SCIENCE:

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Communications will be welcomed from any quarter. Abstracts of scientific papers are solicited, and twenty copies of the issue containing such will be mailed the author n request in advance. Rejected manuscripts will be returned to the authors only when the requisite amount of postage accompanies the manuscript. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guaranty of good faith. We do not hold ourselves responsible for any view or opinions expressed in the communications of our correspondents.

Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

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CONTENTS:

BOOK-REVIEWS.

A Text-Book of Animal Physiology. By WESLEY MILLS. New York, Appleton. 8°.

UP to the present time no work on physiology has been written which has been based on the comparative method. Hardly a book which treats of zoölogy has been published, within recent years, but has this method as a foundation. The book before us is an attempt on the part of the author to do for physiology what has already been done for morphology. In his preface he calls attention to an error which is found in too many works on human physiology, — the application to man of conclusions which have been deduced from experiments on lower animals. That this is thoroughly illogical goes without saying, and yet many writers of physiological text-books constantly err in this direction.

Professor Mills commences his treatment of the subject with the consideration of general biology, describing the cell, both animal and vegetable, and then passing on to unicellalar, parasitic, and multicellular organisms. The origin of the forms of life finds a place in the author's plan for a concise and yet sufficiently extensive statement of the arguments of evolution. Reproduction, which is usually left until the last subject for consideration, is taken up early for discussion, and this portion of the work is one of the best. The general treatment of special physiology is excellent. The "summary" which is found at the conclusion of each subject treated is a most valuable addition. Especially worthy of commendation is the table of contents, than which we do not remember ever to have seen one more full or more convenient for reference. The five hundred illustrations are well selected and admirably executed. As a whole, this text-book will be acceptable to all teachers and students of physiology, and, as it contains matter not found in any book on the subject which has as yet appeared, no other can take its place. It certainly deserves the name of being unique, especially in the plan upon which it is written.

The Lost Inca. A Tale of Discovery in the Vale of the Inti-Mayu. By the INCA-PANCHO-OZOLLO. New York, Cassell. 12°.

THIS is a pleasing novel by a writer evidently possessed of more genius than art, who hides his identity behind a pseudonyme, and makes himself the hero of his own story. The scene is laid in the Peru of the present, geographically modified to meet the demands of the occasion, and the action is a curious blending of the past with the present, and the possibilities of the future. Peru is a land rich in romantic traditions, which are lifted from the realm of fiction by the evidences of her antiquities; and it is strange that novelists, to whom these traditions should be suggestive and fruitful material, have so long neglected them.

The writer of this novel, who has evidently travelled in Peru, and given some attention to its antiquities and traditions, bases his work upon the mysterious disappearance of Manco-Capac, the last of the Incas, from the presence of his conquerors, as detailed by Prescott in his "Conquest of Peru." In working out his plot, the author sometimes outdoes Jules Verne in his inventions, though his evident lack of patient attention to details, so characteristic of that author, leads him into blunders that will furnish mirth to historians, engineers, and electricians. For instance, he travels on the Mollendo and Puño Railroad some three years before the contract for its construction was signed. Reaching Lake Titicaca, he embarks on a flat-bottomed, stern-wheel steamboat, constructed some time previously, under his own supervision, at Wilmington on the Delaware. One of the peculiar features of this boat is that the engines are located on the upper deck, amidships. Besides the engines, she was provided with electric motors, "served by six immense storing batteries disposed symmetrically on both sides the kelson." These batteries are charged by the "economical utilization of the nearly constant north-east winds of the lake, which generated electricity by means of machinery designed for the purpose." This was in 1865. But these are only slight flaws. When the author reaches the hidden fastnesses of the Lost Inca's ideal kingdom, all is beyond criticism. Here Verne, Bellamy, and Henry George seem to have combined forces in an attempt to improve on More's Utopia, and the result might furnish suggestions to Edison as an inventor and to Ingersoll as a reformer. The book is certainly interesting and edifying, if not instructive.

AMONG THE PUBLISHERS.

AMONG the contents of *Outing* for January, we note "Wabun Anung," a tale of sport in the Great Lake region, by F. Houghton; "The Merits and Defects of the National Guard," by Lieut. W. R. Hamilton (second paper); "Gymnastics for Ladies," by W. G. Anderson, M.D.; "Fly-catcher," a tale of the hunt cup, by Hawley Smart; "Brant Shooting on Smith's Island," by Alexander Hunter; "Haak Fishing off Ireland's Eye," by Robert F. Walsh; "Alligator Shooting in Florida," by J. M. Murphy; "California Winter Resorts," by C. H. Shinn; "Ice Yachting, the Prospects of the Sport," by W. W. Howard; "Catching Frost Fish with a Shot-Gun," a story of Australian sport, by Edward Wakefield; and "Instantaneous Photography," by W. I. Lincoln Adams.

