of determining the most advanced and coarser effects of syphilis of the larynx. After giving an account of the previous observations published by various authors, Dr. Whistler defines the syphilitic lesions of the larynx in the secondary and intermediate stages as—

1. Catarrhal congestions simulating those arising from simple causes.
2. Congestions accompanied by *diffuse redness and swelling*.
3. Mucous patches of various types.
4. More chronic inflammations, occupying, as it were, the period of transition, the signs of which are—*diffuse redness, thickening, and ragged ulceration*, especially of the vocal cords.

He intones the fact of the occurrence of accidental congestions of the larynx liable to occur in any one, but points out that, if they accidentally occur in a syphilitic patient, and