

one feature of it from which the idea of the whole can be gained. The children weave, but not in the babyish, kindergarten way; they are taught to reproduce the processes of weaving (including spinning, carding, etc.) in the various ways in which they were carried out by primitive peoples long ago. Different fibres are studied, and simple plans are devised by the children themselves for working them up into fabrics. It often happens that they reproduce, with more or less exactness, the idea of the earliest inventors. The machines thus thought out (with or without the suggestion of the teacher) are constructed by the children themselves during the manual-training hour, and afterwards they are used in the actual weaving. This is only one instance of the way in which the children are kept at learning by doing, and are led to reproduce in their own school-life the successive stages of activity and of thought of the past ages of man. This, of course, cannot be carried out without something like genius as well as erudition on the part of the teacher, even after its general features have been worked up by the enthusiastic originator of the scheme; and it will be long before its admirable methods will become widespread. Moreover, it will certainly be asked, Has the young generation a right to receive from us such sacrifice of talent and of money as would be involved in carrying it out on any large scale? The children of twelve in Professor Dewey's school keep the school accounts; it is to be surmised that the per capita sums with which they deal are very large. But, aside from that, it is a great thing achieved that the plan has been actually carried out, and with success.

The idea of making children learn only what they are interested in learning has impressed itself strongly at the same time upon a Frenchman, M. Lacombe. The keen wit and cutting satire with which the author lays bare the absurdities of present methods will be a source of intellectual enjoyment to every reader; he will also be easily convinced that something should be done to create a more fitting environment for the helpless child, one in which he is active spontaneously and not from being forced into becoming a receptacle for uncared-for knowledge. But the only plan that M. Lacombe offers in substitute is a little too simple for meeting so grave a difficulty. He would have the children appear in the school-room at an appointed time, and the teachers as well. A teacher, or one of the clever boys or girls, starts a topic for discussion, and the eager children ask for more; if they do not, they are left alone in their idleness until another day. But the clever ones are easily interested, and the others are soon led, by suggestion and imitation, to follow in their wake.

It is so extremely desirable that children should be in an active instead of a receptive state of mind during their school years, in a state of spontaneous rather than of forced attention (by which one means a state of attention awakened directly by the subject-matter presented to them, instead of indirectly by rewards, and punishments, and examination marks), that every effort should be welcomed to break down existing methods, especially when the effort is such a brilliant attack upon existing deficiencies as is that of M. Lacombe. It is to be feared, however, that his plan has, besides others,

one fundamental and fatal weakness—there is great danger of its introducing an atmosphere of artificiality if not of deceit. The teacher whose first aim it must be to make subjects attractive, is not a teacher in the right frame of mind. Moreover, a certain amount of direct coercion is good for the child at this age. It is a great gain if the child is enabled to work with pleasure in spite of the fact that he also works because he must. For the coercion of real life, which the child is too much of a wild Indian to be able to feel for himself, we must substitute the direct coercion of the teacher.

*A History of Modern Philosophy: A Sketch of the History of Philosophy from the Close of the Renaissance to Our Own Day.* By Harald Höffding. Translated from the German edition by B. E. Meyer. Macmillan Co. 1900. 2 vols. 8vo, pp. 532, 600.

At the nineteenth century's midday, a doubt used to be entertained whether human powers were adequate to writing the complete history of a great branch of science entirely from primary sources. If the requirement is that the whole matter shall be thoroughly well digested, the feat remains, probably, unaccomplished yet. The larger histories of Modern Philosophy have hitherto belonged to one or other of two varieties. There have been essays, long and heavy, on the leading philosophical tendencies of the successive generations, mentioning none but the supreme productions. These have been too vague and too much colored by their authors' predilections to repay more than a skimming. There have, besides, been set chronicles, one painfully like another, each containing a quasi-bibliography of the subject, with more or less penetrative criticisms of a few writings, adopting current views of the rest, and enumerating a throng of publications with which the compiler's acquaintance seems limited to their names and some guess at their affiliations. These are extremely useful works, but no more entitled to be called histories than a gazetteer to be called a geography. Höffding is the first to furnish Modern Philosophy with a history, in the high sense of the word, an intelligible and interesting chart of the course of the main stream of thought, based upon actual soundings of his own, upon studies minute, critical, and mature. Nor have these been jotted down as in a notebook, but generalized with unusually good literary judgment. If he calls his work a sketch, it must be because only the great questions are touched upon, and because minor writings that he has not himself carefully read and considered are left unmentioned. For in other respects it is no sketch at all, but an elaborately finished work of literature.

