

Ancient Egypt and the geological antiquity of man, 1847–1863

History of Science
2019, Vol. 57(2) 194–230
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DOI: 10.1177/0073275318795944
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Abstract

The 1850s through early 60s was a transformative period for nascent studies of the remote human past in Britain, across many disciplines. Naturalists and scholars with Egyptological knowledge fashioned themselves as authorities to contend with this divisive topic. In a characteristic case of long-distance fieldwork, British geologist Leonard Horner employed Turkish-born, English-educated, Cairo-based engineer Joseph Hekekyan to measure Nile silt deposits around pharaonic monuments in Egypt to address the chronological gap between the earliest historical and latest geological time. Their conclusion in 1858 that humans had existed in Egypt for exactly 13,371 years was the earliest attempt to apply geological stratigraphy to absolute human dates. The geochronology was particularly threatening to biblical orthodoxy, and the work raised private and public concerns about chronological expertise and methodology, scriptural and scientific authority, and the credibility of Egyptian informants. This essay traces these geo-archaeological investigations; including the movement of paper records, Hekekyan's role as a go-between, and the publication's reception in Britain. The diverse reactions to the Egyptian research reveal competing ways of knowing the prehistoric past and highlights mid-Victorian attempts to reshape the porous boundaries between scholarly studies of human antiquity.

Keywords

Ancient Egypt, geology, archaeology, ethnology, fieldwork, prehistory, human antiquity, biblical chronology, Victorian

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Can we then wonder that they who decipher the monuments of Egypt, or the geologist who interprets the earth's autobiography, should arrive at views respecting the date of an ancient empire, or the age of our planet, irreconcilable with every one of these numerous and conflicting chronologies?¹

Mid-nineteenth-century Victorians engaged in heated cross-disciplinary debates about the age, origin, and development of human civilization. British geologist Charles Lyell indicated a divisive question plaguing those involved: who had the expertise to provide authoritative chronologies? He also shared the common belief that Egypt contained some of the earliest evidence of civilized mankind. Naturalists and scholars alike looked to the country's artefacts to support their various claims. Strictly speaking, this was not a new practice. Seventeenth and eighteenth-century naturalists tackled ancient chronology, Hermetic philosophy, and pyramidology using pharaonic materials.² As new sources and tools became increasingly available in the nineteenth century, Egypt acquired unprecedented importance for understanding the "antiquity of man" – the partial title of Lyell's 1863 book.³ This controversial topic was a continuation of older antiquarian and chronological traditions and, as this essay will demonstrate, became the shared focus of several key Victorian disciplines, notably geology, ethnology, and archaeology. Historians have discussed the geological acceptance of flint tools in 1859 and the subsequent disciplinary development of prehistoric archaeology,⁴ as well as the relationship between Egyptology,

