judgment of the most prudent naturalists the real use of the luminosity of these insects is still utterly unknown.

Can any of the readers of *Science* give me "a great light" on the subject in dispute? CHARLES NIEDLINGER.

New York, 5 East 16th St., Sept. 26.

BOOK-REVIEWS.

An Account of the Principal Facts and Theories Relating to the Colors and Markings of Animals. By FRANK E. BEDDARD, M.A. New York, Macmillan & Co. 8°. $3.50.

THERE is significance in the number of recent works involving a discussion of questions of biological philosophy and a presentation of fundamental principles to intelligent non-scientific thinkers. Starting with Darwin's "Origin of Species," a steadily increasing volume of this kind of literature has been produced to supply an intellectual demand, in itself a grateful proof of the re-adjustment and betterment of the relations between scientists and other thinkers.

Among these newly developed lines of thought, none is more interesting than the significance of coloration in the organic world; and none deals with a subject more intrinsically beautiful. The work under review is an attractive book on an attractive subject. The press-work is good, the type clean and sufficiently large. The four colored plates are a feature which will be much appreciated, while the wood-cuts are well selected and well executed, with the exception of the illustration of the sloth, which is little short of execrable.

The classification of colors according to their supposed purpose is much less intricate than that adopted by Poulton, and not very unlike that of Wallace. A compromise between Poulton and Beddard would have its advantages. Contrary to the promise of the author in the introductory chapter, he has used insects almost, if not quite, as much as Poulton in the presentation of his subject. The author says that his book "contains nothing novel," but we think that he is over modest in this, for his excellent series of experiments for the purpose of determining the palatability of various animals is both new and very much to the point.

In the introductory chapter the origin of animal coloration is explained, and an indication of the anti-Darwinian trend of the work is furnished by a denial of the fact that coloration is always in harmony with the mode of life of the animal, a question which might still be left *sub judice*. Albinism is considered an individual variation, although there is much to indicate that it is a physiological weakness or dermal disease. Although Mr. Beddard does not touch upon the transmission of acquired characters, perhaps thereby showing his wisdom, he is evidently intensely Lamarckian in his beliefs. A comparison between Wallace's "Darwinism" and Beddard's "Coloration of Animals" would be instructive perhaps, but sorely perplexing to the general student, who cares more for ascertaining the truth than being *au fait* in theories. Natural selection is apotheosized by the former, while no author is more persistent in his attempts to minimize the effects of natural selection than the latter. Here again middle ground would seem more safe.

Our author concludes that "the brilliant and varied coloration of deep-sea animals is totally devoid of meaning," a conclusion that will doubtless meet with considerable opposition.

Chapter II., on coloration as affected by environment, is a thoroughly Lamarckian chapter with many significant facts. The nature and quantity of food is held to materially affect coloration. Moisture deepens colors, while a dry climate lightens them. The white of Arctic animals, it is maintained, is due to environment, although this proposition can hardly be said to be substantiated in a satisfactory manner.

In Chapter III., on protective coloration, this well-worn but never tiresome subject is illustrated by a large number of examples in much the usual way. The author is surprised at the small number of green animals frequenting trees. We are inclined to think the number much greater than he admits. For instance, a

vast multitude of birds are green or olivaceous, at least dorsally. On the other hand, tree-frequenting animals, perhaps a majority of them, are better protected by a color-resemblance to *bark* than to leaves, and they are certainly so protected. The author combats here, as elsewhere, the exclusive or even general agency of natural selection. He confesses that "at every step, in fact, in the study of animal coloration we are met with closed doors, which can only be unlocked by keys furnished by an intimate chemical and physiological knowledge, such as we do not at present possess."

In Chapter IV., on warning coloration, we find the most valuable original feature of the work — the numerous experiments with the palatability of animals, especially insects generally supposed to illustrate warning coloration. These experiments, although furnishing somewhat contradictory evidence, are in the main a valuable confirmation of previous ideas. Dr. Eisig's theory of warning colors is advocated. He thinks that "the brilliant colors have caused the inedibility of the species, rather than that the inedibility has necessitated the production of bright colors as an advertisement," a somewhat startling if not revolutionary idea.