The very table of contents promises freshness, especially in dwelling most upon neglected men and movements. The "philosophy of romanticism," as the author rather too wittily (and a little anachronistically) calls German post-Kantian idealism and its accompaniments, is confined to a seventh of the whole space, instead of its regular quarter. Two hundred of the eleven hundred pages go to Positivism, J. S. Mill and Darwin by themselves getting ninety, against the 6, 8, 10, 25, which are the respective proportional allotments of the two combined in four reputable histories of modern philosophy that happen to lie at our hand. A

still greater novelty, and a most welcome one, is the allowance of 160 pages to the philosophy of the Renaissance. This is treated under two heads, "The Discovery of Man" and "The New Conception of the World." Thomas and Cæsalpinus being passed by without mention, which can only be because Höffding has not read them, we come to Pomponazzi, of whose half-dozen books interesting to the historian of philosophy only that one of which there is a modern reprint is noticed. We discover how broad is the author's notion of a history of philosophy when we find eight of his large pages consigned to Macchiavelli, whose "Discorsi" as well as the "Principe" have been studied. Althusius is another figure not before introduced into the history of philosophy. "The Discovery of Man" ends with a chapter on Jakob Boehme precisely equal in length to the account of Macchiavelli. Under "The New Conception of the World" we meet only familiar names; but the treatment continues to be original. Of the forty pages occupied with Giordano Bruno not one would be willingly spared by the reader.

It was an excellent idea, after the Renaissance, to appropriate a space equal to that which Bruno fills to Leonardo, Kepler, Galileo, and Bacon. Copernicus had been already treated. For the scientific men, however, the execution is not at the height of the conception. It is no light task, even for an astronomer, in these days, to read Kepler's great book "De Motu Stella Martis" so as fully to appreciate the motive and import of each step of the investigation. Yet no work of special science can be more significant for philosophy, in that no other describes with anything like the same fulness all the steps of a difficult hypothetic reasoning; and, perhaps, man never achieved another reasoning of any kind so elaborate and so triumphant, while its historical influence was of commensurate importance. It cannot be concealed that Höffding has no idea of what the work really was. The chapter on Galileo is not quite so inadequate. The author has evidently run through Galileo's correspondence, and has not contented himself with the famous dialogues. Still he does not begin to do Galileo justice. When one knows next to nothing of the matter except what the celebrated *Giornata Terza* of the "Discorsi intorno a Due Nuove Scienze" discloses, the founding of the sciences of dynamics seems such an easy matter! The *ars celare artem* was never carried further. It is requisite to have other reading in order to place one's self where Galileo set out, in that state of mind in which it was considered manifest that when we throw a ball, that which causes it to move on after it leaves the hand can only be the rush of air behind it. It is requisite to have some experience in physical experimentation to appreciate the fineness of those observations of Galileo, made with almost no apparatus, by which he refuted that false notion. It is requisite to be one's self something of an investigator to realize how far he yet stood from his final clear understanding of the matter, even after he had refuted that error, though the little-read "Sermones de motu gravium" come in to help us here. The whole investigatory procedure of Kepler is laid bare to whoever chooses to peruse it, while we can gather what that of Galileo was only from slight indications. Those are, however, quite sufficient to show that

quantitative experimentation played a much greater part in it than the reader of the *Giornata Terza* would gather that it did, Höffding might as well have read nothing else, as far as his conception of Galileo is concerned.

We can notice in this interesting and original work only a few points here and there selected to illustrate its characteristics. Equal space is allotted to Descartes and to Hobbes. Spinoza gets more, as much as Bruno; and Spinoza is pronounced to be the thinker of the seventeenth century—high praise considering that the author rates seventeenth-century philosophy as far more accurate and valuable than that of the nineteenth. Newton, with his doctrine that space is a peculiar entity, receives some notice, which is more than he does in most histories of philosophy. But Professor Höffding evidently has no suspicion that Newton's position is less purely gratuitous than the opposite notion that position and motion are entirely relative. Hartley is disposed of in two pages. The other father of the association of ideas is mentioned only as "a little-known author called Gay." Rousseau is treated with some respect, and at greater length than either Locke, Berkeley, or Hume. Kant has evidently been studied with the utmost thoroughness; and a good many small points are made which appear to be new. Thus, the suggestion that the "Kritik der reinen Vernunft" must have been largely a patchwork of detached papers strikes one as happy. Again, in regard to his metaphysical dualism, several passages are cited whose bearing upon this question might easily escape the most attentive student. Yet, after all, Höffding apparently fails to see that the decisive consideration in Kant's mind was no other than that for which, in his second edition, he invented the most prominent situation he could contrive. But it is curious how insensible some men are to this argument, although to others it seems a knock-out. The chapters on the German philosophy of the Hegelian period are the only ones where a little skipping can ever enter the reader's thoughts. But interest is thoroughly roused again when the more recent Germans are reached, especially in the dozen pages about Dühring, whose "Natürliche Dialektik" is treated with admiration, and much preferred to his later doctrine. Nothing subsequent to 1880 enters into the *cadre* of the work; and much that is previous to that date is too close to us to be accurately sized up. There is not a word about Renouvier, whose principal work was published in the fifties.

The second-hand translation, though authorized, is regrettable. It has been executed by one of those types of German humility who undertake to improve upon our language and rules of style before they know English well enough to avoid effects, now comical, now ungainly, now indecent, now enigmatic, now self-stultifying, now merely silly. He improves a little, however, as the work proceeds; and, besides, the reader becomes inured to his lingo. A book that in another dress would have been a literary treat has, we are bound to warn the reader, thus been rendered somewhat unpleasant reading. The volumes, though large, are comfortable to hold and read. The print is good, the paper particularly so. Each volume is provided with a sufficient index.