1. Sir Charles Lyell, *Principles of Geology*, 9th ed. (Boston: Little, Brown, and Co., 1853), pp. 659–60.
2. Anthony Grafton, "Joseph Scaliger and Historical Chronology: The Rise and Fall of a Discipline," *History and Theory* 14 (1975): 170–81; Paolo Rossi, *The Dark Abyss of Time: The History of the Earth and the History of Nations from Hooke to Vico*, trans. by Lydia G. Cochrane (Chicago: University of Chicago Press, 1984); Zur Shalev, "Measurer of All Things: John Greaves (1602–1652), the Great Pyramid, and Early Modern Metrology," *Journal of the History of Ideas* 63 (2002): 555–75; David Boyd Haycock, "Ancient Egypt in 17th and 18th Century England," in Timothy Champion and Peter Ucko (eds.) *The Wisdom of Egypt: Changing Visions through the Ages* (London: UCL Press, 2003), pp. 133–60; Brian Curran, *The Egyptian Renaissance: The Afterlife of Ancient Egypt in Early Modern Italy* (Chicago: University of Chicago Press, 2007); Daniel Stolzenberg, *Egyptian Oedipus: Athanasius Kircher and the Secrets of Antiquity* (Chicago: University of Chicago Press, 2013); Dmitri Levitin, "Egyptology, the Limits of Antiquarianism, and the Origins of Conjectural History, c. 1680–1740," *History of European Ideas* 41 (2015): 699–727.
3. Sir Charles Lyell, *The Geological Evidence for the Antiquity of Man* (London: John Murray, 1863).
4. Donald K. Grayson, *The Establishment of Human Antiquity* (New York: Academic Press, 1983); George W. Stocking Jr., *Victorian Anthropology* (New York: The Free Press, 1987), pp. 69–74; A. Bowdoin Van Riper, *Men among the Mammoths: Victorian Science and the Discovery of Human Prehistory* (Chicago: University of Chicago Press, 1993); Clive Gamble and Robert Kruszynski, "John Evans, Joseph Prestwich and the Stone That Shattered the Time Barrier," *Antiquity* 83 (2009): 461–75; Clive Gamble and Theodora Moutsiou, "The Time Revolution of 1859 and the Stratification of the Primeval Mind," *Notes and Records of the Royal Society* 65 (2011): 43–63; Matthew R. Goodrum, "The Idea of Human Prehistory: The Natural Sciences, the Human Sciences, and the Problem of Human Origins in Victorian Britain," *History and Philosophy of the Life Sciences* 34 (2012): 117–45.

ethnology, and anthropology during the second half of the century.⁵ The pivotal role that Egypt occupied *across* these subject specialities on the eve of Darwinian evolution, particularly in geology, will be addressed here.

Representatives from each subject had distinct yet overlapping research programs. Geologists occupied themselves with deep-earth history, stratigraphy, paleontology, and mineralogy.⁶ Ethnologists were concerned with the history of human races and engaged with comparative linguistics.⁷ Historic and prehistoric archaeologists in Britain concentrated predominantly on that country's past.⁸ Ancient Egypt was increasingly in the public spotlight due to new antiquities displays in the British Museum and Sydenham Crystal Palace, and with ever more translations, collections, and travel accounts. However, Egyptologists (then also described as Egyptologers, Hieroglyphicists, or Hierologists) were few in number. They formed a fragmented array of practitioners engaged with chronology, philology, exegesis, museology, travel writing and sketching, artefact collection and analysis.⁹ Amongst all the topics that aroused the curiosity of these disparate groups mid-century, few inspired interdisciplinary transformations as much as the question of human antiquity, to which ancient Egypt was central.

With few exceptions, Egypt's place in histories of Victorian science has been overlooked. Historians of archaeology have recently argued that disregard of this sort for the antique sciences in the history of science is unjustified, as there is no legitimate reason to separate the history of artefacts from natural history.¹⁰ Similarly, histories of Egyptology