— P. Blakiston, Son, & Co., medical and scientific publishers, booksellers and importers, 1012 Walnut Street, Philadelphia, will publish in January "Massage and the Original Swedish Movements: their Application to Various Diseases of the Body," a manual for students, nurses, and physicians, by Kurre W. Ostrom, from the Royal University of Upsala, Sweden; a text-book on mental diseases, having special reference to the pathological aspects of insanity, by Bevan Lewis, medical director, West Riding

Asylum, Wakefield, England; and "A Manual for Nurses," being a complete text-book, including general anatomy and physiology, management of the sick-room, etc., by Laurence Humphrey, assistant physician to, and lecturer at, Addenbrook's Hospital, Cambridge, England.

— A. D. F. Randolph & Co. have in press a work on "The Bible and Modern Discoveries," by Henry A. Harper.

— The J. G. Cupples Company will publish shortly a volume of European travel, entitled "A Bundle of Letters from Over the Sea," by Louise B. Robinson, well known in artistic and social circles of Boston.

— P. Blakiston, Son, & Co., Philadelphia, announce that they have arranged with the London publishers to reprint here a new text-book on anatomy, by Professsor Alexander Macalister of the University of Cambridge.

— A catalogue of a collection of books, comprising Americana, including many rare genealogies and local histories, natural history, biography, numismatics, occult sciences, South America, the West Indies, etc., was issued under date of Dec. 15, 1889, by S. H. Chadbourne, Hotel Dartmouth, 57 Warren Street, Roxbury, Mass.

— As a memorial of a distinguished administrator, and to further the cause of imperial federation, Mr. Stanley Lane-Poole has edited the paners of Sir George Bowen, and they will be published immediately in London and New York by Longmans, Green, & Co. In one of Sir George's earlier letters there is a pleasant glimpse of Washington society during Grant's administration.

— The Open Court Publishing Company of Chicago announces the immediate appearance of the authorized translation of M. Th. Ribot's "Psychology of Attention." The monograph of M. Ribot, who is now professor of experimental and comparative psychology at the Collège de France, and editor of the *Revue Philosophique*, has been characterized by a prominent French critic as the most important production of the French philosophical press for the present year.

— Dr. Holmes's "Over the Teacups," and the first instalment of Mr. Frank Gaylord Cook's series of papers on "Forgotten Political Celebrities," are in the *Atlantic* for January. Dr. Holmes writes about old age. He says, "There is one gratification an old author can afford a certain class of critics, — that, namely, of comparing him as he is with what he was. If the ablest of them will only write long enough, and keep on writing, there is no pop-gun that cannot reach him." Another political article, "The United States Pension Office," by Gaillard Hunt, contains suggestions as to the reform of the present pension system. "A Precursor of Milton," a certain Avitus, Bishop of Vienne in the fifth century, forms also the subject of one paper.

— The *Critic* announces that with the new year Dr. W. J. Rolfe of Cambridgeport, Mass., the distinguished Shakspearian scholar, will take charge of a department in that paper to be entitled "Shakspeariana." In this department he will review new editions of Shakspeare's works, together with new publications relating to those works and their author, and will answer any questions concerning them that show an intelligent interest in the subject on the part of the inquirer. The study of Shakspeare has assumed such proportions nowadays as to demand special treatment in literary journals of a serious character. Dr. Rolfe will edit the Shakspearian department of no other periodical while he has charge of the one to be opened next month in the *Critic*.

— Mr. Edward Atkinson will open the January *Popular Science Monthly* with a paper on "The Future Situs of the Cotton-Manufacture of the United States," in which he answers the questions whether the number of spindles in this country is being increased faster than the demand for their products, and whether the South is likely to become a formidable competitor of New England in the cotton-manufacture. A series of six Chinese pictures, illustrating the processes of cotton-manufacture in China, embellish the article. Herbert Spencer was recently quoted in the London *Times* as favoring the nationalization of land, which drew out a letter from him repudiating the doctrine as ascribed to him. This led to a lively discussion, in which Professor Huxley, Sir Louis Mallet, and others took part, and a variety of views on the general question were expressed. The correspondence will be printed in the same number under the title "Letters on the Land Question." "Public Schools as affecting Crime and Vice" is the title of another article, by Benjamin Reece, to appear in this number. Mr. Reece cites figures which show that crime does not decrease as illiteracy is diminished, and says that our school system should be made more effective by the addition of moral teaching. An interesting account of the "Irrigation of Arid Lands" in the Far West will be given by Henry J. Philpott. The effect which this practice has on the methods of agriculture, the interest of farmers in the science of meteorology, and on state and national legislation, are also brought out in the article.

