certain principles of education to which little exception can be taken. The author holds that education ought to conform to the course of mental development, each study being introduced at the time when the mind is best fitted to pursue it, and hence that studies requiring a high degree of abstraction and close reasoning should not be taken up until after the simpler and more concrete subjects have been mastered. He gives some examples of wrong arrangement of studies, and some suggestions as to the proper mode of teaching certain branches; and, though there is nothing new in his theories, teachers may find his presentation of them worth examining.

AMONG THE PUBLISHERS.

IN the February *Wide Awake*, "Forty-eight Hours a Day" will interest all astronomically minded young folk, and their elders as well; "An Old-fashioned Boat" is an interesting chapter in the progress of invention, by Ernest Ingersoll; Mrs. Sallie Joy White, in her chapter on "The Use of the Oven," tells how potatoes are baked in the Boston public schools; Mrs. Goddard Orpen gives the history of the famous Spanish crown pearl, the Pelegrina; and Professor Starr, in his geological series, describes some of the gnawings of "The Tooth of Time."

— P. Blakiston, Son, & Co., of Philadelphia, have just ready "A Text-Book of Operative Dentistry," by Professor Thomas Fillebrown of the Harvard Dental School, and a second edition of "A Handbook of Diagnosis and Treatment of Skin Diseases," by Dr. Arthur Van Harlingen. They have nearly ready "A Surgical Handbook," by Professor F. Mitchell Caird and Dr. C. Walker Cathcart, of the University of Edinburgh, thoroughly illustrated, and printed in a convenient shape for carrying about.

— W. H. Lowdermilk & Co. will publish in the course of a week "Matthew's Guide for Settlers upon Public Lands of the United States," intended for all having business before the district land office and the Department of the Interior. It is prefaced by a map of the United States, showing the thirteen original States, with the territory subsequently acquired, giving dates and sources of acquisition and the various State and territorial laws regarding real property, and how under Untited States laws it may be acquired. The author was late assistant chief of the preëmption division, General Land Office.

— G. P. Putnam's Sons announce among their earlier publications for 1889 the following: the first volume of the letter-press edition of "The Writings of Washington," edited by Worthington C. Ford, which will be uniform with the previously published sets of "Hamilton" and "Franklin," and be completed in fourteen volumes, limited to 750 sets; a second edition, revised and enlarged, of "The Best Books: a Reader's Guide to the Choice of the Best Available Books in All Departments of Literature, down to 1888," compiled by William Swan Sonnenschein; and "English Wayfaring Life in the Middle Ages" (fourteenth century), by J. J. Jusserand, translated from the French by Lucy Toulmin Smith. The author has supervised the translation, and has added about a third of new matter, so that the volume differs materially from "La Vie Nomade." The original work was published without illustrations, while this English edition, which is issued in London by T. Fisher Unwin, will be elaborately illustrated from a number of rare designs that have not previously come into publication. Besides these, they announce "A Manual of Oriental Antiquities," including the architecture, sculpture, and industrial arts of Chaldea, Assyria, Persia, Judea, Phœnicia, and Carthage, by Ernest Babelon, librarian of the Department of Medals and Antiquities in the Bibliothèque Nationale of Paris, translated and enlarged by B. T. A. Evetts of the Department of Egyptian and Assyrian Antiquities of the British Museum, with 250 illustrations; "From Japan to Granada: Sketches of Observation and Inquiry in a Tour round the World in 1887–88," by James Henry Chapin, D.D.; "Business," a practical treatise, by James Platt, reprinted, under arrangement with the author, from the 75th English edition; in the Knickerbocker Nuggets, "Ancient Spanish Ballads," historic and romantic, translated, with notes, by J. G. Lockhart, with sixty illustrations by Allan, Roberts, Harvey, and others, and "The Wit and Wisdom of Sydney Smith;" and in the Questions of the Day Series, "Outlines of a New Science, a Study of Industrial Conditions," by E. J. Donnell; "Politics as a Duty and as a Career," by Moorfield Storey; "The Plantation Negro as a Freeman," observations upon his character, conditions, and prospects in Virginia, by Philip A. Bruce.

— D. Lothrop Company will publish shortly a story by a New York lady which is said to be a refutation of much of "Robert Elsmere;" and a volume of stories by H. H. Boyesen, called "Vagabond Tales."

— T. Y. Crowell & Co. have in preparation, for the use of schools, an abridged translation of Duruy's admirable "Histoire de France," under the charge of Professor J. F. Jameson of Brown University. They announce for early publication Bourrienne's "Memoirs of Napoleon Bonaparte" in four volumes. They will be handsomely illustrated, and will contain all the critical and biographical and historical notes which add so much to the value of the latest English edition.

