of the people and the mode of government. Most of the colonies, or dependencies, dealt with in this volume are valuable chiefly as naval and commercial stations, this being particularly the case with Gibraltar, Malta, Aden, Singapore, and Hong Kong; but others, such as Cyprus, Ceylon, and Mauritius, have inherent resources of their own. The work shows the immense variety of races, religions, and material interests with which the British Colonial Office has to deal; and this notwithstanding none of the larger dependencies are touched upon. Germans in Heligoland; Spaniards, Italians, Greeks, and Turks in the Mediterranean; Arabs, Negroes, Indians, Malays, and Chinese in the Eastern seas, — all pass in review before us; while the three great religions of the world, — Christianity, Mohammedanism, and Buddhism, — besides minor faiths, are represented. If the work is completed on the plan of this volume, it will be useful not only to geographers, historians, and statesmen, but to all intelligent persons who wish to be informed about the world's affairs.

AMONG THE PUBLISHERS.

ROBERT CLARKE & CO., Cincinnati, O., announce the fifth edition of "Benner's Prophecies," with forecasts for 1889, 1890, 1891. These prophecies are of future ups and downs in prices, and what years to make money on pig-iron, hogs, corn, and provisions, by Samuel Benner, an Ohio farmer.

— The following are from the contents of the *Popular Science Monthly* for March: "New Chapters in the Warfare of Science," by Andrew D. White, LL.D.; "The Chemistry of To-Day," by Professor Ira Remsen; "Glass-Making," by Professor C. Hanford Henderson; "South Slavic Moon-Myths," by Dr. Friedrich S. Krauss; "Competition and the Trusts," by George Iles; "Law as a Disturber of Social Order," by Benjamin Reece; "Among the Fiji Islands," by Coutts Trotter; "The Foundation-Stones of the Earth," by Professor T. G. Bonney; "Natural Science in Elementary Schools," by J. M. Arms; "The Aryans in Science and History," by Horatio Hale; "The Americanists in Congress;" "Sketch of Pierre Belon" (with portrait); also the regular correspondence and editorial departments, literary notices, popular miscellany, and notes.

— The *American Journal of Archæology*, Vol. IV. No. 4 (Boston, Ginn & Co.) contains "Inedited Terra-cottas from Myrina, in the Museum at Constantinople" (with 2 Dujardin heliotype plates), by Salomon Reinach; "Discoveries in the Attic Deme of Ikaria," by Carl D. Buck, and "A New Sikyonian Inscription," by Mortimer L. Earle, both members of the American School of Classical Studies at Athens; "Early Bronzes discovered on Mount Ida in Krete" (with 5 plates and 4 figures), by A. L. Frothingham, jun., professor of archæology at Princeton; "Remains of an Ancient Greek Building discovered in Malta" (with ground-plan), by A. A. Caruana, director of education in Malta; notes on the excavation of a Christian palace at Rome, and the existence of America known early in the Christian era; reviews and notices of books on archæology — general, Oriental, classical, Christian, and prehistoric — and on the Renaissance; archæological news from Asia Minor, Austria-Hungary, Central America, Colombia, Denmark, Egypt, England, France, Germany, Greece, Hindustan, Italy, Krete, Kypros, Palestine, Phœnicia, Russia, Sicily, Spain, Syria, Tunisia, Turkey, United States, and Wales; and summaries of archæological periodicals.

— William H. Burnham, Ph.D., late fellow of Johns Hopkins University, will give in the March *Scribner* some valuable practical suggestions to busy men for economy in brain-work.

— The *Contemporary Review* for March (New York, Leonard Scott Publishing Company) will contain an important paper on the Panama Canal by the eminent traveller, Mr. Edward Whymper, illustrated by a large chart of the scene of operations, etc. An interesting and full *résumé* of the financial condition of the Canal Company appeared in the *Nineteenth Century* for February, 1888, which is particularly valuable, in view of the recent collapse of the enterprise.

— Probably the most interesting paper in the *Scottish Review* (New York, Leonard Scott Company) for the present quarter is a translation of Ivan Turgenieff's weird story of the "White Lady." The spirit which forms the central figure in this extraordinary play of the imagination belongs to a class which appears more frequently in the popular beliefs of Russia than in those of other countries. It is, however, not unknown in Scotland. Sir Walter Scott's ballad of "Glenfinlas," for example, is based upon a legend of a young man killed by a being of this sort, — a catastrophe which Turgenieff has obviated or postponed by the use of a peculiar expedient.

