

a sixth to linguistics, a seventh to the history of science; and still the list is incomplete; and there is an equal disagreement as to the business of logic. The school to which Mr. Joseph seems to give his adherence, which is that of the majority of English logicians, is none of those just mentioned; for it troubles itself very little with any questions of method, but just goes its way, scattering opinions upon points of logic, and attaching to this one and to that any reason that may suggest itself. Such promiscuity of method might be expected to issue in great variations among the doctrines of the different members of the school; and it is true that some of its adherents—Miss Constant Jones, for example, and Alfred Sidgwick—have written books of marked originality, which readers who dip into the subject without diving too deep find very suggestive. The greater number, however, among them the author of this volume, are led, by whatever unseen and inscrutable power it may be, to reproduce in the main the divisions and forms of the traditional logic, slightly modified by metaphysical doctrines, partly in most cases those of Mill, mixed not infrequently with those of Mill's philosophical antipodes.

When, however, we say they reproduce the traditional divisions, we only mean that verbally they do so, for the significations some of them attach to the old terms of logic, have only preserved the shell and have cast away the kernel. For instance, Mr. Joseph excludes from the class of universal propositions all those which do not imply the existence of some individuals denoted by their subject, as well as all those which do not predicate by "conceptual necessity," both of which exclusions flatly conflict with the *Dictum de omni* of Aristotle and with all tradition, and which, taken together, make one simple proposition to express at once both existence and necessity, which constitutes a third breach of traditional usage in connection with the use of the single term "universal." In such ways as this he effects a verbal agreement with the traditional doctrine by demolitions of parts of the existing system of nomenclature and using the debris to begin, but only to begin, the erection of a new system in the place of it, like that architectural performance of Charles V. in Granada.

We shall not find fault with any man for any sincere study; and if it gives him any particular pleasure to call his study logic, that word is by this time pretty near past spoiling. Only we would suggest that to define one's object of study in such a way that scarce anything would be excluded—as when Mr. Joseph and others of his school tell us that logic ascertains, "how we think"—it seems fair to demand that their conclusions should be based upon inductions correspondingly broad. The reviewer, for example, can have nothing but praise for a logic he dimly remembers reading in the sixties, which carefully analyzed all those phrases of the German language that are equivalent to conjunctions, without any pretence that it covered all the possibilities of thought in this narrow class of conjunctive elements. We might think, however, that before coming to those variations of thought, it would be better to begin by considering all the ways in which

we must think in order to draw all kinds of necessary conclusions; for even if logic be concerned with all modes of thinking, we are inclined to the opinion that it is specially concerned with those forms of thought that have some bearing upon the validity or non-validity of different ways of reasoning. It was fifty-nine years ago that Professor De Morgan called attention to certain forms of inference of great practical importance, which nothing in the logic-books explained or gave any clue to, although it is necessary to sound reasoning to distinguish the cases in which such arguments are valid from the cases in which they are invalid. Yet we do not remember ever having seen any mention of these forms of inference in any treatise of Mr. Joseph's school. Here is an example of one of them:

Every dollar that ever was or will be in the safe was or will have been received as a loan.

For every dollar ever received as a loan a payment of a dollar will be made.

Hence, every dollar that ever was or will be in the safe was or will be paid out.

When De Morgan opened this road to logical inquiry, he opened a road to sempiternal glory for British logic; but unfortunately investigators of any vigor of thought were lacking. De Morgan did much more than that; for he also opened up the logic of relations, which had from the beginning been a well-recognized branch of logic, and which, when American and German logicians developed it, turned out to throw a wonderful new light upon every part of logic, while the logicians of the Oxford school merely advanced little reasons for thinking a logic of relations to be impossible.

The distinguished mathematical genius, George Boole, produced a method of logical inquiry by means of algebra, which was a most brilliant achievement. A few logicians of the most numerous British school have paid attention to the Boolean logic. We mention here, not because they are the best, but because they are the most soundly critical, Venn, Jevons, and Keynes. The great body seem never to have looked into it.

Posterity will say that human intelligence is under vast obligations to the logical work of Alfred Bray Kempe, sometime President of the London Mathematical Society. But one may search in vain for any evidence that logicians of the school we are speaking of, have so much as divined what relevancy his laborious researches have for any real problem of reasoning.

