fourths of an inch. On this account the pieces to be preserved must not be too large.

The best formula for Müller's fluid known to me is:—

Bichromate of potassium	2 per cent
Sulphate of sodium	2 " "
Water	96 " "

In practice it is convenient and sufficiently exact to dissolve two grammes of each salt in 1,000 cubic centimetres of water.

It will be, I am sure, a pleasure to many naturalists in America to learn of an opportunity of rendering a service to Professor Kölliker, to whom we all owe so much, and whose continued activity is perhaps the most remarkable instance of prolonged and fully sustained mental power in the whole history of biological science. We must all feel confident that any material placed at his disposal will be the means of securing important additions to knowledge.

CHARLES SEDGWICK MINOT.
Harvard Medical School, Boston, Mass.

BOOK-REVIEWS.

The Meaning and the Method of Life: A Search for Religion in Biology. By GEORGE M. GOULD. New York, G. P. Putnam's Sons. $1.75.

THIS book is a result of the unsettled and transitional state of religious opinion. Feeling deeply the want of some religion, but dissatisfied with the religions of the past, Dr. Gould has sought in the phenomena revealed by his favorite science of biology the basis of a new theology and a new religion. His views are somewhat singular. He holds that matter is eternal and independent of God, who is the author of life and mind only, using matter as the material of the living bodies that he forms, but having otherwise no control over it. Hence God is a limited and conditioned being, and, though very wise and perfectly good, is very far from omnipotent. This theory is somewhat like one that had some prevalence in ancient times, which also regarded matter as eternal and the Creator as merely the workman who fashioned it; yet the doctrine of this book limits Him still more, since it confines Him strictly to the world of life, excluding Him entirely from the vastly larger field of inorganic matter. In this way Dr. Gould thinks that he accounts for the existence of evil, which is due to the limited power of the Creator, whose goodness is thus saved at the expense of his omnipotence. Every living thing is an incarnation of Divinity, and man especially so. Man's duty consists in promoting the growth and fulness of life everywhere, and especially the spiritualization of human life. On the question of immortality, Dr. Gould expresses no decided opinion, holding that God has not seen fit to reveal his design with regard to man's future, and believing that information concerning it would be of no use to us here if we had it.

Such is Dr. Gould's religion; but, though it may find some favor among other biologists, we doubt if it wins acceptance anywhere, for religions and philosophies that deny the Divine omnipotence have never proved congenial to the human mind, and never will. His theory of the universe and its Author is evidently due to a too exclusive study of one science to the neglect of other and wider views, a mode of investigation peculiarly dangerous in theology. But whatever may be thought of his positive doctrines, all true souls will symphathize with the sentiment expressed in his introductory chapter, that "the bravest, noblest attitude is that of unsatisfied longing, and the never stilled faith that light will come into all of our darkness, and that the riddle of our lives will be solved."

Beiträge zur Kenntniss der Baues und Lebens der Flechten. II. Die Syntrophie. VON DR. ARTHES MINKS. WIEN, 1893.

DR. MINKS of Stettin, Prussia, is, or should be, known to all who are interested in the Lichens, and the controversy with regard to them, as one of the strongest advocates of their autonomy, on grounds peculiarly his own. In various publications he has announced the result of arduous and long-continued investigations, which are at least worthy of serious consideration. They cannot be ignored, as is the fashion among those who adopt the ideas of the new school.

CALENDAR OF SOCIETIES.

Biological Society, Washington.

Apr. 22.—O. F. Cook, Notes on the Natural History of Liberia; J. N. Rose, Two New Trees of Economic Importance from Mexico; V. A. Moore, Observations on the Distribution and Specific Characters of the Streptococci Group of Bacteria; Erwin F. Smith, Peach Yellows and Plant Nutrition.

Geological Society, Washington.

Apr. 26.—The first half hour will be devoted to continuing the discussion concerning the Age of the Earth. Bailey Willis, Interpretation of Sedimentary Rocks; M. R. Campbell, The Influence of Post-Paleozoic Deformation on the Drainage of the Central Appalachians.

Academy of Sciences, Biological Section, New York.