— No less than eight editions have been called for of the *Contemporary Review* for February, containing the remarkable article on the Bismarck dynasty. This article is said to be circulating freely in Germany.

— "England and Germany in East Africa" forms the subject of the opening paper in the *Fortnightly* this month. Professor Dowden writes on "Hopes and Fears for Literature;" Mr. Swinburne continues his notice of Victor Hugo's poetry; Professor Tyndall furnishes another instalment of his articles on "English Lighthouse Management;" Dr. Ingram writes on "Two Centuries of Irish History;" and Mrs. Lynn Linton begins her series on "Characteristics of English Women." Among the other articles, the unsigned one on the "Trade of Author" will probably attract most atention.

— The February number of the *Modern Science Essayist* contains "Solar and Planetary Evolution," an essay by Garrett P. Serviss, together with criticisms on the essay by R. G. Eccles, M.D., Professor Van der Weyde, and L. G. James, M.D.

— The "Truth Seeker Annual" for 1889 contains a fine picture of the statue of Giordano Bruno, soon to be erected in Rome, and two illustrations showing the Lick Observatory and its great telescope.

— During the session of the Electric Light Convention at Chicago last week, the *Western Electrician* issued a daily edition, containing full reports of the proceedings.

— Col. T. W. Higginson's poems, which Longmans, Green, & Co. are about to publish in New York and London, are dedicated to J. R. Lowell, "schoolmate and fellow-townsman." The volume is called "The Afternoon Landscape," for the morning of the poet's life is now past. The poems include the sonnet to "Duty" and the lighter stanzas on "A Jar of Rose-Leaves." Among the translations are Sappho's "Ode to Aphrodite," and a dozen sonnets from Petrarch and Camoens.

— "Micah Clarke: his Statement" is the title of an autobiographic tale of Monmouth's rebellion, which is soon to be published by Longmans, Green, & Co. It is rather a narrative of personal adventure than a romance, yet the author's art recalls both "Lorna Doone" and "Kidnapped." This is a tale of adventure, full of strong incident and vigorous character-drawing, with not a little incidental humor. Saxon is a younger brother of Dugald Dalgetty, and quite as delightful in his professional pride.

— The *Political Science Quarterly* for March opens with a striking article by H. L. Osgood, upon "Scientific Anarchism," reviewing the theories of Proudhon, and showing the aims of American anarchists. Professor Gustav Cohn of Göttingen, taking the progressive income taxes of Switzerland as his text, indicates the merits and the dangers of this democratic scheme of taxation. Mr. Arnold Forster (son of the late Irish secretary) presents forcibly the Unionist view of the Irish question. A conservative Frenchman, M. Gauvain, explains the causes of the present crisis in France, and the significance of "Boulangism." Mr. Bernheim sketches the history of the ballot in New York, and argues for the Australian System. Professor Woodrow Wilson analyzes and criticises Bryce's "American Commonwealth." The June number will contain an article by Professor Sloane of Princeton, editor of the *New Princeton Review*, and will continue and bring down to the 1st of May the "Record of Events" heretofore published in the *New Princeton Review*.

— W. J. Schofield, 105 Summer Street, Boston, Mass., has published "Political History since 1815 (excluding the United States)." This syllabus of lectures upon modern political history, prepared originally for use in the Massachusetts Institute of Technology, by C. H. Levermore, assistant professor of history, and D. R. Dewey,

assistant professor of economics and statistics, presents a skeleton of nineteenth century history down to 1889, and is based on copious references to standard works, and to important articles in the leading reviews.

— John Delay, New York, calls attention to the fact that the volumes in his new library of Gleanings from Foreign Authors are to be published at 30 cents, instead of 50 cents as previously advertised.

— Apropos of the arrival in the American market of his "Souvenirs d'un Homme de Lettres," it is said that Daudet is suffering from a hopeless nervous malady of the kind which wrecked Heine's life, and it is feared he may not be able to accomplish much more work.

— Mr. Ivan Panin, Wellesley, Mass., will print his lectures on Russian literature, delivered before the Lowell Institute, Boston, in a style uniform with his translations from Pushkin, as soon as he procures enough subscribers at $2 per volume. Names should be sent to the above address before April 1.

