

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 validity; 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 character 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 paronyms. 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.