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## BAIN'S LOGIC

## Logic.

By Alexander Bain, LL.D., Professor of Logic in the University of Aberdeen. Part First, Deduction. Part Second, Induction. 2 vols. 8vo. London: Longmans. New York: D. Appleton & Co.

We have discovered no manuscript sources that suggest that Peirce wrote this review. Fisch, in *First Supplement*, attributes this to Peirce, but as "uncertain." Two kinds of internal evidence, however, do suggest that Peirce is the author. First, he wrote a great many logic reviews for *The Nation*. Second, there are a few themes in the review that are characteristic of Peirce. In the first paragraph, there is a slap at "English narrowness." The discussion of chemistry, plus the example from mathematics on parallels, taken in conjunction with the fact that the review concerns a logic book, constitutes a constellation of topics that is distinctly Peircean. Another characteristic theme is antinomialism, which appears here in the claim that Bain is associated with the nominalists. This review is unassigned in Haskell's *Index to The Nation*, vol. 1.

Alexander Bain (1818-1903) studied at Marischal College, Aberdeen. In 1848 he moved from Scotland to London where he held various posts in education and civil service. He returned to Aberdeen in 1860 to a chair of logic and English. He resigned this professorship in 1880, but in later years twice served as rector of his university. He authored many books in philosophical psychology, logic, and ethics. He also founded the distinguished philosophical periodical, *Mind*. John Stuart Mill was a close friend, Bain being the biographer of James Mill.

Many works on logic have lately appeared in our language, and a few of them are of considerable importance. The one before us is a school-book of the driest description, but it is impossible that the best living English psychologist should produce any book which has not the stamp of originality, and which is not deserving of attention. In point of fact, Mr. Bain distinctly proclaims himself a rival, although also a follower, of Mr. Mill. The first thing that we notice in all the English logicians, and Mr. Bain is no exception, is their ignorance or ignoring of all logical writings not English. This is the more reprehensible, as logic has by no means received its greatest development in England. Nothing in the present work will lead the student to suspect that there are any such writers as Trendelenburg or Beneke, although the latter entertains opinions which are more or less in harmony with Bain's own. Trendelenburg has made an elaborate study of Aristotle's categories, the results of which are undeniably of high importance, even if they are not to be regarded as fully established. But Professor Bain does not find it worth while so much as to mention them in his account of the same subject. The exclusively English character of Mr. Bain's work is well illustrated by his making the old distinction of extension and comprehension belong to Hamilton, and by his giving the same writer credit for the symbols S, M, and P, for the three terms of a syllogism.

The chief peculiarity of this treatise is its elaborate treatment of applied logic. One-fourth of the whole book is taken up with "Logic of Mathematics," "Logic

of Physics," "Logic of Chemistry," "Logic of Biology," "Logic of Psychology," "Sciences of Classification," "Logic of Practice," "Logic of Politics," and "Logic of Medicine." The word logic in these phrases is taken in a very much wider sense than that in which Dr. Whewell spoke of the logic of induction. Logic in general is defined by Mr. Bain as "a body of doctrines and rules having reference to truth." He regards logic, therefore, not merely as the *via veritatis*, but as including everything which bears upon truth, whether it relates to the investigation of it or to the testing of it, or simply to what may be called its statical characters. Accordingly, the logic of a particular science is the general description of the nature of that science, including not merely its methods, but also its fundamental conceptions and doctrines. As an example, let us take the logic of chemistry. The author begins by stating the essential characters of chemical attraction. They are three: first, that the proportions (misprinted *properties*; the book is full of misprints) are definite; second, that in combination heat is evolved; third, that the chief properties of the elements disappear. He next divides the propositions of chemistry into two classes; first, those which relate to the general conditions of chemical change; second, those which relate to the chemical changes of special substances. He next divides chemistry into organic and inorganic. (Few chemists would now maintain that this division has more than a temporary validity.) He then proceeds to the classification of the elements. The first great division is into metals and non-metals (this is antiquated). The general properties of each group are enumerated, as, for example, that no opaque non-metal has lustre except selenium (forgetting iodine and carbon). He then gives a classification (very unscientific) of the non-metals. He then says how he thinks a chemical substance should be described in a text-book. He seems to be thinking all along of how a text-book should be written, and not of how the subject should be investigated or conceived in the mind of the chemist, for he urges it as a recommendation to the uniting of oxygen and nitrogen in one class that it gives an opportunity for dwelling on the mechanical peculiarities of gaseous elements. He then states the characters of chemical laws. They are two. The first is that such laws are empirical. As an example, he cites the so-called law of Berthollet, in evident ignorance that this law has been entirely disproved. The other property of chemical laws is that they must express the most general conditions of the redistribution of chemical force. He next remarks that most of the hypotheses of chemistry are representative fictions, and concludes with a few elementary observations upon chemical notation. Such an account of a science as Mr. Bain here attempts would certainly be of the greatest value. It is very unlikely that any one man could successfully accomplish the task for all the sciences. At any rate, he must be profoundly versed in them, and must have quite another than a schoolmaster's conception of science in order to make his work of any use at all. But to attempt to write the logic of mathematics, for example, when one is so ignorant of the work of mathematicians as to be capable of saying that the celebrated axiom concerning parallels is "deducible from the definition of parallel lines, and ought to appear among the theorems of the first book," we must say, smacks of conceit.

