

conditions. And we must further compare the speed of organic processes with those of the crystal—quiescent to all eternity, unless disturbed by external forces. One of the finest conceptions of modern science is that the dynamic equipoise in the life of the individual corresponds to the cycle of living matter in all nature.

Labile equipoise is, however, preponderant in the organism. And here is the simplest explanation of the reaction which Müller held peculiar to living beings—excitability. The specific energies yielded up by living things in response to stimulus, amount to nothing more than the mechanical reaction of stored-up energy which we find, *e.g.*, in a chronometer. A repeating clock, in its specific reaction to stress or strain, heat or cold, moisture or dryness, electrical or chemical influences, presents a close analogy to the living muscle.

A final blow, it seemed, was dealt to vitalism by Darwin's "Origin of Species," which, through natural selection and the survival of the fittest, accounted rationally for existing variations. Thus the controversy was to all appearance ended. Of late, however, on anatomical rather than on physiological grounds, a new school of vitalism has arisen. By a somewhat strained conclusion from the labours of Schwann and Heidenhain, it is asserted that the processes deriving from elemental organisms are too vast in relation to the latter to be accounted for on mechanical principles. A more satisfactory *rationale* for heredity is also demanded.

Prof. du Bois-Reymond dismisses in a few words the arguments of Driesch and Rindfleisch (1888-93). In regard to Bunge ("Lehrbuch der physiol. Chemie," 1887), he points out that the "activity behind which lies the mystery of life" is only static equilibrium of the organism, dependent on integrating stimuli, and reducible to a physical equation. In fact, it is metabolism, maintained by chemical processes, which convert potential into kinetic energy. We have here the *πρώτον ψεύδος* of the older vitalism, for it matters little whether we deal with the comparatively simple problem of fifty years back, or, with Driesch and Bunge, search into the cell and its atoms, or their yet unknown final particles. Impassable, indeed, are the limits of our knowledge, but let us confine our *ignorabimus* to its proper frontier.

To the first contention of Neo-vitalism, du Bois-Reymond opposes the molecular theory with its infinitesimal particles of matter; for the last, he refers us to the current controversy between Weismann and Herbert Spencer. There is, doubtless, room for criticism of the Darwinian theory. For instance, natural selection fails to account for the appearance of organs such as the poison-fangs of snakes or the electric organs of fishes, which are useless in the struggle for existence until fully developed. But if Darwinism were fore-doomed, and exposed, in the words of Herr Driesch, as "a cheap and specious deception," it is improbable that Neo-Vitalism would reap any benefit. There may be still another solution to the problem.

Now, as before, we stand in face of the unsolved riddle, Origin of Being, with all the wondrous chain and intricacies of development. Yet as an alternative to supernaturalism, we can conceive one primordial act of creation whereby the germ of life inherent in matter could develop by its intrinsic laws into the brain of a Newton. Thus, with no day of creation the whole order of nature would evolve mechanically, without intervention of Old or New Vitalism.

And so we return upon the ideas of Leibnitz, save that Materialism replaces Supernaturalism, inasmuch as we may conceive that infinite matter, with its qualities as we know them, has been circling in infinite space from all eternity.

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SCIENCE IN THE MAGAZINES.

PROF. A. W. RÜCKER contributes to the *Fortnightly* a brief sketch of the work of von Helmholtz. Our readers are familiar with the investigations carried out by this eminent physicist; nevertheless, the two concluding paragraphs of Prof. Rücker's article sums up the chief of them so admirably as to be worth quoting here.

"He was one of the first to grasp the principle of the Conservation of Energy. He struck independently, and at a critical moment, a powerful blow in its defence. He penetrated further than any before him into the mystery of the mechanism

which connects us with external nature through the eye and the ear. He discovered the fundamental properties of vortex motion in a perfect liquid, which have since not only been applied in the explanation of all sorts of physical phenomena, of ripple marks in the sand, and of cirrus clouds in the air, but have been the bases of some of the most advanced and pregnant speculations as to the constitution of matter and of the luminiferous ether itself.

"These scientific achievements are not, perhaps, of the type which most easily commands general attention. They have not been utilised in theological warfare; they have not revolutionised the daily business of the world. It will, however, be universally admitted that such tests do not supply a real measure of the greatness of a student of nature. That must finally be appraised by his power of detecting beneath the complication of things as they seem, something of the order which rules things as they are. Judged by this standard, few names will take a higher place than that of Hermann von Helmholtz."

In the same magazine Sir Robert Ball discusses the possibility of life in other worlds—a subject that has a curious fascination for the unscientific, but upon which the author throws the light of modern scientific knowledge. "No reasonable person will," he thinks, "doubt that the tendency of modern research has been in favour of the supposition that there may be life on some of the other globes. But the character of each organism has to be fitted so exactly to its environment that it seems in the highest degree unlikely that any organism we know here could live on any other globe elsewhere. We cannot conjecture what the organism must be which would be adapted for residence in Venus or Mars, nor does any line of research at present known to us hold out the hope of more definite knowledge." The verdict thus appears to be "possible, but not probable," and the subject therefore stands where it did.

Mr. R. S. Gundry contributes to the same magazine an article on Corea, China, and Japan; and Mr. A. H. Savage-Landor one on Japanese people and customs; while Mr. G. Lindsay describes his rambles in Norsk Finmarken.

Prof. N. S. Shaler contributes to *Scribner* an interesting paper on "The Horse," the text being illustrated with pictures by Delort. He does not speak very highly of the animal's intelligence. In his words: "The mental peculiarities of the horse are much less characteristic than its physical. It is, indeed, the common opinion, among those who do not know the animal well, that it is endowed with much sagacity, but no experienced and careful observer is likely to maintain this opinion. All such students find the intelligence of the horse to be very limited. Although some part of this mental defect in the horse, causing its actions to be widely contrasted with those of the dog, may be due to a lack of deliberate training and to breeding with reference to intellectual accomplishment, we see by comparing the creature with the elephant, which practically has never been bred in captivity, that the equine mind is, from the point of view of rationality, very feeble." It is worth remark, however, that a good deal of misapprehension exists as to the intelligence of the elephant. According to the best authorities, though elephants are docile and obedient, their intellectual capacity is below that of most other Ungulates. Colonel H. G. Prout contributes his second article on "English Railroad Methods," giving a number of interesting facts respecting passenger and freight traffic, cost of construction, &c., in England and America.

Colonel A. G. Durand shows, in a paper in the *Contemporary*, that the southern region of the Eastern Hindu Kush is one full of interest. In the *Humanitarian*, St. George Mivart writes on "Heredity." A portrait of the author forms the frontispiece of the number. Mr. Grant Allen continues his moorland idylls in the *English Illustrated*, his subject this month being house-martins.

Chambers's Journal contains its usual complement of chatty articles, among which may be mentioned "Feathered Architects," "The Infinity of Space," and "The Vanishing Eland," *Longman's Magazine* reprints an address, "How to Make the Most of Life," delivered by Sir B. W. Richardson before the Literary and Scientific Section of the Grindelwald Conference this year. The Rev. B. G. Johns writes on "The Injuries and Benefits of Insects" in the *Sunday Magazine*, and the Rev. T. R. R. Stebbing contributes an instructive article on certain crustacea to *Good Words*. The latter magazine also contains an article on tea, by Mrs. A. H. Green, and a well-written explanation of the laws of motion, by Emma Marie Caillard.