

PROCEEDINGS  
OF THE  
AMERICAN PHILOSOPHICAL SOCIETY.

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VOL. I.      SEPTEMBER & OCTOBER, 1838.      No. 4.

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*Stated Meeting, September 21.*

Present, nineteen members.

Mr. DU PONCEAU, President, in the Chair.

The following donations were received:—

FOR THE LIBRARY.

- Archaeologia: or Miscellaneous Tracts relating to Antiquity. Published by the Society of Antiquaries of London. Vol. XXVII. London, 1838.—*From the Society.*
- The Transactions of the Royal Irish Academy. Vol. XVIII. Part 1. Dublin, 1838.—*From the Academy.*
- The Magazine of Natural History. New Series. Conducted by Edward Charlesworth, F. G. S., &c. Vol. II. Nos. 17 & 18. For May and June. London, 1838.—*From the Conductor.*
- Almanacco della Real Casa e Corte per l'anno bisestile 1832. Naples, 1832.—*From the Chev. Morelli.*
- The American Medical Library and Intelligencer. Edited by R. Dunglison, M. D. Vol. II. Nos. 11 & 12. Philadelphia, 1838.—*From the Editor.*
- Observations relative to Lymphatic Hearts. By Joseph J. Allison, M. D. Philadelphia, 1838.—*From the Author.*
- Transylvania Catalogue of Medical Graduates, with an Appendix, containing a concise History of the School. By Thomas D. Mitchell, M. D. Lexington, 1838.—*From the Author.*
- Journal of the Asiatic Society of Bengal. Nos. 68 & 69. For August and September. Calcutta, 1837.—*From the Society.*

- A Genieida. Poema filosofico, e allegorico sobre a Lucta da Liberdade contra a Tyrannia. Composto por João de Souza Pacheco Leitaõ. Two Vols. Lisbon, 1835-6.—*From the Author.*
- The Anglo-Arabic Primer and Vocabulary. Malta, 1832.—*From Lieut. P. Drayton, U. S. Navy.*
- A Complete Collection of all the Protests made in the House of Lords, from their Original in the Year 1641 to the present Year 1745. London, 1745.—*From Mr. John Penington.*
- Observations on the Winds and Monsoons. By James Capper. London, 1801.—*From Mr. John Vaughan.*
- Bija Ganita: or the Algebra of the Hindus. By Edward Strachey. London, 1812.—*From the same.*
- Algebra, with Arithmetic and Mensuration, from the Sanscrit. Translated by Henry Thomas Colebrooke, Esq. London, 1817.—*From the same.*
- Grammaire des Grammaires, ou Analyse Raisonnée des meilleurs Traités sur la Langue Française. Par Girault Duvivier. Two Vols. Paris, 1822.—*From the same.*
- A Catalogue of American Minerals, with their Localities. By Samuel Robinson, M. D. Boston, 1825.—*From the same.*
- An History of the Parliament of Great Britain, from the Death of Queen Anne, to the Death of King George II. London, 1764.—*From the same.*
- The Poetical Works of John Trumbull, LL. D. Two Vols. Hartford, 1820.—*From the same.*
- The Reign of Doctor de Francia in Paraguay; being an Account of a Six Years' Residence in that Republic, from July 1819, to May 1825. By Messrs. Rengger and Longchamps. Translated from the French. London, 1827.—*From the same.*
- Memoir on the Topography, Weather, and Diseases of the Bahama Islands. By P. S. Townsend, M. D. New York, 1826.—*From the same.*
- The Campaign of 1781 in the Carolinas. By H. Lee. Philadelphia, 1824.—*From the same.*
- A Historical Sketch of the Formation of the Confederacy, &c. By Joseph Blunt. New York, 1825.—*From the same.*
- A View of the Constitution of the United States of America. By William Rawle. Philadelphia, 1825.—*From the same.*
- An Analysis of the Galic Language. By William Shaw, A. M. Edinburgh, 1778.—*From the same.*

The Charter, granted by his Majesty, King Charles II. to the Governor and Company of the English Colony of Rhode-Island and Providence-Plantations, in New England. Newport, 1767.—*From the same.*

The New Testament, translated into the Greenland Language by the Missionaries of the Unitas Fratrum. London, 1822.—*From the same.*

Description Géographique des Isles Antilles possédées par les Anglois. Paris, 1758.—*From the same.*

The Select Medical Library. Edited by John Bell, M. D. Vol. II. Nos. 1 to 11. Philadelphia, 1837-8.—*From the Editor.*

Memorial of Facts connected with the History of Medalllic Engraving and the Process of M. Collas. By V. Nolte. London, 1838.—*From Mr. Thomas Sully.*

FOR THE CABINET.