— Houghton, Mifflin, & Co. have nearly ready the concluding volume of Justin Winsor's valuable "Narrative and Critical History of America." It covers the later history of British, Spanish, and Portuguese America. A general index accompanies it. They will also publish at an early day a new brochure by Professor E. N. Horsford, on "The Discovery of the Ancient City of Norumbega." The substance of the book was communicated to the president and council of the American Geographical Society, at a special session in Watertown, on the 21st of November last. In addition to the historical address, there will be photographs of the site of the ancient city, sixteen maps from Icelandic sources down to the United States Coast Survey, and an original map of the valley of the Charles River from Stony Brook to Cambridge. The book will also include the "Poem of Vinland," delivered at Watertown by Mr. E. H. Clements of the Boston *Transcript*.

— The fourth number of the second volume of the *American Journal of Psychology*, just at hand, contains an interesting collection of folk-tales of the Bahama Islands, by Charles L. Edwards; a critical exposition of the characteristics of symbolic logic, by Christine Ladd Franklin; and the concluding chapter of Dr. W. H. Burnham's historical study of memory, this chapter dealing with recent theories and the results of experiment, and closing with an extended bibliography of the whole topic; the usual fifty odd pages of reviews, abstracts and notes on the nervous system (by Dr. H. H. Donaldson), experimental psychology (including an original paper on colored shadows by E. B. Delabarre), hypnotism, etc., covering from seventy-five to eighty books and articles. The notes are followed in this number by a brief survey, by the editor, of progress in the psychological field during the two years of the journal's existence. With the first number of Vol. III., to appear in January, 1890, material changes in the form of the journal are promised, and a new department will be added. Special efforts will be made not only to enlarge the scope and improve the quality of the journal, but more attention will be given to foreign work in psychological lines. During Dr. Hall's recent year in Europe, he was at pains to make such foreign connections as will forward this end. In Vol. III. the following larger contributions will appear: a very detailed examination of the brain of Laura Bridgman, several studies in paranoia and other rare and borderland forms of mental alienation, a continued history of reflex action, and a series of articles embracing reviews of recent and important literature on heredity and the psychology of sex. It is probable, also, that the educational material will be increased on both its psychological and university sides. During the past year the journal has been under the efficient editorial care of Dr. E. C. Sanford: with the next number Dr. Hall will re-assume personal direction, and will probably associate with himself in the editorial work other well-known psychologists.

— *The Ladies' Home Journal* (Philadelphia) has secured its large circulation by believing in woman and home as the two greatest factors of human life. It has aimed to cover every department of life in which women are interested. Its purpose has been to make woman's daily life easer and brighter. The actual circulation is said to be 542,500 copies per month in 1889. For 1890 the journal has a most promising prospectus, including among many others such features and authors as "Two Sides of Washington Life," by two of the "most famous women" at the nation's capital, telling of the trials and pleasures of official and social life in Washington; "New York Fashionable Life and Women" as seen by Mrs. John Sherwood; "Woman's Life in Foreign Lands," by sev-

eral writers now travelling in Europe; "Mrs. Harrison in the White House," — a paper telling of the daily life of the President's wife, — authorized by Mrs. Harrison, and written by one of the attachés of the White House; "Mary J. Holmes's Travels Abroad," in European capitals and countries. Articles by such writers as Mrs. Lew Wallace, Elizabeth B. Custer, Blanche Willis Howard, Julia Ward Howe, Harriet Prescott Spofford, Susan Coolidge, Dr. William A. Hammond, Anna Katharine Green, Mrs. Henry Ward Beecher, Grace Greenwood, Ella Wheeler Wilcox, Margaret J. Preston, Rev. Robert Collyer, D.D., and Kate Upson Clarke, will be features of each number. The new regular department by Rev. T. De Witt Talmage, D.D., we have already referred to. In this the famous preacher will talk on all subjects of interest to woman. The department will be called "Under my Study Lamp." Fifteen departments for woman's daily life will be sustained by the journal, including "Side-Talks with Girls," "Practical Housekeeping," "Artistic Needlework," "The Latest Fashions," "All about Flowers," "Facts for Mothers."

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.*

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

On request, twenty copies of the number containing his communication will be furnished free to any correspondent.

Is Man Left-Legged?

IN view of the subjoined facts and remarks, we would seem justified in awaiting the presentation of more statistics and investigations, before giving an affirmative answer to the above query.

1. Of over fifty men questioned by the writer, every one answered that he would kick a foot-ball with his right foot, except two, one of whom was left-handed, the other ambidextrous; and out of forty boys interrogated by the school superintendent here, thirty-eight kicked with the right foot, and the two others equally well with either foot, both being ambidextrous.

2. About half of those asked took the spring, in leaping, from the right foot, and alighted on the left; the other half, the reverse. The strain and force required in either case seem about equal.

3. Every shoe-merchant of this place testified that nearly all their customers preferred trying a new boot or shoe on the right foot, considering that one the larger, especially in breadth.