It is a matter of regret to us that the brevity of this notice forces us to confine ourselves to Mr. Joseph's faults, since they are the faults of his school, and it is not quite fair to the individual to judge him exclusively according to the genus to which he belongs. But the truth is that when we have said that this treatise possesses such original merits as the majority of the thousand treatises can claim that have appeared since Michael Scott and the western publication of Aristotle, and perhaps possesses a little more, we have accorded to it all the notice it merits; while its school is of more importance simply on account of its numerical greatness, and because of the evil that it is working to British thought. This school is composed mostly of indolent and often feeble minds

whose interest in logic lies in the professorships, the fellowships, the popularity as tutors, or other sources of bread and butter which they enjoy, and who are therefore sworn obscurantists, bound to oppose any movement of real thought in English logic. When a study fails to develop definite and well-considered methods; when it is not animated by a sufficient passion to find out the truth, whatever the truth may be, to insure the careful study of all the work that earnest students do within its province; and when in place of manifold new discoveries, it does no more than verbally reproduce foregone conclusions, it is idle to boast that is a science.

Mr. Joseph sometimes lays down general propositions without any pretence at making their reasonableness evident; and he justifies this practice by saying that his book is not a complete treatise on logic, but, as its title indicates, is only "an introduction to logic." Now, says he, in the first introduction to any science there must be more or less dogmatism. Is this Oxford pedagogics? Elsewhere, if a man is to write an introduction to any science—say chemistry—he will draw a clear line between information as to what has happened, and dogmatic insistence upon principles and the like, and will take the utmost pains in describing, say, the experiments of Lavoisier upon the oxidation and reduction of mercury, to show the convincingness of the reasoning; so as to remove the idea that there is to be any appeal to authority or other arbitrary determination of principles. If he has to teach botany, he will probably set the beginner at work to dissect a flower with his own eyes and fingers, and to describe what he sees; and will be careful to make him understand that botany is only an orderly description of what can always be seen under favorable conditions. It appears to some of us that the first steps in any science ought to deal with those departments of the science that come most in contact with the life and interests of the students; and we should not approve of an introduction to botany, whose first two hundred pages were occupied with the artificial, though indispensable, technicalities that botanists are compelled to use in order to describe species and other forms. Yet it is the like of that, that Mr. Joseph does in logic; and useful as his book may prove to an advanced logician, it is almost the worst possible for a beginner's introduction to the subject.

*The Arbitrator in Council.* New York: The Macmillan Co., \$2.50 net.

This anonymous octavo volume of more than 550 pages discusses peace and war. It is in the form of an elaborate symposium, supplemented by various reports in writing by the *dramatis personæ*, among whom are Reginald Case, K. C., a barrister "with a conscience," Martin Truelove, in holy orders, the Rev. Augustine Clarke, an Independent minister, Leopold Meyer, a stock broker, William Browne, a learned Cambridge historian and pupil of Lord Acton, Captain Seymour of the Intelligence Department of the War Office, and Tracy de Vere, a retired admiral. The Arbitrator himself is Mr. Ashworthy, a veteran Liberal of seventy

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might in some ways have been the model of Osvald in Ibsen's "Ghosts." He belonged to the group of young Swedish impressionists who revolted against the tutelage of the Royal Academy of Free Arts at Stockholm and turned to France for a wider and more authentic inspiration. Together with Carl Larson, Björck, Nordström, Paull, and others of less note, he headed the secession which, in the eighties, rent the Swedish art world as, still later, that of Germany was divided. By a series of paintings combining rare mastery of color and line with poetry of thought Josephson established a reputation not only in his native country, but in France, England, and Germany as well. Then from being a reveller in sunshine and the joy of life, he grew melancholy and brooding. The signs of the change became first evident in three collections of poetry which he published, the most highly valued bearing the title "Black Roses." His poetry was not less exquisite than his work with the brush, but it was even more morbid than "The Neck" and other specimens of the latest period of his career as painter. At last the catastrophe came, and for the closing eighteen years of his life he remained confined to an asylum.

