

links may in itself be a sufficient means of appreciating the appearance of other closely related trains of thought. Under this general position, it remains to interpret the following four characteristics of the results, which may be regarded as the most essential outcome of the study: first, the time of a limited association is longer than the time of a free association (III. is longer than II.); second, univocal association (where the answer is limited to one) is less than the limited, or even than the free (IV. is less than III. or II.); third, by reading a series of words belonging to the same category as the words to be compared, the time of the mental process is much shortened (VI. is less than V., and X. than IX.); fourth, the combination of any two or three factors in the same process takes less time than the sum of the times needed to perform each of the factors separately (VII. is less than the sum of III. and V., less the time of I., which is counted twice). The first fact is not new, and is explained by considering that in both cases, III. and II., several associations present themselves to the mind, but that, while any one of them will answer in II., some may have to be rejected (or the association impulse inhibited) in case III. The second fact is more striking, and seems to mean that the mind does not run over the general category and select the one answering to the particular relation, but takes the nearest and usually prominent association of the limited character. Irrelevant associations do not consciously reach the focus of apperception. The third fact brings out the mechanism of preparation. When a series of words is read, and we know we are to compare some two terms of the series, we anticipate the general kind of comparison, and so shorten the process. We throw out all those associations with the terms in question other than those which they have in common with the series of words read. The fourth fact accentuates the importance of the position that the mind can do more than one thing at a time. If each mental process had to be finished before the next one is begun, such acts as reading ahead, as forming a sentence or an argument while speaking other words, would be impossible. The results distinctly show how the various processes overlap in time, and form that rich complexity of inter-associated and mutually dependent factors that is the charm as well as the strain of mental labor.

**THE NATURE OF NEGATIVE HALLUCINATIONS.**—M. J. Foutan has recently devised an interesting method of showing that in hypnotism the physiological processes remain, while their psychic interpretation is altered. If a subject be told that he sees nothing red, every thing of this color falls out of his mental horizon, and we have an ordinary instance of a negative hallucination. If, now, the red object viewed be a red light, and if we suggest to the subject that when a bell is sounded he will again be restored to normal vision, and if as the bell is sounded the light is put out, the subject sees a light of the complementary color, green, just as he would have done when normally viewing a red light. While the brain refuses passage to the sensation of red, the retina is impressed with it, and re-acts to it, just as though the action were normal in every respect.

#### ELECTRICAL NEWS.

##### The Telephone on Railways.

THERE has been in use on the Austrian State railways a portable telephone that can easily be attached to a passing wire so as to place the trainmen in connection with the neighboring stations. An exhibition of the apparatus was recently made before a number of Austrian railway-men on a line running from Hüttelsdorf to Purkersdorf, with satisfactory results.

**THE DURATION OF A LIGHTNING-FLASH.**—The researches of Trouvelot, Colladon, and Dufour have shown that the duration of a lightning-flash is not infinitesimal, but that the flash lasts a measurable time. For instance: if one sets a camera in rapid vibration, and exposes in it a plate so as to receive the impression of the flash, it is found that the impressions appear widened out on the negative, showing the negative to have moved during the time the flash was in existence.

ARTHUR WINSLOW has entered upon the duties of State geologist of Missouri, with headquarters at Jefferson City, and the work of the survey is now begun.

#### BOOK-REVIEWS.

*The Struggle for Immortality.* By ELIZABETH STUART PHELPS. New York, Houghton, Mifflin, & Co. 16°. \$1.25.