Another principal feature in the book is the treatment of definition. Like many of the old logicians, the author separates the process of forming a definition

from reasoning, a separation which ought not to be made, because analysis of the former proceeding shows it to contain the same elements as the latter. His attaching a very high importance to definition is more in accordance with the tendencies of natural science than it is with the doctrines of that nominalistic school of metaphysics with which Mr. Bain is affiliated. He rightly insists that the characters of the object which are enumerated in the definition should be such as are *important*, but his analysis (usually weak) fails to detect in what the *importance* of a character consists. A sentence which he has quoted from Sir George Cornwall Lewis might have furnished him with a hint. "By including in monarchies," says that writer, "and excluding from republics, every government of which a king is the head, we make every true general proposition respecting monarchies and republics impossible." An *important* character is obviously one upon which others depend, that is, one the inclusion of which in a definition renders true general propositions concerning the object defined possible; and the more such propositions a character renders possible, the more important it is. In the same way, a natural class is one which can be so defined that something can be predicated of it which cannot be predicated of the genera included in its definition. Mr. Bain endeavors to make the logical definition identical with the scientific definition—a most worthy aim; but we fancy that zoölogists and botanists are already so much advanced in the knowledge of classification beyond the mere logician, that Mr. Bain's maxims will have little weight with them.

In treating of causation, Mr. Bain includes in the pure logical principle the law of the conservation of force, which according to him, in opposition to the physicists, refers not to *vis viva* but to *momentum*.

He gives a long account of the systems of De Morgan and Boole, but not such a one as they would approve, and he makes some serious mistakes.

As a school-book the work has some advantages, but even where the author's thought is perhaps not itself vague, his manner of expressing it is not calculated to inculcate precision in the mind of the pupil.

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## NOTES

This obituary notice is mentioned in the note that immediately follows—12 (20 April 1871) 276—which Fisch attributes to Peirce. Therefore, the foregoing notice is included here in order to complement comments in the next item. This piece is unassigned in Haskell's *Index to The Nation*, vol. 1.

—A scarcely less voluminous writer was Professor De Morgan, who was born at Madura, in Southern India, in June, 1806, of a family distinguished in the military service. His mother's grandfather, however, who was a mathematical teacher of some eminence, may be supposed to have predetermined his career. In 1827, he gained at Cambridge the first place in the mathematical tripos of that year, but declined to subscribe to the religious tests necessary to obtain either the degree of M.A., or a college fellowship. In 1828, he accepted the professorship of mathematics in the London University, the principles on which that institution was founded being in accord with his religious independence; and he abandoned this position in 1866 when, as he thought, in violation of those principles, James Martineau was refused a professorship on account of his theological opinions. In the service of the London insurance companies, "he raised the actuary's vocation to the dignity of a profession," and was almost to his last day the confidential adviser of several associations. His "Essay on Probabilities," "Elements of Algebra," "Formal Logic, or the Calculus of Inference Necessary and Probable," and "Differential and Integral Calculus," are among the works which made him distinguished, but which show but a small part of his intellectual activity. He was a constant contributor to various periodicals, to the *Athenæum* from 1840; and by no means on mathematical subjects alone. "His contributions to Knight's *Penny Cyclopædia* are a considerable proportion of the entire work. "He passed for diversion's sake from one arduous study to another;" but found time to acquire a good degree of proficiency as an instrumental performer, and was a habitual and eager reader of novels, especially of humorous novels. As a mathematician he had the rare merit of not overestimating his favorite science, though he proved by his "Formal Logic" that it was not incompatible for a mathematician to be also a logician; and he was accordingly one of the weightiest adherents that Spiritualism has ever won over. A treatise of his on these manifestations, entitled "From Matter to Spirit," was written in 1863. As a writer and a teacher, he was one of the clearest minds that ever gave instruction, while his genial and hearty manners in private and in the school-room strongly attached to him all who came in contact with him. He was a man of full habit, much given to snuff-taking; and those who have seen him at the blackboard, mingling snuff and chalk in equal proportions, will not soon forget the singular appearance he often presented.