— *The Publishers' Weekly* announces that Mr. Samuel C. Eastman of Concord, N.H., while spending the summer in Denmark, translated, under the author's encouragement and supervision, Dr. George Brandes' "Impressions of Russia." Dr. Brandes was invited to deliver a course of lectures in French before the literary clubs of St. Petersburg and Moscow, and while there he was given remarkable facilities for studying the people and institutions of the country. His views are extremely lively and entertaining, and his frankness of criticism is so pronounced that the book was placed on the black list by the censor. The chapters on Russian literature are fresh and full of information, and the work is a decided addition to our knowledge of an extraordinary country. Mr. Eastman's translation will be shortly published by T. Y. Crowell & Co.

— The *Forum* for March begins its new volume with an article by Cardinal Manning, showing the evils of compulsory education, and opposing the reading of the Bible in the public schools. Dr. George P. Fisher of Yale University will write a refutation of Cardinal Manning's conclusion. A paper by Professor W. S. Scarborough, a negro, will explain the aspirations and hinderances of the negro in the South.

— Peter Paul & Brother, Buffalo, will publish immediately "The Champions of Agrarian Socialism, and their Teaching," from the German of the Rev. V. Cathrein, S.J.

— Brentano Bros. announce that they will publish shortly "Where the Trout Hide," giving a detailed description of a newly opened, easily acessible, and beautiful country, whose waters teem with brook trout, black bass, and land-locked salmon, by Kit Clarke, an angling enthusiast.

— It is said that Mr. Du Chaillu's book on the Norsemen has practically been reset for the sixth time, the author having made discoveries and revisions which involve important changes and additions. The whole work, which has 1,200 beautiful illustrations, will probably appear next month.

— A volume which promises to be of interest to Scotsmen and their descendants in this country will shortly be issued from the office of the *Scottish American*, New York. It contains a series of essays illustrative of Scottish life, history, and character, gathered together under the title of "Scotland and the Scots." The author, Mr. Peter Ross, has long been a diligent student of the history of the Scottish race on this side of the Atlantic; and in the opening essay, "The Scot in America," is given a succinct account of how the people of that nationality have aided in all the religious, military, educational, national, political, and other movements which make up the history of North America. Among the other essays are "The Scot Abroad," "Scottish Characteristics," "Scottish Sports," "Scottish Superstitions," and "Freemasonry and Robert Burns."

— J. B. Lippincott Company have in press the third revised and rewritten volume of "Chambers's Encyclopædia," which will be complete in ten volumes; a "Life of Henry M. Stanley," by Rev. H. W. Little; and "Examples, Rules, Tables, and References" for engineers, etc., by John Richards (subscription). They will also add to their medical list a "Cyclopædia of Diseases of Children," edited by Dr. J. M. Keating, to be in four volumes, sold by subscribtion; a new edition of the "Elementary Treatise on Human Anatomy," by Professor Joseph Leidy; "The Clinical Diagnosis of Non-Surgical Diseases," by Dr. Rudolf von Jaksch of Vienna, translated by Dr. Cagney of London; and a fifth volume in their "Practical Lessons in Nursing," devoted to "Diseases and Injuries of the Ear."

— A. Flanagan, 185 Wabash Avenue, Chicago, has issued a game of cards entitled "Literary Whist, or, Games of Great Men," prepared by N. O. Wilhelm. In playing the dozen or more games that may be played with these cards, it is expected that one may soon become acquainted with the lives, the works, and the characteristics of the world's greatest poets, prose writers, statesmen, warriors, scientists. Most of the games are simple enough for a child, or may be made abstruse for the learned. The set consists of 100 cards, $3\frac{1}{2} \times 2\frac{1}{2}$ inches. There are 26 "books" to be made or obtained. These are of poets, indicated by key-word P.; prose writers, key-word P.W.; soldiers, So.; statesmen, St.; scientists, Sc. Contemporaries of the same class are in the same book. Prominent traits and works are given with each name, so that in playing these games one acquires valuable knowledge while passing away a pleasant hour.

— Dr. H. A. Hare of the University of Pennsylvania has issued through P. Blakiston, Son, & Co., Philadelphia, his essay on "Mediastinal Disease," to which the Medical Society of London awarded the Fothergillian medal for 1888.

