

dise. One beheld and died. One beheld and lost his senses. One destroyed the young plants. One only entered in peace and came out in peace." Many are the mystic and cabalistic interpretations which have been given of this saying; and if for 'Paradise' we read the 'world of knowledge,' each of you can no doubt best interpret the parable for himself. Speaking to a body of scientific men, each of whom has, I hope, also certain unscientific beliefs, desires, hopes, and longings, I will only say, 'Be strong and of a good courage.' As scientific men, let us try to increase and diffuse knowledge; as men and citizens, let us try to be useful; and, in each capacity, let us do the work that comes to us honestly and thoroughly, and fear not the unknown future.

When we examine that wonderful series of wave-marks which we call the spectrum, we find, as we go downwards, that the vibrations become slower, the dark bands wider, until at last we reach a point where there seems to be no more movement; the blackness is continuous, the ray seems dead. Yet within this year Langley has found that a very long way lower down the pulsations again appear, and form, as it were, another spectrum; they never really ceased, but only changed in rhythm, requiring new apparatus or new senses to appreciate them. And it may well be that our human life is only the lower spectrum, and that beyond and above the broad black band which we call death there are other modes of impulses, — another spectrum which registers the ceaseless beats of waves from the great central fountain of force, the heart of the universe, in modes of existence of which we can but dimly dream.

#### CLARK'S PHILOSOPHY OF WEALTH.

'A REMARKABLE book!' Such is my involuntary exclamation as I finish reading Professor Clark's book, 'The philosophy of wealth.' In reviewing it I suffer in several ways under an 'embarrassment of riches.' There are so many excellent features of the work that it is difficult to select one or two for treatment, and there are so many passages in my copy marked for quotation that they would occupy far more space than can be given to the entire review. It seems, under the circumstances, best to abandon any idea of an exhaustive treatment of this admirable book, and simply attempt to notice a few of its characteristics in the hope that many may be induced to confer a benefit on themselves by its perusal.

*The philosophy of wealth.* By J. B. CLARK. Boston, Ginn, 1886. 12°.

'The philosophy of wealth' is a treatment of fundamental principles in economics, in which every page is luminous with clear analysis and profound thought. Yet the entire work is most practical, and should attract the attention of all interested in the problems of the day; for nothing is more needed at the present time than deeper knowledge. People lose themselves in a maze of stock-phrases, and continue to move in the same weary circle because they fail to grasp primary principles.

Professor Clark very properly lays emphasis on this point in his first chapter. He says, "If obscurity still hangs over principles, the clear apprehension of which is essential to all reasoning on the subject, the removal of it, besides having an incalculable value in itself, will afford a welcome supplement to directly practical work. It will shed light on the pressing social questions of the day. In the present state of the public mind, for example, financial heresies and strange teachings concerning the rights of property find a ready circulation; and if these false doctrines connect themselves, even remotely, with fundamental errors of political economy, then the assault upon the practical fallacies can never be quite successful until the underlying errors be exposed and corrected. Questions on the solution of which the general prosperity depends cannot be solved without the clear apprehension of correct principles."

The scope of the work may most readily be gathered from the titles of the chapters, which are the following: Wealth; Labor and its relation to wealth; The basis of economic law; The elements of social service; The theory of value; The law of demand and supply; The law of distribution; Wages as affected by combinations; The ethics of trade; The principles of co-operation; Non-competitive economics; The economic function of the church.

One of the best examples of clear analysis of economic phenomena is found in the discussion of utilities. There is first a distinction between absolute and effective utility, which explains satisfactorily the apparent contradiction, found in old treatises, between high value in use and low value in exchange. Water is said to be useful, for example, but to have no value. The logical ambiguity lies in this: when we say water is more useful than diamonds, we think of water in the abstract; when we say water has no value, we think of a definite concrete amount of water, a glassful for example. But that has also very little use. If my glass is upset, I do not grieve: I have no special attachment to that particular concrete water, and I get some more without difficulty.

This is explained more clearly by Professor Clark than by any other writer in English.