A mummy of the Ibis, in an earthen jar, taken from one of the catacombs of Egypt.—*From Lieut. P. Drayton, U. S. Navy.*

Four small models of human mummies; two of wood, and two of baked clay.—*From the same.*

Several suites of minerals, comprising 33 specimens. Nos. 1 to 18, rocks and ores from the Island of Cuba; Nos. 19 to 31, minerals from the mineral region of Missouri; No. 32, sulphuret of copper, from Flemington, N. J.; No. 33, bituminous coal, from the banks of the Black Warrior river, Alabama.—*From Mr. Thomas G. Clemson.*

The Committee on the solar eclipse of the 18th of September made a Report in part, comprising the Observations made at Philadelphia, the principal results of which are as follows:

The observations made at Philadelphia are fifteen in number. A list of observers, telescopes, &c., is given in the following table. The correction in the third column is to be added algebraically to the latitude of the place of observation, to obtain that of the State House, + 39° 56' 58". The correction in the fourth column is likewise to be added to the local longitude in time, to obtain that of the State House, — 5h 0m 39.2s.

No.	OBSERVER.	Reduction to Latitude of State House.	Reduction to Longitude of State House.	Focal length in Feet.	Maker of Telescope.	Description.	Screen Glass.	Estimated Power.
1	E. J. Beans	-70.0	+1.70	2.5	Unknown	Spy-glass	Smok'd	15
2	Wm. Penn Cresson	-1.8	+5.20	2.5	Jones	Achromatic	Red	30
3	Prof. W. R. Johnson	-1.8	+5.20	3.5	Dollond	do.	do.	100
4	George M. Justice	-10.0	+2.86	2.5	Jones	Gregorian	do.	80
5	E. O. Kendall	-10.0	+2.86	2.5	Plössl	Dialytic	Green	50
6	Joseph Knox	-21.0	-1.39	3.5	Dollond	Achromatic	Red	80
7	Isaiah Lukens	-9.0	+0.86	1.8	Plössl	Dialytic	Yellow	20
8	Thomas M'Euen	+0.4	+2.33	2.5	Dollond	Achromatic	Red	60
9	Prof. Roswell Park	-6.5	+1.30	2.5	do.	Gregorian	do.	50
10	Dr. R. M. Patterson	-1.1	+1.20	5.0	do.	Equatorial	do.	100
11	Wm. H. C. Riggs	+0.4	+2.33	3.5	do.	Achromatic	do.	50
12	Samuel Sellers	-7.5	+0.05	2.5	Jones	do.	do.	40
13	Tobias Wagner	-10.0	+2.86	3.5	Dollond	do.	do.	80
14	Sears C. Walker	-10.0	+2.86	5.0	Tulley	do.	do.	100
15	William Young	+21.0	-1.39	7.0	Holcomb	Herschelian	do.	200

*Phases Observed, in Mean Times of the Places of Observation.*

No.	A. h m	B. h m	C. h m	D. h m	F. h m	H. h m	I. h m	K. h m	L. h m	M. h m	N. h m	O. h m	P. h m
	3 13	4 30	4 31	4 31	4 31	4 35	4 35	4 35	4 35	4 41	5 45	5 45	5 45
1			<sup>s</sup> 3.9			<sup>s</sup> 28.4							
2			-7.0			27.8							
3	<sup>s</sup> 10.7		10.5	<sup>s</sup>	15.5	23.5	<sup>s</sup> 27.5	<sup>s</sup> 29.0			<sup>s</sup> 4.2	<sup>s</sup> 12.2	
4	7.4		6.3	12.8		27.3						11.3	
5	8.3			10.9		28.4						12.9	
6	12.8												
7				21.7				36.2					
8	*3.0			18.1		29.1						13.2	
9				19.1		29.1							
10	7.0	<sup>s</sup> 39.1		19.1		30.1				<sup>s</sup> 23.1		16.1	<sup>s</sup> 19.1
11	7.3	39.2	2.3	16.3		29.4		36.3				7.8	
12	6.0			16.0		31.0						16.0	
13	6.1								<sup>s</sup>				
14	5.6	36.7		15.6	23.0	28.0	29.5	37.0	42.0		10.0	13.0	16.0
15				12.9				38.9				15.0	

- A. *Beginning.* Prof. Johnson noticed dark indentations for eight seconds after the first disturbance of the limb.
- B. Arch of faint light, with speck or brush in centre, round the moon's limb beyond the cusps; brush or blaze in centre, between cusps, extending outwards about two digits. One cusp broken at end, presenting a bright bead.
- C. Arch of light much increased in brightness; the brush or blaze, at first in the centre, now extends from cusp to cusp; radiation outwards, nearly three digits; cusps distant 30° on sun's limb, a

\* Doubtful.