4. Standing on either leg, and using it more, would rather tend to consolidate the bone, and develop the muscle, of that leg: hence the somewhat increased length of the left leg, indicated by Dr. Sibley, might denote comparative weakness. Besides, if the greater length of the leg is admitted as evidence of left-leggedness, by parity of reasoning, we should find the right arm, on right-handed people, longer than the left; which, from such evidence as the writer has been able to obtain, is not the case.

5. The recruit is taught, at the word "forward," to throw his weight on the right foot; and, at the word "march," to step off with the left. This position, in olden warfare, would be favorable for the use of the shield, the spear, and the cross-bow, and in modern times is equally appropriate for a bayonet charge or for firing, by right-handed men. In dancing, the instructions are invariably to begin the "chassez," and similar movements, with the right foot. Piano and harp pedals, besides various treadles for harvesters and other agricultural implements, etc., are usually made to accommodate the right foot.

6. That man is naturally right-handed, is stated to arise from a physiological cause (see Bell's "Bridgewater Treatise on the Hand," or McClintock's "Biblical Cyclopædia," when commenting on the ambidextrous Benjamites); and the same cause would be likely to strengthen the whole side, including leg and foot.

7. In the West, our race-courses, quite as often as otherwise, are so arranged as to make the horse and rider, or sulky driver, curve to the left. Circus-riders invariably follow the left-hand curve, in order to mount and dismount on the near side. The reason for generally mounting on the left is obvious. Every right-handed man, in going to battle, has his sword in scabbard on his left side, and seizes his bridle-rein with his left hand: hence the necessity of mounting from the near side, and placing the left foot in the stirrup, but all the weight comes on the right stirrup, when wielding the sabre, battle-axe, or lance; and the lunge with the foil or small-sword is made with the right foot, by right-handed men.

8. As in dancing the lady is on the right of her partner, naturally in "hands round" or "balance all," or in the first movement of the waltz, the turn is to the right; but in each case the circle pursued is a left-hand curve: so that the argument on that point seems to have little force.

9. Backwoodsmen state, that, when lost in the forest, they usually find they have wandered in a left-hand curve, and come back nearly to the place of starting; and experiments in wheeling a wheel-barrow when blindfolded usually result in the stronger right leg gaining on the left, thus producing an inclination to the left hand.

If the officers of athletic college-clubs at Harvard, Yale, Princeton, etc., would be kind enough to report to *Science* the percentage of those students who kick the foot-ball with the right foot, and the comparative measure between the right and left leg in circumference around the muscular portion, it would aid much in arriving at the truth, especially if the small percentage kicking with the left proved to be either left-handed or ambidextrous.

RICHARD OWEN, M.D.

New Harmony, Ind., Dec. 20.

On Physical Fields.

WHEN the physical state of a body re-acts upon the medium that surrounds it so as to produce in the medium a state of stress or motion, or both, the space within which such effects are produced is called the "field" of the body. When a body is made to assume two or more physical states simultaneously, each state produces its own field independent of the existence of the others: hence two or more fields may co-exist in the same space. For instance: if a magnet be electrified, both the magnetic and the electric fields occupy the same space, and each as if the other did not exist.

PROPERTY OF VARIOUS FIELDS.

I. The Electric Field. — Suppose a glass rod be electrified with silk or cat skin. It is experimentally known that other bodies in its neighborhood are physically affected by its mere presence without contact, and various motions result which are commonly attributed to electric attraction or repulsion. The phenomena are explained as due to the stress into which the neighboring ether is thrown by the electrified body, the stress re-acting upon other bodies, and moving them this way or that as the stress is greater here or there. Suppose an electrified mass of matter remote from any other matter, in free space. The field, or the stress that constitutes it, is found to vary in strength inversely as the square of the distance from the body in every direction about it, which shows that the effect upon the ether is uniform in all directions, and that for such a stress under such conditions the ether is isotropic. Experiment shows that this kind of a stress travels outwards with the velocity of 186,000 miles a second, or the same as that of light, which shows that the velocity of motion in the ether depends solely upon the properties of the ether, and not at all upon the source of the disturbance. If this assumed electrified mass of matter were the only matter in the universe, then its electric field would be as extensive as the universe, and any electric change in the mass would ultimately re-act upon the whole of space, and be uniform in every direction. If, however, there be another mass of matter in proximity to the first, the disposition of the stress is altogether different; for instead of being disposed radially, as in the first case, the field is distorted by the re-action of the stressed ether upon the second body. The so-called "lines of force" bend more or less towards the second body, and the field stress becomes denser between the bodies at the expense of the field more remote. If this advancing stress in the ether from an electrified body be called radiation, and it seems to be an action of that kind, then it appears that the direction of such radiation depends upon the existence of other bodies in the ether. It is truly rectilinear no further than the shortest distance between the two bodies.

The electric field thus produced, and thus re-acting upon an-