eating-houses have fallen off, and a tendency to go back to the private shops has manifested itself.

There are numerous co-operative building-societies in Sweden, but the system has not been extended to agriculture, nor, to any considerable extent, to fishing.

MENTAL SCIENCE.

Healing Wounds by Mental Impressions.

PROFESSOR DELBOEUF of Liège is certainly the most versatile of living investigators, when one considers the great originality and suggestiveness of all the work he does. Ancient and modern languages, logic, general physics and physiology, and especially experimental psychology, have received his attention by turns. His latest contribution is to therapeutics, and is a communication made on June 4 to the Belgian Academy, which will probably turn out to be of the greatest theoretical as well as practical importance.

We all are familiar with accounts of the wounds inflicted on themselves by African dervishes; but the statement which the narrators always make, that the wounds do not inflame, or may even be quite healed in twenty-four hours, probably often tends to discredit their whole description in the reader's mind. Delboeuf's observations now make these stories wholly plausible. It is well established that in certain hypnotic subjects a suggestion made during trance, that to a part of their body a cautery or a blister is applied, will produce, after due lapse of time, an actual vesication of the skin. The hallucinatory feeling of inflammation produces in these persons a genuine inflammation. M. Delboeuf argued from this, that the feeling of pain, however useful in other respects, must itself be an inflammatory irritant, and went on to infer that the abolition of it from an actual wound ought to accelerate its healing. He immediately thought of some hypnotic subjects whom he had made anæsthetic, and in whom he had often admired the rapidity with which the marks of punctures and pinchings disappeared, and proceeded to more systematic experiments, which, so far as they go, seem to verify his hypothesis perfectly. On a young woman whom he could make insensible by suggestion, he marked two corresponding spots, one on each arm, and made on each an identical burn with the hot iron, announcing to the patient that the one on the right should not be felt. The suggestion took effect; and the next day, when the bandages were taken off, and the left arm presented a vesicled sore with an inflammatory area three centimetres in diameter, the right arm showed only a clean scorch of the skin of the exact size of the iron (8 millimetres diameter), without redness or inflammation. On another subject similar results were obtained with burns and blisters, the spots chosen being near together on the same arm or on the neck. The experiments are few in number, and ought to be multiplied; but the reader will immediately see the vista which they open. Many of the results of the 'mind-cure,' and the strange fact, so long known, of opium controlling inflammations, are explained by M. Delboeuf's principle. So is the popular belief in 'hardening' one's self by a little judicious indifference, and neglect of one's condition. Local pain is useful in leading us to protect the wounded part from mechanical abrasion, — several of M. Delboeuf's experiments were inconclusive, because the subjects, being insensible at the seat of their injuries, allowed them to get scraped, etc., — but it has the drawback of exciting reflex changes of nutrition of an unfavorable kind. Anæsthetizing a wound prevents these reflex changes. M. Delboeuf, suggesting to a very sensitive subject that she should not feel a severe dental operation, was assured by the dentist that what he found most extraordinary in the whole performance was the absence of the salivary secretion which would usually have accompanied it.

It is to be hoped that others, with better facilities for surgical experimentation than a professor of classical literature like M. Delboeuf, will follow the example he has so happily set them.

BOOK-REVIEWS.

Technical School and College Buildings. By EDWARD C. ROBINS, F.S.A. New York, Van Nostrand. 4°.

THIS handsome volume by a gentleman who holds a most honorable position among architects and friends of technical education, is inscribed to Professor Huxley. It is a treatise on the design and construction of applied-science and art buildings, together with a description of their suitable fittings and sanitation. Its value will be apparent at once to every one, but especially to those professors and instructors who desire to utilize the results of the best European experience in their laboratories, museums, and lecture-rooms. Our medical and educational readers will recall the pains taken by the trustees of the Johns Hopkins Hospital in Baltimore to obtain the benefit of the best thought and ripest experience of the world in relation to their work, and will readily understand how a book of this scope relating to hospitals would have lightened their labors.