— D. Appleton & Co. announce for this week, "Nature and Man," a series of essays, scientific and philosophical, by the late William Benjamin Carpenter, with an introductory memoir by J. Estlin Carpenter, and a portrait of the writer of the essays. The volume also includes a few passages from Dr. Carpenter's earlier writings, prefixed to illustrate the prior stages of his great labors for physiological psychology.

— Henry Holt & Co. will publish shortly a book on the American Revolution, which will furnish not only novel but highly curious matter. In his researches among the French archives, Mr. John Durand, the translator of M. Taine's "French Revolution," found many documents relating to the United States which were of the greatest interest. These papers have been translated by Mr. Durand for the first time, and are edited by him. The work will throw light on various episodes of the American Revolution as well as on the characters of the men who took part in it. The peculiar *rôle* played by Beaumarchais, the cabal against Washington and Franklin, the secret sessions of the Continental Congress, of which no detailed account has come down to us, together with the social aspects of the country while the Revolution was in progress, will all be presented.

— Harper & Brothers have just published a volume on "The Government of the United States," by W. J. Cocker, A.M., primarily intended as a text-book for public schools, but also calculated to serve as a clear and concise reference manual upon the Constitution. The author presents the influences and conditions which rendered the Constitution a necessity, and describes the powers and limitations of our form of government. The numerous references to more extensive works on the subject make the book a valuable guide in prosecuting further a study of our institutions. Three other books also just ready are: "Modern Science in Bible Lands," by Sir J. W. Dawson, which presents a study of such points of the geology and physical features of Italy, Egypt, and Syria as might throw light on their ancient history, and especially upon the history of the sacred scriptures; "Our English," by Professor Adam S. Hill, which contains novel and sensible suggestions for the proper teaching of the language in schools and colleges, and reviews "Newspaper English," "English in the Novel," "Pulpit English," and "Colloquial English;" also an edition in book form of Charles Reade's "Bible Characters."

— The two latest issues of the *Forum* contain articles by ex-President Andrew D. White of Cornell, on the need of new universities in this country, and particularly on the project for a great central university at Washington. In the January number the writer speaks of the present position of the higher education in America, and of the rapidly increasing demands on the existing universities. He notes the fact that a process of separation is in progress among our institutions of learning, and that a few of them are developing into real universities, while the remainder are tending to become intermediate colleges, holding a position between the universities and the public schools. Real university instruction, he maintains, can only be given in large and liberally endowed institutions, and he believes that we need one or two such institutions of a higher order than any we now have. The most suitable

places for such an institution are New York and Washington. With regard to the former, Columbia College has excellent facilities for supplying the need; but in Mr. White's opinion "the majority of its trustees have long since proved themselves blind to their opportunities." Hence, in a second paper in the February number, he favors the founding of a new university at the national capital, which he thinks the best place in the country for the purpose. The advantages offered by Washington consist partly in the number of able and learned men resident there, whom the university could employ as lecturers or teachers, but still more in the libraries already established in the city, containing over a million volumes, and in the extensive laboratories and other means of investigation maintained by the government. Mr. White believes, that, if the necessary funds could be obtained, a university could be established at Washington which would not only have a powerful influence on the higher education of the country, but would help to raise the tone of political life at the national capital. As to this latter point, however, the question arises whether the politicians would not be more likely to exercise a deleterious influence on the students. Besides this article by Mr. White, the February *Forum* contains ten other papers on a great variety of subjects. Mr. W. F. Lilly has one on "The Foundation of Ethics," in which he takes strong ground against the evolutionary theory of ethics as taught by Herbert Spencer, maintaining that it is not only false, but practically pernicious, and that it is already exercising a baneful influence on moral conduct in art, journalism, politics, and other departments of action. What its effects and tendencies are, he promises to state more fully in succeeding articles. Judge Alfred C. Coxe has an important paper on "Relief for the Supreme Court." He alludes to the fact that the Supreme Court of the United States is three or four years behind its docket, and then suggests that the court might catch up with its work if the judges were relieved from circuit duty, which would enable them to sit at Washington two months longer than they do now, and if the practice of reading opinions, which now occupies one day in each week, was abandoned. The other articles we have not space to notice. The *Forum* has taken its place as the foremost magazine for general discussion in the country; but it seems to us, that, if some of the papers it prints were longer and more elaborate, its usefulness would be enhanced.

LETTERS TO THE EDITOR.

***Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

Twenty copies of the number containing his communication will be furnished free to any correspondent on request.