At an auction at Christie's in London, on December 1, the following prices were paid for paintings: De Hooghe, An Interior, with two gentlemen playing and singing, £189; Rubens, "Atalanta," £105; J. Ruysdael, Landscape, £183; G. Terburg, A Lady, in yellow jacket with black hood, £204; Watteau, A Fête Champêtre, £241; D. Teniers, Card-Players, £210; W. van de Velde, A Sea-Piece, £117; F. Hals, A Man, in brown dress, playing a flute, £1,575; Romney, Head of Lady Hamilton, £252; D. van Delen, The Interior of a Palace, with a party of cavaliers and ladies, £157; Le Brun, Portrait of a Lady, in gray dress, £131; S. Ruysdael, A River Scene, £252; F. Boucher, A Shepherd and Shepherdess, £136; J. Cornelisz, The Madonna and Child Enthroned, £168; G. David, St. Ambrose, £126; Giorgione, Head of a Youth, £120; Van Romerswale, "The Misers," £131. The same firm sold on December 4 the following engravings: After Lawrence: Lady Peel, by S. Cousins, £26; Miss Farren, by Bartolozzi, £63. After Roslin: Empress Marie Christine, by Bartolozzi, £30. After Reynolds: Mrs. Sheridan as St. Cecilia, by W. Dickinson, £31; Lady Catherine Montagu, by J. R. Smith, £37; The Ladies Waldegrave, by V. Green, £71; Hon. Miss Bingham, by Bartolozzi, £58; Mrs. Williams Hope, of Amsterdam, by C. Hodges, £61; Lady Jane Halliday, by V. Green, £48; Lady Louisa Manners, by the same, £105; Master Crewe as Henry VIII., by J. R. Smith, £39. After Constable: Salisbury Cathedral, by D. Ducas, £43. After J. R. Smith: "Retirement," by W. Ward, £43. After Romney: Edmund Burke, by J. Jones, £29; Lady Hamilton as the Spinster, by T. Chesman, £28. After Coates: Frances, Lady Bridges, by J. Watson, £26. After Lely: James, Duke of Monmouth, by Blooteling, £80. After Gainsborough: Mrs. Elliot, by J. Dean, £60; Signora Bacelli, by J. Jones, £71. After Hoppner: The Setting Sun (The Godsall Children), by J. Young, £110. After Huët Villiers: Mrs. Q., by W. Blake, £31. After Morland: Guinea-Pigs and Dancing Dogs, by T. Gauguin (a pair), £126; The Farmer's Door, by B.

Duterrau, £54. After Gardner: A Child with Flowers, by J. Baldrey, £31.

The art collection of Alexandre Blanc was offered at auction in Paris at the Galerie Georges Petit on December 3 and 4. There were seventy-eight pictures by Jongkind. The highest price for his work was 14,000 fr., given for Crépuscule d'Été au bord de la Merwede à Dordrecht, 14,000 fr.; two other pieces brought 10,000 fr. each—a view of the Meuse near Rotterdam, and La Partie de Patinage.

## Science.

### PRIMITIVE MAN IN NEBRASKA.

LINCOLN, Neb., December 15.

The human remains discovered near Omaha by Robert F. Gilder and reported briefly in the *Nation* of November 1 (p. 380), have been the object of careful investigation during the intervening time both by local students and by scientists from other parts of the country. These criticisms have served to bring out the great importance of the find and to establish an even greater antiquity for the remains than was held at first. Prof. Edwin Hinckley Barbour and his assistants in geology in the University of Nebraska have made an extended and minute examination of the locality. It is the top of a loess hill some 200 feet above the Missouri River; and it presents 150 feet of typical, undisturbed loess formation. The bones from the upper level came from an intrusive burial and were surrounded by a mixture of loess and surface soil. They are clearly very much younger than the hill itself.

The other remains are scattered widely through the loess and evidently were deposited with it. Abundant evidence has been obtained in detail of their transport by water and deposit in fragments as the loess was being laid down. As these bones are thus shown to be synchronous with the formation, they antedate the hill, and the two series of remains are associated purely by accident.

These facts indicate the existence of man on this continent before the formation of the loess. It is well known that not only the method of deposit of the loess but also its age are at present matters of sharp controversy. This discovery goes far to disprove the view that the loess is an æolian deposit and to establish it as aqueous.

Furthermore all previous evidence of the occurrence of human remains in the loess has been rejected as incomplete. The evidence accumulated in this case cannot be set aside in such manner; and even supposing this hill to be of the latest date assigned by any one to the loess formation, the earliest record of man in North America which it would seem to establish antedates by far any yet accepted in connection with other discoveries. It places man on an equal footing geologically with the most primitive records of the European continent.

*Side-Lights on Astronomy and Kindred Fields of Popular Science: Essays and Addresses.* By Simon Newcomb. New York: Harper & Brothers. \$2 net.

Simon Newcomb is not only the most

eminent astronomer now living, according to the judgment of the French Academy, expressed in making him one of its five carefully selected Foreign Associates, a judgment supported by the opinion of the scientific world, but he is also a remarkable reasoner; and a good dozen of the twenty-one chapters of the present volume afford valuable lessons in *logica utens*. In addition to that, he has, for a scientific man, a surprising command of language, not of phrases *recherchées*, but of that eloquence which comes from turning the tap of thoroughly filtered thought and allowing it to run crystal-clear and copious. His "Reminiscences" show (unconsciously, no doubt) how well adapted the circumstances of his boyhood were to making him a conversationalist; and this volume is conversational, in the sense of being at once light and serious. It would be hard to find a serious book more entertaining, or a light book that affords better exercise in reasoning.

