

TEXAS TECHNOLOGICAL

PETITION

OF

AMERICAN ARTISTS IN ROME, COLLEGE

PRAYING

*For the repeal of the duty on works of art.*

JANUARY 7, 1884.—Referred to the Committee on the Library and ordered to be printed.

*To the honorable the Senate and House of Representatives in Congress assembled:*

This petition humbly sheweth—

That we, the undersigned American artists and students of art now in Rome, learn with regret and apprehension that a duty of 30 per cent. has been imposed by act of Congress upon works of foreign artists imported into our country, and believing, as we do, that any duty is seriously injurious to the interests of art and artists in America, we respectfully submit that the clause levying it should be repealed.

Art is a universal republic to which the citizens and subjects of all nations belong, and a discrimination between the works of foreign and native artists, by imposing duties on the former from which the latter are exempted is in our opinion unjust, illiberal, and impolitic.

First. It is unjust, because art is a free field to which all competitors should be admitted on equal terms.

Second. It is illiberal and unbecoming the free spirit of a great nation. No tax on works of foreign artists has been laid by any nation on this side the Atlantic. On the contrary, such works have been welcomed by all, and free privileges of importation, exhibition, and sale offered to all, without discrimination in favor of native artists.

Third. It is impolitic and injurious to the development of art in our own country. The productions of the masters of the past and the present are to the artist what the great works of literature are to the scholar and student, and the freest and largest opportunities should be given for their introduction into our country, so that our artists may be enabled, by a careful examination and study of them, to enlarge their experience, enrich their minds, and train their powers. A duty like this now imposed is a practical injury to every American artist, and especially to those living in America, who are thereby in great measure deprived of the opportunities and of study most valuable, if not absolutely necessary, for their training as artists, and are forced to leave their own

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REPORT

OF THE

NATIONAL ACADEMY OF SCIENCES

FOR

THE YEAR 1883.

WASHINGTON:

GOVERNMENT PRINTING OFFICE.

1884.

## APPENDIX D.

### LIST OF OFFICIAL REPORTS MADE TO THE GOVERNMENT BY THE NATIONAL ACADEMY OF SCIENCES, AND OF SCIENTIFIC PAPERS PRESENTED TO THE ACADEMY, 1863-1883.

#### OFFICIAL REPORTS.

1. On the protection of the bottoms of iron vessels. February 4, 1864.
2. On the magnetic deviations in iron ships. February 11, 1864.
3. On an alcoholometer. 1864.
4. On the explosion of the boiler of the United States steamer Chenango. 1864.
5. On the use of aluminium bronze for cent coinage. 1864.
6. On wind and current charts and sailing directions. 1864.
7. On the protection of the national currency against counterfeiting. 1865.
8. On testing the purity of whisky. 1865.
9. On the expansion of steam. 1866.
10. On the preservation of paint on army knapsacks. 1866.
11. On the prevention of counterfeiting. 1866.
12. On proving and gauging distilled spirits. 1866.
13. On the improvement of Greytown Harbor, Nicaragua. 1867.
14. On galvanic action from association of iron and zinc. 1867.
15. On spirit meters. 1868.
16. On the protection of coal mines from explosions by electricity. 1870.
17. On removal of ink from revenue stamps. 1870.
18. On distinguishing calf's-hair goods from woolen goods. 1875.
19. On water-proofing of the fractional currency. 1876.
20. On the surveys of the Territories. 1878.
21. On Demerara sugars. 1878.
22. On proposed changes in the Nautical Almanac. 1878.
23. Committee to co-operate with National Board of Health. 1879-1880.
24. On silk culture in the United States. 1870.
25. On the use of polarized light for determining values of sugars. 1878.
26. On the artificial coloring of sugars designed to simulate a lower grade according to the standard on which duties are levied. 1876-1877.
27. Instructions for the Polaris Expedition. 1873-1877.
28. On building-stone for custom-house, Chicago. 1878.
29. Measurement of velocity of light. 1878.
30. On the preservation of Government collection of Centennial Exhibition. 1876.
31. Magnetic chart of the United States. 1880.
32. Observation of Transit of Venus. 1873-1883.
33. Magnetic observations on the voyage of the Monitor and Monadnock around Cape Horn.
34. Reports on weights, measures, and coinage. 1863-1867.
35. On the construction and verification of the metric standards for the States. 1867.
36. On the introduction of metric scales in Post-Office Department. 1868.
37. International Bureau of Weights and Measures. 1873.

38. On the preservation of the writing of the original Declaration of Independence 1878.
39. Introduction of metric weights and measures in the United States. 1879.
40. On the exploration of the Yellowstone region by General Stanley. 1873.
41. Report on sorghum sugar. 1882.
42. On the separation of methyl from alcohol. 1883.
43. On the total eclipse of May 6, 1883. 1883.
44. Report on glucose. 1883.

## SCIENTIFIC PAPERS.

## I.—WASHINGTON, JANUARY 4-9, 1864.

1. On individuality among animals, with reference to the question of varieties and species. By LOUIS AGASSIZ.
2. On the elements of the mathematical theory of quality. By BENJAMIN PEIRCE.
3. Discussion of magnetic observations made at Girard College observatory, in the years 1840-45. Parts IV, V, and VI. Horizontal force; investigation of the eleven-year period; of the solar diurnal variation and annual inequality, and of the influence of the moon. By A. D. BACHE.
4. On the force of fired gunpowder, and the pressure to which heavy guns are actually subjected in firing. By F. A. P. BARNARD.
5. Reduction of the observation of fixed stars made by d'Aleut at Paris during the years 1783-85, with a catalogue of the corresponding mean places referred to the equinox of 1800. By B. A. GOULD.
6. On the metamorphoses of fishes. By LOUIS AGASSIZ.
7. On the Saturnian system. By BENJAMIN PEIRCE.
8. Notes on the parallelogram of forces, and on virtual velocities. By THEODORE STRONG.
9. On the geographical distribution of fishes, as bearing upon their affinities and systematic classification. By LOUIS AGASSIZ.
10. Discussion of magnetic observations, &c. Parts VII, VIII, and IX. Vertical force; investigation of the eleven-year period, of the solar diurnal variation and annual inequality, and of the influence of the moon. By A. D. BACHE.
11. Description of an anemograph, designed for the University of Mississippi. By F. A. P. BARNARD.
12. On materials of combustion for lamps in light-houses. By JOSEPH HENRY.
13. On photographs of the solar spectrum. By LEWIS M. RUTHERFURD.
14. On tangencies of circles and spheres. By J. G. BARNARD.
15. On observation of the planet Venus, near the times of her inferior conjunction, September 28, 1863, and subsequently. By STEPHEN ALEXANDER.
16. Brief note on the forms of icebergs. By STEPHEN ALEXANDER.

## II.—NEW HAVEN, AUGUST 4-6, 1864.

17. Memoir of the late Henry Fits. By LEWIS M. RUTHERFURD.
18. On the distribution of certain important diseases in the United States. By A. A. GOULD.
19. On the integration of differential equations of the first order and higher degrees. By THEODORE STRONG.
20. Criticism on the forms of ships. (Presented by Theodore Strong.) By Capt J. COLE.
21. On the light visible on the moon's surface, and that seen adjacent to her edge when the sun is either partially or totally eclipsed. By STEPHEN ALEXANDER.

22. On the influence of the hour of the day on the results of barometric measurements of altitudes. By ARNOLD GUYOT.
23. On shooting-stars. By H. A. NEWTON.
24. A method of determining the errors of a vertical divided circle. (Presented by Benjamin Peirce.) By SIMON NEWCOMB.
25. Considerations relative to various phenomena presented by certain comets. By STEPHEN ALEXANDER.
26. Memoir of Lieut. E. B. Hunt. By F. A. P. BARNARD.

## III.—WASHINGTON, JANUARY 3-7, 1865.

27. On a chronograph for measuring the velocity of projectiles. By J. E. HILGARD.
28. On the homologies and classification of the cephalopods. By L. AGASSIZ.
29. On the geographical distribution of North American birds. By S. F. BAIRD.
30. Note on the changes that have taken place in the bar of Charleston Harbor since the sinking of the obstructions in the main channel, as developed by the United States Coast Survey. By J. E. HILGARD.
31. On the tables of the moon. By BENJAMIN PEIRCE.
32. On the metamorphoses of some malacopterygians. By L. AGASSIZ.
33. On chemical classification. By WOLCOTT GIBBS.
34. On the dimensions and proportions of American soldiers. By B. A. GOULD.
35. On a method of exhibiting certain statistics of hospitals. By J. L. LE CONTE.
36. On the special phenomena and present configuration of the State of Maine. By L. AGASSIZ.
37. On a regulator for maintaining uniform motion, and an apparatus for recording time observations in type. By J. E. HILGARD.
38. On the progress of the geological survey of California. By J. D. WHITNEY.
39. On the mineral lands of the United States, and the relations of the Government to their management. By J. D. WHITNEY.
40. On the origin and formation of sedimentary rocks. By J. S. NEWBERRY.
41. On the origin and distribution of petroleum in the United States. By J. S. NEWBERRY.

## IV.—NORTHAMPTON, AUGUST 23-26, 1865.

42. The theory of the sling. By BENJAMIN PEIRCE.
43. The facoids of the Coal Measures. By LEO LESQUEREUX.
44. Letter from. By L. AGASSIZ.
45. Observations of the right ascensions of stars within one degree of the north pole. By B. A. GOULD.
46. On observations of tides at the island of Tahiti, made by Capt. John Rodgers, of the United States Navy, for the United States Coast Survey. By J. E. HILGARD.
47. Discussion of magnetic observations made at Eastport, Me., during the years 1861-1864, by the United States Coast Survey. By J. E. HILGARD.
48. On rifled guns. By W. H. C. BARTLETT.
49. A new theory of the first principles of the differential calculus. By THEODORE STRONG.
50. On the ages of the United States volunteer soldiery, as deduced from the statistical bureau of the Sanitary Commission. By B. A. GOULD.
51. On a photometer. By O. N. ROOD.
52. On the structure of the moon. By S. ALEXANDER.
53. On the systems of mountain upheaval to which the continent of North America owes its present configuration. By J. D. WHITNEY.
54. Abstract of geological investigations made in China and Mongolia (communicated by J. D. Whitney). By RAPHAEL PUMPELLY.