THIS book is characteristic of the times, and could not have been written at any other period. The authoress is a Christian of the new liberal type, — a type so different from the old that it seems another thing, — and she is a passionate believer in immortality. She presents her views and arguments in an epigrammatic style and generally with clearness, and her book is certainly entertaining. Unhappily she is a pessimist of a rather extreme type, declaring expressly that there is far more pain than pleasure in this life, and consequently, that, if there is no other life before us, God is not good. She admits, however, that with rare exceptions men cling tenaciously to this life, which seems very strange if it brings a surplus of pain. She insists that there is more in man than material forces can account for, and adduces the phenomena of hypnotism and telepathy in support of this claim. Her theory of immortality is as set forth in the following passage: "Immortality is not a right, but a privilege. . . . This gift is offered to you or me upon conditions which we can accept or deny at will. The founder of our religion makes, we may say that he constitutes, the conditions. Everlasting life is, in fact, according to this religion, bestowed by Jesus Christ upon the human soul. The consequence of declining this gift and its conditions would seem to be logically, if not theologically, wrapped in the phrase 'everlasting death'" (p. 137). This means, if we understand it, that, if we live like Christ in this world, we shall live forever in another and happier one; but if not, we shall be annihilated. Hence arises a "struggle for immortality" analogous to the struggle for existence here, in which we may win or lose according to our conduct. This seems to us rather singular doctrine; yet there is much in the book that is both true and valuable, and it will serve to some extent as an antidote to the prevailing spirit of negation.

*A Dictionary of Electrical Words, Terms and Phrases.* By EDWIN J. HOUSTON. New York, The W. J. Johnston Co. 16°. \$2.50.

THE need has long been felt of some work that should give good definitions of the terms which have come into use in the electric science and practice that have been brought into existence mainly within the past ten or twenty years. The larger dictionaries are too slow in adopting new words to serve this special purpose. In fact, some of the terms defined in Houston's "Dictionary" may be out of use, and no longer words in any proper sense as conveyors of ideas, by the time they figure in Worcester or Webster. Such is the march of language with those who are creating apparatus and phenomena never before existing. It is unnecessary to introduce the chief editor of this electrical dictionary to our readers. Professor Houston is too well known to need this. What he has done in the dictionary is, first, to give a concise definition of each word or phrase, and then a brief statement of the principles of the science involved in the definition, that it may be clear, in so little trodden a field, just what the definition means. This statement is frequently illustrated by appropriate cuts. To some extent the short explanations make the work encyclopedic in its character.

This is a first edition, and it may be that the difficulty of introducing a phrase under the most appropriate catch-word, so that it may be readily found, has not been completely overcome; yet such an elaborate system of cross-references has been introduced as to overcome this trouble to a great extent. We must say we have found it satisfactory in use so far.

The publishers are to be commended for the large number of illustrations they have placed at Professor Houston's command.

#### AMONG THE PUBLISHERS.

THERE is announced to appear Nov. 2, 1889, and each Saturday thereafter, *Nature*, a weekly journal for the gentleman sportsman and naturalist, to which the contributing editors will be William C. Harris, Charles Hallock, Charles Barker Bradford, and J. Charles Davis. The articles will include sketches about all kinds of game-hunting; sketches about all kinds of game-shooting; sketches on

the hunter's camp; sketches on life in the woods; articles on guns, gunning, and ammunition; articles on game birds and animals; articles on game dogs; on the mountains and in the meadows; in the woods and on the waters; abroad in the fields and forests, and stories about rural nature in general; special articles by the leading sportsmen writers. The Nature Publishing Company, No. 10 Warren Street, New York, will publish the paper.

— *Outing* for November has for its leading article, "A Winter's Sport in Florida," by O. A. Mygatt. Other principal articles are "Whaling," by Herbert L. Aldrich; "Our Four-footed Friends," by "Borderer;" and "The Orange Athletic Club." Other articles are, "Lobsters and Lobster Pots;" "Crankslinger Skaddle Rides Back to his Youth," a cycling story by President Bates; "Squirrel-Hunting;" and the hunting story, "Over Rag Wheel Mountain."

— Charles Scribner's Sons published last week "The Viking Age," by Paul B. Du Chaillu. This work is the product of many years of incessant labor in the collection and arrangement of facts which throw light upon the character of the progenitors of the English-speaking race. Recent researches have made it clear that those Northmen who at the decadence of the Roman Empire overran and settled in Britain and the northern coast of Germany and France, were not barbarians, as has long been erroneously supposed, but a most highly civilized and accomplished people. Vast quantities of objects, including arms and armor, gold and silver ornaments of the most skillful workmanship and refined beauty, wood-carving, filigree work, agricultural and domestic implements, magnificent carriages, etc., have been unearthed. The work is in two octavo volumes, and contains 1,400 illustrations.

— The Reform Club, New York, has just issued a tariff dictionary, explaining the specific and ad valorem duties as imposed on every article under the present law, and as proposed by the Mills and Senate bills. It has been prepared by the tariff-reform committee of the club.