- broken point or bead at each end. This phase noted as that of the formation of the ring by Nos. 1, 2, 3, 4, and 11.
- D. *Formation of ring, or instant of osculation of limbs.* This phase noticed as the approach of two sharp well defined points to a contact by Nos. 5 and 15. It was observed at the instant when the cusps, apparently  $20^\circ$  of the sun's limb apart, suddenly united by the extension of four or five luminous beads, or rounded portions of the sun's disc, by Nos. 3, 4, 8, 9, 10, 11, 13, and 14.
- E. Omitted in the table. This letter refers to the time when the dark lines, described by Van Swinden and Bailey, should have appeared. They were not seen by any observer, though carefully searched for.
- F. Perfect ring, the beads of light having united, or run into each other suddenly.
- G. Counterpart of E, not observed though looked for.
- H. *Rupture of ring*, counterpart of D. Took place at a point, and so noted by all the observers.
- I. Appearance of beads, five or six in number, extending from cusp to cusp.
- K. Counterpart of C in every respect.
- L. Counterpart of appearance just preceding C. Brush or blaze of light, narrowed down to a small space,  $3^\circ$  or  $4^\circ$  on the moon's border, extending outwards  $2\frac{1}{2}$  digits; cusps still broken, as seen by most of the observers. Nos. 5 and 15, however, saw no irregularity of cusps, no beads of light.
- M. Final disappearance of arch of faint light, with brush of light extending beyond the middle, having previously become very faint. This phenomenon observed with great care and certainty by No. 10.
- N. Appearance of dark lines extending into the sun's disc, noticed by Nos. 3, 4, 10, and 14. The time noted by Nos. 3 and 14 as the end of the eclipse.
- O. *End of eclipse*, inferred by each observer from his notes.
- P. Final disappearance of the dark lines, the sun's disc having resumed its natural shape. Nos. 3, 4, 10, and 14 inferred the time of O as at some instant intermediate between N and P. The time of external contact difficult to determine, on account of this irregularity.

For the convenience of computers, the local times above given have been reduced to their corresponding value for the State House by E. O. Kendall, by means of his formulæ, in Vol. XX. of the Journal of

the Franklin Institute, p. 125, which gives the following values for the variation of the local times of the several phases, for a small variation of terrestrial latitude or longitude, as follows:—

	<i>Beginning.</i>	<i>Ring.</i>	<i>End.</i>
	$\underbrace{\hspace{1.5em}}_s$	$\underbrace{\hspace{1.5em}}_s$	$\underbrace{\hspace{1.5em}}_s$
Variation for + or north 1" terr. lat.	= - 0.0397	- 0.0382	- 0.0343
Do. + or east 1s of terr. lon. in time	= + 1.2600	+ 1.1400	+ 0.9925

The means of his results for the State House, giving to each observation its proper weight, in mean time of the State House, are,

	<i>h</i>	<i>m</i>	<i>s</i>
Beginning, - - - -	3	13	10.06
Formation of ring, - - -	4	31	18.76
Rupture of ring, - - - -	4	35	31.35
End, - - - - -	5	45	15.46
Duration of eclipse, - - -	2	32	5.40
Duration of ring, - - - -		4	12.59

Mr. Du Ponceau presented a communication, entitled "A Vocabulary of the Language of the Valiente Indians, who inhabit the State of Costa Rica, in Central America, by Col. D. Juan Galindo, of Guatemala." Referred to the Historical and Literary Committee.

Mr. Nulty read a mathematical paper, entitled "New Formulæ relative to Comets, by E. Nulty, of Philadelphia." Referred to Dr. Patterson, Mr. Walker, and Capt. Talcott.