55. Examination of shells obtained by the sounding-lead in the coast survey of New York and New Jersey, with some nautical hints. By AUGUSTUS A. GOULD.
56. On the probable immediate cause of the Glacial Epoch of the Post Tertiary. By A. GUYOT.
57. On the Lower Silurian oils of Kentucky and Tennessee. By J. S. NEWBERRY.
58. Suggestions relative to the annular eclipse of the sun in October next. By S. ALEXANDER.
59. On certain converging series expressing the ratio of the diameter to the circumference of the circle (communicated by Benjamin Peirce). By WILLIAM FERREL.
60. On a tide meter for cold regions (communicated by Benjamin Peirce). By A. M. BATCHELDER.

## V.—WASHINGTON, JANUARY 24-27, 1866.

61. On the silver reduction process of Nevada, with statistical tables, and metallurgical tables and data. By B. SILLIMAN.
62. On a new general method of volumetric analysis. By WOLCOTT GIBBS.
63. On sodium amalgam and its application in saving precious metals. By B. SILLIMAN.
64. On the limits and character of the vision of American soldiers as deduced by the statistical department of the United States Sanitary Commission. By B. A. GOULD.
65. On the primary triangulation of the coast of New England in connection with the United States Coast Survey. By A. D. BACHE.
66. On the relation of language to ethnology. By W. D. WHITNEY.
67. On certain mineral districts of Arizona. By B. SILLIMAN.
68. On California petroleum and the product of its distillation. By B. SILLIMAN.
69. Observations on the annular eclipse of October, 1865, made at Lebanon, Ill. By STEPHEN ALEXANDER.

## VI.—NORTHAMPTON, AUGUST 7-12, 1866.

70. Photometric method. By OGDEN N. ROOD.
71. On a normal map of the solar spectrum. By WOLCOTT GIBBS.
72. On traces of glaciers under the tropics. By L. AGASSIZ.
73. On the secular acceleration of the moon's mean motion. By JOHN N. STOCKWELL.
74. On the origin of solar heat. By BENJAMIN PEIRCE.
75. On the morphological value and relations of the human hand. By B. G. WILDER.
76. On the correlation of gravity and temperature. By P. E. CHASE.
77. Grounds of analogy between linguistic science and the physical sciences. By W. D. WHITNEY.
78. On the limitation of homologies. By L. AGASSIZ.
79. On a new method of optical analysis. By WOLCOTT GIBBS.
80. On recent soundings in the Gulf Stream. By HENRY MITCHELL.
81. On repeated linear substitutions. By J. E. OLIVER.
82. On some points in the geological structure of Southern Minnesota. By JAMES HALL.
83. A new theory of planetary motion. By THEODORE STRONG.
84. On the linear evaluation of surd forms. By WILLIAM WATSON.
85. On the study of young animals, and its bearing upon the progress of paleontology and zoölogy. By ALEXANDER AGASSIZ.
86. On the mass of the satellites of Saturn. By BENJAMIN PEIRCE.
87. On a remarkable rainbow. By BENJAMIN PEIRCE.
88. Investigation in regard to sound in its economical applications. By JOSEPH HENRY.

89. On the geographical distribution of fishes in the waters of the Amazon. By LOUIS AGASSIZ.
90. On the stature of American soldiers. By B. A. GOULD.
91. On the influence of the hour of the day on the heights obtained by barometric measurements. By ARNOLD GUYOT.
92. On astronomical photography. By LEWIS M. RUTHERFORD.
93. On the reduction of photographic observations, with a determination of the positions of the Pleiades from photographs by Mr. Rutherford. By B. A. GOULD.
94. On a table for facilitating the conversion of longitude and latitude into right ascension and declination. By WILLIAM FERREL.
95. On the *Nephila plumipes*, or silk spider of South Carolina. By B. G. WILDER.

## VII.—WASHINGTON, JANUARY 23-27, 1867.

96. On the systematic value of rhynchophorous Coleoptera. By J. L. LE CONTE.
97. On the November meteors. By HUBERT NEWTON.
98. On the total eclipse of the sun of August 7, 1850, in connection with some remarks of the annular eclipse of October, 1865. By STEPHEN ALEXANDER.
99. On some of the phenomena presented by the planet Venus when near her inferior conjunction. By STEPHEN ALEXANDER.
100. On the relative longitude of Europe and America, and the velocity of galvanic signals in the Atlantic cable. By B. A. GOULD.
101. On the principles of the classification of fishes. By LOUIS AGASSIZ.
102. Recent observations on the glacial phenomena of the basin of the Great Lakes. By J. S. NEWBERRY.

## VIII.—HARTFORD, CONN., AUGUST 13-17, 1867.

103. A protest against modern nomenclature in zoölogy. By L. AGASSIZ.
104. On the duration of the electric discharge. By O. N. ROOD.
105. On homocercy and heterocercy. By L. AGASSIZ.
106. On new process in analytical chemistry. By WOLCOTT GIBBS.
107. On algebras. By BENJAMIN PEIRCE.
108. On the significance of classes in the animal kingdom. By L. AGASSIZ.
109. Observations in 1863-67 of right ascension of stars observed, by J. Lepaute d'Agelet. By B. A. GOULD.
110. Determination of the proper motions of stars, first observed by J. Lepaute d'Agelet. By B. A. GOULD.
111. On the limitations and conditions of associated linear algebra. By BENJAMIN PEIRCE.
112. On the limitations and conditions of associated linear algebra. By BENJAMIN PEIRCE.
113. The structural character of the selachians. By L. AGASSIZ.
114. Note on a problem of curvature. By THOMAS HILL.
115. Remarks on the geological relations of the mastodon and fossil elephant suggested by the discovery of the Cohoes, N. Y., mastodon. By JAMES HALL.
116. On the precision of the equinoxes and nutation as resulting from the theory of the gyroscope, with remarks explanatory of the deviation of rifled projectiles. By J. G. BARNARD.
117. On single, double, and triple linear associative algebras. By BENJAMIN PEIRCE.
118. On sterility among skates. By LOUIS AGASSIZ.
119. On the fifth pair of nerves and the organ of hearing in skates. By L. AGASSIZ.
120. On periodical ovulation in sharks. By LOUIS AGASSIZ.
121. On quadruple linear associative algebras. By BENJAMIN PEIRCE.
122. Spectroscopic notices. By W. GIBBS.
123. On the value of certain groups in the geological series when studied in their geographical extension. By JAMES HALL.

124. The circulation of blood in selachians. By L. AGASSIZ.
125. On the determination of wave lengths by the method of comparison. By WOLCOTT GIBBS.
126. Parasitic crustacea in the gills of sharks. By L. AGASSIZ.
127. Embryology and affinities of the cylopterus. By L. AGASSIZ.
128. Further remarks explanatory of the deviation of rifled projectiles as resulting from the theory of the gyroscope. By J. G. BARNARD.
129. On a process of integration used in the case of a planet's orbit disturbed by small forces. By THEODORE STRONG.

## IX.—WASHINGTON, JANUARY 22-26, 1868.

130. On the practical character of the usual thermometric scales, and a common substitute for them. By ARNOLD GUYOT.
131. On the use and interpretation of single and double linear associative algebras. By BENJAMIN PEIRCE.
132. On the existence of a great central zone of fracture of the surface of the globe. By ARNOLD GUYOT.
133. Respecting the cosmical theory of the November meteors. By ALEX. TWINING.
134. The history of a week in the life of a young salmon. By L. AGASSIZ.
135. Comparison of the iron meter belonging to the American Philosophical Society, and used as the standard measure of the Coast Survey, with the platinum standard meter of the Conservatoire des Arts et Metiers in Paris, in the summer of 1867. By F. A. P. BARNARD.
136. Some points in the geological development of the continent between the Rio Grande and Arkansas River. By J. L. LE CONTE.
137. On the penetration of sound. By JOSEPH HENRY.
138. On a new reflector as a signal in geodetic observations. By J. E. HILGARD.
139. Remarks upon the condition of the skeleton of the mastodon found at Cohoes, N. Y., and its relations to the geology of the surrounding country. By JAMES HALL.
140. On observations of the zodiacal light. By BENJAMIN PEIRCE.
141. On the fauna of the Gulf of Mexico at great depths. By L. AGASSIZ.
142. Exploration of the coast of Alaska. By GEORGE DAVIDSON.
143. Notes on a treatise on topographical drawing by J. Enthoffer. By J. C. HILGARD.
144. Solution of a particular form of algebraic equation. By BENJAMIN PEIRCE.
145. Note on the velocity of the transmission of perceptions and volitions. By B. A. GOULD.
146. Remarks on the buffalo of North America. By LOUIS AGASSIZ.

## X.—NORTHAMPTON, MASS., AUGUST 25-29, 1868.

147. On the rainfall of the United States, discussed by Charles A. Schott, Assistant United States Coast Survey, from data collected by the Smithsonian Institute. By JOSEPH HENRY.
148. Remarks on Mr. Airy's reduction of Kirchoff's scale. By WOLCOTT GIBBS.
149. On the origin of bitumens, together with experiments of the formation of asphaltum by S. F. Peckham. By J. D. WHITNEY.
150. On the topography and topographical work west of the 103d meridian. By J. D. WHITNEY.
151. On an invariable meter. By A. C. TWINING.
152. On the tides and tidal currents in an estuary or a canal between two tidal basins. By B. PEIRCE.
153. On the fossil human skull of Calaveras County, California. By J. D. WHITNEY.
154. On deep-sea dredgings in the Gulf Stream. By L. F. POURTALES.
155. On subdivisions of cretaceous and marine tertiary formations in California. By W. M. GABB.