Utilities are further subdivided, and a different law of costliness is found to govern elementary utilities from that which obtains with respect to form and place utilities. The law of diminishing returns holds only for elementary utilities. This has an important bearing on Malthusianism, for a predominance is demonstrated of those utilities which tend to cheapness. At the same time the essence of Malthusianism is recognized and admirably stated in these words: It "maintains that a retarding of the rate of increase of population is an ultimate necessity, if humanity is to fully enjoy the earth and to perfect itself." This is a great improvement on any thing which can be found in previous writers, and ought to modify the teaching of political economy. Other points which must especially interest the professional economist are the theory of non-competing groups and the treatment of non-competitive economics, which show conclusively the existence of narrower limits to the range of competitive action than is ordinarily supposed.

The chapter on non-competitive economics is in some respects as important as any in the book. It demonstrates the fact that the field of non-competitive economics is increasing; that it ought, in the interest of humanity, to be still further widened; and that even now the highest forms of rational wealth are disbursed non-competitively.

The book abounds in valuable practical suggestions; but the man of affairs will be chiefly interested in the chapters on combinations, the ethics of trade, and the economic functions of the church. The last-named subject is discussed more profoundly than in any other book which has come under my notice, and the root of the matter is touched in the protest against the appeal in the forms of church activity to the spirit of caste. The author does not hesitate to call things by their proper names, and throughout he reveals a vigor of treatment equal to the strength of moral purpose everywhere displayed.

More, perhaps, might have been said about the nature of economic laws, which is to most economists even a dark field: and possibly the terms 'induction' and 'deduction' should have been more clearly defined. A great deal of current discussion on economic method leaves the painful impression of sad ignorance in the fundamental principles of logic as understood at present.

I cannot either express unqualified approval of what is said in regard to railways. I do not believe, as the result of my studies, that experience has so far pronounced in favor of government control rather than ownership of means of com-

munication and transportation; and, if that alternative be accepted, Professor Clark fails to show the possibility of an exercise of control over such powerful economic factors. Experience has never demonstrated it. However, this is a subject which needs much further discussion by non-partisans whose sole purpose is the public weal; and I close this notice of Professor Clark's book with the unhesitating assertion that it is one of the most important contributions to economics ever made by an American.

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#### PLANT-DISSECTION.

*Handbook of plant-dissection.* By J. C. ARTHUR, C. R. BARNES, and J. M. COULTER. New York, Holt, 1886. 8°.

THIS book is a useful guide to the study of a dozen plants of common occurrence, ranging from the most simple forms to those of highest organization. It is modelled on Huxley and Martin's 'Elementary biology,' physiological details being, however, omitted. The introduction gives brief instructions as to the instruments and materials to be used, including the simple lens and compound microscope; the chemical reagents employed; section-cutting and the mounting and drawing of objects; and a list of books of reference needed. The gross anatomy of the plant is first studied with the aid of a hand-lens only, and subsequently its minute anatomy explored with the compound microscope. Outlines are given for the complete study of the following forms: *Protococcus viridis*, *Oscillaria* (more usually written *Oscillatoria*) *tenuis*, *Spirogyra quinina*, *Cystopus candidus*, *Microsphaera Friesii*, *Marchantia polymorpha*, *Atrichum undulatum*, *Adiantum pedatum*, *Pinus sylvestris*, *Avena sativa*, *Trillium recurvatum*, and *Capsella Bursa-pastoris*. It would have been a little more convenient for the average student if one of our native pines had been selected instead of the Scotch pine, though this is quite commonly cultivated; and *Trillium recurvatum* is of rare occurrence in the eastern states, though for any other purpose save the study of its gross anatomy, any other species of wake-robin will answer as well. A useful glossary of terms used, and an index, are appended.

A REVOLVING pneumatic cannon, devised by a Washington inventor, is one of the most recent additions to the list of destructive weapons. Another recently invented device of a similar nature is an accelerating projectile, which is so constructed that a series of charges, contained in chambers attached to the rear of the projectile, are exploded in succession, at distinct intervals, as the projectile passes along the tube of the cannon.