— G. P. Putnam's Sons have just ready Alfred Church's "To the Lions," a story of the persecution of the Christians under the early Roman Empire; and "The Story of Boston," by Arthur Gilman, in the series of Great Cities of the Republic.

— Gebbie & Co., Philadelphia, have just issued "Froudacity: West Indian Fables by James Anthony Froude," explained by J. L. Thomas, — a criticism of Mr. Froude's late book on the West Indies, written by a native in defence of his colored companions in the West Indies.

— J. G. Cupples Company announce a little book entitled "The Elixir of Life," being a compilation of what has been written concerning Dr. Brown-Sequard's discovery. It also contains Dr. Brown-Sequard's own account of his famous alleged remedy for debility and old age, Dr. Variot's experiments, and a sketch of Dr. Brown-Sequard's life, and a portrait.

— Longmans, Green, & Co. are about to issue an outline history of the development of modern music, showing the growth of opera, oratorio, and symphony, without digressing into mere biography of composers. It has been prepared by Mr. W. J. Henderson of the *New York Times*, and it will be called "The Story of Music."

— *Sun and Shade*, published by the Photo-Gravure Company, New York, has just concluded the first volume of a most successful year. Starting almost as an experiment, with a list of less than fifty subscribers, it has, by dint of its excellency, won for itself, as its publishers claim, a circulation of four thousand copies monthly. It is a novel undertaking, in that it is simply a picture periodical without letterpress excepting a table of contents. In the next volume will be presented reproductions of leading pictures in the Metropolitan Museum of Art; portraits of prominent leading men, first among which will be one of Mr. W. H. Appleton, the senior of the firm of D. Appleton & Co., to be followed by one of Henry George; and reproductions of the works of American artists, whether painters, sculptors, or architects. The reproductions, by whatever process, are all of the very best quality. The subscription price is four dollars per year.

— J. B. Lippincott Company have just ready a work entitled "Cycling," by R. P. Scott, which will be of interest to all who are fond of the exhilarating and healthful sport afforded by the bicycle,

tricycle, etc. The book contains a great deal of curious and useful information for wheelmen, and is illustrated by numerous engravings showing the development of the "wheel" itself.

— Judge S. M. Green, well known as the author of a number of legal works, embodied in an excellent treatise on crime, to appear shortly from the press of J. B. Lippincott Company, the opinions and settled convictions to which he has been led by a long experience as judge both in the circuit and supreme courts of Michigan. While the volume will naturally be of much service to lawyers, it is not specifically a legal book, but is a popular, and at the same time exhaustive, discussion of the nature, causes, treatment, and prevention of crime. The author looks on the criminal as diseased, and enables us to sympathize with him while we hate his crime, and, moreover, encourages us to bright hopes and strenuous effort for his cure.

— The Geological Survey of Pennsylvania has issued "A Dictionary of the Fossils of Pennsylvania and Neighboring States named in the Reports and Catalogues of the Survey," compiled by J. P. Lesley, State geologist. There are given three thousand figures of all the forms of animal and vegetable life hitherto seen in the geological formations of the State, both those collected by the assistant geologists of Professor H. D. Rogers, fifty years ago, and those collected since 1874.

— The "Bibliographical Catalogue of the Described Transformations of North American Lepidoptera," by Henry Edwards, issued by the Smithsonian Institution as Bulletin No. 35 of the National Museum, will supply a want that has long been felt by many entomologists, and will be acceptable to the students of the earlier stages of North American *Lepidoptera*. In its compilation, the author has occupied a good portion of the spare time at his command for three years past, and has carefully examined every publication that has been accessible to him.

— By permission of the Institution of Civil Engineers, the Scientific Publishing Company of this city publish the admirable paper of Sir Frederick Abel on "Mining Accidents," and the instructive discussion of it by the best-informed experts in Great Britain. This book summarizes the most advanced modern practice in coal-mining and the prevention of accidents; and it should be in the hands of every one interested in mining, as it is unquestionably the most valuable treatise on coal-mining in the language. In order to still further increase its value, the laws governing coal-mining in every State and Territory in the Union, and those of Great Britain and of the chief German mining districts, have been added to it.

