Reviews.

THE MECHANISM OF THE HEART BEAT.

THE study of the heart's action in health and disease has occupied the attention of the clinical and pathological observers in all schools of medicine during the last decade, and a vast amount of work has been recorded. A journal devoted exclusively to the subject has been the medium in this country for the discussion of the relative value and importance of each new step as it has been taken, but the vastness of the subject renders it extremely difficult for any but the expert to follow the details of controversy. Hence the appearance of a book containing a clear statement of the present position of expert knowledge on the subject, set forth by one of the most skilled of our English students of cardiac pathology, will be welcomed not only by laboratory workers but also by clinical physicians who seek to deal with the multiple problems of heart disease on other than traditional lines. In his work, admirably printed and illustrated, on *The Mechanism of the Heart Beat*,[1] Dr. T. LEWIS has presented the whole subject in well-arranged order, and has wisely omitted any reference to experimental work that has not been sufficiently demonstrated to warrant acceptance; at the same time he makes it quite clear that no sort of finality has been reached, and that the observations of to-day may be modified by closer research to-morrow. It may be well to state that the book is not elementary, and that a certain degree of acquaintance with modern methods of investigation is essential to full appreciation.

A living moving organ of highly complex construction can only be studied by observation of its movements; the sounds which it produces in the course of those movements cannot be relied upon to the same extent as can the mechanical record of the movements themselves. The early work of Marey, Galabin, and others on the instrumental record of the pulse in the arteries led the way to similar means of demonstrating the cardiac and venous movements, but it is only within recent times that the services of electricity have been utilized, and the invention of the electro-cardiograph may well be reckoned amongst the marvels of modern science.

In an early chapter Dr. Lewis gives an admirably clear account of the steps by which the path of cardiac impulses has been demonstrated, and photographic illustrations of dissections display the whole course of the auriculo-ventricular bundles down to their ultimate arborization in the ventricle.

Much controversy has ranged round the question of heart-block, and it will be found to form the text of many sections of Dr. Lewis's work. He makes it clear that many variations are present in the size, form, and appearance of the fibres composing the auriculo-ventricular bundle in health, and this fact of itself suggests that such fibres may be unequally affected by a common cause, such as a restricted blood supply, in disease. Of the various methods employed for investigation it must suffice to say that they are described as simply and clearly as is possible, and that the tracings obtained are easily understood with the help of short notes appended to the foot of each illustration.

A chapter devoted to the "pace-maker of the mammalian heart," by which term is indicated the point where the cardiac impulse arises, contains some interesting electro-cardiographic observations, by which the conclusion is reached that this point is situated at the superior vena caval junction in the immediate neighbourhood of the sino-auricular node. A detailed account of such complex and comprehensive investigations cannot here be attempted, and it must suffice to mention a few of those subjects examined by the author which have a direct practical interest for the clinical physician. First among these comes the question of heart-block already referred to, and here the results of experimental observation are of the highest importance. The pathological evidence of the condition is almost always complicated by other changes in the heart, and hence the production of the clinical phenomena of disease in the normal heart, by artificial means, has thrown clear light upon the various morbid conditions that have been observed, proving that other factors besides the mechanical interference with the path of impulse may give rise to the block. Incidentally this question has led to the study of impulses arising within the ventricular wall, but the bewildering variety of the results hitherto obtained as yet prevent any definite conclusions.

Tachycardia, continual or paroxysmal, has long been a clinical puzzle, and research has made it clear that the condition is closely associated with intimate changes of the musculature of the auricle, whereby the impulses which should normally be passed down to the ventricle are broken up into irregular contractions, which succeed each other with extreme rapidity, so that they become merely fibrillar, and that in the end the ventricular muscles also may pass into a state of inco-ordination amounting to delirium. This question of auricular fibrillation is very closely examined, and a good account is given of the previous work that has been done to elucidate it. Dr. Lewis insists upon its occurrence in the human subject, and his investigations on the mammalian heart prove the existence of scattered fibrosis in the auricular muscle, most marked about the region of the pace-maker, whereby the even course of impulses may be broken up.

The influence of the vagus is discussed, and the observations upon it are fully illustrated. The whole work may be described as a compendium of modern knowledge on the movements of the heart in health and disease, forming a trustworthy platform on which to found a still more enlightening structure. So complex a subject, involving experiments of the most delicate description, must of necessity give rise to differences of opinion, even as to the interpretation of recognized phenomena, but such a work as Dr. Lewis has put forth cannot fail to stimulate the ardour of all labourers in the same field, and will serve as a permanent record of sound observation, clear exposition, and convincing argument worthy of the best traditions of British science.