156. On the constitution of uric acid and its derivatives. By WOLCOTT GIBBS.
157. On new methods in analytical chemistry. By WOLCOTT GIBBS.
158. On the tides and tidal currents of Hell-Gate. By HARRY MITCHEL.
159. On the distribution of the forest vegetation west of the Rocky Mountains. By W. H. BREWER.
160. On the reported occurrence of human bones at Antelope Station, on the Union Pacific Railroad. By O. C. MARSH.
161. On the motions of a freely-suspended pendulum. By J. G. BARNARD.
162. On tides and tidal currents in a harbor. By BENJAMIN PEIRCE.
163. On alphabetic systems as tests of race. By W. D. WHITNEY.
164. On a new borate from Mine Hill, Sussex County, New Jersey. By G. J. BRUSH.
165. On the transportation of the materials of the carboniferous conglomerate. By J. S. NEWBERRY.
166. On the estimation of carbonic acid. By S. W. JOHNSON.
167. On nitrification. By S. W. JOHNSON.
168. On some points in the surface geology of the region west of the Rocky Mountains. By J. D. WHITNEY.
169. On the pendulum and gyroscope as exhibiting the rotation of the earth. By J. G. BARNARD.

## XI.—WASHINGTON, APRIL 13-17, 1869.

170. On the age of beaver dams. By ALEXANDER AGASSIZ.
171. On the cooling of the sun and planets. By BENJAMIN PEIRCE.
172. On the most plausible reconstruction of the original Appalachian surface. By J. P. LESLEY.
173. On the bone phosphate beds of South Carolina, their formation, age, and fossils, including the human remains lately discovered. By F. S. HOLMES.
174. On a new meridian and equal altitude instrument used in the Coast Survey. By J. E. HILGARD.
175. On the deep-sea exploration of the Gulf Stream. By BENJAMIN PEIRCE.
176. On tidal researches. By WILLIAM FERREL.
177. On tidal rainfall. By P. E. CHASE.
178. On the products of the action of the alkaline nitrates upon uric acid and its derivatives. By WOLCOTT GIBBS.
179. On inversion in algebra. By BENJAMIN PEIRCE.
180. On a mode of examination of potable waters. By B. F. CRAIG.
181. On the meteorite which fell in Franklin County, Alabama, December 5, 1868. By GEORGE J. BRUSH.
182. On a new member of the chrysolite group. By GEORGE J. BRUSH.
183. On the effects of expansion and contraction in large ice fields, illustrating the formation of anticlinal and synclinal axes in geological formations. By M. C. MEIGS.
184. On international coinage. By S. B. RUGGLES and E. B. ELLIOTT.
185. On the tornado in Iowa and Illinois, June 3, 1860. By W. L. NICHOLSON.
186. On the history and present condition of an investigation of the winds. By JAMES H. COFFIN.
187. On the connection between solar spots, the magnetic declination, and the exhibition of the aurora borealis. By ELIAS LOOMIS.
188. On a certain new method of endiometrical analysis, with examples of analytical work done therewith. By B. SILLIMAN and HENRY WURTZ.
189. On the effects of atmospheric air in reducing the illuminating power of coal gas. By B. SILLIMAN and HENRY WURTZ.
190. On an important modification in the hydrocarbon process for the production of illuminating gas. By B. SILLIMAN.
191. On the physical construction of the sun. By J. H. LANE.

## XII.—NORTHAMPTON, MASS., AUGUST 31—SEPTEMBER 3, 1869.

193. On the law of distribution of volcanoes and its bearing on the theory of volcanic action. By A. GUYOT.
194. On the correction for temperature and pressure in gas analysis. By WOLCOTT GIBBS.
195. Notice of a worn tooth and tusk of a mastodon indicating glacial action. By JAMES HALL.
196. On the structure of the Rocky Mountains as observed in the southern extension of the Black Hill range, the Sheep Mountain, and the eastern part of the Medicine Bow range. By JAMES HALL.
197. On solar heat and the temperature of the surface of the moon. By J. ERICSSON.
198. On the rate of asimuthal motion of a freely suspended pendulum as corrected for the proper apsidal progression of its orbit. By J. G. BARNARD.
199. On certain ammonia cobalt bases. By WOLCOTT GIBBS.
200. On the total eclipse of August 7, 1869. By B. A. GOULD.
201. On total eclipse of the sun, with observations on the recent eclipse. By STEPHEN ALEXANDER.
202. Notes on the aurora borealis. By W. H. DALL.
203. On the total eclipse of the sun, August 7, 1869. By A. C. TWINING.
204. On accidental colors and their application to the explanation of some phenomena of solar eclipses. By JOSEPH HENRY.
205. On the application of the spectroscope to the analysis of reflected light. By WOLCOTT GIBBS.
206. Contributions to the chemistry of common salt with special reference to our home sources of supply. By CHARLES A. GOESMANN.
207. On constancy of rotation of the earth, incompatible with solar influences. By JOHN ERICSSON.

## XIII.—WASHINGTON, APRIL 13—17, 1870.

208. On the measurement of wave-lengths by means of indices of refraction. By WOLCOTT GIBBS.
209. On the coming transits of Venus, and the mode of observing them. By S. NEWCOMB.
210. Meridional arcs measured in connection with the Coast Survey. By J. E. HILGARD.
211. The relations of the four archetypes of structure of the animal kingdom as parts of one life system. By A. GUYOT.
212. Observations on the measurement and iconography of crania. By G. A. OTIS.
213. The Northmen in Greenland. By I. I. HAYES.
214. Considerations on the apparent inequalities of long periods in the moon's mean motion, and on the possible variability of the siderial day. By S. NEWCOMB.
215. On the deviation of compasses in iron-clad ships. By WILLIAM HARKNESS.
216. On the influence of the interior structure of the earth on precession and nutation. By J. G. BARNARD.
217. On the classification of clouds. By ANDRE POEY.
218. On the proposed astronomical observatory in the Argentine Republic. By B. A. GOULD.
219. On the comparison of barometers. By B. F. CRAIG.
220. On certain points in the use of artificial lights in photographing objects, as seen with the microscope. By J. J. WOODWARD.
221. On metric standards. By J. E. HILGARD.
222. On artificial deformation of skulls. By G. A. OTIS.
223. Reduction of photographic observations of Praesepe. By B. A. GOULD.

224. Astronomical photographs. By L. M. RUTHERFURD.
225. On some of the phenomena attending the tornado-thunderstorm of Iowa and Illinois of June 3, 1860. Report made for the Smithsonian Institute. By L. W. NICHOLSON.
226. The basalt of Washington Territory, Oregon, and Idaho. By R. W. RAYMOND.
227. On the lignites of Western America. By J. S. NEWBERRY.
228. Description of the new binocular for the microscope to be used with high powers. By F. A. P. BARNARD.
229. Redemption periods of life annuities and reversions. By E. B. ELLIOTT.
230. On the polarization of the atmosphere. By ANDRE POEY.
231. The classification of mammals. By THEO. GILL.
232. A new form of quarternions. By BENJAMIN PEIRCE.
233. New breeds of hardy silk-worms, which feed on the ailanthus and oaks, and the importance of their introduction into the country, a future industry. By J. Q. A. WARREN.

## XIV.—WASHINGTON, APRIL 18—23, 1871.

234. On the waning of the glacial period. By L. AGASSIZ.
235. Explanation of the observed fact that a man's left side walks faster than his right. By WILLIAM FERREL.
236. Additional evidences in regard to the antiquity of man. By J. D. WHITNEY.
237. Optical notices. By WOLCOTT GIBBS.
238. On the discharge of a small Leyden jar. By O. N. ROOD.
239. On the hexatomic compounds of cobalt. By WOLCOTT GIBBS.
240. Determinations of the moon's mass from tide observations. By WILLIAM FERREL.
241. Some account of the progress in the investigation of the laws of winds. By JAMES H. COFFIN.
242. Some phenomena of acoustics. By J. HENRY.
243. On the influence of a covering of snow on climate. By ALEX. WOELKOF.
244. Systematic zoology and modern nomenclature. By ALEXANDER AGASSIZ.
245. On the formation and motion of glaciers. By J. D. WHITNEY.
246. On certain compounds of iridium. By WOLCOTT GIBBS.
247. Geographical distribution of marine animals. By ALEXANDER AGASSIZ.
248. Non-associative algebra. By BENJAMIN PEIRCE.
249. Observations of the eclipse of the sun, December 22, 1870. By J. C. WATSON.
250. Some remarks on Lambert's formula. By JAMES H. COFFIN.
251. Probabilities in the game of billiards. By BENJAMIN PEIRCE.
252. On the use of the zenith telescope in the observations of the transit of Venus. By ORMOND STONE.

## XV.—WASHINGTON, APRIL 16—19, 1872.

253. On evidences of glacial action near Montevideo, South America. By LOUIS AGASSIZ.
254. On the application of photography to the observation of the transit of Venus. By JOSEPH WINLOCK.
255. On observation of solar prominences. By JOSEPH WINLOCK.
256. Remarks on the discovery of two new planets, Nos. 115 and 119. By JAMES C. WATSON.
257. On the progress made in the construction of metric standards for the several States of the Union. By J. E. HILGARD.
258. Biographical memoir of Theodore Strong. By STEPHEN ALEXANDER.