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5. For instance, Timothy Champion, "Beyond Egyptology: Egypt in 19th and 20th Century Archaeology and Anthropology," in Timothy Champion and Peter Ucko (eds.) *The Wisdom of Ancient Egypt: Changing Visions through the Ages* (London: UCL Press, 2003), pp. 161–86; G. Blair Nelson, "'Men Before Adam!' American Debates over the Unity and Antiquity of Humanity," in David C. Lindberg and Ronald L. Numbers (eds.) *When Science and Christianity Meet* (Chicago: University of Chicago Press, 2003), pp. 161–82; B. Ricardo Brown, *Until Darwin: Science, Human Variety and the Origins of Race* (London: Pickering and Chatto, 2010), pp. 66–99; Debbie Challis, *The Archaeology of Race: The Eugenics Ideas of Francis Galton and Flinders Petrie* (London: Bloomsbury, 2013); Christina Riggs, *Unwrapping ancient Egypt* (London: Bloomsbury Academic, 2014), pp. 37–76; Alice Stevenson, "Egyptology, Archaeology, and Anthropology at Oxford, 1860–1960," in William Carruthers (ed.) *Histories of Egyptology: Interdisciplinary Measures* (London and New York: Routledge, 2015), pp. 19–32.
 6. James A. Secord, *Controversy in Victorian Geology: The Cambrian-Silurian Dispute* (Princeton: Princeton University Press, 1986), pp. 24–38; Van Riper, *Men among the Mammoths*, pp. 45–54 (note 4).
 7. Stocking Jr., *Victorian Anthropology*, p. 52 (note 4).
 8. Philippa Levine, *The Amateur and the Professional: Antiquarians, Historians and Archaeologists in Victorian England, 1838–1886* (Cambridge: Cambridge University Press, 1986), pp. 7–39; Van Riper, *Men among the Mammoths*, pp. 15–43 (note 4); Bruce G. Trigger, *A History of Archaeological Thought*, 2nd ed. (New York: Cambridge University Press, 2006), pp. 133–47; Peter Rowley-Conwy, *From Genesis to Prehistory: The Archaeological Three Age System and Its Contested Reception in Denmark, Britain, and Ireland* (Oxford: Oxford University Press, 2007).
 9. David Gange, *Dialogues with the Dead: Egyptology in British Culture and Religion, 1822–1922* (Oxford: Oxford University Press, 2013), pp. 53–120.
 10. Mirjam Brusius, "Towards a History of Preservation Practices: Archaeology, Heritage, and the History of Science," *International Journal of Middle East Studies* 47 (2015): 574–6;

tend to ignore their practitioners' engagements with other scholarly inquiries, like natural history.¹¹ Indeed, early nineteenth-century French concerns for the human past and natural world commonly convened around an enigmatic multifaceted Egypt, as a strategic political gateway to the Orient, a decayed country with peoples ripe for colonization, and the source of ancient knowledge.¹² These interests converged in the Napoleonic expedition to Egypt in 1798, after which Egyptian artefacts took on a central role in controversial debates about the age of antique civilizations. At its crux was an inscribed zodiac discovered in a Pharaonic temple in Dendera, Upper Egypt. French savants argued over the object's age and undeciphered hieroglyphs. Mathematicians, such as Joseph Fourier, believed it was evidence of advanced astronomical knowledge 15,000 years earlier, vastly predating the biblical account. Philologist Jean-François Champollion contended the object dated to the much later Greco-Roman period. While the latter opinion prevailed, the episode exemplifies how Egyptian artefacts were promoted as the basis for extreme human antiquity and, moreover, exposed competing ways of understanding the remote human past, as well as rising tensions between scientific and religious authority.¹³

In the following decades, practitioners from a wide range of disciplines shared a growing interest in the human past with little consensus on how to study it. Human antiquity was perhaps most troublesome for geologists. Late eighteenth-century savants had adapted the tools of human historiography to earth history, including temporal sequences pioneered by chronologers of universal histories, as well as local histories, inscriptions, and excavated artefacts. This integration of human and natural history underpinned the new science of geology, after which antiquities, ancient texts, fossils, and rocks became analogous material evidence to the deep past.¹⁴ These studies referenced (explicitly or otherwise) the dominant historical model of biblical chronology, particularly the flood and Bishop James Ussher's creation date of 4004 BCE. However, by the 1830s, British geologists cautiously avoided human history. Geology became a battleground between elite members of the Geological Society of London, led by Lyell, and a body of "scriptural geologists" who were more than eager to address human chronologies. The former disassociated themselves to secure authority and avoid religious scorn, excluding any

Mirjam Brusius, "Hitting Two Birds with One Stone: An Afterword on Archaeology and the History of Science," *History of Science* 55 (2017): 383–91; William Carruthers and Stéphane Van Damme, "Disassembling Archaeology, Reassembling the Modern World," *History of Science* 55 (2017): 255–72.