HERBERT SPENCER AND DARWIN.

THE two last "Herbert Spencer" lectures delivered before the University of Oxford deal with the attitude of that great man towards the Theory of Evolution. The terms upon which the lectureship was founded make this theme more or less obligatory. The two lecturers, however, approach the same end by very different routes. In the earlier lecture Professor G. C. BOURNE treats of *Herbert Spencer and Animal Evolution*,[2] while Professor MELDOLA takes as the title of his address *Evolution, Darwinian and Spencerian*,[3] and deals with the subject more from the chemico-physical standpoint.

Professor Bourne commences by drawing attention to the fact that the idea of evolution dates as far back as the early Greek philosophers, and did not originate with Darwin, as is so often supposed. The great contribution made simultaneously by Darwin and Alfred Russel Wallace to scientific advance lies in the fact that they gave to the world a rational explanation of how evolution has been brought about—namely, by the great factor, Natural Selection. Among the pre-Darwinian exponents of organic evolution the name of Herbert Spencer stands out prominently, but the idea of Natural Selection did not occur to him in concrete form. It is as a philosopher that he is most widely known, but his theory of "physiological units"—to some extent anticipating Darwin's theory of pangenesis—would alone stamp him as a profound biological thinker thoroughly imbued with a true biological spirit.

Like Darwin, Spencer was a firm believer in the action of external forces in producing variations, and this led him into an animated controversy with Weismann on the question of the inheritance of acquired characters, a controversy which may now be rightly termed historical. A brief account of the positions taken up by the two disputants is given by Professor Bourne. Interesting as is the earlier part of this lecture, there is little in it which is

[1] *The Mechanism of the Heart Beat, with especial reference to its Clinical Pathology.* By Thomas Lewis, M.D., D.Sc., Lecturer in Cardiac Pathology University College Hospital Medical School; Physician to Out-patients, City of London Hospital for Diseases of the Chest, Victoria Park. London: Shaw and Sons. 1911. (Sup. roy. 8vo, pp. 311; 214 figures, 5 plates. 16s. 6d. net.)

[2] *Herbert Spencer and Animal Evolution.* The Herbert Spencer Lecture. By Gilbert Charles Bourne. Oxford: Clarendon Press. 1910. (Med. 8vo, pp. 36. 1s. 6d. net.)

[3] *Evolution, Darwinian and Spencerian.* Herbert Spencer Lecture. By Raphael Meldola. Oxford: Clarendon Press. 1910. (Med. 8vo, pp. 44. 1s. 6d. net.)

not already familiar to most persons. The same cannot be said of the latter part, in which the lecturer gives a summary of some of the more recent and important results of the modern school of experimental morphology and embryology so actively developed within recent years in America and on the European Contin nt, and with which the School of Zoology in Oxford is gradually becoming identified. The results obtained by the experimentalists are as yet too restricted, and, in certain cases, too contradictory, to warrant any very definite generalizations.

As an example of contradictory results reference is made to the experiments of Boveri and of Kupelweiser and Loeb. The first-named succeeded in rearing an echinoderm larva exhibiting only paternal characters from the anucleated fragment of an egg of one species fertilized by the sperm of another species, whereas Kupelweiser and Loeb obtained a larva showing no paternal characters whatever from the ovum of a sea-urchin fertilized by the spermatozoon of a mollusc. The outcome of these and many other experiments tends to the belief that some of the organ-forming materials must be contained in the cytoplasm of the germ cell and are not restricted to the nucleus. These results have led Weismann to somewhat modify his former views as set forth in his recent volume on the evolution theory.

After recounting in some detail the ontogenetic history of the various blastomeres in the development of *Dentalium*, Professor Bourne concludes that there is "ample evidence of the pre-existence of 'primary constituents' or 'factors' in the germ." Though, like many other biologists, he is not altogether satisfied with Weismann's explanations, he is of opinion that Herbert Spencer's "conception of germ cells" no longer holds good.

In conclusion, we may quote one or two passages with reference to the application of the conclusions of zoology to "the affairs of State."

> It is to be feared that much that still passes for progress is really regress, for it is founded on mistaken conceptions of the operations of nature. Hygiene, education, social institutions, may improve the lot of the individual, but they cannot produce any permanent effect on the race, and many of our apparently most promising reforms may actually do injury to the race, if they result in the multiplication of the unfit at the expense of the fit—fitness and unfitness being innate and not acquired characters.