## XVI.—CAMBRIDGE, MASS., NOVEMBER 20–22, 1872.

259. The organization of the museum of comparative zoology in Cambridge. By L. AGASSIZ.
260. On three different modes of teething among selachians. By L. AGASSIZ.
261. On the manufacture of gunpowder for great guns, and on increasing the efficiency of small arms by improved ammunition and sights. By M. C. MEIGS.
262. An acoustic pyrometer. By A. M. MAYER.
263. Results of the Coast Survey astronomical expedition to the Rocky Mountains. By CHARLES A. YOUNG.
264. Presentation of an isothermal chart, and of a hypsometric sketch of the United States. By CHARLES A. SCHOTT.
265. Account of the proceedings of the International Metric Commission. By J. E. HILGARD.
266. Development of actiniae. By ALEX. AGASSIZ.
267. The glacial phenomena of the southern hemisphere compared with those of the northern. By L. AGASSIZ.
268. Affinities of echinoderms and worms. By ALEX. AGASSIZ.
269. On the construction and advantages of a large aneroid barometer. By M. C. MEIGS.
270. Notice of investigations making in California on the reliability of the barometer as a hypsometric instrument. By J. D. WHITNEY.
271. Pedicellariæ of echinoderms. By ALEX. AGASSIZ.
272. On the determination of the relative intensities of sounds, and on the measurement of the powers of various substances to transmit and reflect sonorous vibrations. By A. M. MAYER.
273. Researches on the change of dimensions of iron and steel rods, and of hollow iron cylinders by their magnetization. By A. M. MAYER.
274. Experimental exhibition of the exploration of an acoustic wave-surface. By A. M. MAYER.
275. Analytical notices. By W. GIBBS.
276. Results of recent dredgings on the coast of New England. By A. E. VERRILL.
277. Tidal researches. By W. FERREL.
278. Embryological fragments concerning the volutidæ. By L. AGASSIZ.
279. On the specific identity of some animals along the Atlantic and Pacific shores of America. By L. AGASSIZ.
280. The copulatory organs of the selachians compared with one another and with those of other vertebrates. By L. AGASSIZ.
281. On the changes selachians undergo with age. By L. AGASSIZ.
282. Critical remarks about scientific views entertained upon theoretical grounds. By L. AGASSIZ.
283. Observations on the nature and duration of lightning. By O. N. ROOD.
284. Notice of the progress of the topographical work of the geological survey of California. By J. D. WHITNEY.
285. The 1474 corona line. By C. A. YOUNG.
286. Mathematical reversal and semi-reversal. By BENJAMIN PEIRCE.

## XVII.—WASHINGTON, APRIL 15–19, 1873.

287. The determination of singular points of curves and surfaces by the methods of quaternions. By BENJAMIN PEIRCE.
288. On the meteoric iron found in 1871 near Shingle Springs, El Dorado County, California. By BENJAMIN SILLIMAN.
289. Determinations of longitude between Europe and America. By J. E. HILGARD.
290. On the structure and age of the Cincinnati antielinal. By J. S. NEWBERRY.

291. On the need of more accurate investigations and tables of the celestial motions. By S. NEWCOMB.
292. Experimental and graphic results of distilling certain hydrocarbons by heat with and without the aid of vacuum and steam. By C. F. CHANDLER and B. SILLIMAN.
293. The geodesy of the United States Coast Survey. By BENJAMIN PEIRCE.
294. On the general atmospheric circulation. By A. J. WOIEKOF.
295. On repeating curves. By H. A. NEWTON.
296. Comparison of the spectra of the limb and of the center of the sun made at the Sheffield Scientific School by Charles Hastings. By H. A. NEWTON.
297. On the observation of very small stars near the ecliptic, and some peculiarities in two recently discovered minor planets. By J. C. WATSON.
298. On the altitude of Gray's and Torrey's Peaks, in Colorado Territory; some questions connected with the determination of barometric altitudes in the interior of continents. By A. GUYOT.
299. On some experiments made with a slitless spectroscope in 1871 in order to see the whole chromoscope of the sun at once. By JOSEPH WINLOCK.
300. On the stability of the meridian circle of Harvard College. By JOSEPH WINLOCK.
301. On the method of illuminating the threads of the reticule of a telescope by the electric spark. By JOSEPH WINLOCK.
302. On observations of the sun made at Harvard College in 1872 with the aid of the Bache fund. By JOSEPH WINLOCK.
303. Report of the progress of a magnetic survey made by the aid of the Bache fund. By J. E. HILGARD.
304. On certain harmonies of the solar system. By STEPHEN ALEXANDER.
305. On the reproduction in progeny of defects produced by injuries in parents. By CHARLES E. BROWN-SEQUARD.
306. Silt analysis of soils and clays. By E. W. HILGARD.
307. On the unity of the system of life in animals, and the true principle of graduation in the various animal types. By A. GUYOT.

## XVIII.—NEW YORK, OCTOBER 28–31, 1873.

308. Sound in relation to fog-signals. By JOSEPH HENRY.
309. Results of explorations of the deeper portions of the Gulf of Maine with the dredge. By A. S. PACKARD, Jr.
310. On the constitution of the sun's surface. By C. A. YOUNG.
311. On the admeasurement of volume. By J. E. HILGARD.
312. On the determination of the volume of a sphere. By HOMER J. LANE.
313. On the distribution of the thoracic spiracles of insects. By A. S. PACKARD.
314. Some results derived from an examination of the United States weather maps. By ELIAS LOOMIS.
315. Circles of deposition in American sedimentary strata. By J. S. NEWBERRY.
316. On the relations of different classes of vertebrates. By THEODORE GILL.
317. On a new method of analysis of composite sounds, and on experiments elucidating Helmholtz's hypothesis of audition. By A. M. MAYER.
318. Experimental researches on fluorescence. By HENRY MORTON.

## XIX.—WASHINGTON, APRIL 21–25, 1874.

319. On the classification of the rynchophorous series of coleoptera. By J. L. LeCONTE.
320. Combinations of mechanism representing mental processes. By FAIRMAN ROGERS.
321. Suggestions as to the functions of the spiral scale of the cochlea, leading to an hypothesis of the mechanism of audition. By ALFRED M. MAYER.

322. Results of a series of experiments on the sets or residual deflections of pine sticks after having been subjected to a transverse stress. By W. A. NORTON.
323. On the pretended localization of the mental and the sensorial faculties of the brain. By CHARLES E. BROWN-SEQUARD.
324. Account of the proceedings of the commission for observing the transit of Venus By SIMON NEWCOMB.
325. The progress made in the survey of the Colorado River of the West and its tributaries, by parties under the direction of the Smithsonian Institution. By J. W. POWELL.
326. On the tides of Tahiti. By WILLIAM FERREL.
327. The law of duration of the residual sonorous sensation. By ALFRED M. MAYER.
328. On metamerism in inorganic chemistry. By W. GIBBS.
329. An outline of the history and operations of the United States Geological Survey of the Territories, with some account of its results. By F. V. HAYDEN.
330. On a small correction of the velocity of light, as deduced from experiments. By STEPHEN ALEXANDER.
331. Mineralogical notes. By B. SILLIMAN.
332. Experiments on the reflection of sound from flames and heated gases. By A. M. MAYER.
333. On the laws of cyclones. By WILLIAM FERREL.
334. The history of Smith Sound, in a geographical and geological point of view, and some other general results of the Polaris expedition. By E. BESSELS.
335. Some results of an examination of the United States weather maps for the years 1872 and 1873. By ELIAS LOOMIS.
336. On the so-called land plants of the Lower Silurian of Ohio. By J. S. NEWBERRY.
337. Report on the great telescope of the United States Naval Observatory. By SIMON NEWCOMB.
338. The geographical distribution of the lignite group of the Southwest, with some remarks in regard to its age. By F. V. HAYDEN.
339. On certain phenomena sometimes presented by three of the satellites of Jupiter. By STEPHEN ALEXANDER.
340. A criticism on the contractional hypothesis of the earth's surface-change. By C. E. DUTTON.
341. On the polarization of the zodiacal light. By A. W. WRIGHT.
342. On some points in Mallet's theory of vulcanicity. By E. W. HILGARD.
343. On the zodiacal light. By STEPHEN ALEXANDER.
344. A new set of Bernoulli's numbers. By J. D. WARREN.

## XX.—PHILADELPHIA, NOVEMBER 3-6, 1874.

345. Additional results derived from an examination of the United States weather reports. By ELIAS LOOMIS.
346. A new method of investigating the composite nature of the electric discharge. By A. M. MAYER.
347. On the specific gravity of the waters of the Gulf of Maine. By A. S. PACKARD, JR.
348. On ancient ruins in Southwestern Colorado. By F. V. HAYDEN.
349. Some examples of the decomposition of rocks. By T. STERRY HUNT.
350. On an undescribed organ in *Limulus*, supposed to be venal in its nature. By A. S. PACKARD.
351. New discussion of the secular change of the magnetic declination in the United States and adjacent countries in North America. By CHARLES A. SCHOTT.
352. On a method of measuring minute variations in atmospheric pressure. By A. M. MAYER.
353. On the change in dimension of hollow iron cylinders and solid iron rods on their magnetization. By A. M. MAYER.

354. On the horizontal pendulum as arranged for purposes of physical investigation. By OGDEN N. ROOD.
355. On the effect of magnetism on the thickness of soft iron bars. By OGDEN N. ROOD.
356. On atmospheric air as engaged with sound. By JOSEPH HENRY.
357. On summary of work done by the United States Geological Survey of the Territories during the season of 1874. By F. V. HAYDEN.
358. On a method of separating ammonia and its compounds from gaseous mixtures. By B. SILLIMAN.
359. On an instance of total replacement of porphyry matrix by metallic copper. By RAPHAEL PUMPELLE.
360. An additional character serving to define the rhynchophorous series of coleoptera. By J. L. LE CONTE.
361. On the use of a mineral poison for the protection of agriculture. By J. L. LE CONTE.
362. Notes on Grant's difference engine. By F. ROGERS.
363. Observations on the Newport conglomerate. By W. B. ROGERS.
364. Simple mode of producing electricity for lecture-room purposes. By R. E. ROGERS.
365. Remarks in regard to the age of the lignitic group of Colorado. By F. V. HAYDEN.
366. On the value of paleontological evidence in determination of strata. By THEODORE GILL.
367. Description of a balance for determining specific gravities without calculation. By F. A. P. BARNARD.

