and the affirmation, on the basis of the argument from design, of the necessity of referring the origination of the world to an intelligent mind—*i. e.*, an optimistic deism. It was implied in this that God must in some sense also be corporeal. Now, this peculiar combination of ideas was characteristically that of Priestley; and (as Dr. Riley neglects to point out, in his account of the sources of Jefferson's ontological notions) the Virginian's language plainly shows that he took over this combination, and the arguments for it, from Priestley, ready-made. The author's use of the term "deism" (to which movement a whole section of the book is devoted) is confusing and inconsistent. It would take too long to discuss here the historically correct and the incorrect uses of the word; but it is surely absurd to classify equally as "deists" such strange bed-fellows as Berkeley, Bishop Butler, Cotton Mather, Addison, Charles Chauncey, Channing, Toland, Ethan Allen and Thomas Paine. These men, between them, represent all possible attitudes upon all the issues with which the term "deism" has been associated: natural *vs.* revealed religion, pantheism *vs.* transcendence of the deity, optimistic *vs.* pessimistic view of nature, uniformity of natural law *vs.* miracles and special providences, inherent dignity *vs.* natural depravity of man. There can be no possible ground for the application of a common name to such an incongruous collection. Finally, it is rather unfair to dismiss as "puerility" a passage in which an otherwise unknown eighteenth-century writer, Thomas Dobson (p. 239), points out, concisely and clearly, just that fundamental fallacy in the then popular argument from design which Clifford, many years after, still thought it worth while to explain at some length.

But though open to criticism upon these and some other details, the book as a whole is a thorough and scholarly piece of research in a territory where the author has often been obliged to blaze his own way, and a notable addition to our historical literature. It will be indispensable to all who are interested in the history of philosophy, of natural science, of education, of religious movements, of literature, and of public opinion in America.

A. O. Lovejoy

SOCIETIES AND ACADEMIES

THE WASHINGTON ACADEMY OF SCIENCES

The Washington Academy of Sciences at its annual meeting, January 16, elected the following officers for 1908:

President—C. D. Walcott.

Vice-president representing the Anthropological Society—W. H. Holmes.

Vice-president representing the Archeological Society—J. W. Foster.

Vice-president representing the Biological Society—L. Stejneger.

Vice-president representing the Botanical Society—T. H. Kearney.

Vice-president representing the Chemical Society—F. W. Clarke.

Vice-president representing the Society of Engineers—A. P. Davis.

Vice-president representing the Entomological Society—A. D. Hopkins.

Vice-president representing the Society of Foresters—Gifford Pinchot.

Vice-president representing the Geographic Society—Willis L. Moore.

Vice-president representing the Geological Society—Geo. Otis Smith.

Vice-president representing the Historical Society—J. Dudley Morgan.

Vice-president representing the Medical Society—Henry D. Fry.

Vice-president representing the Philosophical Society—J. F. Hayford.

Corresponding Secretary—Frank Baker.

Recording Secretary—J. S. Diller.

Treasurer—Bernard R. Green.

Manager, Class of 1910—Bailey Willis.

Managers, Class of 1911—L. O. Howard, O. H. Tittmann, B. W. Evermann.

Under the auspices of the academy the president of the Anthropological Society of Washington, Dr. Aleš Hrdlička, delivered the annual address at Hubbard Memorial Hall, February 11, on "Physical Anthropology and its Aims."

The fiftieth meeting of the Washington Academy of Sciences was held at Hubbard

Memorial Hall, February 17, 1908. Dr. L. A. Bauer presided.

Professor Wallace C. Sabine, of Harvard University, delivered an address on "Some Phases of Architectural Acoustics."

The lecture hall of the Fogg Art Museum erected in 1895 was modeled after Sanders Theater in Cambridge, but failed to duplicate its excellent acoustic properties. This misfortune led the corporation of Harvard University to request Professor Sabine to investigate the matter and propose changes to remedy the difficulty.

It has been claimed by some that to secure good acoustic properties the dimensions of the room should be as 2:3:5 or similar proportion, or that the room should be elliptical, but the best and the worst auditoriums in Cambridge are both semicircular, indicating that it is by no means a matter of proportion or shape alone.

