

## OUR BOOK SHELF

*Deschanel's Natural Philosophy.* Edited by Prof. J. D. Everett. Sixth edition. (Blackie and Son, 1882.)

PROF. EVERETT'S admirable adaptation of "Deschanel's Natural Philosophy" is so well known as a text-book, that it needs no commendation from us. We heartily welcome this sixth and greatly improved edition. Amongst the new items we notice that the chapter on thermodynamics has been amplified and re-written; and other parts of the book devoted to heat have also been improved, particularly those relating to the apparent minimum density of water, and to conduction of heat. We notice also a useful note on the mathematical treatment of the periodical variations of underground temperatures. The section dealing with electricity and magnetism has also been greatly improved. The elements of electric testing by Wheatstone's bridge and resistance coils are now included. The modern dynamo-electric machines and such recent inventions as the electric pen and the induction-balance are described. Rowland's experiments on electric convection-currents, and Planté's secondary battery are also mentioned; though it appears to us that by a slight slip of the pen in the paragraph dealing with Planté's researches his "rheostatic machine," which is in reality a compound condenser of mica plates, is described as a species of commutator (like that of Müller) for his secondary batteries. There is another slip in the paragraph on the use of the galvanometer for measuring transient currents, for it is stated that the quantity discharged through the galvanometer is proportional to the swing of the needle, whereas by the well-known ballistic formula of Maxwell, it is proportional to the sine of half the angle of the first swing. These are however minor points. In the section on Light and Sound little has been changed; the more recent measurements of the velocity of light, and the phonograph, being the most important additions. It is a pity that in the optical formulæ the editor does not use the same notation as in the accepted Cambridge text-books. The problems, which in former editions were lumped together at the end of the book, are in this new edition placed at the ends of the separate volumes, a change which is a great boon to teachers and students who find it most convenient to buy the separate parts. Why the date of 1882 should be put upon a work which appears in October, 1881, is one of the mysteries of publishing which lies beyond the pale of scientific criticism.

## LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

## The Struggle of Parts in the Organism

As the Duke of Argyll does not appear to have quite understood the meaning which I intended to convey in the paragraph of my review to which he refers, I should like to state that meaning a little more explicitly. This I should have done in the first instance had I not shared the feeling which he expresses, that "a purely scientific journal" is not an appropriate place in which to discuss the relations of science to theology, and I shall now hope to show that in my review I did not transgress the border of any such debatable ground.

My remarks were limited to the "Argument from Design as elaborated by the natural theologians of the past generation," the material of which was furnished by "the endless number and complex variety of those apparently purposive adaptations of structures to functions which are everywhere to be met with in organic nature." By this limitation I intended every one

conversant with the writings of these theologians to understand that I alluded only to the Argument from Design as this was expounded by the school of Paley, Bell, and Chalmers, and which amounted to inferring that particular instances of adaptation were so many separate pieces of evidence pointing to as many "operations of special design." This is the form of teleology which I conceive Mr. Darwin's writings to have completely "subverted," for these writings have shown that in natural selection we have a general law whose operation is presumably competent to produce most of the adaptations previously ascribed to special design. This form of teleology is what I called in my review "scientific teleology," and I did so because it embodied what is, in the full sense of the term, a scientific theory; certain definite facts or results were observed, and of these results the immediate cause was inferred. Therefore this endeavour to explain the causation of special mechanisms in organic nature properly admits of being discussed in the pages of a scientific periodical; it is as purely a scientific hypothesis as is that of natural selection.

But the Duke of Argyll clearly attaches to the term "design" a much wider signification than that which I expressly and intentionally assigned to it. For he uses the term in its most unlimited sense, and says; "There are many minds, including some of the most distinguished in science, who not only fail to see any contradiction between evolution and design, but who hold that the doctrine of evolution and the facts on which it is founded have supplied richer illustrations than were ever before accessible of the operation of design in nature," &c., &c.

Here and elsewhere the Duke clearly alludes to the whole question of Theism, or of Mind as the First Cause, and not to the narrower one of this or that particular mechanism in nature as the result of immediate and special design. Now teleology in this larger sense, or the doctrine that behind all the facts open to scientific inquiry (special mechanisms, physical causes, and general laws) there is "Mind and Will" as the ultimate cause of all things—teleology in this sense is a general theory of things which it does not fall within the scope of scientific method to examine. In contradistinction to the cruder teleology of Paley, which, as I have said, may properly be called "scientific," this may be called "metaphysical"—if we use these terms as they are used by Lewes to denote respectively a theory that is verifiable (or the reverse) and a theory that is not. The school of Paley thought that the existence of a designing Mind in nature could be proved by a purely inductive method; Mr. Darwin has since shown that such is not the case; therefore this system of teleology is a scientific system, and, like many other theories of the scientific class, it has had to yield to fuller knowledge. But there remains the metaphysical theory of an ultimate design pervading all nature and blending into one harmonious cosmos what the Duke calls the "combination and co-ordination of physical causes"; and this theory, I quite agree with him, "no possible amount of discovery concerning the physical causes of natural phenomena can affect," either by way of proof or of disproof. But this has nothing to do with the special question between Darwinism and "the argument from design as elaborated by the natural theologians of the past generation"; and therefore I shall not discuss the merits of the theory in these columns.

GEORGE J. ROMANES

## "The Micrococcus of Tubercle"

AN article on "Disease Germs," by Dr. W. B. Carpenter, in the current number of the *Nineteenth Century*, contains the following:—"Another line of inquiry which has obviously the most important bearing upon human welfare is the propagability of the micrococcus of tubercle by the milk of cows affected with tuberculosis, a question in regard to which some very striking facts have been brought before the Medical Congress by a promising young pathologist"—naming myself; and I hope that I am sufficiently grateful to a veteran in science for his complimentary if not altogether accurate reference to my work. What I did say at the recent Medical Congress, and at much greater length in a small volume entitled "Bovine Tuberculosis in Man" (London, 1881)—Dr. Carpenter will find it, I think, among his books—was not anything about "the micrococcus of tubercle," but about a variety of somewhat technical morphological details in respect to which certain cases of tuberculosis in man resembled the tuberculosis or "pearl disease" of the bovine species. I did indeed introduce half a page at the end of my essay to show how clear