## XXI.—WASHINGTON, APRIL 20-23, 1875.

368. Results derived from an examination of the United States weather maps for 1872, 1873, and 1874. By ELIAS LOOMIS.
369. Notes on observation of the transit of Venus. By G. DAVIDSON.
370. On an improvement of the present civil or Gregorian calendar. By J. P. BRADLEY.
371. Results of experiments on the set of rectangular bars of wood, iron, and steel, resulting from a transverse stress. By W. A. NORTON.
372. Note on Goldschmid's aneroid barometer. By J. E. HILGARD.
373. Sketch of progress of second geological survey of Pennsylvania. By J. P. LESLEY.
374. On the orography of the Catskill group of mountains. By A. GUYOT.
375. Report of the committee on weights, measures, and coinage. By F. A. P. BARNARD.
376. On the observations of contacts in transits of Venus and Mercury. By S. NEWCOMB.
377. New formula for the deflections of rectangular bars or beams, resting on supports and subjected to a transverse stress. By W. A. NORTON.
378. Size of the brain of extinct mammals. By O. C. MARSH.
379. Account of researches in solar physics made at the Alleghany Observatory during the past four years. By S. P. LANGLEY.
380. Use of the stereoscope in the study of solid geometry. By JAMES D. WARNER.
381. On the interpolation of a change of sign by passage through infinity of a mathematical function expressive of a physical phenomenon; a curious particular case in the theory of tides. By J. G. BARNARD.
382. On the discussion of the laws of atmospheric circulation, by Prof. James H. Coffin (now deceased). By SELDEN J. COFFIN.
383. On the influence of arsenical compounds upon vegetation. By WM. McMARTIN.
384. Preliminary account of results of a magnetic survey made at the charge of the Bache fund. By J. E. HILGARD.
385. On the relations of some of our ancient fossil fishes to living forms. By J. S. NEWBERRY.
386. On areas of cold. By A. WOEIKOF.

## XXII.—PHILADELPHIA, NOVEMBER 2-5, 1875.

387. On the evidence of horizontal crushing in the formation of the Coast Range of California. By JOSEPH LE CONTE.  
 388. Contributions to meteorology. By ELIAS LOOMIS.  
 389. On the composition of schorlomite. By GEORGE A. KOENIG.  
 390. Sound in its applications to fog-signals. By JOSEPH HENRY.  
 391. Table of the sedimentary group of the plateaus. By J. W. POWELL.  
 392. Second notice of Grant's difference engine. By FAIRMAN ROGERS.  
 393. A new and simple form of compensating pendulum. By J. LAWRENCE SMITH.  
 394. A confirmation of my theory of the zodiacal light. By STEPHEN ALEXANDER.  
 395. Exposition of several very peculiar astronomical phenomena. By STEPHEN ALEXANDER.  
 396. Influence of marine life and currents in the formation of metalliferous deposits. By RAPHAEL PUMPELLY.  
 397. A soluble crystalline product from the graphite of meteoric iron. By J. LAWRENCE SMITH.  
 398. A notice of the modern system of chemical terminology. By R. E. ROGERS.  
 399. On the steam geysers of California, and on the chemistry of the mines of the Comstock Lode. By R. E. ROGERS.

## XXIII.—WASHINGTON, APRIL 18-22, 1876.

400. On the precise determination of the number of vibrations of tuning-forks, and on the effect of temperature and of amplitude on the same. By A. M. MAYER.  
 401. On the theory of simultaneous ignition of many mines. By H. L. ABBOT.  
 402. On the theory of magic squares. By F. A. P. BARNARD.  
 403. Contributions to meteorology. By ELIAS LOOMIS.  
 404. On the sensations produced by concurrent and rapidly succeeding sounds. By A. M. MAYER.  
 405. On maxima and minima in algebra, by the late General D. P. Woodbury, with a biographical notice of the author. By J. G. BARNARD.  
 406. The character of the Eocene fauna of New Mexico. By E. D. COPE.  
 407. On the history of the problem of tangencies. By BENJAMIN ALVORD.  
 408. On the geological evidences on the question of the cause of the cold of the ice period. By J. S. NEWBERRY.  
 409. Biographical memoir of Joseph Winlock. By J. LOVERING.  
 410. On a method of exploring the acoustic condition of the atmosphere leading to determining the direction of a source of sound. By A. M. MAYER.  
 411. On the geological and physical structure of the Black Hills. By HENRY NEWTON.  
 412. On the imperfection of the present system of chemical nomenclature. By R. E. ROGERS.  
 413. The age of mountains as determined by degradation. By J. W. POWELL.  
 414. On the progress of the magnetic survey of the United States at the charge of the Bache fund of the Academy. By J. E. HILGARD.  
 415. Results of experiments on contact resistance. By WILLIAM A. NORTON.  
 416. A conjectural restoration of the pueblo of the mound-builders. By L. H. MORGAN.  
 417. On the geology of petroleum. By J. S. NEWBERRY.

## XXIV.—PHILADELPHIA, OCTOBER 17-19, 1876.

418. Contributions to meteorology. By ELIAS LOOMIS.  
 419. Upon the direct comparison of solar radiation with that of the Bessemer furnace and upon the law of Du Long and Petit. By S. P. LANGLEY.  
 420. On the affinities of hypocephalus. By J. L. LE CONTE.

421. On a change in the relative length of the British bronze and iron standard yards in the United States office of weights and measures. By J. E. HILGARD.  
 422. On sounds in relation to fog-signals. By JOSEPH HENRY.  
 423. The results of an investigation upon the transformation of *Planorbis multiformis*. By ALPHEUS HYATT.  
 424. On the transmission of the shock of the explosion at Hell Gate. By H. L. ABBOT.  
 425. On the geological structure and topographical aspects of the Catskill Mountains. By JAMES HALL.  
 426. On the physical structure and altitudes of the southern group of the Catskill Mountains. By A. GUYOT.  
 427. On the force involved in Crooke's radiometer. By O. N. ROOD.  
 428. On a new method of studying reflection of sound-waves. By O. N. ROOD.  
 429. On a property of the retina first observed by Tate. By O. N. ROOD.  
 430. On a series of molecular changes in the basaltic rocks of Lake Superior. By R. PUMPELLY.  
 431. On the power of certain substances to abstract salts from their solution in water by filtration through them. By R. E. ROGERS.  
 432. On the compensation of a pendulum heretofore described. By J. LAWRENCE SMITH.

## XXV.—WASHINGTON, APRIL 17-20, 1877.

433. On a new measuring instrument, the Vernier microscope. By A. M. MAYER.  
 434. On systematic errors in star declinations. By E. C. PICKERING and W. A. ROGERS.  
 435. On the young stages of some osseous fishes. By ALEXANDER AGASSIZ.  
 436. On critical periods in the history of the earth, and their relations to evolution, and on the quaternary at such a period. By JOSEPH LE CONTE.  
 437. On the progressive motion of storms. By WILLIAM FERREL.  
 438. Contributions to meteorology. By E. LOOMIS.  
 439. Improved method of obtaining metallic spectra. By G. F. BARKER.  
 440. On the effect produced by mixing white with colored light. By O. N. ROOD.  
 441. On Newton's use of the term indigo, with reference to a color of the spectrum. By O. N. ROOD.  
 442. Internal structure of the earth as affecting the phenomena of precession and mutation: supplementary to article under this head read before the Academy and published in Vol. XIX, Smithsonian Contributions. By J. G. BARNARD.  
 443. On a method of solar spectrum analysis. By S. P. LANGLEY.  
 444. On complex inorganic acids. By WOLCOTT GIBBS.  
 445. Micrometer-level and topographical camera. By E. C. PICKERING.  
 446. On the determination of the coefficient of expansion of solids. By A. M. MAYER.  
 447. The results of deep-sea dredgings. By ALEXANDER AGASSIZ.  
 448. Description of a detached gravity escapement. By C. A. YOUNG.  
 449. On the laws ruling the vibrations of tuning-forks. By A. M. MAYER.  
 450. On the structure of the "Henry" Mountains. By G. K. GILBERT.  
 451. On some remarkable facts in the distribution of magnetism in very long (60 inches) magnets. By A. M. MAYER.  
 452. Remarks on some artesian wells along the line of the Union Pacific Railroad, in Wyoming Territory. By F. V. HAYDEN.  
 453. On the structure of the crystalline lens and its relation to periscopism. By JOSEPH LE CONTE.  
 454. Remarks on the apparent secular acceleration of the mean motion of the moon, as derived from the observations of ancient eclipses. By SIMON NEWCOMB.  
 455. Researches in lunar theory. By GEO. W. HILL.  
 456. On the public domain. By J. W. POWELL.

## XXVI.—NEW YORK, OCTOBER 23–25, 1877.

457. On the laws of extreme distances in the solar system. By STEPHEN ALEXANDER.
458. Velocity of transmission of shocks caused by the explosion of gunpowder and of nitro-glycerine compounds through the earth's crust. By HENRY L. ABBOT.
459. On the morphology of the antlers of the Cervidæ. By THEODORE GILL.
460. On a new and simple method of determining the number of vibrations of sonorous bodies. By A. M. MAYER.
461. On a construction for the study of the contrast of colors. By O. N. ROOD.
462. Whence came the inner satellite of Mars. By STEPHEN ALEXANDER.
463. On the photometric comparisons of light of different colors. By O. N. ROOD.
464. Contributions to meteorology (eighth paper). By ELIAS LOOMIS.
465. On abnormal phenomena of sound in relation to fog signals, on behalf of the United States Light-House Board. By JOSEPH HENRY.
466. On the development of flounders. By ALEXANDER AGASSIZ.
467. On the luminous band which seems to encircle the moon during a partial solar eclipse. By STEPHEN ALEXANDER.
468. Note on the hydraulic limestone and associated strata at the falls of the Ohio. By JAMES HALL.
469. On some gigantic Dinosaurian reptiles from the wealden of the Rocky Mountains. By O. C. MARSH.
470. On comets. By H. A. NEWTON.
471. On the inclinations in a direction retrograde to the shadow of the planets. By STEPHEN ALEXANDER.
472. On a method of studying the velocity of sound in wood. By Dr. M. C. IHLSENG.
473. On some new fossil fishes from Ohio and Indiana. By J. S. NEWBERRY.
474. On the geological age of the western lignites. By J. S. NEWBERRY.
475. Remarks on the analyses of columbate, and on the native iron and basalt of Greenland, with exhibition of specimens showing the occurrence of sulphuret of chrome in meteoric iron. By J. LAWRENCE SMITH.
476. On the air-sacs of locusts. By A. S. PACKARD, Jr. (Communicated by Alexander Agassiz.)
477. On the glycogenic function of the liver, and its relation to vital force and vital heat. By JOSEPH LE CONTE.
478. American cretaceous birds. By O. C. MARSH.
479. Biographical memoir of Louis Agassiz; 1st part. Relating to his life and work in Europe. By A. GUYOT.