— Henry Worthington, 88 Liberty Street, this city, announces that he will furnish free, upon application, a handsomely illustrated catalogue descriptive of steam-pumps, pumping-engines, and hydraulic machinery.

— We learn from *Engineering* that the long-continued experiments which have been conducted on board the "Nettle" at Portsmouth, with the view of determining the respective merits of compound armor and of solid steel armor as a protection for battleships, have just been brought to a close. Only two Sheffield manufacturers sent in compound samples for competition; but the number of steel plates forwarded for trial amounted to eight, from as many makers, being two less than were expected. The ten-inch plates were attacked by steel and Palliser projectiles, at a range of thirty feet; and although two of the solid steel armor-plates, at least, underwent the crucial ordeal with satisfactory results, the superiority remained with the steel-faced armor now adopted in the English Navy.

— In experiments recently made in France on the elasticity of cork, it was found that disks of that substance, when submitted to a pressure of 1,100 kilograms per square centimetre, were compressed to one-fifth their thickness, and recovered their original dimensions in exactly ten minutes after the pressure was removed.

— The announcement recently made, that Professor Kruss of Munich had succeeded in decomposing nickel and cobalt, proves to be erroneous. What he has really done is to obtain from these two elements a third one, which existed in them as an impurity.

— In the March *Atlantic*, history is possibly the strong point, there being a paper on those two brave Scots, "The Keiths," by Hope Notnor, and one of Mr. Fiske's papers upon "Ticonderoga, Bennington, and Oriskany." Mr. Frank Gaylord Cook writes an article upon "Some Colonial Lawyers and their Work;" while a theme of a more recent day is treated in "Personal Reminiscences of William H. Seward," by Samuel J. Barrows, and his wife Isabel C. Barrows. The paper is especially interesting, since Mr. Barrows was private secretary to Mr. Seward, and Mrs. Barrows also acted temporarily in the same capacity. In this connection, Stuart F. Weld's consideration of "The Isthmus Canal and our Government" should be mentioned, and a review of Professor Bryce's book on "The American Commonwealth." Mr. James's serial, "The Tragic Muse," abounds in studies of personality, and Mr. Hardy's "Passe Rose" is interesting. The first part of a negro story called

"Hannah Calline's Jim," and an essay on "Simplicity," by Charles Dudley Warner, close the prose articles; and the poetry includes Mr. Whittier's "The Christmas of 1888," and verses by E. Wilson.

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 editor will be glad to publish any queries consonant with the character of the journal.

The Soaring of Birds.

SINCE my paper was reported in *Science* (xii. p. 267), Messrs. Oliver, Pickering, and MacGregor have favored the journal with letters on the subject.

Professor Oliver (xiii. p. 15), while admitting that the action I suggest is to some extent efficient in sustaining the bird, questions its sufficiency. I had asked the same question myself, and found no answer; but I am glad to know, through private correspondence, that Professor Oliver and at least one other physicist are disposed to put the question to nature through experimentation.

Professor Oliver also suggests minute vibratory motions of the wings, or perhaps of the individual wing-feathers, and cites an observation by another. The same hypothesis was advanced in explanation of the allied phenomenon of hovering, but was rejected on the strength of what seemed sufficient observation (*Nature*, viii. p. 324; ix. p. 5). The hovering bird remains in one place for so long a period that he can be deliberately and carefully watched.

Mr. Pickering and Professor MacGregor each proposes an explanation different from mine, and not involving differential air movements, but appealing instead to a homogeneous and uniform wind. Their conception of relative velocities is so different from mine, and I am so confident in the correctness of my own, that I am led to suspect I have not made my meaning clear, and I therefore ask the privilege of restatement.

As I conceive the matter, the horizontal velocity of the bird with reference to the earth has no importance, and should be ignored. The earth enters the problem only by means of its attraction. Except for the gravitational pull, we need not consider the bird in relation to any thing except the air. If a cloud intervened between the bird and the earth, so that he could not see the ground, he would not know in which direction the air surrounding him was passing over the earth; but the possibility of his soaring would not be affected by that ignorance. Provided the air in which the bird floats is not disturbed thereby, his motions would not be affected by the sudden reversal of the direction of rotation of the earth, although such a reversal would enormously change the relative velocity of bird and earth.

In my analysis of the subject I spoke of winds, that is, currents of air moving horizontally with reference to the earth, because such language afforded me a simple means of expression, and for that reason only. In so doing I took a special case as illustrative of the general case. As this seems to have been misunderstood by some of your correspondents, I will repeat the analysis in more general language.