Without fully endorsing these sentiments expressed by Professor Bourne, there is, undoubtedly very much truth in them, and they ought to be well considered by all those having control of the affairs of State.

The second lecture—that by Professor Meldola—is a most thoughtful and suggestive contribution, the type of lecture that gives rise to many reflections as to the genesis and evolution of the universe. Professor Meldola, like Professor Bourne, commences by laying stress upon the independent position which Herbert Spencer held as an evolutionist, as shown in all his earlier writings. Previously to the publication of the *Origin of Species*, Spencer was a thorough-going Lamarckian. The influence of Darwin's great work upon the evolutionist-philosopher is traced, and it is shown that, while not entirely abandoning his former tenets, he accepted natural selection as an accessory factor in evolution. The term "survival of the fittest," as an alternative for natural selection, was introduced by Spencer himself and sanctioned by both Darwin and Wallace.

The lecturer discusses in an extremely interesting manner the possible genesis of living matter. "From the evolutionary standpoint, may not a chemical compound be regarded as the analogue of a biological species?" is the question which he asks. Of the many carbon compounds found under primaeval conditions, certain possessed atomic configurations adapted to a particular environment. Some tautomeric or dynamical isomeric compounds are capable of existing in one or another of certain distinct modifications according to the chemical or physical environment, such being the chemical analogue of a dimorphic or polymorphic species. To follow the line of argument of the application of the Darwinian principle of evolution to the possible evolution of inorganic carbon compounds would exceed the limits at our disposal; suffice it to say that it is most suggestive and well worth reading.

The latter part of the lecture is devoted to a comparison of the influence of Darwin and of Spencer upon science generally and of the influence of each upon the other. In estimating the influence of these two great evolutionists upon scientific thought, the differences in their "method of attack" has always to be borne in mind, but within the limits of each branch of science there is a constant attempt to produce a minor philosophical system. "The generalizations of science pass by imperceptible steps into philosophical generalizations," hence "the Spencerian treatment was wanted as a co-factor with the Darwinian treatment."

This sketch of the contents of the lecture must necessarily be very inadequate. It must be read to be appreciated, and we feel sure it will be appreciated when read.

SENILITY AND PERVERTED DEVELOPMENT.

FOURTEEN years ago Mr. HASTINGS GILFORD surprised and interested the Royal Medical and Chirurgical Society by reading a paper on two cases of "premature old age engrafted upon, or running side by side with a condition of immaturity or infantilism." In *The Disorders of Post-Natal Growth and Development*,[4] he discusses these and allied conditions, and seeks to elucidate the processes of normal senile decay. In so doing he has swept his net widely, and in its meshes have been entangled such subjects as acromegaly, gigantism, longevity, and many others which affect the progress or duration of individual existence. Clearly, then, we may expect in these seven hundred pages to find much food for reflection. To the condition of spontaneous and premature senile decay, the name "progeria" (πρω = early, and γηρας = old age) has been given, and spontaneous, persistent immaturity has been called "ateleiosis" (α = privative, and τελειωσις = a becoming perfect). On considering questions of growth and development, Mr. Gilford was struck by the fact that the highest exponents of textbook medicine say nothing whatever in their "contents" about post-natal development, and that the classification of such books is in general unsatisfactory. This work, then, represents an attempt to remedy these alleged defects. To quote the author:

> The method adopted is to devote the first part to an explanation of the terms "growth" and "development" and to a definition of their diseases. In so doing it will be seen that these disorders are essentially natural processes dislocated from their proper setting, and either falling short of their proper degree or carried to an unhealthy excess. The rest of the book consists in the application of the axioms, rules or generalizations gained, first to the disorders of growths and development of cells in their individual capacity, then to organs, and lastly to the whole complex organism.

Mr. Gilford complains that diseases are not reckoned among natural phenomena and that medicine is the abode of mystery, whereas all diseases

> must of necessity be no more than the expression of the common laws of life. . . . If we put on one side bacteria-produced diseases, and group together all those maladies which are independent or only partly dependent upon external sources, we find that by far the majority are merely the extremes of normal biological processes. Most of them seem to be affairs of development or of growth. Growth is defective or excessive; development is too tardy or terminates too soon. Such extremes have received the names of "variations." . . . We have seen that the cancer, the cirrhotic liver, and the man with acromegaly, though seeming to have nothing in common, are in reality all examples of the same morbid variation of a biological process. Though there is as much difference between these forms of premature old age as of the old age which attacks the amoeba, the sponge, and the man, they are all fundamentally alike.