## XXVII.—WASHINGTON, APRIL 16–19, 1878.

480. Formation and structure of Alacran Reef, on the Yucatan bank. By A. AGASSIZ.
481. The theory of water-spouts. By WM. FERREL.
482. Report on the orbits of the satellites of Mars. By A. HALL.
483. The relation of loess and drift to secular disintegration. By R. PUMPELLY.
484. The characteristic invertebrate forms of the central zoo-geographical province of the United States. By A. S. PACKARD, Jr.
485. On an optical ocean salinometer. By J. E. HILGARD.
486. Preliminary report on deep-sea dredgings of the United States Coast Survey, steamer Blake, during the past winter, in the Gulf of Mexico and in the Gulf Stream. By A. AGASSIZ.
487. Abrasions on the northwest coast of America. By G. DAVIDSON.
488. On the law of Boyle and Mariotte. By W. GIBBS.
489. Abstract of memoir on the intersection of circles and the intersection of spheres. By B. ALVORD.

490. Biographical memoir of Louis Agassiz; 2d part. Relating to his life and work in America. By A. GUYOT.
491. Biographical memoir of Jeffries Wyman. By A. S. PACKARD, Jr.
492. Plan for measuring the velocity of light. By S. NEWCOMB.
493. On the force of effective molecular action. By W. A. NORTON.
494. On the value of the results obtained for the solar parallex from the English telescopic observations. By C. H. F. PETERS.
495. On the vertebrate fauna of the Permian period of the United States. By E. D. COPE.
496. Report of progress on the subject of oxygen in the sun. By H. DRAPER.
497. Photometric comparison of the components of close double stars. By E. C. PICKERING.
498. On the duplication of geographical names. By F. V. HAYDEN.
499. Characteristics of some of the lower spectral lines. By S. P. LANGLEY.
500. A new element of the cerium group. By J. L. SMITH.
501. On the primary zoo-geographical divisions of the globe, and their relations. By T. N. GILL.
502. Mr. Wallace and Mr. Allen on geographical distribution, with special reference to the alleged distinctness of the nearctic region. By E. COUES.
503. On the laws governing the movements of the Rocky Mountain locusts. By C. V. RILEY.
504. On the structure and origin of mountains, with special reference to recent objections to the contractional theory. By JOSEPH LE CONTE.
505. Photometric measures of certain faint stars and planets. By E. C. PICKERING.
506. Contributions to meteorology. By E. LOOMIS.
507. Recent displacements in Utah. By G. K. GILBERT.
508. Supplementary notice on the paper "Whence came the inner satellite of Mars," read at the October session, 1877. By S. ALEXANDER.

## XXVIII.—NEW YORK, NOVEMBER 5–8, 1878.

*Title of papers read at the November session, 1878.*

509. On the solar eclipse of July 29, 1878. By HENRY DRAPER.
510. The early types of insects. By S. H. SCUDDER.
511. On the acceleration of gravity at initial stations. By C. S. PEIRCE.
512. The inapplicability of the old theory of turbine water-wheels to the new constructions of Boyden and Francis. By W. P. TROWBRIDGE.
513. The embryology of the gar-pike. By A. AGASSIZ.
514. On arrangement of a zoological marine laboratory at Newport. By A. AGASSIZ.
515. On the value of photography in the study of instantaneous phenomena, illustrated by photographs taken at successive stages of torpedo explosions. By H. L. ABBOT.
516. On the eleventh axiom of Euclid, with a proposed demonstration of the same. By S. ALEXANDER.
517. A biographical memoir of Prof. Dennis Hart Mahan. By H. L. ABBOT.
518. A continuation of a paper presented at the April meeting on the "Intersection of circles and the intersection of spheres." By B. ALVORD.
519. Contribution to meteorology; storms of the Atlantic Ocean. By E. LOOMIS.
520. On the instruments of precision at the Paris Exposition, &c. By G. DAVIDSON.
521. On some remains of new fossil fishes and their relation to living forms. By J. S. NEWBERRY.
522. On the quantitative analysis of white light. By O. N. ROOD.
523. On measures of the diameter of Mercury by a new method, made at the transit of May 6, 1878. By C. A. YOUNG.

524. A recapitulation of some of the author's views on the origin of the forms and the present state of many of the clusters of stars and of several of the nebulae, source of solar heat, and drift of the stars. By S. ALEXANDER.
525. On some mooted points in American geology. By J. S. NEWBERRY.
526. On Hering's theory of color. By O. N. ROOD.
527. On the characters of the theromorphous reptilia and stegocephalous batrachia. By E. D. COPE.
528. Brief notice of the total solar eclipse of January 11, 1880. By S. ALEXANDER.
529. Some remarks on an investigation of the laws of heredity, undertaken by the board of health of Massachusetts. By A. HYATT.
530. On certain modifications of the Schehallien experiment, and of the Cavendish experiment. By S. ALEXANDER.

## XXIX—WASHINGTON, APRIL 15-18, 1879.

531. Ghosts in the diffraction spectra. By C. S. PEIRCE.
532. Comparisons of the meter with wave lengths. By C. S. PEIRCE.
533. On the relations of neuralgic pains to storms and the earth's magnetism. By S. WEIR MITCHELL.
534. Confirmations by spectrum photographs of the discovery of oxygen in the sun. By HENRY DRAPER.
535. On vowel theories, considered in the light of recent experiments with the phonograph and phonautograph. By A. GRAHAM BELL.
536. The Palaeozoic cockroaches. By S. H. SCUDDER.
537. On the eclipses of Jupiter's satellites. By E. C. PICKERING.
538. On a new form of heliostat. By ALFRED M. MAYER.
539. On the extinct species of the rhinoceros and allied forms of North America. By E. D. COPE.
540. On the errors of pendulum experiments, and on the method of swinging pendulums proposed by Mr. Faye. By C. S. PEIRCE.
541. The loess of the Mississippi, and the Æolian hypothesis. By E. W. HILGARD.
542. The extinct volcanoes about Lake Mono, and their relation to our glacial drift. By JOSEPH LEE CONTE.
543. Report on the progress of the International Bureau of Weights and Measures. By J. E. HILGARD.
544. On the stability and instability of drainage lines. By G. K. GILBERT.
545. On a new polariscopic method for the detection and estimation of dextro-glucose in the presence of cane and invested sugars. By CHARLES F. CHANDLER.
546. On the ignition of high-tension fuses. By HENRY L. ABBOT.
547. On the hibernations and migrations of *Aletia argilacea* (the parent of the cotton worm). By C. V. RILEY.
548. Report on dredgings in the Caribbean Sea by the Coast Survey steamer Blake, Commander John R. Bartlett, United States Navy. By ALEXANDER AGASSIZ.
549. On two new forms of micrometers. By E. C. PICKERING.
550. On the physical hydrography of the Gulf of Maine. By HENRY MITCHELL.
551. The winds on Mount Washington compared with the winds near the level of the sea. By ELIAS LOOMIS.
552. On a mineral locality in Fairfield County, Connecticut. By G. J. BRUSH.
553. On the great silver deposits recently discovered in Colorado, Utah, and Nevada. By J. S. NEWBERRY.
554. On the recurrence of solar eclipses. By SIMON NEWCOMB.
555. On the influence of Jupiter upon bodies passing near that planet. By H. A. NEWTON.
556. On the projections of the sphere which preserve the angles. By C. S. PEIRCE.
557. Report of the Committee on Weights, Measures, and Coinage. By F. A. P. BARNARD.

558. An account of geodetic arcs determined by the Coast Survey in relation to the figure of the earth. By J. E. HILGARD.
559. A biographical memoir of the late Dr. Theodore Strong. By Justice J. P. BRADLEY.
560. A biographical memoir of the late Dr. Jared P. Kirtland. By J. S. NEWBERRY.
561. On two more diazo colors from coal-tar. (Read by title only.) By C. F. CHANDLER.

## XXX.—NEW YORK, OCTOBER 25-30, 1879.

562. On photographing spectra of the stars. By HENRY DRAPER.
563. Spectroscopic notes. By C. A. YOUNG.
564. Original researches, reported in the second volume of the Medical and Surgical History of the War of the Rebellion. By J. J. WOODWARD.
565. Some observations on the structure of the human brain. By J. C. DALTON.
566. Some remarks on a new map of the Catskill Mountains, and on the topographical relations of that mountain group to the adjacent regions of the Appalachian system. By A. GUYOT.
567. Brief comments on the nebular hypothesis of La Place. By S. ALEXANDER.
568. On some new and remarkable forms of crinoidea from the lower Helderberg formation. By J. HALL.
569. Notes on the *Lycopoditis vanuxemi* and allied forms. By J. HALL.
570. Mean pressure of the atmosphere over the United States at different seasons of the year. By E. LOOMIS.
571. The satellites of Mars in 1879. By A. HALL.
572. Questions as to a very direct and simple method of ascertaining the ellipticity of the terrestrial spheroid. By S. ALEXANDER.
573. The completion of the theory of parallel straight lines. By S. ALEXANDER.
574. Old river beds of California. By JOSEPH LEE CONTE.
575. On our memory for color and luminosity. By O. N. ROOD.
576. On absorption of the solar atmosphere. By S. P. LANGLEY.
577. On the glycogenic function of the liver. By JOSEPH LEE CONTE.
578. On Arago's experiments showing the magnetism of a conductor. By G. F. BARKER.
579. On the vegetation of the Atlantic coast of North America in the cretaceous age. By J. S. NEWBERRY.
580. On some interesting deposits of gold and silver ores in Utah and Colorado. By J. S. NEWBERRY.
581. On monandrum and other earths recently announced as occurring in gadolinite, samarkite, &c. By J. LEE SMITH.