Let the line AB represent in section a horizontal plane within the atmosphere. Conceive the body of air above this plane and the body of air below it to have different motions, such that their differential motion has the direction indicated by the arrows; that is

to say, the upper body referred to the lower moves from B to A, or the lower body referred to the upper moves from A to B. The movement of the two bodies collectively may be in any horizontal direction. They may both move toward A, the upper moving the swifter. They may both move toward B, the upper moving the slower. Either may be still and the other move past it, or they may move in directions approximately normal to the paper. My only postulates are, that their motions have no vertical component, and that their differential motion, i, has the direction expressed by the arrows.

The oval curve represents the assumed orbit of the bird as presented to an eye nearly in its plane. The bird ascending on one side of this orbit through the point C has, just before reaching that point, a velocity V as referred to the lower body of air, in which it is then moving. Immediately after passing C, his velocity referred to the upper body of air, in which he is then immersed, is $V + i$. He moves faster in the upper air, because when he enters it his direction is opposed to the direction of the differential motion of the upper air referred to the lower. His absolute motion both before and after passing the plane of separation is the same; but his relative velocity, that is, his velocity referred to the air through which he is passing, has been increased by the quantity i. Continuing on his circling orbit, he first ascends and then descends, reaching the plane of separation at the point D. While he ascends, gravity retards his motion; while he descends, his motion is accelerated by gravity to the same extent; so that he returns to the plane at D with the same velocity ($V + i$) with which he left it at C. He now passes from the upper body of air to the lower body in such direction that he again increases his relative velocity. As soon as he has passed D, his velocity referred to the lower air is $V + 2i$. Continuing to C, he first descends and then ascends, his velocity being first accelerated by gravitation, and then retarded by the same amount; so that he reaches C with the velocity $V + 2i$, in place of the previous velocity V, having gained the velocity $2i$ by passing in suitable directions to and fro between the differentially moving bodies of air.

The various qualifications of this theorem, and its relation to the problem of soaring, need not be repeated here. All that is now attempted is to show that the essential parts of the analysis are absolutely independent of the direction and velocity of air movement as referred to the ground.

It appears to me that Mr. Pickering and Professor MacGregor, by referring the motions of the bird partly to the ground and partly to the air, engender confusion, and are led to assume untenable positions. Mr. Pickering (xiii. p. 31) says that a piece of paper floating on the air is carried along horizontally with the velocity of the wind, but that a soaring bird does not drift so fast. Then, to account for the floatation of the bird, he appeals to the "force exerted on him by the wind, owing to the fact that he does not move along as fast as the surrounding air." Thus he assumes a force tending to prevent the bird from drifting horizontally with reference to the earth; and this assumption reduces the problem to practical identity with the problem of the ascent of a boy's kite. In point of fact, the assumed force does not exist: the only re-action between the bird and the earth is through gravity, and the direction of gravitation is vertical. If it be true that the soaring bird drifts less rapidly than the piece of paper, the explanation lies in something that the bird does; and that thing, whatever it is, costs energy. Appealing to the bird's net movement against the wind as a source of energy merely shifts the point of difficulty, for his net movement against the wind must then be explained.

Professor MacGregor says, "Let us suppose, now, that a bird is at any instant moving horizontally, in the same direction as the wind, and with a small velocity relative to the earth. . . . As his speed increases, the velocity of the wind relative to him diminishes" (xiii. p. 152). Now, if the velocities of bird and wind relative to the earth are so related that increase of the bird's speed diminishes the velocity of the wind relative to him, then it must be that the wind is moving faster than the bird, or is overtaking him. The context shows that Professor MacGregor conceives the bird to face in the direction toward which the wind blows, and it follows that with reference to the air the bird is moving tail first. I am confident that no ornithologist will admit the possibility of such flight; and its implicit postulation could hardly have occurred had the problem been stated wholly in terms of bird and air instead of being stated partly in terms of bird and ground. A little further on he says, "Let us suppose that in wheeling he maintains his velocity relative to the earth as well as his elevation. Then [after wheeling], starting upwards with a considerable velocity, he will clearly be able to rise through a certain height before his velocity has been reduced to its initial value." The assumption that the bird in wheeling maintains his velocity relative to the earth