Chapter V. is on protective mimicry. This ever-delightful theme is well handled, although we can hardly repress an instinctive shudder at the iconoclasm which seeks to tear down the exquisite structure so beautifully wrought by Bates, Wallace, Belt, and others, and we hope to be forgiven for expressing a perhaps unscientific but deep-seated aversion to this attempted destructive criticism of the conclusions of those whose knowledge was gained in the woods and fields rather than in the laboratory or dissecting-room.

Chapter VI. treats of sexual selection; but lack of space forbids more than a mention of this chapter, except to enter a protest against the idea that birds do not possess an exalted æsthetic sense. Here again the field-naturalist will be apt to agree with Poulton, who, after presenting a large array of facts, says: "Such facts point toward the existence of a widespread æsthetic sense in the higher animals."

The book as a whole is a valuable contribution to the literature of an intensely interesting subject, and will doubtless be read with pleasure and profit by thousands who do not claim to be scientists.

C. C. NUTTING.

State University, Iowa City, Iowa.

Handbook of School Gymnastics of the Swedish System. By BARON NILS POSSE. Boston, Lee & Shepard.

THE merit of the Swedish system consists in the effort to develop in a scientific and systematic manner all the parts of the body. It is not an attempt to make a derrick of the human body by the excessive development of a few lifting muscles, nor does it aim at drills which make an attractive show by the simultaneous movements of identical parts of the body. It discards the old rhythmical and automatic movements as being of but little value. The fundamental principles and advice which form the introductory portion of this little handbook give this definition: "The aim of educational gymnastics is to develop the body into a harmonious whole under the perfect control of the will. It is not to produce great bulk of muscle, but to cause that already present to respond readily to volition, to improve the functional activity of the body, and to counteract and correct tendencies to abnormal development, especially those resulting from 'the artificial life of civilization.' . . . Movements are chosen for physical and physiological effects, local or general, so that only those exercises are used whose effects are needed, and those are excluded whose effects are doubtful or pernicious."

Attention in this country was first called to the Swedish gymnastics by the introduction of the Swedish movement-cure. Though we derive this massage treatment from Sweden, the Japanese have practised a similar method for centuries, utilizing blind people as masseurs.

This handbook will be of great assistance to those who have studied the system.

TO THOSE INTERESTED IN SCIENCE.

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Zoology in the Public Schools of Washington, D. C.

Some of the Contributors to *Science* Since Jan. 1, 1892.