11. David Gange, "Beyond Disciplinary Histories of Egyptology," in William Carruthers (ed.) *Histories of Egyptology: Interdisciplinary Measures* (London and New York: Routledge, 2015), pp. 64–78.
12. For instance, Charles Coulston Gillispie, "Scientific Aspects of the French Egyptian Expedition 1798–1801," *Proceedings of the American Philosophical Society* 133 (1989): 447–74; Simon Schaffer, "Oriental Metrology and the Politics of Antiquity in Nineteenth-Century Survey Sciences," *Science in Context* 30 (2017): 173–212.
13. Jed Z. Buchwald and Diane Greco Josefowicz, *The Zodiac of Paris: How an Improbable Controversy over an Ancient Egyptian Artifact Provoked a Modern Debate between Religion and Science* (Princeton: Princeton University Press, 2010).
14. Martin J. S. Rudwick, *Bursting the Limits of Time: The Reconstruction of Geohistory in the Age of Revolution* (Chicago: University of Chicago Press, 2005), pp. 181–94, 235–7.

scientific claims to the human past that used biblical or text-based arguments.¹⁵ As their opponents' popular appeal subsided, gentlemanly geologists resumed their predecessors' inquiries by focusing on the most problematic moment between the end of the last geological period and the oldest human records. This is what prompted Cambridge geologist Adam Sedgwick in 1850 to ask: "Between the first creation of the earth and that day in which it pleased God to place man upon it, who shall dare define the interval?"¹⁶ He was ultimately questioning how geologists could once again tackle the age of civilized humans.

Like French naturalists before them, British geologists sought a solution in Egypt. An autonomous state within the Ottoman empire, Egypt had semi-colonial status in the 1850s. European consuls and technicians held high positions in the country's administration, particularly in public works and communications. From 1852, Britain kept an increasing presence in the north to oversee the construction of the Cairo–Alexandria railway and maintenance of the overland trade route to India.¹⁷ This renewed British occupancy proved useful for naturalists and scholars. During a period when most Victorians believed humans were only 6,000 years old, local Egyptian labor and knowledge of antiquities, geology, and engineering became vital for understanding human antiquity. One notable example of such expertise was Joseph Hekekyan, a Turkish–Armenian engineer educated in Britain and resident in Cairo, who supervised geoarchaeological excavations at the ancient sites of Heliopolis and Memphis. Hekekyan meticulously recorded his field observations in hundreds of letters, reports, sketches, and maps which he sent to geologist Leonard Horner in London. From afar, Horner analyzed the Nile flood sediments that had accumulated above and below pharaonic antiquities to produce the first geological chronology of ancient Egypt and to show that civilized humans had existed there for exactly 13,371 years. The excavations were jointly funded by the Royal Society of London and the Ottoman–Egyptian government of Abbas Pasha. They contributed to a research program, championed by Horner and his son-in-law Lyell, to measure alluvial sediments and assign absolute dates to the most recent geological period.

Hekekyan and Horner's excavations were the first initiative to apply stratigraphy – previously a relative dating tool in geology – to ancient Egyptian chronology and archaeology. This novel attempt to draw on earth history in order to understand human history had significant disciplinary implications. The incident does not merely point to the

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15. Martin J. S. Rudwick, "The Shape and Meaning of Earth History," in David C. Lindberg and Ronald L. Numbers (eds.) *God and Nature: Historical Essays on the Encounter between Christianity and Science* (Berkeley: University of California Press, 1986), pp. 312–14; Ralph O'Connor, "Young-Earth Creationists in Earth Nineteenth-Century Britain? Towards a Reassessment of 'Scriptural Geology'," *History of Science* 45 (2007): 388.
 16. Adam Sedgwick, *A Discourse on the Studies of the University of Cambridge*, 5th ed. (London: John W. Parker, 1850), pp. 110–11, quoted in Leonard Horner, "The Anniversary Address of the President," *The Quarterly Journal of the Geological Society of London* 17 (1861): lxx–lxxi.
 17. F. Robert Hunter, *Egypt under the Khedives, 1805-1879* (Cairo: The American University in Cairo Press, 1984), p. 93.