Apr. 10.—H. F. Osborn, on "The Evolution of Teeth in Mammalia in Its Bearing upon the Problem of Phylogeny," reviewed the recent researches and theories of Kükenthal, Röse, and Tacker upon the formation and succession of the dental series in mammamalia, and pointed out that, especially in marsupials, cetaceans, and edentates (with other placentates), the existence of two series of teeth was now abundantly proven, as well as the fact that Homodynamous forms were derived from early Heterodont. He then showed that recent discoveries demonstrated that in marsupials teeth of the second series might be interposed in the first series—to explain the typical dentition of such forms of Didelphys. This transposition enables a comparison of dentition of marsupial with that of turassic mammalia $\left(=i, \frac{4}{4}, c, \frac{1}{1}, p, \frac{4}{4}, m, \frac{8}{8}\right)$. It was further noted that the triconodont type (as Amphilestes) was probably the hypothetical point of divergence of placental mammalia. As to the form of crowns, the theory (Kükenthal-Röse) that complex mammalian types were made by concrescence of simple reptilian cusps was upon the evidence of the turassic mammalia shown untenable, as well as the converse theory that cetaceans have derived homodynamous form by the splitting of the cusps of triconodont. Bashford Dean, in "Contributions to the Anatomy of Dinichthys," correlated the parts of this Devon-Lower Carboniferous Arthrodiran to those of Coccostens. Notes were made upon the (1) disposition and character of the lateral line organs, (2) pineal foramen, (3) nasal capsules, (4) dentary plates (homologies), (5) ginglymoid articulation of lateral shoulder plates, (6) character of shagreen, (7) probable disposition of paired and unpaired fins. N. L. Britton presented a "Note on the Genus Lechea." This genus of Cistineæ is entirely American, and, from the investigations of Mr. Wm. H. Leggett and Dr. Britton, appears to consist of about fourteen species.

Agassiz Scientific Society, Corvallis, Ore.

Apr. 13.—C. D. Thompson, Relation of Soils to Plant Growth.

Mar. 8.—Professor John M. Bloss, The Early Lives of Some of Our Scientists.

In the work now before us, Dr. Minks considers the question of the so-called parasitic Lichens. In 1880, in "Morphologisch-lichenographische Studien," II., he had said that "Lichen and parasite are two irreconcilable conceptions." In the present work he develops this idea and extends it to a considerable number of Lichens, the apothecia of which had been previously considered to belong to the thallus on which they are found, and applies the term "syntrophy" to all such. In a syntropic lichen, by careful microscopic investigation, the epiphytic apothecium is found to have a very delicate thalline tissue of its own, from which it derives sustenance independently of the foreign thallus on which it grows. Dr. Minks describes this relation in language almost as picturesque as that used by Schwendener, in a phrase which has become classic. The syntrophic apothecia, he says, "are guests, because they offer nothing to the host, but claim services from him without compensation. But they are not boarders, else they might properly be termed parasites, but only lodgers. They are tenants, who pay no rent, but share the lot of the landlord."

In application of this doctrine, Dr. Minks considers a number of genera and species of Lichens, which, from his point of view, are syntrophic. Prominent among these is the genus Pyxine, the apothecia of which are syntropic on species of Physicia. Others are the Caliciacei and the Gyalectacei, the latter being elevated to the dignity of a tribe, while the author follows Nylander in combining the Lecanorei and the Lecideei in one tribe, the Lecano-Lecideei.

It were much to be desired that some of our younger botanists and microscopists, instead of consuming time in tedious and often superficial attempts to determine species, and of accepting as a dogma the Schwendener theory, neglecting to study what has been said on both sides of the controversy, would make themselves familiar with the copious literature of the last few years, and apply themselves to the study of the morphology and physiology of the Lichens, which, from whatever point of view they are considered, are among the most remarkable products of the vegetable kingdom. They might be able, by patient labor and by not being in too much haste to arrive at conclusions, to make valuable contributions to the vexed controversy. W.

The Story of the Atlantic Telegraph. By HENRY M. FIELD. New York, Chas. Scribner's Sons.

THE story of difficulties overcome in the endeavor to accomplish a great work is always interesting, and the account here given of the laying of the Atlantic cable reads like a romance. As is natural, since the writer is a brother of his, the work of Mr. Cyrus W. Field is given the most prominence, but we notice with pleasure that the indomitable perseverance and courage of the financiers engaged in the undertaking is recognized as it should be.

The Voltaic Cell. By PARK BENJAMIN, LL.B., Ph.D. New York, John Wiley & Sons.

DR. PARK BENJAMIN has had long experience in collecting the material for encyclopedic treatises, and the reader of this book may be sure that nearly all that could be collected on the subject has been incorporated here. This, however, does not necessarily constitute a good book, and in the present case the material used in cementing together the vast quantity of contained information might have been improved upon had a little more care been spent on this part of the work. For instance, while the list of cuts of storage cells is a very complete one, the theory of the changes which go on during the charge and discharge is hardly touched upon. The book contains a large number of valuable tables of conductivities of solutions, heats of combination, etc.

