Stated Meeting, Feb. 1, 1878.

Present, 11 members.

Vice-President, Mr. E. K. PRICE, in the Chair.

Letters accepting membership were received from Mr. Asaph Hall, dated U. S. N. Obs., Washington, Jan. 22; Mr. John Price Wetherill, 430 Walnut street, Philadelphia, Jan. 23; Prof. I. C. White, Morgantown, W. Va., University, Jan. 24; and Mr. J. F. Mansfield, Cannelton, Beaver Co., Pa., Jan. 25, 1878.

A letter of envoy was received from Dr. Lloyd, of Dublin, Ireland.

Donations to the Library were received from the Imp. Academy of Prussia; the Belgian Entomological Society; the Revue Politique; London Nature; Harvard College Observatory; Silliman's Journal; the Coast Survey; Min. de Fomento, Mexico; and Dr. B. F. Gould, of Cordova.

Applications and inquiries respecting the Coal Slack Premium were received and referred.

A letter was received from Mr. Alex. Wilcocks, dated Donaldsonville, Louisiana, Jan. 24, 1878, giving an account of the shadows without penumbra cast by the planet Venus.

A letter relating to a bust of John Vaughn was received from Jos. Fry Mogridge, dated Philadelphia, Jan. 26, 1878.

On motion the use of the Hall was granted to the American Institute of Mining Engineers, at 8 P. M., Feb. 26.

Prof. Cope offered for publication in the Transactions a description of fossil remains found in caves in the Island of Anguilla, and read the concluding pages. He proposed for it several lithographic plates, and said that this concluded and completed his previously published memoir on the subject. On motion, the paper was referred to Dr. Horn, Mr. B. V. Marsh, of Philadelphia, and Dr. Daniel G. Brinton, as a committee to report.

Dr. LeConte presented for publication in the Proceedings, as the first of a series, a paper entitled "On the Coleoptera of Florida, by Mr. E. A. Schwarz, of Detroit," which went

by regular reference to the board of Secretaries, to be reserved until other papers of the series were received and presented for publication at the convenience of the Society. Dr. Le Conte read a summary of the places where the collections were made.

Mr. Briggs communicated his results in discussing the question where and how the heat generated by a gas burner disperses itself.

In a recent investigation of the chemical and physical properties of ordinary coal gas and its products of combustion, which was made in preparing a statement exhibiting the various relations of chemical changes and heat effects, attendant upon gas lighting, the results of which were intended to be applicable to the heating and ventilation of habitable rooms, has given a value for the heat evolved by burning of coal gas, of so large amount, that it is difficult to account for the dispersal of this heat, at all in accordance with the common observation of the result of gas burning. No facts in physics are so positively established as the heat effects upon bodies, and the determinations of Favre and Silbermann and Regnault have been corroborated by numerous examiners, and are accepted by all physicists. The combustion of coal gas, as it is consumed in lighting, is so nearly a perfect one, with the products of H_2O and CO_2 completely effected, that it must be asserted that the full equivalent of heat due to the chemical combination of the entire Hydrogen and Carbon or Carbonic oxide is produced by the burning. The coal gas itself may be taken as having a specific gravity of 0.426, which gives at 70° a weight of 0.0319 lbs. per cubic foot. Careful computation gives about 19,450 units of heat as the effect of burning one pound, or 622 units as the effect of one cubic foot, and it follows that a four foot gas burner, that is such a burner as will burn four cubic feet in one hour, will produce 2488 units of heat. Taking an extreme case of lighting, a small bed-room which may be assumed to have a floor area of about 100 square feet (that is $8' \times 12'$ or $10' \times 10'$ on the floor) and to be 8 feet in height of walls, thus having a cubic capacity of 800 feet; this room would be appropriately lighted by a single gas burner, consuming four cubic feet per hour. If it could be imagined that the room was closed against the admission of any fresh air whatever, and that the air at the commencement of the experiment was at 70° Fah. with 60 per cent. of humidity, and besides these conditions, that no loss of heat occurred from the enclosing surfaces, floor, walls, ceiling, doors or windows, then at the end of an hour's time the following changes in the air would have occurred : 2.42 cubic feet of carbonic acid, and 0.253 pound, = 5.42 cubic feet of aqueous vapor would have been generated, while 4.91 cubic feet of oxygen would have been taken up ; and 2488 heat units would have been produced. The changes are as follows :

	Air at commencement, cu. ft.	Change during hour, cu. ft.	Air at end of one hour, cu. ft.
O	157.53	— 4.91	152.62
N	630.13	....	630.13
CO_2 @ 4 to 10,000	0.32	+ 2.42	2.74
H_2O lbs. 0.56	12.02	+ 5.42 (0.253 lbs.)	17.44
	800.		
Gas	4.		
	804.		803.03
Temperature	70°	= 174.2° (2488 units)	244.2° !!!