— "A Preliminary Catalogue of the Shell-bearing Marine Mollusks and Brachiopods of the South-Eastern Coast of the United States," with illustrations of many of the species, by William Healey Dall, A.M., honorary curator, Department of Mollusks, United States National Museum, has just been issued by the Smithsonian Institution. This work is intended to assist students of the *Mollusca* in the United States by bringing together for their use a large number of excellent figures of species belonging to or illustrating the fauna of the southern and south-eastern coasts of the United States, from Cape Hatteras south to the Straits of Florida, and west to Mexico, with the adjacent waters. These figures are explained and connected by a catalogue of the mollusks known to inhabit that region, either from the presence of authenticated specimens in the National Museum or on the authority of reputable naturalists who have collected in the region, and whose specimens have been seen or reliably identified. This catalogue, arranged for convenience in tabular form, includes not only the species which are illustrated on the plates, but all other species common to the region, as far as known.

— J. E. Munson, Tribune Building, New York, has reprinted his important "Phonographic Phrase-Book," which has long been out of print.

— D. C. Heath & Co. will issue at once Hoffman's "Tales from History." Every student of German should read something of an historical nature, and the difficulty lies in finding something brief enough for class use. These tales are short, and independent of each other, and yet complete enough to insure sustained interest. The notes are both historical and explanatory. This firm will also

issue at the same time Freytag's "Aus dem Staat Friederichs des Grossen," with notes explanatory and critical, by Herman Hager. In this sketch we have not a detailed account of the facts of Frederick's life, but the author directs his attention mainly to the working of the hero's mind, to the gradual building-up of that character which came to be the moulding force of Germany. An appendix adds some notes on the phonetic changes in German, and special attention is given to awaken an interest in the gradual development of the meaning in words.

— Macmillan & Co. have just ready "Select Essays of Dr. Johnson," edited by George B. Hill, in the Temple Library; a selection of the best essays of De Quincey, edited by W. H. Bennett, in the Stott Library; and a new library edition of Wordsworth, in eight octavo volumes.

— From the *Publishers' Weekly's* "Notes on Authors," we learn the following: Friedrich Spielhagen is reported to be writing his autobiography. It is to be issued in instalments in a new German magazine. Miss Kate Field, the author and lecturer, contemplates starting a journal. Gustav Freytag, the novelist, will shortly publish a little work on the late Emperor Frederick, taken from his notes during the war, and his letters from the camp down to the election of the German Emperor. Horatio Seymour of Marquette, Mich., who was formerly State engineer of New York, is preparing for publication the correspondence of Gov. Horatio Seymour, and desires to secure copies of letters not already in his possession.