The Baconian Method in Science.

IN the nineteenth aphorism of his "Novum Organum," which forms the second part of his "Instauratio Magno," Lord Bacon observes that there are two possible methods for investigating and discovering truth. The one, he says, flies at once from particular observations to axioms of the broadest generality, and from these principles and their immutable verity it scrutinizes and discovers its mediatory axioms or propositions leading to subordinate truths. The other method from particular observations calls forth axioms in a continuous and gradual ascent, so as at last to attain truths of the broadest generality. The former of these methods, he says, is the one in use; the other is new and untried.

The former method is familiarly known as the deductive method. This movement of thought was thoroughly studied and expounded by Aristotle, and is well understood. Lord Bacon opposed his "new and untried" method to the old in this specific feature, that the old or deductive method moved characteristically from the general to the more specific, whereas his new method proceeded from the particular, and advanced, step by step, to the general. Obviously this new movement of his is simply what is known in recent logical science as generalization, — the amplification of a subject-notion or concept. It does not appear from Lord Bacon's writings that he concerned himself at all about the special differences between logical generalization and logical induction. He only insisted that scientific study should in the future unite the two methods, — the old, which moved from the general to the particular, with the new, which moves from the particular to the general. Nor does he appear ever to distinguish the movement of thought in proper generalization, which confines itself to the subject-notion, from that known in logic as determination, which is the amplification of the attribute-notion; just as the old method did not distinguish between the two movements in the reduction of a concept or notion, — between division, which was applied to subject-notions, and partition, which was applied to attribute-notions.

These movements of thought are fundamental movements, and differ widely from one another in their respective natures and their governing laws. It is as important for the facile and successful prosecution of scientific study in any field of knowledge that they be familiarly known, and be reduced to ready use, as it is for the successful prosecution of mathematical studies that the fundamental or ground rules of arithmetic be mastered for accurate, and, as it were, instinctive application whenever needful. Popular discourse may, perhaps, be pardoned for some looseness in the use of the technical terms and phrases of science; but discussion professedly scientific, and claiming for itself something of the certitude of genuine knowledge, should not ignore these ground rules of scientific knowledge, nor confound them one with another. Widely as they differ, they are alike serviceable for scientific uses; they are of equal valitlity; they are equally intelligible in their essential nature and in their applications. This is evident from the most cursory exposition.

All complete thought is quantitative. This attribute is revealed among the most fundamental properties of thought. But in quantity, which is but the attribute otherwise known as that of "whole and parts," as we conceive of an object quantitatively when we conceive of it as a whole having parts, extensive or intensive — in quantity there are three, and only three, conceivable relationships of the highest or most generic order; viz., (1) that of whole to part, (2) that of part to whole, and (3) that of part to part. There are, accordingly, only three corresponding movements of thought possible in this relationship: (1) deduction, (2) generalization, and (3) induction. We pass over here the distinctions already indicated as required in accurate science to be made on account of the diverse charcter of notions as subject-notions or as attribute-notions, and use the familiar designations of the different movements. Deduction moves from whole to part; generalization, from part to whole; induction, from part to part.

Notwithstanding this manifest, and to a large extent familiarly recognized, distinction between these fundamental movements of thought, there is a common loose or faulty use of the terms which properly designate them that is greatly to be deprecated. Particularly is this observable in the case of the term "induction" and its paronymes. For example: "an inductive study of the mind" or "of the Scriptures" is every now and then proposed, when a true inductive study obviously could never have been intended. And even among professedly scientific thinkers are to be detected not infrequently the most shadowy and illusive or even positively false notions of induction and inductive science. Modern science boasts of itself as being characteristically and distinctively inductive, while it would be difficult to find in its work any conscious recognition of the essential character of this fundamental movement of thought. In truth, even logical science has but very imperfectly apprehended it, although the most familiar movement in every-day life. The child induces from one experience from touching the flame what a repetition will cause, and confidently expects to find in the next flower he plucks something of the figure or color or fragrance that he has found in the one he has already gathered. Moreover, the exact character of the movement was scientifically grasped and indicated many centuries ago by the father of logical science. He did not elaborate the exposition of the inductive movement as he did that of the deductive movement; but he exemplified it perfectly in the first book of his "Prior Analytics," c. xxv. (Tauchnitz edition), where from "bileless" and "long-lived" being both attributes of "man," "horse," etc., he infers that the presence of "bileless" involves that of "long-lived." The principle, he says, is this: if any two attributes as parts belong to the same whole, the existence of either one in any case determines the existence of the other. We might state it thus: from any part of a given whole we may infer or induce any complementary part.

LOGICUS.