Perhaps it is a critic's perversity that disposes us to note the kind of reflections that so distinguished a mind either overlooks or suppresses. In a chapter on the "World's Debt to Astronomy," after showing how valuable the services of that science have been to navigation, surveying, and geography, the author very truly says that, great as that debt is, man owes less to the stars on that score than for the tremendous message of their awesome reality. Very true; but does the science of astronomy add to that lesson more than it deducts from it? Professor Newcomb will hardly contend that lying on one's back at a summer night contemplating the poetry of the heavens is science; and if Goethe was right, the scientific view is that the smallest smoke-ring is, in itself considered, as vast and as sublime as the Galaxy. The lesson of devoutness seems to have put the veritably greatest debt of man to astronomy quite out of the head that should be the last to forget it. For Professor Newcomb ought, at any rate, to have mentioned that in the common view it was astronomy that actually taught men to reason scientifically.

The volume is divided into a smaller part discussing those questions in which the astronomer almost becomes a metaphysician, and a larger part devoted mostly to consideration of the methods of astronomical and other scientific research. The smaller part, in accordance with the turn of the author's genius, seems to have received more of his care. It is true that he has discussed such questions as the limits of the universe with more elaboration in another book; but the presentation here is captivating. We confess we cannot understand how the promise of the preface, conveyed in the words, "it became incumbent to do what he [the author] could . . . by revising the material and bringing it up to date," can be reconciled with a number of statements in the larger fraction of the volume. For instance, on p. 213, we are given to understand that the computations of the American "Ephemeris," so far as they concern Venus, are derived from the tables of Dr. George W. Hill, and so far as they relate to Mars, Jupiter, and Saturn from old tables corrected on account of

more recent observations. But every recent volume of the almanac in question states that the places of Venus and Mars are derived from Newcomb's own tables, and those of Jupiter and Saturn from Hill's.

The most valuable chapters are those in which Professor Newcomb definitely limits himself to the needs of science at the present day and in this country. He repeatedly alludes with great force to the disadvantages of personal isolation, from which investigators in this country have often suffered. Think of the momentous consequences to science of that little accidental chat between De Vries and van't Hof, which led to the proof of ionization and to much else. Professor Newcomb sanely preaches a greater consolidation and unification of scientific research. He rightly says that this need not stand at all in the way of the individualism which is also requisite.

If we have conveyed the idea that the book deals wholly with generalizations and generalities, we beg to say that such an impression would be entirely false. The interest is largely derived from its explanations of details; and some of the chapters are almost entirely of such matter. The whole process of making an astronomical objective, according to Alvan Clark's method, is described, with prices, etc.; and in other chapters there are details, though not always the very latest items. But the work is not a treatise; it is a collection of addresses and of magazine articles, and as such treats mainly of broad questions. The dress of the work is most agreeable. The uncut folds of the paper are at the bottoms of the leaves, which are gilt at the top, thus preserving the volume from dust.

"A Text-Book of Fungi," by George Massee (London: Duckworth & Co.), gives a succinct account of this marvellous group of plants. Mr. Massee is the principal assistant in charge of cryptogams at the herbarium of the Royal Botanic Garden, Kew, and is well known as the author of other works on fungi. Our cryptogams, or flowerless plants, comprise far more types of structure than do all of our flowering plants taken together. Of these flowerless plants the fungi rank among the most difficult objects of study. Considerable diversity exists among the investigators of fungi as to the true relationships of many of the groups, and hence it would not be possible for any one student to prepare a text-book which could prove wholly satisfactory to all of his associates. Mr. Massee has not accomplished the impossible. But he has presented to general botanists a handy work of reference which is likely to prove useful. He has given, moreover, an interesting account of certain biological relations of fungi, such as their luminosity, their sensitiveness to chemical agents, etc., and he has dealt at considerable length with the very puzzling subject of biologic forms. Mr. Massee's reference to one of our American investigators is well worth quoting. Speaking of a large group of minute fungi, the Laboulbeniaceæ, the author says, p. 307:

Our knowledge of this group is, with the exception of some few misinterpreted European specimens, entirely due to the admir-

able investigations of one person, Dr. R. Thaxter of Harvard University.

Some time ago the Mercers' Company gave a considerable sum of money to University College, London, in aid of the department of physiology. This has led to the establishment of a course of lectures in which the researches of the department are to be made more widely known. The first series of ten lectures given last year by Prof. E. H. Starling has now appeared in print (W. T. Keener, Chicago). They treat of "Recent Advances in the Physiology of Digestion," including a chapter on the newer knowledge of the movements of the intestine. Naturally much stress, perhaps a little too much, is laid upon the work done at University College, but the subject is presented with much clearness and such simplicity that the general reader, with a very moderate knowledge of the subject, may follow the lectures without difficulty and obtain a good view of the remarkable changes now developing in our ideas concerning ferments and their action.