Aaron, Eugene M., Philadelphia, Pa.
Allen, Harrison, Philadelphia, Pa.
Ashmead, Albert S., New York City.
Bailey, L. H., Cornell University, Ithaca, N. Y.
Baldwin, J. Mark, University of Toronto, Canada.
Ball, V., C. B., LL.D., F.R.S., Dublin, Ireland.
Barnes, Charles Reid, Madison, Wis.
Baur, G., Clark University, Worcester, Mass.
Beal, W. J., Agricultural College, Mich.
Beals, A. H., Milledgeville, Ga.
Beauchamp, W. M., Baldwinsville, N.Y.
Bell, Alexander Graham, Washington, D. C.
Boas, Franz, Clark University, Worcester, Mass.
Bolley, H. L., Fargo, No. Dak.
Bolles, Frank, Cambridge, Mass.
Bostwich, Arthur E., Montclair, N.J.
Bradley, Milton, Springfield, Mass.
Brinton, D. G., Philadelphia, Pa.
Call, E. Ellsworth, Des Moines, Ia.
Chandler, H., Buffalo, N.Y.
Comstock, Theo. B., Tucson, Arizona.
Conn, H. W., Middletown, Conn.
Coulter, John M., Indiana University.
Cragin, F. W., Colorado Springs, Col.
Cresson, Hilborne T., Philadelphia, Pa.
Davis, W. M., Harvard College, Cambridge, Mass.
Dimmock, George, Canobie Lake, N.H.
Dixon, Edward T., Cambridge, England.
Farrington, E. H., Agric. Station, Champaign, Ill.
Ferree, Barr, New York City.
Fessenden, Reginald A., Lafayette, Ind.
Flexner, Simon, Johns Hopkins, Baltimore, Md.
Foshay, P. Max, Rochester, N.Y.
Gallaudet, E. M., Kendall Green, Washington, D.C.
Garman, S., Mus. Comp. Zool., Cambridge, Mass.
Gibbs, Morris, Kalamazoo, Mich.
Golden, Katherine E., Agric. College, Lafayette, Ind.
Grinnell, George B., New York City.
Hale, Edwin M., Chicago, Ill.
Hale, George S., Boston, Mass.
Hale, Horatio, Clinton, Ontario, Canada.
Hall, T. Proctor, Clark University, Worcester, Mass.
Halsted, Byron D., Rutg. Coll., New Brunswick, N.J.
Haworth, Erasmus, Oskaloosa, Iowa.
Hay, O. P., Irvington, Ind.
Haynes, Henry W., Boston Mass.
Hazen, H. A., Weather Bureau, Washington, D.C.
Hewitt, J. N. B., Bureau of Ethnol., Washington, D. C.
Hicks, L. E., Lincoln, Neb.
Hill, E. J., Chicago, Ill.
Hill, Geo. A., Naval Observatory, Washington, D.C.
Hitchcock, Romyn, Washington, D.C.
Holmes, E. L. Chicago, Ill.
Hoskins, L. M., Madison, Wis.
Hotchkiss, Jed., Staunton, Va.
Houston, Edwin J., Philadelphia, Pa.
Howe, Jas. Lewis, Louisville, Ky.
Hubbard, Gardiner G., Washington, D.C.
Jackson, Dugald C., Madison, Wisconsin.
James, Joseph F., Agric. Dept., Washington, D.C.
Johnson, Roger B., Miami University, Oxford, O.
Keane, A. H., London, England.
Kellerman, Mrs. W. A., Columbus, O.
Kellicott, D. S., State University, Columbus, O.
Kellogg, D. S., Plattsburgh, N. Y.
Lintner, J. A., Albany, N. Y.
Loeb, Morris, New York City.
Mabery, Charles F., Cleveland, Ohio.
Macloskie, G., Princeton, N.J.
McCarthy, Gerald, Agric. Station, Raleigh, N. C.
MacDonald, Arthur, Washington, D.C.
MacGregor, J. C., Halifax, Nova Scotia.
MacRitchie, David, Easter Logie, Perthshire, Scotland.
Marshall, D. T., Metuchen, N.J.
Mason, O. T., Smithsonian Inst., Washington, D. C.
Millspaugh, Charles F., Morgantown, W. Va.
Morse, Edward S., Salem, Mass.
Nichols, C. F., Boston, Mass.
Nuttall, George H. F., Johns Hopkins, Baltimore Md.
Oliver, J. E., Cornell University, Ithaca, N.Y.
Osborn, Henry F., Columbia College, New York City.
Osborn, Herbert, Agricultural College, Ames, Iowa.
Pammel, L. H., Agricultural Station, Ames, Iowa.
Pillsbury, J. H., Smith College, Northampton, Mass.
Poteat, W. L., Wake Forest, N. C.
Preble, Jr., W. P., New York City.
Prescott, Albert B., Ann Arbor, Mich.
Riley, C. V., Washington, D. C.
Ruffner, W. H., Lexington, Va.
Sanford, Edmund C., Clark Univ., Worcester, Mass.
Scripture, E. W., Clark University, Worcester, Mass.
Seler, Dr. Ed., Berlin, Germany.
Shufeldt, R. W., Washington, D.C.
Slade, D. D., Museum Comp. Zool., Cambridge, Mass.
Smith, John B., Rutgers Coll., New Brunswick, N. J.
Southwick, Edmund B., New York City.
Stevens, George T., New York City.
Stevenson, S. Y., Philadelphia, Pa.
Stone, G. H., Colorado Springs, Col.
Taylor, Isaac, Settrington, England.
Thomas, Cyrus, Washington, D. C.
Thurston, R. H., Cornell University, Ithaca, N.Y.
Todd, J. E., Tabor, Iowa.
True, Frederick W., Nat. Mus., Washington, D.C.
Turner, C. H., Univ. of Cincinnati, Cincinnati, O.
Wake, C., Staniland, Chicago, Ill.
Ward, R. DeC., Harvard Univ., Cambridge, Mass.
Ward, Stanley M., Scranton, Pa.
Warder, Robert B., Howard Univ., Washington, D.C.
Welch, Wm. H., Johns Hopkins, Baltimore, Md.
West, Gerald M., Clark University, Worcester, Mass.
Whitman, C. O., Clark University, Worcester, Mass.
Williams, Edward H., Lehigh Univ., Bethlehem, Pa.