turn of the plate gives 25 stops and opening of the holes or the same number of pulsations of air are produced.

I promised to meet Prof W tomorrow at [10 a.m.].[6]

[6] The appointed time is unclear in the manuscript.

HENRY'S EUROPEAN DIARY

Henry Papers, Smithsonian Archives

April 1st [1837] Called with Prof Bache on Prof Wheatstone that the former might deliver his letters. Was favoured with the reading of several letters from eminent Philosophers among the number was one from Herchel[1] another from Orested[2] and also one from Quetellet.[3]

Prof W also read to us an unpublished paper on the light from the long wire as analyzed by the prism and also by the revolving mirror. His experiments in the general corroborate the results of Fusinieri that the light of electricity is the result of the incandesence of ponderable matter but not in any case of a combustion.

Different metals produce different lines in the spectrum. He does not intend to publish this paper until he can get an instrument for the accurate measurement of these lines on the plan of Fraunhofer.[4]

[1] John Herschel (1792–1871; *DSB*) lent early encouragement to Wheatstone's scientific career and became his frequent correspondent. See Brian Bowers, *Sir Charles Wheatstone* (London, 1975), pp. 14, 15, 54, 55.

[2] Hans Christian Oersted (1777–1851; *DSB*), the Danish physicist, helped introduce the young Wheatstone to the scientific world. Bowers, *Wheatstone*, pp. 14–16.

[3] The Belgian scientist Adolphe Quetelet (1796–1874; *Henry Papers*, 2:261) was a friend of Wheatstone and a promoter of his work on the Continent, especially his experiments on the electrical telegraph and on the velocity of electricity. Bowers, *Wheatstone*, pp. 49, 145.

[4] Wheatstone's paper apparently remained unpublished; however, similar experiments were described in one of his earlier communications, "On the Prismatic Decomposition of Electrical Light," *British Association, Report, 1835* (1836), part 2, pp. 11–12, in which it was stated:

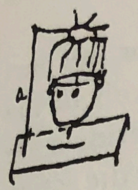
> Fraunhofer having found that the ordinary electric spark examined by a prism presented a spectrum crossed by numerous bright lines, Professor Wheatstone examined the phaenomena in different metals, and found that these bright lines differ in number and position in every different metal employed.

Wheatstone concluded that "electric light results from the volatilization and ignition (not combustion) of the ponderable matter of the conductor itself; a conclusion closely resembling that arrived at by Fusinieri from his experiments on the transport of ponderable matter in electric discharges." Possibly Henry inspired Wheatstone to extend his experiments to (self-inductive) sparks from long conductors.

Numerous natural philosophers in the 1820s and 1830s were concerned with the light of the electric spark as yielding possible clues to the basic nature of electricity. Some theorized that the light was a modified form of the electrical fluid itself, electricity made visible. Others interpreted the light, not as the elec-

He finds some curious results on analysing by the revolving mirror the spark from a battery which is produced in breaking contact and also the spark on making contact. The first has all the appearance of the spark produced by common electricity; the 2nd is composed of several sparkes or is of longer duration. The first is instantaneous.[5]

Called this evening at Kings College to see Prof Wheats[t]one. He showed us several interesting instruments. 1st an article to illustrate the vibrations of a glass goblet.[6] The goblet is placed on a board from which rises an upright piece of wood or stiff wire *a* which supports a circle of wood which carries 8 arms desposed in equal angles and from each arm a small ball is suspended down the side of the glass. These balls are paired red and black alternately. When the glass is rubbed by the finger so as to cause a vibration the balls at equal angles or every other ball is thrown off, showing that the glass divides into 4 parts of vibrat[ion]s. He also exhibited to us his apparatus for measuring the velocity of electricity.[7]



The whole apparatus is quite small. The board on which it stands is not more than 12 or 14 inches long by 6 or 7 wide. The large wheel figured in the Phil Transactions[8] (Wheatstone's paper) is not more than 5 inches in diameter. The spark board is also about 5 inches in width and is placed at the distance of 10 feet from the mirror.

We were also shewn an apparatus for the same experiment made from an old watch with the ballanc[e] taken off. The revolving mirror being placed on the pivot of the second hand. Above this is placed a stationary mirror

---

tric fluid, but as an excited state of ponderable matter. In the experiments cited by Wheatstone, Ambrogio Fusinieri came to the latter theory, asserting that the electric spark carries with it particles of the conductor from which it issues. The incandescence of these metallic particles causes the electric light. Contrary to Wheatstone's account, however, Fusinieri believed that the particles are emitted in a group such that interior particles are in a fused state while exterior particles are indeed in a state of combustion because of exposure to oxygen. "Sopra il trasporto di materia ponderabile nelle scariche ellettriche," *Giornale di Fisica, Chimica, e Storia Naturale*, 1825, *8*:450–461. Fusinieri's elegant experiments were widely reported in the English language. *Silliman's Journal* communicated some of his results in 1832, 22:355–357. Henry saw an extensive discussion of Fusinieri's work in the *Encyclopaedia Britannica* and took notes in notebook [23894], p. 115, which remain undated but may have been prompted by Wheatstone's results. For Henry's experiments along these lines see the first notebook entry, above, of March 15, 1836.

Several scientists applied the prism to the electrical light. Wollaston and Biot were among the earliest, followed by Joseph Fraunhofer's thorough spectral analysis of sparks. For a discussion of Fraunhofer's techniques and a history of other inquiries into the electrical light, see *Encyclopaedia Britannica*, 8th ed., s.v. "Electricity," pp. 546–549.

[5] In his studies to determine the velocity of electricity, Wheatstone had perfected the revolving-mirror technique of analyzing the form and duration of electrical sparks. See *Henry Papers*, 2:125n–126n, 292, 491–493.

[6] Wheatstone's experiments on acoustical figures and modes of vibration are examined in Bowers, *Wheatstone*, Chapter 2.

[7] See *Henry Papers*, 2:491–493.

[8] *Phil. Trans.*, 1834, pp. 583–591.