The acoustic properties of a hall involve four principal factors: distributed loudness, reverberation, resonance and interference. To adjust these four physical characteristics there are two variables, the form of the auditorium and the material of which it is constructed. The essential features of the material are its absorbing and reflective powers. Through a measurement of the reverberation it is possible to determine the absorbing and therefore the reflecting powers of a wall surface. The method of so doing was explained at some length, and the results of such measurements given.

With an organ pipe as a constant source of sound and a chronograph to record its duration after the wind was cut off, the audibility of the residual sound, the reverberation, in the lecture hall of the Fogg Museum was found to be 5.62 seconds—a condition which rendered the room intolerable as an auditorium. By putting Sanders Theater cushions upon the seats, floor and part of the wall of the lecture hall, the duration of the residual sound was reduced to 1.14 seconds. The absorbing power of these cushions was ultimately compared with that of an open window. The absorbing power determined for a few of the kinds of wall surface and of an audience are given below, expressed in square meters of open window.[1]

Hard pine wood sheathing per square meter	.061
Plaster on wood lath per square meter	.034
Glass—single thickness—per square meter	.027
Audience per square meter	.94
Isolated woman	.54
Isolated man	.48
Cretonne cloth per square meter	.15
Hair felt 2.5 cm. thick and 8 cm. from wall per square meter	.78

As a result of two years' investigation felt was placed on particular walls of the lecture hall in the Fogg Museum; so the room was rendered, not excellent, but entirely serviceable and has since been used without complaint.

With a number of given and determined factors Professor Sabine treated the subject mathematically and showed that knowing the absorbing power of the wall bounding surfaces and the dimensions of the auditorium it is possible to calculate with accuracy the reverberation if need be in advance of construction. Several examples of such calculations were given. The paper up to this point having dealt entirely with middle C, was then extended to a discussion of the whole range of the musical scale. Examples were given showing the absorbing power of wall surfaces for notes of high pitch.

Mr. Bernard R. Green, discussing the paper, remarked upon the difficulty of killing echoes and inquired as to the facts concerning the Mormon Tabernacle.

Professor Sabine replied that he had made a special journey to Salt Lake City to study the acoustic properties of the tabernacle, and found that its excellence in that respect was not a matter of "inspiration." When first built the acoustic properties were very poor. Attempts were made to remedy the difficulty by stretching wires across the room and hanging curtains, but they were of no avail. Finally, the increasing size of the congregation necessitated the construction of a gallery, which unexpectedly corrected the acoustic defects.

[1] *American Architect and Building News*, Vol. 68, pp. 3, 19, 35, 43, 59, 75 and 83.

Mr. C. K. Wead expressed his high admiration for the ingenuity of the methods used by the lecturer, the monumental patience with which the laborious experiments were carried out, and the skill with which the data have been discussed.

The ordinary man, and even the architect, generally assumes that sound-waves in a room which is only a few wave-lengths long, can be treated like light-waves; but the case is one of diffraction rather than of rectilinear propagation and of reflection by the laws of optics.

A merit of Professor Sabine's work is that he has been able to make a sort of summation of the complex phenomena in all parts of a room. His immediate result—the reverberation, or the number of seconds the sound can be heard after the wind is cut off from his standard organ pipe—is not in itself of any value; but like the percentage of carbon dioxide in the air, which was considered before the days of bacteriology to gauge the impurity of the air, this duration can be measured and it gives information about quantities far more important than itself.

J. S. Diller,
Recording Secretary

The Geological Society of Washington

At the 199th meeting of the society, held at the Cosmos Club, on Wednesday evening, January 22, the following papers were presented.

Regular Program

Deposits of Residual Iron Ore in Cuba: A. C. Spencer.

In Cuba a great part of the deep residual soils are highly ferruginous and in many localities so rich in iron as to constitute usable ores of that metal. Three districts, passing under the names Moa, Mayari and Cubitas, were described in which very large tonnages of such iron ore exist.