problem of human antiquity in the 1850s, but rather, disputed *methods* of inquiry into that problem. The first part of this essay examines the making of this geological chronology and the management of knowledge it required. Hekekyan's papers are remarkable examples of how field records were used to communicate scientific information over long distances and across national borders. In the process, Hekekyan embraced the roles of an Oriental *go-between*, a geological field assistant, and a gentleman of science to satisfy multinational, and his own, interests.¹⁸ I consider these aspects of the fieldwork to understand how practice, locality, trust, and race intersected from a global perspective. The second part investigates the chronology's mixed reception by several overlapping groups in Britain, notably Egyptologists, geologists, scriptural chronologists, monogenist and polygenist ethnologists, and the German higher criticism and universal chronology of Christian Charles Josias von Bunsen. The acceptance or rejection of Horner's conclusions reflected conflicting opinions about biblical authority, chronological expertise, observational techniques, and racial inferiority. The episode is both indicative of the many practical attempts in the 1850s and early 1860s to deal with the growing anxieties about human antiquity and highlights competing ways of knowing the ancient past. It further illuminates the prominence of local knowledge and ancient Egypt within these debates, as well as the changing disciplinary map during a transformative period in Victorian studies of the remote past.

Geological chronology and the missing link

At an annual meeting of the Geological Society of London on 19 February 1847, president Leonard Horner called upon his colleagues to start investigating "geological chronology," especially the most recent human period. This interest was new for geologists, who regularly ordered strata in relative sequences but did not date them. Horner suggested the "recent period" was ill-defined and needed clarification. Some geologists associated it with written documents and called it the "historical period." Others thought it synonymous with the first appearance of the human species and referred to the "human period." Charles Darwin used the term "recent" to refer to alluvial deposits that contained fossils of both existing and extinct species, although he objected to designating any epoch after humans.¹⁹ Horner told his colleagues to start addressing the uncertainty clouding all time periods, including the most recent. He argued that geologists should now seek to "define a certain division of time in the history of *the whole earth*."²⁰

Horner was in an authoritative position to advocate such a potentially divisive subject. The son of a wealthy Edinburgh merchant and younger brother to the celebrated

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18. For *go-betweens* see Simon Schaffer et al. (eds.), "Introduction," in *The Brokered World: Go-Betweens and Global Intelligence, 1770–1820* (Sagamore Beach: Science History Publications, 2009), pp. ix–xxxviii.
 19. Charles Darwin, *Geological Observations on South America* (London: Smith, Elder and Co., 1846), p. 13. Frederick Burkhardt et al. (eds.), *The Correspondence of Charles Darwin*, vol. 3, 1844–1846 (Cambridge: Cambridge University Press, 1987), p. 379.
 20. Leonard Horner, "The Anniversary Address of the President," *The Quarterly Journal of the Geological Society of London* 3 (1847): xxxvi.

politician Frances Horner, Leonard was the patriarch of one of the best-known Whig families in the country and widely recognized as an accomplished geologist, educationist, and social reformer. Horner studied at the University of Edinburgh from 1799, where he took an interest in mineralogy after reading John Playfair's *Illustrations of the Huttonian theory of the Earth* (1802). He soon moved to London and became one of the earliest fellows of the Geological Society in 1808, then its secretary (1810–14), and thrice its president (1846, 1847 and 1860). His earliest geological papers earned him election as a fellow of the Royal Society in 1813 and he served as its Vice-President in 1857. As a Whig reformer, he founded the country's first mechanics institute, the Edinburgh School of Arts, to provide education in the natural sciences for the working class and was the first warden to the nonconformist University of London. He was named royal commissioner in 1833 to investigate the employment of children in factories and his first report became the basis for the Factory Act passed in Parliament that year, ensuring working children had access to part-time education. For twenty-six years, he traveled around the country as a factory inspector.²¹

Horner's busy schedule rarely allowed time to conduct his own geological fieldwork. In one rare 1831 interlude, he and his wife Anne moved their six daughters to live in Bonn, and Horner spent eighteen months studying the mineralogy of the Rhine valley. He presented his observations to the Geological Society in two papers in 1833 and 1835. In the former, he discussed the relative age of the Loess, the last deposit before the recent historical period.²² In the latter, he described his investigations into the mean velocity of the Rhine. Horner experimented by bringing up gallons of water by rope from different depths of the river and then drying and analyzing the silt.²³ These were his earliest investigations into both recent geological time and alluvial excavations.