In this country we are now passing rapidly forward in the construction of school-buildings and laboratories, and, whether they are large or small, our desire is to have them as complete as possible. It is here that European experience is so valuable, and Mr. Robins has done us a great service in putting into a readable form accounts of what has been done in the great schools and universities of Europe. His book contains full descriptions of such famous institutions as the Bonn, Berlin, and Munich Chemical Laboratories, Du Bois-Reymond's Physiological Institute at Berlin, the laboratories of the Royal Trade School at Chemnitz, the Würzburg Physical Institute, the Royal Technical School at Stockholm, the laboratories at Charlottenburg, Zurich, Paris, and Strasburg. Most of these are accompanied with cuts and diagrams, so that their interior arrangements may be studied in minutest detail. Following these come full descriptions of the laboratories at South Kensington, Finsbury, Leeds, Bristol, Manchester, Huddersfield, Oxford, Cambridge, and other English cities. The chapters which follow on the fittings of these buildings are in one sense the most valuable of all; for they give us the most detailed information concerning the hundred and one minor things which go to make up the perfect laboratory. They discuss and describe, for example, the working-benches, demonstration-tables, drawing-rooms, and so on. The heating, ventilation, and sanitation of applied-science buildings are also elaborately treated and profusely illustrated. An appendix gives statistics as to the technical schools in Great Britain, and we find there particulars as to the area occupied by the buildings, their cubical contents, the cost of land, cost of fittings, annual expense of maintenance, number of students, and so forth.

Mr. Robins's book is one which our investigators in physics, chemistry, and biology, our university architects, and our technical educators, cannot do without.

The Natural History of Thought, in its Practical Aspect from its Origin in Infancy. By GEORGE WALL. London, Trübner. 8°.

THIS volume is in many ways a serious disappointment. Much of this effect is due to the fact that the expectations raised by the inviting titlepage are not in the least realized. Had these pages appeared with a less ambitious title, one could have judged them much more leniently than it is possible to do when considering them as an attempt to write a life-history of the thinking process; and this failure is made a hundred-fold more striking by the consideration that science is in a far better position to deal with this problem than ever before. At no very distant date it will be possible to write a natural history of thought that shall be regarded as an illustrious consummation of a most important movement, — the application (as the term 'natural history' suggests) of the biological point of view to the consideration of mental phenomena. Even now a master-hand could sketch the outlines of such a comprehensive undertaking. To blame Mr. Wall for not being such a master-hand would be very unjust; but the same cannot be said when fault is found with his lack of appreciation of the complexity of the problem before him, and the important light which recent experimentally discovered facts have shed upon it. The natural history of thought can be far better gleaned from such a volume as Mr. Tylor's 'Primitive Culture,' or (to make the comparison more immediate) from M. Perez's 'The First Three Years of Childhood,' than from the pages of Mr. Wall's book.

The volume is really a collection of educational essays, written by an observant thinker, deeply imbued with the high pedagogical value of moral training, and in particular with that portion of it usually termed 'religious,' and appreciating here and there the

scientific aspect of these problems. He writes well, says some things very forcibly, but repeats himself *ad nauseam*, crowds his pages with commonplaces, and warps his exposition by an irrelevant and forced introduction of religious considerations. With this survey of the strength and the weakness of the work, a glimpse at its contents will be in order.

In the introductory chapters, on the nature and the function of thought, the only point of note is, that, while the author fully recognizes the significance of mind in animals for the understanding of mind in man, he erects a barrier between them which the evolutionary point of view demanded by the topic finds inconsistent. This distinction between a lower and a higher field of thought, — the two sharply defined, — while of advantage in accenting the peculiarity of human evolution, is yet a decided hinderance to the taking of that general point of view which imbues mental evolution with a larger interest. Hereupon follow a chapter on language, and one on temper, containing much sound advice, but nothing noteworthy. The next four chapters aim to justify the titlepage, and deal respectively with babyhood, infancy, childhood, and youth. The characteristics of each of these periods are pleasingly sketched; but the sketch is incomplete, and dwells in a disproportionate manner upon the moral-religious side of the question. He believes in the careful training of children from their first days; denounces the practice of giving children to the care of ignorant nurses when they are supposed not to be affected by their surroundings, but are really forming habits of character for ill or good. A very apt saying is the author's remark that much that is learned in childhood is not taught, and much that is taught is not learned. And the reason for this he rightly finds in the fact that the child, in his own acquisitions, discovers (by repeated trial and failure, it is true) the natural mode of learning, with interest, timeliness, utility, and attractiveness to help him; while the teacher too often accentuates the artificiality of his task.