Certain features of the deposits are very like those of the high level laterite of India, especially the occurrence of a deep bed of yellow clay next to the basement of solid rock and the common gradation of the yellow clay into red earthy material, containing pisoliths and irregular concretions of brown iron oxide which are locally cemented into continuous but porous layers.

In one of the regions named the combined thickness of these materials varies from a few feet to more than fifty feet, and a large number of analyses have proved that both the ochreous clays and the material lying above them contain on the average about 46 per cent. of iron when dried at 212° F., so that all of the residual material is to be considered as ore. In its natural state the ore carries above 40 per cent. of water of which about 13 per cent. is said to be combined. Alumina is present in excess of the amount required for combination with the silica and is doubtless present in the form of hydrated oxide. Phosphorus is uniformly low, averaging less than .02 per cent. and chromium is always present, the average amount being somewhat less than two per cent.

The fact that chromium is characteristic of the ore is regarded as definite proof that the material has been derived from the serpentine which constitutes the underlying rock in each of the three fields.

The absence of discrete particles from the material is taken as an indication that no part of it is transported, and as strongly suggesting its accumulation in situ as the insoluble residuum of complete weathering and decay of the serpentine. The topography of the ore fields also favors the idea of a simple residual origin, since in each case the deposits constitute surficial mantles over extensive surfaces practically wanting in local relief. Though now uplifted and even warped, these surfaces are interpreted as the remnants of ancient peneplains upon which the sort of rock disintegration, favorable to deep residual deposits, would naturally take place. The geologic period during which this planation to base-level occurred can not be fixed but, in the mind of the speaker, is to be tentatively correlated with Lafayette and pre-Lafayette time.

Systematic chemical work is demanded by the whole problem of the genesis of these ores, but the best promise of immediate results would seem to be offered by an investigation of the variations in the state of hydra-

tion of the material from different depths in the deposits. Some analyses indicate the presence of hematite in addition to the hydrous oxides and the brilliant red of some of the clays near the surface of the ground leads to the same conclusion. Some of the pisoliths are attracted by the magnet showing that there has even been a certain amount of dehydration, unless indeed the presence of undecomposed magnetite, inherited from the original rock, can be shown.

The United States Geological Survey's Hydraulic Laboratory at Berkeley, California: G. K. GILBERT.

The laboratory has been established for the purpose of investigating in a quantitative way the laws controlling the transportation of detritus by running water. Initially it is determining the capacity of a stream of definite discharge to transport sand of uniform grain in a straight channel of definite width and definite slope. The apparatus includes special devices for measuring the quantity (discharge) of water, the velocity, and the amount of sand transported. In each experiment, while water is flowing uniformly through a long trough, sand is introduced from above at a uniform rate, and the water is allowed to arrange it on the bottom of the trough. After a time the sand surface assumes a stable slope adjusted to the maintenance of a velocity just sufficient to transport the amount of sand (load) fed to the water, and this slope is measured. In the next experiment a different quantity of sand is introduced and the resulting slope is measured. A series of such experiments yields a curve or equation of the relation between load and slope. The discharge is then changed and the work repeated. In this way, and by the progressive permutation of the controlled conditions, the laboratory is determining the elementary laws of the transportation of detritus, in relation to slope of channel, width of channel, size of sand grain, discharge, mean velocity of current, and bottom velocity.

The laboratory is in the immediate charge of Dr. E. C. Murphy. Space, power, and other important facilities are generously contributed by the University of California.

RALPH ARNOLD,
Secretary

SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE

REGULAR meetings of the Society for Experimental Biology and Medicine were held on October 16 and December 18, 1907, and February 19, 1908. The scientific program of each of the meetings is appended.[1]

Twenty-fifth Meeting

College of Physicians and Surgeons, Columbia University. October 16, 1907. President Flexner in the chair.

Members elected—Edward T. Reichert, M. J. Rosenau, Richard P. Strong.

Program

"Cardiac Insufficiency due to High Arterial Pressure," by Haven Emerson.

"Effect of Potassium Cyanide upon Metabolism," by George B. Wallace and A. N. Richards.

"Pneumothorax and Posture," by Charles A. Elsberg.

"The Hypersensitiveness of the Guinea-pig to Horse Serum," by Paul A. Lewis.