Lyell shared the enthusiasm for river sedimentation with his father-in-law. While he did not discuss human dates early on, Lyell's geological history always used an analogy with human antiquity. The first edition to *Principles of Geology* (1830) featured the Temple of Serapis in Naples on the frontispiece. Lyell studied the marine shells that had perforated the classical columns to show that the sea level had risen and fallen in antiquity in a steady state. Human history was the basis for his geohistory.²⁴ In his second visit to the USA in 1846, Lyell excavated on the alluvial plain of the Mississippi river

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21. Biographies of Horner in William John Hamilton, "The Anniversary Address of the President," *The Quarterly Journal of the Geological Society of London* 21 (1865): xxx–xl; "Obituary Notices of Fellows Deceased," *Proceedings of the Royal Society of London* 14 (1865): v–x; Bernice Martin, "Leonard Horner: A Portrait of an Inspector of Factories," *International Review of Social History* 14 (1969): 412–43; Colin M. Brown, "Leonard Horner, 1785–1864: His Contribution to Education," *Journal of Educational Administration and History* 17 (1985): 1–10; Patrick N. O'Farrell, *Leonard Horner: Pioneering Reformer* (Edinburgh: Heriot-Watt University, 2010).
 22. Leonard Horner, "On the Geology of the Environs of Bonn," *Transactions of the Geological Society of London*, 2nd series 4 (1836): 469.
 23. Leonard Horner, "On the Quantity of Solid Matter Suspended in the Water of the Rhine," *The Edinburgh New Philosophical Journal* 18 (1835): 103.
 24. Martin J. S. Rudwick, *Worlds before Adam: The Reconstruction of Geohistory in the Age of Reform* (Chicago: University of Chicago Press, 2008), pp. 299–300.

and estimated the depth of the river bed and the amount of time it would have taken for the sediments to accumulate: a period of approximately sixty-seven thousand years.²⁵ According to Horner, this calculation was the first attempt “to give an approximate numerical value” to the most modern geological period. In the fifth edition of *Manual of Elementary Geology* (1855), Lyell further suggested that to understand the most recent human period, geologists needed to investigate the deposits that had accumulated at the bottom of lakes, seas, and rivers in the last several thousand years. If those sediments contained fossilized human bones, or “articles fabricated by the hands of man,” then we could date them.²⁶ Despite his initial reluctance to address human antiquity, Lyell had long proposed using historical artefacts to quantify sedimentary layers.

Horner similarly argued that measurements of sedimentary deposits in river beds were highly effective for constructing absolute chronologies. They could contain traces of human activity and, moreover, they were evidence of past geological changes that were still in operation. In 1847, Horner proposed alluvial excavations along the Nile river: “If, as in Egypt, there were in the valley of the Mississippi monuments of human art of remote antiquity . . . we should be able to form a tolerably correct estimate.”²⁷ The Nile had what the Mississippi river valley was lacking: antiquities of known dates. Egypt was the missing link. The Nile valley, Horner argued, would be of the highest interest to both geologists and historians.

Nowhere else on the face of the earth can we hope to find such a link connecting the earliest historical with the latest geological time. For in Egypt we have accurate records of the earliest periods of the human race . . . combined with records . . . of geological changes contemporaneous with history, and these last having such a degree of uniformity as to warrant us in carrying back the dates of changes of a like nature beyond that of the earliest historical documents.²⁸