The figures for reduction of the 2488 units are as follows : 800 cubic feet of air at 0.075 lbs. per foot (weight at 70°) = 60 lbs. multipled by specific heat of air, 0.238 = 14.28 and $\frac{2488}{14.28}$ = 174.2.° This result might be amended by computation of the relation of the pressure and temperature for the supposed constant volume of air in the room, but it is too preposterous to need further estimate.

It might be argued that the condition of a closed, perfect heat-retaining room is not a supposable one, and I will proceed to compare the effect of this quantity of heat in similar room where the loss of heat is an ascertainable quantity, taking the same room of 800 cubic feet capacity. Such a room, with an outer wall exposure of not over one-sixth its enclosing surface (the one side of a cube), which outer wall has the usual proportion of window surface and presents a mean aspect to the points of the compass (W. or E. about), will be heated by currents of air coming from steam heated surfaces when one foot of surface is provided for each 80 cubic feet of contents. A temperature of 70° will be maintained within the room against an out-door temperature of zero with this ratio of surface.

In performance of this warming the steam surface of ten square feet may derive its air from out of doors at zero, and there will be furnished in the room three cubic feet of air at the temperature of 100° (heated from zero) each minute for each square foot of steam surface, or 30 cubic feet of air in all, heated at 100,° will supply heat for this room. The room is taken at 70°, and consequently 30° of the heated air will have been expended each minute in heating it, or 900 air feet units—900 × 0.238 × 0.075 = 16 units of heat per minute × 60 = 960 units per hour. These figures are gross approximations of actual heat effects of steam heated surfaces, or of capacity to heat a room against losses from the walls, etc., but they are practical in representing what is sure to be accomplished in house warming and ventilation, and they exhibit conclusively that, unless some other laws of heat from gas lights exist than those which radiate or communicate to the air by convection, we must look for a considerable reduction in the heat-producing effect from what is deduced from rigorous application of the established laws of heat of combustion. It is certain that a four foot burner does not give out nearly three times as much heat as will heat a small room on the coldest day of winter.

Prof. Cope exhibited a roughly mounted fossil under jaw of a large extinct mammal obtained by himself in Colorado, in 1873, and described its peculiarities and classical value, as well as the difficult circumstances in which it was secured.

Pending nominations Nos. 852 and 853 were read, and the meeting was adjourned.

Stated Meeting, Feb. 15, 1878.

Present, 14 members.

Vice-President, Mr. FRALEY, in the Chair.

Letters of acknowledgment were received from the R. Society at Upsal, Oct. 15 (96, 98); Phys. Society, Berlin, June 3, '77 (92 to 95, and XV, ii); R. I. Academy, Vienna, Feb. 22, '77 (92 to 95 and 97); Nat. Hist. Society at Emden, Nov. 7, '77 (92, 92, 96 to 99); Royal Society, London (99).

Letters of envoy were received from the Central Observatory at St. Petersburg, Jan., 1878; Royal Society at Upsal, Oct. 15, 1877; Physical Society, Berlin, June 3, '77; Royal Academy, Vienna, Aug. 7, '77; Swiss Society at Berne, Sept., '77; Meteorological Office, London, Jan., 1878; and the Office of the Chief of U. S. Engineers, Washington, D. C., Feb. 11, 1878.

Donations for the library were received from the Academies at Vienna, Berlin and Brussels; the Royal Society of New South Wales; Physical Observatory, at St. Petersburg; Royal Societies at Upsal, Copenhagen and London; M. Joachim Barrande of Prag; Dr. Giebel of Halle; Physical Society at Berlin; Societies at Emden, Görlitz, Ulm, St. Gall, and Basel; M. Henri de Saussure; the Geographical Society and Revue Politique, at Paris; the Commercial Geographical Society of Bordeaux; the Linnean and Astronomical Societies, Victoria Institute, Society of Arts, and London Nature; the Royal Observatory at Greenwich; the Lords of Admiralty; Dr. Humphrey Lloyd; Nova Scotia Institute, at Halifax; Franklin Institute, Penn Monthly, College of Pharmacy, Medical News; Smithsonian Institution; Chief