The latter half of the volume is devoted to chapters on the habit of thought, on the control of the thinking faculty, on memory, on judgment, on inherited capabilities, and on the early training of the mind, and, to a much too large extent, is a repetition of the first half of the book. In the chapter on inherited capabilities the writer exhibits a tendency which he has in common with other thinkers of the day. The writers in question are unwilling to dispense with the rich suggestiveness of the evolutionary point of view, and the light shed upon mental phenomena by the consideration of their physical substrata, but are equally unwilling to give up the general theories — partly religious and partly not — inculcated in their early training, but really incompatible with a consistent evolutionary treatment. The result is at times a curious mixture. The arbitrary curtailing of the evolutionary principle at one point, and an omission to carry to its full consequence the general principle with which it is at variance, give the appearance of a harmony which a deeper consideration shows to be due, not to the fact that the two lines do not run in opposite directions, but that they have been carefully kept from meeting. Mr. Wall is afraid, that, if we admit that our moral and other qualities are to some extent hereditary, this will loosen the bonds of responsibility, and do other moral havoc (a fear, by the way, not at all justified by the history of morality, which clearly shows that new duties follow in the wake of new knowledge), and so refuses to accept the doctrine. In this attempted refutal he draws heavily on preconception instead of on logic and fact. He boldly announces that the child before birth has no life at all, a statement which no biologist will accept; speaks of 'phrenology' as though it were adhered to by scientific men; raises the will into a metaphysical entity, and makes it dominate the reason (as though the former were not a brain quality in the same sense as that in which he acknowledges the latter to be); and refers what we usually call inheritance to early educational influence and the different use of faculties originally alike. In short, the chapter lamentably illustrates the hopelessness of serving two masters.

To leave the reader with a brief verdict of the book, let it be said that it will be suggestive to those interested in this line of thought, but cannot be recommended to those desirous of learning in a short time the modern view of this problem; but with this verdict one must remember the inherent difficulty of the problem, and the fact that the author pleads temporary blindness as an excuse for the literary shortcomings of the work.

Public Debts. An Essay in the Science of Finance. By HENRY C. ADAMS, Ph.D. New York, Appleton. 8°.

POLITICAL economy in the United States appears to have followed the order of development which Auguste Comte maintained was the law of evolution for all science. We have first the 'theological' stage of science. Certain *a priori* ideas regarding the nature of Deity serve as premises from which conclusions are drawn regarding the phenomena of the industrial world. Carey gives an example of this when he argues from the goodness of God that the Malthusian theory cannot be true. Perry's 'Text-Book of Political Economy' is, however, the best illustration in current economic literature of what is meant by the theological stage of science.

The second stage in the evolution of science was called by Comte the 'metaphysical.' *A priori* ideas still furnish premises for conclusions, but they are not theological: rather are they hypotheses concerning the mind of man and the material universe, which have been derived from processes of reflection. Facts are made to square with theories; and in case they cannot be made to do this, why — "so much the worse for the facts." The English orthodox political economy was well described by Comte's metaphysical stage of science; and with the theological political economy this held sway — almost undisputed sway — in the United States until some fifteen years ago. Its most distinguished representatives declared that it was not eager for facts, because it was in possession of general principles which explained the facts.

The third stage of knowledge Comte called the 'positive.' This deals with phenomena, grouping and arranging these. Comte's description of the progress of science is, I believe, now allowed to be faulty in its details, even by his most ardent admirers; but, on the other hand, those who are not his followers can scarcely deny the correctness with which he laid down certain main lines along which human knowledge has advanced, from the time when Socrates urged his disciples to give up empty speculations about the heavenly bodies for an observation of human phenomena, up to the present. The remarkable development of economic and social science in the United States, now attracting attention in Europe as well as in our own country, is due to a change of method and of purpose, both admirably illustrated in the present work on public debts. Professor Adams examines the facts of our economic history, and from them he draws conclusions respecting a sound financial policy for our Federal government, our States, and our municipalities. The older method would have been to search our history for facts to bolster up certain theories assumed before the book was begun. A change in purpose is as important as one in method. The change in purpose to which I allude is this: the tendency of modern economists is to renounce the position of mere advocates, — almost universally assumed by the older economists, — and to search for truth, like other scientific men, regardless of consequences. The old idea of the duty of an economist was that he must combat heresy, whereas heresy is something unknown to science. Clark's 'Philosophy of Wealth' and James's 'Relation of the Modern Municipality to the Gas-Supply,' both of which have been reviewed in *Science*, may be cited as other illustrations of the most recent tendencies in American economics.

The scope of this admirable work can be most readily gathered from the titles of the parts and chapters into which it is divided. Part I. treats of public borrowing as a financial policy; Part II., of national deficit financiering; Part III., of local deficit financiering. The opening chapter of Part I. first brings before the reader most vividly the facts in regard to the growth of public debts; and it is certain that few will read these pages without gaining a new idea of the tremendous significance of this factor in modern industrial life. Professor Adams opens his book with these words: "The civilized governments of the present day are resting under a burden of indebtedness computed at $27,000,000,000. This sum, which does not include local obligations of any sort, constitutes a mortgage of $722 upon each square mile of territory over which the burdened governments extend their jurisdiction, and shows a *per capita* indebtedness of $23 upon their subjects. The total amount of na-