Horner’s intention to unite late geological with early historical time owed much to the work of French savants half a century prior. Utilizing antiquarian and classical scholarship and extending Jean-André de Luc’s geological analysis of the Rhine delta, geologist Déodat de Dolomieu first investigated the rate of sediment increase in the Nile valley to reconstruct the geological history of Egypt. Dolomieu argued in his *Mémoire sur la constitution physique de l’Égypte* (1793) that Nile silt deposits were the result of a finite period of geological activity limited to the last few millennia. Like Horner, his self-proclaimed novel methodology integrated “historical monuments with geological observations,” and as Martin Rudwick argues, represented a shift towards the new science of geohistory.²⁹ Dolomieu’s subsequent participation in the Napoleonic expedition to Egypt

25. Sir Charles Lyell, “On the Delta and Alluvial Deposits of the Mississippi . . .” *American Journal of Science and Arts* 3 (1847): 34–9; Sir Charles Lyell, *A Second Visit to the United States of North America*, vol. 2 (London: John Murray, 1849), p. 250.

26. Sir Charles Lyell, *A Manual of Elementary Geology*, 5th ed. (London: John Murray, 1855), pp. 117–18.

27. Horner, “Anniversary Address,” (1847), p. xlv (note 20).

28. Leonard Horner, “An Account of Some Recent Researches Near Cairo . . . Part I,” *Philosophical Transactions of the Royal Society of London* 145 (1855): 108.

29. Rudwick, *Bursting the Limits of Time*, pp. 321–4 (note 14).

was short-lived. However, the expedition's chief engineer, Pierre-Simon Girard, continued Dolomieu's line of inquiry by focusing on nilometers: monuments used in antiquity to measure the annual height of the Nile during inundation. In the *Description de l'Égypte*, Girard described two nilometers, one on the island of Elephantine in the south and another on the island of Rhoda near Cairo, arguing that the Nile rose much higher in modern times than it had in antiquity. He concluded that the river water had risen at an average rate of 0.126 meters per century and that river sediments accumulated at the same speed.³⁰ Horner surmised Girard's analysis was useful but insufficient. Calculating a mean rate of soil increase was not accurate because surely Nile sediments accumulated in different amounts throughout the valley. The same kind of calculations needed to be performed at specific locations, where a monument of a known date could act as a fixed point in time. Horner saw his research as a continuation of Girard's important work.³¹

Horner was equally inspired by the Prussian philologist Karl Richard Lepsius's observations on ancient Nile levels. Lepsius was commissioned by Frederick Wilhelm IV to lead an expedition to Egypt and the Sudan from 1842–6. Modeled after the Napoleonic expedition, this was a huge state-funded mission undertaken at the recommendation of orientalist Johann Eichhorn, naturalist Alexander von Humboldt, and diplomat–scholar Christian Charles Josias von Bunsen. While exploring the cliffs of Semne in Nubia, Lepsius found marks cut into the solid rocks and foundation stones of a fortress from the time of Sesostri II and two temples of Thutmose III. He inferred that the river bed had lowered approximately twenty-eight feet in the intervening 4,000 years since the buildings were occupied. Contrary to Girard's findings, Lepsius believed the Nile flowed higher in antiquity than in the present day. Horner presented these conclusions to the Geological Society in April 1850 and published a critique in the *Edinburgh Philosophical Journal* three months later.³² Lepsius's results presented a conundrum for Horner. He rejected Lepsius's conclusion, but he could not offer an alternative explanation. The answer could only be found if Horner investigated ancient Nile levels himself.

Excavations in Heliopolis and Memphis, 1851–4

Horner's objective was to measure the depth of Nile sediments that had accumulated above and below some of the oldest known monuments in Egypt. However, he was still occupied as a factory inspector and did not have the opportunity to travel and conduct

30. Pierre-Simon Girard, "Observations Sur La Vallée d'Égypte, et Sur l'exhaussement Séculaire Du Sol Qui La Recouvre," in *Mémoires de l'Académie Royale Des Sciences de l'Institut de France* (Paris, 1817), p. 266.

31. Leonard Horner, "An Account of Some Recent Researches Near Cairo . . . Part II," *Philosophical Transactions of the Royal Society of London* 148 (1858): 80–4.