The subject of this paper was the component velocities of a comet, observed at three consecutive and moderately small intervals of time. In a preliminary notice of his subject and the means employed in its development, the author mentioned some advantages which he conceived to be attached to his peculiar mode of investigation. He alluded to different results already known, and, with several novel and general formulæ comprised in his paper, he announced two new sets of expressions which he represented as being directly applicable to the exceptive cases, in which particular observations render the forms hitherto given, doubtful or indeterminate. He also noticed a numerical application which he made of his formulæ and of others connected with the method of Laplace, to the data of the comet of 1803; and he intimated that a comparison of the results obtained by him in that and other instances, had led him to some remarks, which he inserted towards the close of his paper, from his opinion of their analytical and practical importance.

Dr. Patterson read a paper by Professor Charles Bonnycastle, of the University of Virginia, containing "Notes of Experiments, made August 22d to 25th, 1838, with the view of determining the Depth of the Sea by the Echo."

This paper, which was not offered for publication in the Society's Transactions, states that the generally received notions in regard to the intensity of sound in water, and the distance to which it is conveyed, had suggested to Mr. Bonnycastle, some years ago, the idea that an audible echo might be returned from the bottom of the sea, and the depth be thus ascertained from the known velocity of sound in water. The probability of this view was deemed at least sufficient to justify an experiment; and accordingly the Navy Commissioners authorized the construction of the necessary apparatus, and Captain Gedney, of the U. S. Brig Washington, attached to the coast survey, volunteered his services and the use of his vessel, and authority to this effect was liberally granted by the Secretary of the Treasury, Mr. Woodbury.

The apparatus, which is fully described in Mr. Bonnycastle's paper, consisted, first, of a petard or chamber of cast iron,  $2\frac{1}{2}$  inches in diameter and  $5\frac{1}{4}$  inches long, with suitable arrangements for firing gunpowder in it under water; secondly, of a tin tube, 8 feet long and  $1\frac{1}{4}$  inches in diameter, terminated at one end by a conical trumpet-mouth, of which the diameter of the base was 20 inches, and the height of the axis 10 inches; thirdly, of a very sensible instrument for measuring small intervals of time, made by J. Montandon of Washington, and which was capable of indicating the sixtieth part of a second. Besides these, an apparatus for hearing was roughly made on board the vessel, in imitation of that used by Colladon in the Lake of Geneva, and consisted of a stove-pipe,  $4\frac{1}{2}$  inches in diameter, closed at one end, and capable of being plunged four feet in the water. The ship's bell was also unhung, and an arrangement made for ringing it under water.

On the 22d of August, the brig left New York, and in the evening the experiments were commenced. In these, Mr. Bonnycastle was assisted by the commander and officers of the vessel, and by Dr. Robert M. Patterson, who had been invited to make one of the party.

In the first experiments, the bell was plunged about a fathom under water and kept ringing, while the operation of the two hearing instruments was tested at the distance of about a quarter of a mile. Both instruments performed less perfectly than was expected; the

noise of the waves greatly interfering, in both, with the powers of hearing. In the trumpet-shaped apparatus, the ringing of the metal, from the blow of the waves, was partly guarded against by a wooden casing; but, as it was open at both ends, the oscillation of the water in the tube was found to be a still greater inconvenience, so that the sound of the bell was better heard with the cylindrical tube. At the distance of a quarter of a mile this sound was a sharp tap, about the loudness of that occasioned by striking the back of a penknife against an iron wire: at the distance of a mile the sound was no longer audible.

In the second experiments, the mouth of the cone, in the trumpet apparatus, was closed with a plate of thick tin, and both instruments were protected by a parcelling of old canvas and rope-yarn, at the part in contact with the surface of the water. In these experiments the cone was placed at right angles to the stem, and the mouth directed toward the sound. The distances were measured by the interval elapsed between the observed flash and report of a pistol. At the distance of 1400 feet, the conical instrument was found considerably superior to the cylindrical, and at greater distances the superiority became so decided, that the latter was abandoned in all subsequent experiments. At the distance of 5270 feet, the bell was heard with such distinctness as left no doubt that it could have been heard half a mile further.

The sounds are stated in the paper to have been less intense than those in air, and seemed to be conveyed to less distances. The character of the sound was also wholly changed, and, from other experiments, it appeared that the blow of a watchmaker's hammer against a small bar of iron gave the same sharp tick as a heavy blow against the large ship's bell. It is well known that Franklin heard the sound of two stones struck together under water at half a mile distance; yet two of the boat's crew, who plunged their heads below the water, when at a somewhat less distance from the bell, were unable to hear its sound.