We have quoted Mr. Hastings Gilford at some length because we wish to avoid any unconscious misrepresentation of his views. The human body, he says, is "tribasic," that is to say, it consists of cells, of collections of cells or organs, which again are collected to form the whole man, which is a unit of the body politic. Most intrinsic diseases are degenerations of one or other of these units, and take the form of reversions to bygone ancestors, such as the amoeba, the sponge, and prehistoric man. The changes of old age are also degenerations, and reproduce the conditions not only of first childhood, but also of more primitive developmental ancestors. We cannot but admire the industry and earnestness which the author has displayed in preparing this work, but we are afraid that he has

[4] *The Disorders of Post-Natal Growth and Development.* By Hastings Gilford, F.R.C.S. London: Adlard and Son. 1911. (Sup. roy. 8vo. pp. 749, with 65 illustrations. 15s. net.)

taken many assumptions for facts, and pushed his analogies further than is justifiable. No doubt the symptoms of senile imbecility do present some resemblance to the conditions of normal infancy, but this second childishness and mere oblivion is only superficially like true infancy, and many men live beyond the psalmist's limit, and die without becoming childish. More convincing evidence than he offers is needed to show that in pernicious anaemia "the blight of senility" causes the production of embryonic nucleated red blood cells, or that old age is a reversion to an anthropoid ancestor.

PARALYSIS AGITANS.

THOUGH described by Sauvage over a century ago, and accurately depicted in 1817 by Parkinson in his historical *Essay on the Shaking Palsy*, the etiology and pathology of this striking and disabling disorder are still veiled in obscurity. This veil, Dr. KURT MENDEL, in a most excellent and informing monograph,[5] does nothing to lift. Dr. Mendel has made an exhaustive study of the literature of the subject, and quotes no less than 284 published works in the course of a pamphlet of only 106 pages, and examines the recorded investigations in the light of his own observations of fifty cases. Although Dr. Mendel sheds no fresh light on either etiology or pathogeny, he touches upon many points worthy of passing, though necessarily disjointed, mention.

From his own observations he agrees with Gowers that the generally mentioned predisposing factor of heredity is of only subordinate importance. Also, with many other authorities, he lays great weight as a causal factor on the influence of painful emotions, and in this relation the striking analogy of the tremor of fear to that of this disease—long ago pointed out by Gowers—springs to mind.

A remarkable fact mentioned by Dr. Mendel is that this disease, whose symptoms are mainly those of disordered motility, has for prodromes symptoms of an exclusively sensory order, namely, pains, paraesthesias, gastric crises, colics, headache, giddiness, etc.

Concerning symptomatology, Dr. Mendel agrees with most others that of all symptoms the stiffness or muscular rigidity is the most characteristic and important; so much so, he says, that the rigidity of the frontal and superciliary muscles makes Stellwag's sign more pathognomic of paralysis agitans than of exophthalmic goitre. Also the "frontalis symptom" (persistence of voluntarily induced wrinkling of the forehead for forty to sixty seconds after the patients' forced attempts to smooth their ruffled brows), first described by Moczutkowsky, was found almost constantly by the author. Other particular symptoms of this same characteristic rigidity which occasions the well-known "mask face," are furnished by the external ocular muscles, notably by the difficulty in changing the direction of the gaze of the eyeballs, a phenomenon designated by Debove as *lateropulsion oculaire*, and, of course, by delayed reaction of almost any of the voluntary muscles of the body to auto-stimulation. In the facial symptoms, however, Dr. Mendel sees merely the result of muscular rigidity and delayed transmission of nervous impulses, and in contrasting these with the common propulsive or lateropulsive or retropulsive gait of the victims of this disorder, is in agreement with those who consider that these phenomena are due in large part to disordered cortical co-ordination.

A small point worth noting is that, unlike most observers, Dr. Mendel found the Achilles tendon reflex absent in a comparatively large proportion of cases where no sign of tabes or organic nervous disease was elicited.

After giving in considerable detail the published and quite inconclusive results of investigations made by numerous observers into pathological anatomy and pathogeny, he states that as to the nature of this disease we must still plead an ignoramus, though most probably it is "a degenerative process affecting preponderatingly the motor sphere, and possibly beginning in the vessels." In consequence no causal therapy exists, but as to symptomatic treatment he mentions that in certain cases he has found duboisin (made from the Australian plant *Duboisia myoporoides*) of distinct use, lessening both the tremor and the rigidity and improving the sleep.