"A Sporozoan found in the Peptic Glands of the Common Mouse," by E. E. Tyzzer.

"The Rôle of Tonicity in Human Isohemagglutination," by Frederick P. Gay.

"Effects of Calcium and Magnesium Salts upon the Development of Rigor Mortis," by S. J. Meltzer and John Auer.

"Restraint and Promotion of Tumor Growth," by Simon Flexner and James W. Jobling.

"Reestablishment of Function in Transplanted Kidneys," by Alexis Carrel.

"A Depressor Reaction obtainable by Traction on the Carotid Artery," by Torald Sollmann and E. D. Brown.

"A Modification of Teichmann's Method for obtaining Hemin Crystals," with a demonstration

[1]Authors' abstracts of the papers read before the Society for Experimental Biology and Medicine are published in the *Proceedings of the Society for Experimental Biology and Medicine*. A number is issued shortly after each meeting, and costs 15 cents a copy. Copies may be obtained from the managing editor, William J. Gies, 437 West 59th Street, New York.

of specimens, by James P. Atkinson and Arthur I. Kendall.

"The Influence of Ether Anesthesia on the Excretion of Nitrogen by Dogs," by Philip B. Hawk.

"The Relative Value of Antitoxin and other Curative Substances in Antidiphtheric Serum," by Edna Steinhardt and Edwin J. Banzhaf.

Twenty-sixth Meeting

Rockefeller Institute for Medical Research, New York. December 18, 1908. President Flexner in the chair.

Members elected—Edwin J. Banzhaf, William N. Berg, H. D. Dakin, Charles A. Elsberg, Shinkishi Hatai, Charles E. Simon, S. Burt Wolbach.

Program

"The Effect of Light on Cells in Fluorescent Solutions after Addition of Potassium Cyanide," by Elizabeth Cooke and Leo Loeb.

"Physiological Age," by C. Ward Crampton.

"Gastric Peristalsis after Section of the Vagi and Splanchnic Nerves," by John Auer.

"The Effect of Stimulation of the Vagus Nerves upon the Development of Rigor Mortis of the Mammalian Heart," by Don R. Joseph and S. J. Meltzer.

"The Antagonistic Action of Calcium upon the Inhibitory Effect of Magnesium," by S. J. Meltzer and John Auer.

"Remote Result of the Transplantation of a Segment of Popliteal Artery from a Man to a Bitch," by Alexis Carrel.

"Concerning the Relation of the Coagulation Time of the Blood to Thrombosis in Phlebitis," by Harlow Brooks and B. C. Crowell.

"The Reactive Power of the White Rat to Tissue Implantation" (second communication), by Isaac Levin.

"The Hemolytic Reactions of the Blood in Dogs with Transplantable Lymphosarcoma," by Richard Weil.

"On the Circulation through the Kidneys, (I.) On Vaso-motor Reactions, (II.) The Renal Blood Flow in Relation to the Pressure in the Ureter and Bladder, (III.) The Effect of Solutions of Adrenalin," by R. Burton-Opitz and D. R. Lucas.

"Some Data regarding the Portal Circulation," by R. Burton-Opitz.

"A Clinical Viscosimeter," by R. Burton-Opitz.

"Studies in Experimental Arteriosclerosis," by Isaac Adler and O. Hensel.

"On the Influence of Various Substances, Applied Directly to the Medulla Oblongata, upon the Respiratory Rhythm in Frogs," by T. Brailsford Robertson.

"Metaplasia and Metastasis of a Rat Tumor," by Simon Flexner and J. W. Jobling.

Twenty-seventh Meeting

(Fifth Annual Business Meeting)

Schermerhorn Hall, Columbia University. February 19, 1908. Vice-president Morgan in the chair.

Members elected—L. W. Famulener, C. Stuart Gager, W. S. Halsted, W. A. Jacobs, Theodore C. Janeway, Don R. Joseph, Frank R. Lillie, Alwin M. Pappenheimer, Donald D. Van Slyke.

Officers elected:

President—Frederic S. Lee.
Vice-president—Thomas H. Morgan.
Treasurer—Graham Lusk.
Secretary—William J. Gies.