R. A. F.

THE Egypt Exploration Fund's new circular respecting the archæological survey of Egypt may be obtained from Dr. W. C. Winslow, 525 Beacon Street Boston.

Exchanges.

[Free of charge to all, if of satisfactory character. Address N. D. C. Hodges, 874 Broadway, New York.]

For sale or exchange—A Telescope (36 diameters, copper barrel)—for $20 cash or scientific books of that value. A. N. Somers, La Porte, Ind.

For sale—A complete set of the Reports of the Second Geological Survey of Pa., 1874-1893, including the Grand Atlas. Publisher's price over $115. Will sell for $50. Address F. D. Chester, Newark, Del.

The undersigned has skins of Pennsylvania and New Jersey birds, as well as other natural history specimens: which he wishes to exchange for marine, fresh water, and earthworms of the South and West. Correspondence with collectors desired. J. Percy Moore, School of Biology, University of Pennsylvania, Philadelphia.

For sale or exchange.—I have a Caligraph typewriter (No. 2) in perfect order and nearly new. It is in a heavy leather, plush-lined office case, the whole costing me about $100. I desire to obtain for it, either by sale or exchange, a new, No. 5 "Kodak" camera, with six double feather-weight plate-holders and the latest pattern of their tripod. The lens and pneumatic time-shutter must also be the same as those now sold with the last No. 5 Kodak. The price of what I desire in exchange is $78. Address, for particulars, P. O. Box 314, Takoma, District of Columbia.

For sale.—An Abbe binocular eye-piece for the microscope. Alfred C. Stokes, 527 Monmouth St., Trenton, N. J.

For sale or exchange.—One good long range Remington B. L. rifle, 44 calibre, also land and fresh water, and marine shells. Want shells, Safety, camera or printing press. A. H. Boies, Hudson, Mich.

Fine collection of microscopic slides for sale, or would exchange for first-class pneumatic bicycle. J. E. Whitney, Box 549, Rochester, N. Y.

For sale—A Zentmayer new model U. S. Army Hospital monocular stand. Price $110, will sell for $75. Address H. C. Wells, No. 151 Broadway, New York.

For sale—A complete set of the third series of the American Journal of Science (1870-1893) handsomely bound in single volumes in dark brown half morocco. Address G. H. Williams, 803 Cathedral Street, Baltimore, Md.

Wants.

WANTED, as principal of a flourishing technical school, a gentleman of education and experience who will be capable of supervising both mechanical and common school instruction. Special familiarity with some technical branch desirable. Address, giving age, qualifications, etc., J. B. Bloomingdale, Fifty-ninth street and Third avenue, N. Y.

THE undersigned desires specimens of North American Gallinae in the flesh for the study of their pterylosis. These species are especially desired: *Colinus ridgwayi, cyrtonyx montezumae, deudragapus franklini, lagopus welchi, tympanuchus cupido* and *pedioecetes phasianellus.* Any persons having alcoholic specimens which they are willing to loan or who can obtain specimens of any of the above are requested to communicate with Hubert Lyman Clark, 3922 Fifth Avenue, Pittsburgh, Pa.

A COMPETENT TEACHER of botany in college or university is open to engagement. Address L., Box 86, Rochester, Mich.

CAN any one inform me as to the age to which cats have lived? I have one twenty years old. Edward D. Webb, 132 W. Eighty-first St., New York.

WANTED — Second-hand. Foster's Physiology, Balfour's Comparative Embryology, Claus & Sedgwick's Zoology, Flower's Osteology of Mammalia, Vine's Physiology of Plants. Please state editions and prices asked and address Richard Lees Brampton, Ontario, Canada

WANTED.—American Journal of Conchology, seven volumes. Parties having these for sale will please address the undersigned, stating condition and price. R. Ellsworth Call, Louisville, Ky.

A GRADUATE ENGINEER will give instruction evenings in geometry, trigonometry and surveying, mechanics, physics, mechanical drawing and general engineering construction. Five years' experience in field and editorial work on engineering journal. References furnished. C. S. H., 102 Tribune Building, New York.

WANTED.—By well-qualified and experienced science master and associate of the Royal School of Mines, London, aged 26 (at present in England), a mastership in technical college or university for any of the following subjects: Engineering sciences, geology and mineralogy, physics, chemistry and metallurgy, etc., etc. Can provide excellent references and credentials. Apply, J. G., 17 Sussex St., Rochdale, England.