— In spite of the rapid increase in the number of millionnaires in the United States in recent years, the popular notion is that wealth is yet very much more evenly distributed in this country than in England. Mr. Thomas G. Shearman, the well-known New York statistician, has been engaged for some time in collecting facts to show as precisely as possible the proportion of the wealth of the country held by a few rich men and families; and he finds a greater concentration of wealth here than in any other country. The results of his investigation will appear in *The Forum* for November, from advance sheets of which the following facts are taken. Mr. Shearman makes the following enumeration of owners of more than \$20,000,000 each: \$150,000,000, J. J. Astor, Trinity Church; \$100,000,000, C. Vanderbilt, W. K. Vanderbilt, Jay Gould, Leland Stanford, J. D. Rockefeller; \$70,000,000, estate of A. Packer; \$60,000,000, John I. Blair, estate of Charles Crocker; \$50,000,000, William Astor, W. W. Astor, Russell Sage, E. A. Stevens, estate of Moses Taylor, estate of Brown & Ives; \$40,000,000, P. D. Armour, F. L. Ames, William Rockefeller, H. M. Flagler, Powers & Weightman, estate of P. Golet; \$35,000,000, C. P. Huntington, D. O. Mills, estates of T. A. Scott, J. W. Garrett; \$30,000,000, G. B. Roberts, Charles Pratt, Ross Winans, E. B. Coxe, Claus Spreckels, A. Belmont, R. J. Livingston, Fried Weyerhauser, Mrs. Mark Hopkins, Mrs. Hetty Green, estates of S. V. Harkness, R. W. Coleman, I. M. Singer; \$25,000,000, A. J. Drexel, J. S. Morgan, J. P. Morgan, Marshall Field, David Dows, J. G. Fair, E. T. Gerry, estates of Gov. Fairbanks, A. T. Stewart, A. Schermerhorn; \$22,500,000, O. H. Payne, estates of F. A. Drexel, I. V. Williamson, W. F. Weld; \$20,000,000, F. W. Vanderbilt, Theo. Havemeyer, H. O. Havemeyer, W. G. Warden, W. P. Thompson, Mrs. Schenley, J. B. Haggin, H. A. Hutchins, estates of W. Sloane, E. S. Higgins, C. Tower, William Thaw, Dr. Hostetter, William Sharon, Peter Donohue. These 70 names represent an aggregate wealth of \$2,700,000,000, an average of more than \$37,500,000 each. Although Mr. Shearman, in making this estimate, did not look for less than twenty-millionnaires, he discovered incidentally fifty others worth more than \$10,000,000 each; and he says that a list of ten persons can be made whose wealth averages \$100,000,000 each, and another list of one hundred persons whose wealth averages \$25,000,000. No such lists can be made up in any other country. "The richest dukes of England," he says, "fall below the average wealth of a dozen American citizens; while the greatest bankers, merchants, and railway magnates of England cannot compare in wealth with many Americans." The average annual income of the richest hundred Englishmen is about \$450,000; but the average annual income of the richest hundred Americans cannot be less than \$1,200,000, and probably exceeds \$1,500,000. The richest of the Rothschilds, and the world-re-

nowned banker, Baron Overstone, each left about \$17,000,000. Earl Dudley, the owner of the richest iron-mines, left \$20,000,000. The Duke of Buccleuch (and the Duke of Buccleuch carries half of Scotland in his pocket) left about \$30,000,000. The Marquis of Bute was worth, in 1872, about \$28,000,000 in land; and he may now be worth \$40,000,000 in all. The Duke of Norfolk may be worth \$40,000,000, and the Duke of Westminster perhaps \$50,000,000. Mr. Shearman's conclusion is that 25,000 persons own one-half the wealth of the United States; and that the whole wealth of country is practically owned by 250,000 persons, or one in sixty of the adult male population; and he predicts, from the rapid recent concentration of wealth, that under present conditions 50,000 persons will practically own all the wealth of the country in thirty years, or less than one in 500 of the adult male population.

— Col. H. G. Prout, in the November *Scribner*, gives the following pen-picture of Emin Pacha, whom he knew about thirteen years ago: "In person Emin is a slender man, of medium height and tough and wiry figure. He is swarthy, with black eyes and hair. His face is that of a studious professional man, and that impression is heightened by the glasses he always wears. His attitudes and movements are, however, very alert. He stands erect and with his heels together, as if he had been trained as a soldier. He was always reticent about himself, and his history was known to no one in the Soudan or the provinces of the equator. He was supposed to be a Mohammedan. I am not sure that he ever said that he was, but I am quite sure that he did not deny it when I knew him. It has become known later that he is German, of university education; but there were many at that time who thought he was a Turk of extraordinary acquirements. He is certainly a man of great abilities in many ways, and of strong character." There is a circle in Paris which pays weekly visits to the studio of a young Russian artist, Marie Bashkirtseff, who died five years ago. This ambitious and gifted young woman left a remarkable journal, which has been published in France, and has attracted many readers because of the frankness with which she here draws the complete story of her life, her ambition, her suffering, and her love. The book has many of the qualities which made Amiel's journal famous. Miss Josephine Lazarus, a sister of the poet, Emma Lazarus, will summarize this notable book in the same number of *Scribner*. William Henry Bishop, author of "The House of the Merchant Prince," who has been living abroad for the past year, has written, also for this number, a picturesque description of the old Spanish university of Salamanca, giving a clear idea of modern Spanish student life.