## XXXI.—WASHINGTON, APRIL 20-23, 1880.

582. Binocular vision; laws of ocular motion. By JOSEPH LEE CONTE.
583. On hollow water-spouts and sand-spouts. By WILLIAM FERREL.
584. On the structure of the vertebrata of the Permian period. By E. D. COPE.
585. On the perforations in the squamosal bone of the mammalia. By E. D. COPE.
586. Contributions to meteorology; on sudden changes of temperature at stations near the Rocky Mountains. By E. LOOMIS.
587. The sea urchins of the Challenger expedition. By A. AGASSIZ.
588. On the structure of the brain of *Limulus Polyphemus*. By A. S. PACKARD.
589. Conclusion of the investigations of the laws of ruling the vibrations of tuning-forks. By A. M. MAYER.
590. On the size of the brains of extinct animals. By O. C. MARSH.
591. On new complex inorganic acids. By W. GIBBS.
592. On the use of the electric telegraph during total eclipses, applied to the search for intra-mercurial planets. By D. P. TODD.

593. On the telegraphic determinations of longitude by the United States Hydrographic Office. By F. H. GREEN.
594. On the taeonic system in geology. By T. S. HUNT.
595. On an instrument for measuring radiant heat. By S. P. LANGLEY.
596. On the composition of colors. By S. P. LANGLEY.
597. On the nebula of Orion. By E. S. HOLDEN.
598. On the distribution of the *Zonopsis conchifera*. By T. N. GILL.
599. On the solar corona. By WILLIAM HARKNESS.
600. On an early race of man in Japan. By E. S. NORSE.
601. Revision of atomic weight of antimony. By J. P. COOKE.
602. Cloud-bursts. By WILLIAM FERREL.
603. On the effects of vibrations transmitted by railroad trains on observations in fixed observatories. By H. H. PAUL.
604. On the modifications suffered by light on passing through a very narrow slit. By A. A. MICHELSON.
605. Some remarks on the supposed nature of the sun's corona. By J. L. SMITH.
606. On a supposed new meteoric silicate. By J. L. SMITH.
607. On some modern developments bearing upon the nebular hypothesis and other matters connected therewith, as well as on some previous changes and miscellaneous notices. By S. ALEXANDER.

## XXXII.—NEW YORK, NOVEMBER 16-19, 1880.

608. Report on the dredging cruise of the United States steamer *Blake*, Commander Bartlett, during the summer of 1880. By ALEXANDER AGASSIZ.
609. On the intimate structure of certain mineral veins. By BENJAMIN SILLIMAN.
610. Notes on the relations of the Oneonta and Montrose sandstones with the sandstones of the Catskill Mountains. By JAMES HALL.
611. On the new general method of analysis. By WOLCOTT GIBBS.
612. On some recent experiments in determining the electro-motive force of the Brush dynamo-electric machine. By HENRY MORTON.
613. Measurement of new form of electric lamps operating by incandescence. By HENRY MORTON.
614. On the *Phenacodontidae*. By E. D. COPE.
615. On the *Nimravidae* and *Canidae* of the Miocene period. By E. D. COPE.
616. On the basin of the Gulf of Mexico. By J. E. HILGARD.
617. On the origin of the coral of reefs of the Yucatan and Florida banks. By ALEXANDER AGASSIZ.
618. Observations on ice and icebergs in the Polar regions. (By invitation of the Academy.) By Lieut. F. SCHWATKA, U. S. A.
619. On the duration of the Arctic winter. (By invitation of the Academy.) By Lieut. F. SCHWATKA, U. S. A.
620. Mineralogical notes. By BENJAMIN SILLIMAN.
621. The relationship of the Carboniferous to living and extinct Myriapods. By SAMUEL H. SCUDDER.
622. On measurement of radiant energy. By S. P. LANGLEY.
623. On the bolometer. By S. P. LANGLEY.
624. Causes which determine the progressive movements of storms. By ELIAS LOOMIS.
625. On the antimony mines of Southern Utah. By J. S. NEWBERRY.
626. On the conglomerate ore deposits of the United States and Mexico. By J. S. NEWBERRY.
627. On an improvement in the Sprengel air-pump. By O. N. ROOD.
628. On the deposits of crystalline ores in Utah. By J. S. NEWBERRY.
629. On the origin of anthracite. By T. STERRY HUNT.
630. On the star list of Abul Hassan. By C. H. F. PETERS.
631. On photographing the nebula in Orion. By HENRY DRAPER.

632. On condensers for currents of high potential. By GEORGE F. BARKER.
633. On Sigsbee's gravitating trap. By ALEXANDER AGASSIZ.
634. On the ellipticity of the earth as deduced from pendulum experiments. By CHARLES S. PEIRCE.
635. Dimensions of the brain and spinal cord in some extinct animals. By O. C. MARSH.

## XXXIII.—WASHINGTON, APRIL 19-22, 1881.

636. On the domain of physiology. By T. STERRY HUNT.
637. The compass plant of the western prairies. (By invitation of the Academy.) By B. ALVORD.
638. The solar constant. By S. P. LANGLEY.
639. The color of the sun. By S. P. LANGLEY.
640. On mountain observations. By S. P. LANGLEY.
641. On the relations of soils to health. By R. PUMPELLE.
642. Reduction to sea level of barometric observations made at elevated stations. By ELIAS LOOMIS.
643. On electric light photometry. By GEORGE F. BARKER.
644. On the condenser method of measuring high tension currents. By GEORGE F. BARKER.
645. On the relations between strains and impacts and the structure of the feet of mammalia. By E. D. COPE.
646. On the progress of pendulum work. By C. S. PEIRCE.
647. On the carbon lamp fiber in the thermo-balance. By GEORGE F. BARKER.
648. Upon the production of sound by radiant energy. By A. GRAHAM BELL.
649. On the later tertiary of the Gulf of Mexico. By E. W. HILGARD.
650. On the utilization of the sun's rays in heating and ventilating. By EDWARD S. MORSE.
651. Recent researches in the vicinity of Bering's Strait, an account of the land ice of Kotzebue Sound and the Arctic coast. By W. H. DALL.
652. Recent researches in the vicinity of Bering's Strait; (II) additions to our knowledge of the currents and temperature of the ocean in the vicinity of Bering's Strait. By W. H. DALL.
653. Results just obtained with regard to the molecular weight of hydro-fluoric acid. By J. W. MALLET.
654. A method for finding the proximities of the orbits of minor planets. By C. H. F. PETERS.
655. On incandescent lights. By GEORGE F. BARKER.
656. On the auriferous gravels of California. By T. STERRY HUNT.
657. Biographical memoir of Louis F. Pourtales. By A. AGASSIZ.

## XXXIV.—PHILADELPHIA, NOVEMBER 15-17, 1881.

658. On a gigantic scalpa from the Gulf Stream. By A. AGASSIZ.
659. The echini of the Challenger expedition. By A. AGASSIZ.
660. Classification of the *Dinosauria*. By O. C. MARSH.
661. Mean annual rainfall for different countries of the globe. By ELIAS LOOMIS.
662. The porritidae and velellidae and the surface fauna of the Gulf Stream. By A. AGASSIZ.
663. On complex inorganic acids. By W. GIBBS.
664. On the *Phenacodontidae*, a new group of *Perissodactyla*. By E. D. COPE.
665. Succession in time of the *Allotheria*. By O. C. MARSH.
666. The distribution of the corals of the *Tortugas*. By A. AGASSIZ.
667. A comparison between the shells of *Kjokkenmoddings* and present shells of the species. By E. S. MORSE.
668. On a form of regulator for the driving-clock of an equatorial. By C. A. YOUNG.

669. On the objects and results of the recent expedition to Mount Whitney. By S. P. LANGLEY.
670. Notice of a remarkable mineral vein in the Black range (Negretta Mountains) of Socorro County, New Mexico. By B. SILLIMAN.
671. Statement respecting experiments on the velocity of light. By SIMON NEWCOMB.
672. On the logic of number. By C. S. PEIRCE.
673. On hydrometer scales. By G. F. CHANDLER.
674. On chinoline, its synthesis and medical uses. By HENRY MORTON.
675. On the theory of the dynamo-electric machine. By W. GIBBS.
676. Facts regarding sorghum, and some conclusions as to its value as a source of sugar. (Read by B. Silliman.) By PETER COLLIER.
677. On Mascart's electrometer and its use as a meteorological instrument. By G. F. BARKER.
678. On the fossil and recent fauna of the Oregon desert. By E. D. COPE.
679. On a new form of volumescope. By R. E. ROGERS.
680. The newly-determined line of the terminal moraine across Pennsylvania. By J. P. LESLEY.
- Biographical memoir of S. F. Haldeman. By J. P. LESLEY.