Program

An exhibition of photographs of chromosomes, with explanatory comment, by Edmund B. Wilson.

"The Production of two Kinds of Spermatozoa in Phylloxerans—Functional 'Female Producing' and Rudimentary Spermatozoa," by T. H. Morgan.

"Physiological Problems of the Geographical Distribution of *Partula* in Polynesia," with demonstration of specimens, by Henry E. Crampton.

"Note on the Isolation of Carnaubic Acid from Beef Kidneys," by Edward K. Dunham.

"The Change of Corpuscle Resistance in the Blood of Immunized Animals, Coincident with the Formation of Antibodies," by Frederick P. Gay.

"Further Observations on the Precipitation of Inorganic Colloids by Sera," by Cyrus W. Field.

"A Note on Anaphylaxis," by Edwin J. Banzhaf and L. W. Famulener.

"The Relation of Plasticity to Sex and Age in the Dancing Mouse," by Robert M. Yerkes.

"The Crystallography of Hemoglobin," by Edward T. Reichert and Amos P. Brown.

"The Germicidal Property of Milk," by M. J. Rosenau and Geo. W. McCoy.

The next regular meeting will be held on April 15.

William J. Gies,
Secretary

THE TORREY BOTANICAL CLUB

The meeting for January 29, 1908, was held in the Museum Building of the New York

Botanical Garden at 3:30 P.M. Vice-President Barnhart presided and there was an attendance of thirty-four.

The secretary presented the report of Mr. Percy Wilson, chairman of the field committee, for 1907. Twenty-five field meetings were reported scheduled through the months of May to October, inclusive, though a few of these meetings were not held, on account of inclement weather.

Biographical résumés and appreciations of Professor Underwood's life and work were read as follows:

"A Biographical Sketch of Lucien Marcus Underwood," by Carlton C. Curtis.

"Lucien Marcus Underwood: A Memorial Tribute," by Marshall A. Howe.

"The Published Work of Lucien Marcus Underwood," by John Hendley Barnhart.

"Professor Underwood's Relationship to the Work of the New York Botanical Garden, together with the Preamble and Resolutions on Professor Underwood's death, adopted by the Scientific Directors of the Garden," by N. L. Britton.

The above papers were published in full in the January, 1908, number of the *Bulletin of the Torrey Botanical Club.*

The following resolutions, presented by a committee of the club, were read and unanimously adopted:

In the death of Lucien Marcus Underwood American botany has lost one of its foremost representatives, one who was exceptionally free from prejudice and selfishness and who abhorred all superficiality and obsequiousness. The Torrey Botanical Club has lost a faithful officer and a zealous and enthusiastic supporter of all its activities and interests.

We desire to pay tribute to his superior qualifications and attainments as a man of science, and to express our profound sorrow as we attempt to realize that we shall no more feel the warm clasp of his hand, meet the glance of his sympathetic eye, or hear his cheering words of counsel and encouragement.

The Torrey Botanical Club hereby directs that this minute be entered in its proceedings and duly published with them.

C. STUART GAGER,
Secretary

THE AMERICAN MATHEMATICAL SOCIETY

THE one hundred and thirty-seventh meeting of the society was held at Columbia University on Saturday, February 29, extending through the usual morning and afternoon sessions. Thirty-four members were in attendance. President H. S. White occupied the chair, being relieved at the afternoon session by Professor P. F. Smith. The following persons were elected to membership: Mr. E. G. Bill, Yale University; Mr. C. H. Currier, Brown University; Mr. W. S. Pemberton, State Normal School, Edmond, Okla.; Professor S. W. Reaves, University of Oklahoma; Mr. L. L. Silverman, University of Missouri; Mr. W. M. Smith, Lafayette College; Mr. H. W. Stager, University of California. Twelve new applications for membership were received.

The by-laws of the society were amended to provide that a member of the editorial committee of the *Transactions* should be appointed each year at the April meeting of the council and should take office on the following October 1.

The usual informal dinner was arranged for the evening and was attended by twelve of the members.