— In *Lippincott's Monthly Magazine* for November, Edward Heron-Allen contributes an article on "The Violin," which gives much information concerning that instrument. The poet-critic R. H. Stoddard continues his series of papers upon American authors by contributing a sketch of William Cullen Bryant. William S. Walsh has an article upon "Handwriting and Writers," in which he dilates upon the chirography of many famous people. Some funny stories are told of Horace Greeley, arising from the well-known illegibility of his handwriting. In "Does College-Training Pay?" D. R. McAnally severely arraigns the methods of instruction in our colleges, and hurls some hard facts at the dons, which it is to be hoped they will take cognizance of. "The Question of Pure Water for Cities" is an article contributed by William C. Conant, editor of *The Sanitary Era*. It contains suggestions for rendering water pure and drinkable, — suggestions that should be acted upon by the authorities in every large city. Melville Philips, one of the editors of the *Philadelphia Press*, tells what it costs to issue big newspapers.

— "The Lost Inca," by the Inca Pancho-Ozollo, is one of Cassell's Sunshine Series of original novels. In this story, the scene of which is laid in Peru, the *dramatis personæ* mainly consist of a party of North American engineers and a newly discovered people in the valley of the Inti-Mayu. This party become suddenly and without preparation residents of the valley, and find there much cultivation and refinement, and themselves add many modern scientific appliances to an already advanced civilization. It is an historical fact that an Inca disappeared from history. The Spaniards declared that he was killed in an engagement: there is no proof of it. The bodies of the Spanish soldiers were found, but

none of the Indians ; and it is still believed in Peru, among *las barbaras* in the upper Amazonas, that the descendants of this Inca still live. The author has found the Lost Inca : the Last Inca is not yet.

— Col. H. G. Prout (Baroud Bey), in his article on Emin's province in the November *Scribner*, says, "Emin's uncertain power in a savage land is all that remains of the late Khedive's Central African Empire. One day, in Khartoum, Gordon asked me what I thought would be the future of the Equatorial Provinces. I said, 'The power will gradually return to the Arabs, the negroes will kill their friends and tormentors together, and the good old times of war and famine will come back.' I am still of that opinion. Unless the enlightenment of Europe can control the upper Nile country, either through the Soudan or from the south, barbarism will control it. By control I mean physical control, and that must be directed by some one better than the Turk, the Arab, or the Circassian." Dr. James E. Pilcher, captain Medical Department, U.S.A., will describe in the same number the organization and appliances of the modern Sanitary Corps, which aims to relieve and care for the sick and wounded in the time of battle and in peace. The abundant illustrations of this article have been made from photographs of the corps actually at practice-work, and show very clearly the methods, which are of equal interest to all those who are members of the many societies for First Aid to the Injured, and the National Guard, which has adopted this system. In view of the congress of representatives of maritime nations in Washington, Professor J. Russell Soley's article will be of especial interest. He shows how certain principles of international law (which Great Britain has mainly been instrumental in establishing) will re-act to the disadvantage, and even great peril, of that nation in the event of another Anglo-continental war. He also discusses the effect which our navigation laws will have in preventing us to profit from the redistribution of the carrying trade which would ensue. Goethe's house at Weimar, from which the public have been excluded rigidly until within a year, will be fully described by Oscar Browning. The many illustrations are from the first photographs taken since the house was thrown open, and represent the rooms as Goethe left them. Dr. M. Allen Starr will describe the effects of electricity upon the human body. This subject is of special importance, owing to the frequent reports of accidents due to contact with electric wires, to the recent adoption of electricity as a means for executing criminals, and to the extravagant claims of the curative powers of electricity in diseases. Dr. Starr will draw the line very sharply between the legitimate use of electricity and quackery.

— The November issue of *The Chautauquan* presents the following table of contents : "The Burial of Rome," by Rodolfo Lanciani, LL.D. ; "The Politics which made and unmade Rome," by President C. K. Adams, LL.D. ; "The Life of the Romans," by Principal James Donaldson, LL.D. ; "The Story of Sejanus," by George Parsons Lathrop ; "Map Quiz" on *The Chautauquan* Map Series ; "The Cause of Geographic Conditions," by Professor N. S. Shaler ; "Mental Philosophy," by John Habberton ; "The Uses of Mathematics," by Professor A. S. Hardy, Ph.D. ; "Traits of Human Nature," by the Rev. J. M. Buckley, D.D. ; "What shall the State do for me?" by Thomas B. Preston ; "English Politics and Society," by J. Ranken Towse ; "The Story of No Man's Land," by John R. Spears ; "Maria Mitchell," by Harriet Prescott Spofford ; "The French Constitution," by Albert Shaw, Ph.D. ; "Electricity at the Paris Exposition," by Eugene-Melchior de Vogue ; "In Armenian Villages," by Harriet G. Powers ; "The Modern Thermometer," by Ernest Ingersoll.