## XXXV.—WASHINGTON, APRIL 18-21, 1882.

681. On the course of the Gulf Stream since the Cretaceous period. By A. AGASSIZ.
682. Notes on the geology of Yucatan. By A. AGASSIZ.
683. The pre-Cambrian rocks of Italy. By T. STERRY HUNT.
684. On the brain of Phenacodus. By E. D. COPE.
685. On the young stages of a few osseous fishes. By A. AGASSIZ.
686. On the genesis and development of the Chiropterygium from the Ichthyopterygium. By T. GILL.
687. The affinities of Palæocampa, Meek and Worthen, as evidence of the wide diversity of type in the earliest known myriapods. By S. H. SCUDDER.
688. Preliminary notice of a new dividing engine. By H. A. ROWLAND.
689. On photographs of the spectrum of the nebula of Orion. By H. DRAPER.
690. Theory of concave gratings. By H. A. ROWLAND.
691. On the influence of time on the change in the resistance of the carbon disk of Edison's tasimeter. By T. C. MENDENHALL (by invitation of the Academy).
692. On the results of the incandescent lamp tests at the Paris Exhibition. By G. F. BARKER.
693. Note on a special form of secondary battery or electric accumulator. By W. GIBBS.
694. Researches on complex inorganic acids. By W. GIBBS.
695. Some discoveries that enhance the value of the cotton and orange crops. By C. V. RILEY (by invitation of the Academy).
696. The relation of rain areas to areas of low pressure. By E. LOOMIS.
697. Description of an articulate of doubtful relationship from the Tertiary beds of Florissant, Colorado. By S. H. SCUDDER.
698. Mythology of the Zuni Indians. By F. H. CUSHING (by invitation of the Academy).
699. On the polarization of the light of the moon. By A. W. WRIGHT.
700. On the infra-red portion of the solar spectrum as studied with the bolometer. By S. P. LANGLEY.
701. On the phenomena of metalliferous vein formation at Sulphur Bank, California. By JOSEPH LE CONTE.
702. On a form or standard barometer. By A. W. WRIGHT.
703. On a marsupial genus from the Eocene. By E. D. COPE.
704. On a fallacy of induction. By C. S. PEIRCE.

## XXXVI.—NEW YORK, NOVEMBER 14-17, 1882.

705. On the mean annual rainfall. By E. LOOMIS.
706. On white phosphorus. By IRA REMSEN.
707. On a modified form of solar eye-piece for use of large apertures. By C. A. YOUNG.
708. On Triassic (?) insects from the Rocky Mountains. By S. H. SCUDDER.
709. Explanations on presenting a copy of the first ten numbers of the author's celestial charts. By C. H. F. PETERS.
710. On a method of studying the laws of contrast quantitatively. By O. N. ROOD.
711. On the existence in both hemispheres of a terrestrial dry zone and its cause. By A. GUYOT.
712. On a graphical method of representing the errors of a screw. By A. M. MAYER.
713. On the general equations of optics as derived from the electro-magnetic theory of light. By J. W. GIBBS.
714. On an improved form of standard Daniell cell. By G. F. BARKER.
715. On complex inorganic acids. By W. GIBBS.
716. On a sphereometer for measuring the radii of curvature of lenses of any diameter. By A. M. MAYER.
717. On a simple experimental demonstration of Ohm's law. By A. M. MAYER.
718. Lists of errors in star catalogues. By C. H. F. PETERS.
719. On the heat of the Comstock lode. By G. F. BECKER (by invitation of the Academy).
720. On the physical and geological character of the sea-bottom off our coast, especially beneath the Gulf Stream. By A. E. VERRILL.
721. Co-operation in observing variable stars. By E. C. PICKERING.
722. On the topographical effects of faults and land-slides. By G. F. BECKER (by invitation of the Academy).
723. On the physical conditions under which coal was formed. By J. S. NEWBERRY.
724. On the fauna of the Puerco Eocene. By E. D. COPE.
725. On the total solar eclipse of May 6, 1883. By C. A. YOUNG.
726. On so-called eruptive serpentines. By T. S. HUNT.
727. On the place of the Echineidæ in the system. By T. GILL.
728. Remarks on the structure of the present comet. By C. H. F. PETERS.
729. On the effect of magnetism on chemical action. By IRA REMSEN.
730. On a form of kathetometer and comparator. By A. W. WRIGHT.
731. On the Permian genus Diplocaulus. By E. D. COPE.
732. On sinapic acid. By IRA REMSEN.
733. On the microscopic structure of some of the Brachiopoda with reference to their generic relations. By JAMES HALL.
734. On the origin of the carbonaceous matter of the bituminous shales. By J. S. NEWBERRY.
735. On the preparation of cyanin from chinoline. By C. F. CHANDLER.
736. On the logic of relatives. By C. S. PEIRCE.
737. On the determination of the figure of the earth by the variations of gravity. By C. S. PEIRCE.
738. On Ptolemy's catalogue of stars. By C. S. PEIRCE.
739. On the supposed human foot-prints recently found in Nevada. By O. C. MARSH.
740. On the meridian photometer. By E. C. PICKERING.

## XXXVII.—WASHINGTON, APRIL 17-21, 1883.

741. On the genesis of metalliferous veins. By JOSEPH LE CONTE.
742. On the nascent state of oxygen. By IRA REMSEN.
743. On barometric gradients. By ELIAS LOOMIS.

744. On the structure of the skull in the *Hadrosauridae*. By E. D. COPE.  
 745. Determination of the inequalities of the moon's motion which are produced by the figure of the earth; a supplement to Delauney's *Theorie du mouvement de la Lune*. By G. W. HILL.  
 746. On the decay of rocks geologically considered. By T. STERRY HUNT.  
 747. On the composition of the venom of serpents. By S. WEIR MITCHELL and E. T. REICHERT.  
 748. Maxima and minima tide producing machine. By W. FERREL. (Exhibition of machine.)  
 749. On changes in the properties of atoms and atomic groups, caused by change in position in the molecule. By IRA REMSEN.  
 750. On the measurement of wave lengths of heat. By S. P. LANGLEY.  
 751. On the spectrum of an Argand gas-burner. By S. P. LANGLEY.  
 752. Efficiency of storage batteries. By G. F. BARKER.  
 753. On the great object glass made by Alvan Clark & Sons for the Pulkowa Observatory. By OTTO VON STRUVE. (By invitation of the Academy.)  
 754. Photographs of the great comet of 1882. By C. H. F. PETERS.  
 755. Some experiments upon a method of forming a visible image of the solar corona. By A. W. WRIGHT.  
 756. On the phosphorescence of sulphate of quinine. By A. W. WRIGHT.  
 757. Further generalizations regarding complex inorganic acids. By WOLCOTT GIBBS.

## XXXVIII.—NEW HAVEN, NOVEMBER 13-16, 1883.

758. Upon the formation of a deaf variety of the human race. By A. GRAHAM BELL.  
 759. On the solar eclipse of May 6, 1883. Reports by C. A. YOUNG, E. S. HOLDEN, and C. S. HASTINGS.  
 760. Notes on the mass of Saturn. By A. HALL.  
 761. The Animikie rocks of Lake Superior. By T. STERRY HUNT.  
 762. On some new primary cleavage forms of albuminous matter. By R. H. CHITTENDEN (by invitation of the Academy).  
 763. On the use of the word "light" in physics. By S. NEWCOMB.  
 764. On the subsidence of particles in liquids. By W. H. BREWER.  
 765. On a new photograph of the solar spectrum. By H. A. ROWLAND.  
 766. On the theory of errors of observation and probable results. By S. NEWCOMB.  
 767. On the stratified drift or terrace formation of the New Haven region, including its kettle holes and deserted river channels. By J. D. DANA.  
 768. Preliminary notice of phospho-vanadates, arsenio-vanadates, and antimonio-vanadates. By WOLCOTT GIBBS.  
 769. On the probable existence of new acids of phosphorus. By WOLCOTT GIBBS.  
 770. Notes on the mineralogy and lithology of the Bodie mining district of California. By B. SILLIMAN.  
 771. On the ancient glaciation of North America. By J. S. NEWBERRY.  
 772. Marriage institutions in tribal society. By J. W. POWELL.  
 773. Atmospheric absorption. By S. P. LANGLEY.  
 774. Note upon the physical aspects of the higher members of the Chemung group, and the development and distribution of the fossil genera *Ptychopteria* and *Lepidotesma*, preceded by a review of the *Pectenidae* and *Avicolidae* of the Devonian system. By JAMES HALL.  
 775. Personality in the measures of Venus's diameter as derived during transit across the sun. By O. T. SHERMAN (by invitation of the Academy).  
 776. The reduction of barometric observations to sea-level. By ELIAS LOOMIS.  
 777. On the affinities of the Dinosaurian reptiles. By O. C. MARSH.

## APPENDIX E.

## REPORT ON METHYLATED SPIRITS.

[CORRESPONDENCE.]

YALE COLLEGE, NEW HAVEN, CONN.,  
 September 25, 1882.

HON. GREEN B. RAUM,  
*Commissioner of Internal Revenue:*

SIR: I inclose herewith a report made by a committee of the National Academy of Sciences, in response to your communication of April 12, 1882, requesting an investigation of the question whether methyl or wood spirits may be entirely or approximately separated from ethyl alcohol or spirits of wine.

Yours respectfully,

O. C. MARSH,  
*Acting President of the National Academy of Sciences.*

Prof. O. C. MARSH,  
*Acting President of the National Academy of Sciences:*

SIR: The following letter was received by the late Prof. W. B. Rogers, president of the National Academy of Sciences, from the Commissioner of Internal Revenue, General Green B. Raum:

TREASURY DEPARTMENT,  
 OFFICE OF INTERNAL REVENUE,  
 Washington, April 12, 1882.

SIR: There is now pending before Congress a bill (H. R. 5082) "to authorize the withdrawal from distillery warehouse, without tax, of alcohol and other spirits to be used in industrial pursuits," which bill provides that "such spirits shall either first have been mixed with one-ninth of their bulk of methyl or wood alcohol, of equal proof strength, or that such spirits shall be withdrawn for use in tobacco factories, or such other industrial pursuits as shall entail their complete destruction so that they cannot be recovered by any process of distillation."

It is therefore deemed important to the interests of the revenue that a careful and thorough investigation be made, having for its object the determination of the fact whether the methyl or wood spirits may be, entirely or approximately, separated by distillation, or in any other economical manner, from the ethyl alcohol or spirits of wine upon which the tax is imposed.

In other words, the information sought is as to whether the science of chemistry now enables the possessor of the methylated spirits to separate the ethyl alcohol from such mixture in such a state of purity and at such a probable cost as might enable