[5] *Die Paralysis Agitans.* Eine monographie von Dr. Kurt Mendel. Berlin: S. Karger. 1911. (Roy. 8vo, pp. 106. M.4.)

NOTES ON BOOKS.

ONE of the heaviest burdens of kingship must be the constantly recurring necessity for making speeches, an arduous duty which has been faithfully discharged by King George during the whole of his public life, both as heir apparent and as reigning monarch. His speeches have now for the first time been gathered together and published in a book entitled *The King to His People*.[6] In it we have an almost complete collection of Royal addresses delivered at home and abroad before and after his accession to the throne. "The King's name is a tower of strength," but apart from its august authorship the intrinsic merits of the contents are sufficient to ensure the success of the volume. Well bound and printed, and provided with a fine portrait of George V as frontispiece, its pages abound in excellent advice, and will doubtless be perused with interest and edification by a large number of His Majesty's loyal subjects.

It is a regrettable fact that the majority of mankind regard instructive reading as an unmitigated bore, and the literature whose sole aim is to impart information as something to be avoided at all costs. This innate levity of the human mind may, perhaps, be the reason of the astonishing ignorance displayed by "the world as a whole of the great industries which maintain our oft-boasted civilization," of which Miss EDITH A. BROWN complains in the preface to her interesting book on *Sugar*.[7] Thanks to Miss Brown, however, the rising generation has every opportunity of learning in the pleasantest manner all that it is necessary to know about one great industry at least, namely, the cultivation and manufacture of different kinds of sugar in every quarter of the globe. The author has succeeded admirably in a somewhat difficult task. She has cleverly contrived to communicate her exhaustive knowledge of the subject without appearing either didactic or technical, whilst her easy, colloquial style and the studied simplicity of her explanations arouse the interest and hold the attention of her readers. Moreover, the numerous and carefully selected photographs with which this prettily-bound volume is illustrated do much towards promoting an intelligent understanding of the whole process of sugar making. Miss Brown's book is the first of a series whose object is to dissipate the "more than Gothic ignorance" of educated people on the subject of industries and manufactures, and will be followed in due course by others which also will be written from first-hand knowledge.

The choice of a book which will be read with equal pleasure by boys and girls is not an easy task for the average parent, but it is one that has been greatly simplified since the appearance of Mrs. E. NESBIT's admirable tales for children. Her new book, *The Wonderful Garden*,[8] though to all intents and purposes a fairy tale, provides enough adventures to satisfy the most exigent of boy critics, whilst their sisters will succumb to the charm of two most attractive little heroines. The story, which is told in the quaintly humorous style one has learnt to associate with Mrs. Nesbit, is prettily bound and profusely illustrated by Mr. H. R. Millar.

The well deserved popularity of Mrs. MOLESWORTH as a writer of children's books shows no signs of diminishing. Her stories have a charm all their own, and she is one of the few modern authors who can write a genuine fairy tale—a far more difficult task than might be imagined. Her delicate fancy is shown at its best in her latest book, *Fairies Afield*,[9] a collection of short stories in which the "Good People" play a prominent part, and which have something of the haunting fragrance of the ancient

> Stories told of many a feat,
> How faery Mab the junkets eat.

The beauty of these charming tales is further enhanced by the pretty old-world pictures contributed by Miss Gertrude Demain Hammond.

In these days of elaborate mechanical toys and miniature replicas of the latest inventions, it is refreshing to find

[6] *The King to His People.* Being the Speeches and Messages of His Majesty George V as Prince and Sovereign. London: Published (by permission) by Williams and Norgate. 1911. (Imp. 16mo, pp. 470. Price 5s.)

[7] *Peeps at Industries: Sugar.* By Edith A. Brown. Containing 24 illustrations from photographs. London: Adam and Charles Black. 1911. (Post 8vo, pp. 88. Price 1s. 6d.)

[8] *The Wonderful Garden; or the Three C.'s.* By E. Nesbit, with illustrations by H. R. Millar. London: Macmillan and Co. 1911. (Crown 8vo, pp. 416. Price 6s.)

[9] *Fairies Afield.* By Mrs. Molesworth, with illustrations by Gertrude Demain Hammond. London: Macmillan and Co. 1911. (Cr. 8vo, pp. 262. Price 3s. 6d. net.)