On the 24th of August, the vessel having proceeded to the Gulf Stream, experiments were made with the view for which the voyage was undertaken; that is, to ascertain whether an echo would be returned, through water, from the bottom of the sea. Some difficulties were at first presented in exploding the gun under water, but these were at length overcome. The hearing-tube was ballasted so as to sink vertically in the water. The observers then went, with this in-

strument, to a distance of about 150 yards from the vessel, and the petard was lowered over the stern, about three fathoms under water, and fired. The sound of the explosion, as heard by Mr. Bonnycastle, was two sharp distinct taps, at an interval of about one-third of a second. Two sounds, with the same interval, were also clearly heard on board the brig; but the character of the sounds was different, and each was accompanied by a slight shock. Supposing the second sound to be the echo of the first from the bottom of the sea, the depth should have been about 160 fathoms.

To ascertain the real depth, the sounding was made by the ordinary method, but with a lead of 75 pounds weight, and bottom was distinctly felt at 550 fathoms, or five furlongs. The second sound could not, therefore, have been the echo of the first; and this was proved, on the following day, by repeating the experiment in four fathom water, when the double sound was heard as before, and with the same interval.

The conclusion from these experiments is, either that an echo cannot be heard from the bottom of the sea, or that some more effectual means of producing it must be employed.

Dr. Hare suggested the expediency of employing the Galvanic fluid to fire gunpowder below the surface of water, in experiments similar to those of Professor Bonnycastle.

The President laid on the table for the inspection of the members, an English and Japanese, and Japanese and English Vocabulary, by the Rev. W. H. Medhurst, late of Batavia, now in London, and a "Translation of a comparative Vocabulary of the Chinese, Corean, and Japanese Languages, to which are added the thousand Characters classic, in Chinese and Corean; the whole accompanied by copious Indexes of all the Chinese and English Words occurring in the Work," by the same author, under the name of Philo-Sinensis.

These two books, the President said, throw considerable light on the various graphic systems of the Indo-Chinese nations; they had been communicated to him by our associate, Mr. Pickering, of Boston, to whom they must be returned: he, therefore, recommended to the society to take measures to procure them for the library.

The recommendation of the President was then adopted, and the books referred to, ordered by the society.

Dr. Hare laid before the society a specimen of platinum, weighing between twenty-two and twenty-three ounces, being part of a mass of twenty-five ounces, fused by him in May last, by means of his compound blowpipe.

Dr. Hare also mentioned that he had observed, during a recent tornado at Somerset, Mass. various circumstances, which he detailed, all leading to the conclusion that a hiatus or place of rest exists at the centre of motion of the tornado.

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*Stated Meeting, October 5.*

Present, twenty-nine members.

MR. DU PONCEAU, President, in the Chair.

The following donations were received:—

FOR THE LIBRARY.

- Inquisitionum in Officio Rotulorum Cancellariæ Hiberniæ asservatarum, Repertorium. Dublin. Vol. I., 1826; Vol. II., 1829.—*From the Honourable Board of Commissioners on the Public Records of Great Britain.*
- Rotulorum Patentium et Clausorum Cancellariæ Hiberniæ Calendarium. Vol. I. Part I. Dublin, 1828.—*From the Same.*
- Rotuli de Oblatis et Finibus in Turri Londinensi asservati, Tempore Regis Johannis. London, 1835.—*From the same.*
- Proceedings and Ordinances of the Privy Council of England. London. Vol. V., 1835; Vol. VI. & VII., 1837.—*From the same.*
- Excerpta è Rotulis Finium in Turri Londinensi asservatis, Henrico Tertio Rege. Vol. II. London, 1836.—*From the same.*
- The Ancient Kalendars and Inventories of his Majesty's Exchequer. Three Vols. London, 1836.—*From the same.*
- Documents and Records illustrating the History of Scotland. Vol. I. London, 1837.—*From the same.*
- Rotuli Chartarum in Turri Londinensi asservati. Vol. I. Part. I. London, 1837.—*From the same.*
- General Report to the King in Council from the Honourable Board of Commissioners on the Public Records. London, 1837.—*From the same.*
- Registrum vulgariter nuncupatum "The Record of Caernarvon;" è Codice Ms<sup>to</sup>. Harleiano 696. descriptum. London, 1838.—*From the same.*