*The Kinetic Theory of Gases: Elementary Treatise with Mathematical Appendices.* By Dr. Oskar Emil Meyer. Translated from the second revised edition by Robert E. Baynes. Longmans, Green & Co. 1899. 8vo, pp. 472.

The kinetical theory of gases is without doubt the great triumph of that corpuscular philosophy which endeavors to explain the universe by turning its splendid tapestry wrong side out, and showing that it is all nothing but bits of matter moving under their attractions and repulsions, according to the three laws of motion. As an ultimate explanation, even of that which it contemplates explaining, the corpuscular doctrine was doomed from the moment when the seed of evolutionism was dropped into the intellectual soil, since it provides no possible way in which the state of things it supposes, the existence of the atoms and their attractions, could have come about—not to speak of its leaving inexplicable the laws of motion, with space and time, the semi-rationality of which things calls loudly for further elucidation. But the spirit of science (which much better deserves the name of philosophy, or pursuit of knowledge, than any cock-sure metaphysical system does) is to adopt provisionally the simplest promising hypothesis—which, in being simple, is necessarily thereby extreme, radical, and skeptical—to follow it out rigidly to its last consequences, and, by carefully comparing these with the phenomena, ascertain what amendments of the hypothesis may be requisite. In the case of the kinetical theory of gases, no positive disagreements of the phenomena with the hypothesis have ever yet been met with; but, on the contrary, each new deduction that the restless activity of the mathematicians brings to light is still found to fit into its place among the facts, as each piece of a boy's dissected map finds its place as soon as he has once begun to fit the pieces rightly together. There is in all science no other theory so interesting in these three respects at once: first, for the logic of the inductive argument, as it has been historically followed out; second, for the subtle deductive reasoning by which the consequences of the hypothesis are, one by one, getting discovered; and third, for the insight it affords into the ways in which different forms of phenomena may arise in nature.

The work of Oskar Emil Meyer has had a great change for the generation of physicists now beginning to grow old. They were not, for the most part, such accomplished mathematicians as are those who are now taking the stage; and Meyer's plan of dividing his book into two parts, of which the larger called for no more mathematical processes than anybody may perform in his head, while the other set forth deductions in the most elementary way that the subject permitted, suited those men very well. But this is not all. The first division shows how the consequences of the theory compare with observation; and to see one phenomenon after another falling into the ranks of the theory's defenders, as Meyer skillfully, yet simply, shows they do, is mighty pretty and delightful. This division of the work is, from the nature of the case, very nearly a history of the whole course of the investigation; and we do not know what more instructive basis for a course of lectures on the logic of explanatory science

could be found than the history of the theory of gases. Whoever cares to see how explanatory research proceeds cannot fail to be interested in this handsome volume. As for the mathematical division, that, too, affords excellent exercises in reasoning, though of a different kind of reasoning, and exercises of quite an opposite character, since this division is infested with subtle fallacies.

To give a single plain example, the author professes to demonstrate that the mere assumption that the molecules of a gas move in broken straight lines suffices by itself to account for Boyle's law that at constant temperature the volume of a gas is inversely proportional to the pressure. Anybody can see that if the molecules are incompressible bullets, this is not so, whether their motion is rectilinear or not, since in that case there is a minimum volume which no pressure, however great, can diminish. Meyer's wrong conclusion arises from his assuming, in his mathematical work, that any infinitesimal volume within the gas is filled with matter in all respects like, and moving like, that in any other such volume; in flagrant conflict with the theory that the gas consists of separate molecules. In the revised edition such fallacies are not so easily found as in the first, but there remains abundance of game for the logical sportsman.

We may remark, by the way, that this translation is much to be preferred to the original, since the additions have been incorporated with the text, and the translator's notes, though infrequent and short, are always pertinent and useful. The English bears some disagreeable traces of being a rendering from German, but they are not very offensive. The non-mathematical division has been brought nearly to date with all the old ability of its author. There are a great number of useful references to memoirs, and, considering how rich the book is, we are inclined to regret that it should not have been made a repertory of all that is really needed to compare the theory with the facts that have been brought to light. But nobody at all acquainted with the subject can fail to remark that much work has either been passed by unmentioned, or too slightly noticed, both on the side of theory and on that of observation. The author's motive evidently was not to fatigue the reader, or choke with dry details the life and movement by which the work is eminently distinguished. There are books, as our readers know to their sorrow, that are neither popular nor scientific, but fall between the two: this one is at once popular, or, at least, very readable, and highly scientific, at the same time; for, though called elementary, it leaves no important feature of the theory untouched, excepting where the theory crosses the border into the domain of liquids.

Among the special points which will be found important for those who are up in the subject, we may mention further argument concerning the author's views of diffusion, a discussion of the effect of dissipation upon viscosity, a theory of the resistance of the air and of the reaction of a jet, and a synthesis of all the evidence concerning the size of molecules.

*Naval Yarns of Seafights, etc., from 1616 to 1831.* Collected and edited by W. H. Long.