— D. C. Heath & Co. will publish this month Lessing's "Minne von Barnhelm," a comedy in five acts, edited with notes and an extended introduction by Sylvester Primer. The play is highly interesting, since the style is Lessing's best, and the dramatic effects well sustained. The study of Lessing as a dramatist and a critic is essential to a comprehensive knowledge of Germany's great classic period : hence the importance of this masterpiece to students of German. In the introduction the editor gives the progress of German literature from the time of Opitz to Lessing, the condition of the German stage, and something of the intellectual development of the people during this period. A discriminating biogra-

phy of Lessing and a "critical analysis" of the play give a full analysis of the characters and an account of the historical and other sources, while its national importance as being truly German is well brought out.

## INDUSTRIAL NOTES.

### The Bower-Barff Rustless Iron Process.

ABOUT eighteen months ago, Mr. Henry M. Howe, the eminent metallurgist whose work on steel is now being published in *The Engineering and Mining Journal*, applied to several of the licensees of the Bower-Barff Rustless Iron Company for samples of cast and wrought iron which had been treated by the processes controlled by this company, for the purpose of testing their resistance to oxidation. Mr. Howe, who is now in Paris acting as United States iron and steel commissioner at the exposition, writes to the company as follows in relation to these experiments :—

"I have just summed up the results of my experiments in the matter of protective coatings for iron. I enclose table of results, which you may use if you want, and as you want. The Bower-Barff wins easily, beating even tinned and galvanized badly. The galvanizing was done by the Rhode Island Tool Company, whose work, I understand, is of the very highest ; and they were informed that the work was for a test trial. The conditions were rigidly

### Loss of Weight of Wrought and Cast Iron with Different Protective Coatings and under Different Conditions, in Pounds per Square Foot of Surface per Annum.

#### Sheet Iron (No. 23 Gauge, Black).

Protective Coatings.	Exposed to the Weather Inland.		Immersed in	
	Canada.	New York State.	Fresh Water.	Sewage.
Bower-Barffed...	.0	Gain .000.3	.006.7	.003.6
Tinned... ..	Gain .002.0	.000.1	.019.4	.007.1
Nickel-plated...	.0	.000.5	.050.4	.003.1
Galvanized.....	Gain .000.4	.....	.045.9	.080.5
Barffed.....	.001.0	.003.1	.083.9	.117.0
Black ; i.e., unprotected....	.001.3	.022.6	.137.0	.169.0
Copper-plated...	.000.2	.005.0	.179.0	.182.0

#### Cast Iron.

Protective Coatings.	Exposed to the Weather Inland.		Immersed in	
	Canada.	New York State.	Fresh Water.	Sewage.
Bower-Barffed...	Gain .004.0	Gain .003.1	Gain .005.5	.001.4
Bower-Barffed and paraffined	.000.6	.001.9	.000.2	.008.4
Galvanized.....	.0	.0	.049.1	.061.0
Tinned.....	.....	Gain .003.1	.065.5	.061.0
Nickel-plated..	Gain .003.4	.002.5	.136.7	.083.3
Copper-plated...	" .004.0	.005.0	.150.8	.119.2
Black ; i.e., unprotected ...	" .006.3	.012.0	.148.3	.272.4

identical. It is a fair victory. I shall publish the results as an appendix to my "Metallurgy of Steel," and perhaps more fully thereafter. Immersed in Chestnut Hill Reservoir, Boston, for a year, the Bower-Barffed wrought-iron plate was hardly discolored, except where held by the crate. Another immersed in the Boston main-sewer sewage for a year retained its skin, and was only slightly pitted, while most of the tin was removed from a tinned iron sheet beside it. If you publish these, credit R. W. Lodge with doing the work with me. He put in a good deal of hard work and deserves credit."