The "Annual Register" of the society, containing list of officers and members, constitution and by-laws, catalogue of library, etc., has recently been issued. Copies can be obtained from the secretary.

The following papers were read at the February meeting:

R. D. CARMICHAEL: "On the numerical factors of certain arithmetic forms."

R. D. CARMICHAEL: "On the remainder term in a certain development of $f(a+x)$."

F. R. SHARPE: "The Lorentzian transformation and the radiation from a moving electron."

VIRGIL SNYDER: "Normal curves of genus 6 and their groups of birational transformations."

J. W. YOUNG: "The geometry of chains on a complex line."

J. W. YOUNG: "A fundamental invariant of discontinuous ζ-groups defined by a normal curve of order n in space of n dimensions."

E. B. VAN VLECK: "On non-measurable point sets."

L. E. DICKSON: "On higher congruences and modular invariants."

MAX MASON: "Note on Jacobi's equation in the calculus of variations."

G. W. HILL: "Subjective geometry."

G. A. BLISS: "A method of deriving Euler's equation by means of an invariant integral."

C. N. HASKINS: "On the second law of the mean."

EDWARD KASNER: "The contact transformations of mechanics."

EDWARD KASNER: "The plane sections of an arbitrary surface."

G. A. MILLER: "Note on the periodic diurnal fractions."

F. R. SHARPE: "The inner force of a moving electron."

W. H. ROEVER: "Brilliant points of curves and surfaces."

FRANK IRWIN: "Transformations of the elements $x, y, y', \cdots, y^{(k)}$ that carry a union of such elements over into a union."

The San Francisco Section met at Stanford University also on February 29. The Chicago Section will meet April 17–18. The next regular meeting of the society will be held on April 25. The summer meeting will be held at the University of Illinois, September 10–11.

F. N. COLE,
Secretary

DISCUSSION AND CORRESPONDENCE

LAFAYETTE DEPOSITS IN LOUISIANA

TO THE EDITOR OF SCIENCE: In your current number (February 28, 1908, page 351) Professor G. D. Harris suggests assigning the Lafayette formation to the Pleistocene, rather than the Pliocene, on the basis of associated fossils brought up in borings from depths of 1,500 feet or more. In this connection it is worth while to consider the alternative hypothesis that the beds tapped by the drill in southern Louisiana are redeposited Lafayette materials rather than original deposits. It is to be noted as tending to favor the alternative hypothesis that the Lafayette deposits are made up of residuary products gathered from the interior and laid down along shore (with little admixture of other material) during a period of continental depression, the distribution having been effected by river currents or wave action, or by both combined; so that it seems improbable that materials of this distinctive type could have been deposited far off-shore, and especially at depths of 2,000 feet or more—for to the depth of the boring noted by Professor Harris must be added the 500 or more feet of subsidence during the Lafayette period. It is also to be remembered that among the striking features of the Lafayette formation is its extensive erosion, especially in the Mississippi embayment: From a latitude above the mouth of the Missouri to the gulf the formation has been completely removed over an area averaging 50 to 75 miles in width, aggregating fully 40,000 square miles—*i. e.*, about one eighth of the total area of the formation above present tide level. Moreover, it seems certain both from evidence of remnants and from physical considerations that this was the thickest portion of the formation; so that in this district something like a fifth of the aggregate volume of the deposits must have been eroded away, largely during the post-Lafayette high-level period when that portion of the continent about the present mouth of the Mississippi stood a thousand feet or more above its present level. During this high-level period the Lafayette materials might well have been redeposited at what was then a limited depth below the surface of the gulf, with little admixture of foreign matter. Such an association would be quite consistent with Professor Harris's paleontologic evidence; and it has the advantage of consistency both with the physical conditions attending the genesis and partial degradation of the formation, and with the stratigraphic relations found farther in-shore both in the Mississippi Valley and along the middle Atlantic slope.

W J McGEE

A HANDY SUBSTITUTE FOR THE BLAST BLOWPIPE IN BLOWPIPE ANALYSIS

IT occurred to me that the small rubber bulb which is used to furnish the atomized alcohol for the platinum tip in an ordinary pyrography outfit, might profitably, where there is no equipment for tapping a compressed air