In the summer of 1905 Prof. William H. Pickering of Harvard made a trip to the Hawaiian Islands for the purpose of studying their volcanic features with special reference to comparison with craters on the moon. The results of his observations were presented to the American Academy early in 1906, and this report now comes as a memoir of that institution, illustrated by thirty-nine plates, representing terrestrial and lunar features. The Hawaiian Islands exhibit an entirely different class of phenomena from those of our more frequently visited and studied volcanic regions; and in some respects they bear striking resemblances to those upon our satellite. Our best-known craters are of what is known as the explosive type—as Vesuvius and Krakatoa. None of this sort appear upon the moon, but only what may be termed in distinction the engulfment type. Of this variety Hawaii offers many examples, showing little steam, often without exterior cones, and enlarging their craters quietly by the cracking off and falling in of their walls. Although considering lunar craters, these island volcanoes are on a very small scale, the likeness is striking. A comparison of Kilauaea Iki with the lunar Clavius seems to give indirect evidence of the existence of lava cones as the source of "streams" upon the moon. Final suggestions as to the similarity of valleys behind Honolulu (as seen from Tantalus) and those on the central peak of the lunar Eratosthenes and Copernicus are suggestive as implying erosion in both cases.

## Finance.

### NEW BORROWINGS BY THE RAILWAYS.

Traditionally, a tight money market is a bad time for great corporations to issue new stocks or bonds. Subscribers for the bulk of such issues are likely to borrow the greater part of the money, because few capitalists keep large sums available for a sudden call. But if, as has been the case this week, borrowers must pay 15 or 25 per cent. per annum for Wall Street demand loans, and 7 to 10 per cent., allowing for the so-called "commission," for loans running one to five months, there is

little inducement to borrow on such terms and invest in new securities, even with a high dividend. Moreover, if the capitalist has outstanding, in demand loans of his own, money which could be utilized for the investment, he is apt to keep it out on loan. Such a situation, in a shape acutely embarrassing, arose in the summer of 1903, when the "rich men's panic" made money for new investments almost non-procurable, and when, nevertheless, a dozen great corporations had already committed themselves to expensive schemes for which they had to raise funds.

On that occasion, railways which had prepared for issue hundreds of millions in 4 per cent. bonds, designed to be sold at par or thereabouts, were driven to the humiliating recourse of borrowing in Europe, on six months or one year notes-of-hand, at 6 per cent. or higher. When money began to grow tight this season, a number of important railways were in the same position. They were preparing to issue, not bonds, as in 1903, but stocks—an interesting change of policy, which shows how a corporation adapts itself to the prevailing fashion. During the famous Stock Exchange "boom" of 1901, when shares of all kinds of companies seemed to have no limit set to their advance, new stocks were, in the language of another industry, "all the rage." In 1900, there were "listed" on the New York Stock Exchange, \$443,700,000 new bonds and \$620,900,000 new stocks. In 1901, the new bond listings were \$923,000,000, and the new stocks \$1,642,000,000. After the collapse of the market, May 9, 1901, the craze abated; after the prolonged decline in stocks during 1903, the public's taste abruptly changed. In 1904, only \$175,800,000 stocks were listed, as against \$535,000,000 bonds. Even last year, listing of bonds exceeded by \$446,000,000 that of stocks. With 1906, and its persistent increase in price of stocks, the public is deemed once more in a mood for stocks.

But whether stocks or bonds, the market for new securities, for the reasons already set forth, was at the beginning of the present season precarious. To ask for \$250,000,000 new capital—which was the sum required by three railways alone—and to ask for subscription on the spot, was out of the question. The money, however, had to be assured; not less, according to common belief, because legislation hostile to certain practices of borrowing railways was expected when the Western State legislatures should convene next month. The solving of this problem introduced another new contrivance in security issues, namely, the extension of payment by instalments, the last of which would not fall due for two years or more. The plan may have been suggested by last April's \$440,000,000 loan raised by the Russian Government, of which the final instalment (\$38,000,000) will not be paid until next February, when another Russian loan will probably be upon the carpet.

Last week, the Northern Pacific Railway announced a new stock issue of \$95,000,000; of which subscribers were to pay 5 per cent. next February, 7½ per cent. next April, and 12½ per cent. each at the opening of January, April, July, and October, 1908, and January, 1909. Great Northern followed with an offer of \$80,000,000 stock, to be paid