32. Leonard Horner, "Observations on the Discovery, by Professor Lepsius, of Sculptured Marks on Rocks in the Nile Valley in Nubia," *Quarterly Journal of the Geological Society* 6 (1850): 384–5; Leonard Horner, "Observations on the Discovery, by Professor Lepsius . . .," *Edinburgh New Philosophical Journal* 49 (1850): 126–44; Richard Lepsius, *Letters from Egypt, Ethiopia, and the Peninsula of Sinai*, trans. by Joanna B. Horner and Leonora Horner (London: H. G. Bohn, 1853).

fieldwork. Late in 1850, family friend Florence Nightingale presented him with a solution. Nightingale had recently toured up the Nile and described a British antiquarian she had met in Alexandria named Anthony Charles Harris who might be able to assist him.³³ Horner wrote Harris to propose excavations at Heliopolis and inquired whether he could direct them on his behalf. He stressed that the excavations would only be viable if they were under the supervision of someone of “trustworthy value.”³⁴ Horner also explained his plan to Charles Augustus Murray, the British Consul-General in Egypt. Murray, in turn, requested help from the newly appointed Viceroy of Egypt, Abbas Pasha. Murray had some leverage with the Viceroy, who had recently authorized that a British railway be built between Alexandria and Cairo as a partial alternative to the French-financed Suez Canal project. Abbas Pasha agreed to subsidize Horner’s excavation, which was funded by the Royal Society, supplying corvée (forced) labor and tools.³⁵ All three proposed an engineer in the Egyptian government’s service named Joseph Hekekyan to supervise the excavations, and Hekekyan was instructed “to make the required researches” wherever he was directed.³⁶

Hekekyan was a native of Istanbul and raised in an Armenian Catholic family. His father was a translator for the Khedive of Egypt, Muhammad Ali Pasha. In 1818, at the age of ten, the Viceroy sponsored Hekekyan to study abroad in England and put him under the care of Samuel Briggs, the former British Consul in Alexandria. Hekekyan received seven years of English education, first at Clapham Academy and then at the prestigious Catholic Stonyhurst College. There he was introduced to natural philosophy, chemistry, and geology, and excelled in arithmetic, geometry, geography, English, French, handwriting, and especially “drawing and sketching from nature.”³⁷ At the Khedive’s order, Hekekyan undertook an additional five-year apprenticeship in theoretical and practical mechanics at Bramah’s Engineering Factory in Pimlico, studying steam engines, machinery, hydraulics, surveying, and irrigation, and visited Manchester and Glasgow factories to study spinning and weaving techniques. He simultaneously attended lectures in mechanics institutes and read widely on natural philosophy, mineralogy, geology, and architecture, and drew “plans, elevations, and sections of Pumps and Steam Engines.”³⁸ He returned to Egypt in 1830 so that Muhammad Ali could “derive some practical benefit” from his studies abroad, and quickly became active in the country’s educational and industrial reform.³⁹ He was appointed Chief Overseer in several cotton

33. Katharine M. Lyell (ed.), *Memoir of Leonard Horner*, vol. 2 (London: Women’s Printing Society, 1890), pp. 178–9.

34. Leonard Horner to Anthony Charles Harris, 25 December 1850, 37459.2, Hekekyan Papers, British Library (hereafter cited as Hekekyan MSS).

35. Donald M. Reid, *Whose Pharaohs? Archaeology, Museums, and Egyptian National Identity from Napoleon to World War I* (Berkeley: University of California Press, 2002), p. 62.

36. Joseph Hekekyan to Anthony Charles Harris, 11 March 1851, 37460.2 and 37448.215, Hekekyan MSS.

37. Journal Entry, 37448.179, Hekekyan MSS.

38. Journal Entry, 37448.184, Hekekyan MSS.

39. Journal Entry, 37448.166–214, Hekekyan MSS; Paul Sedra, *From Mission to Modernity: Evangelicals, Reformers and Education in Nineteenth Century Egypt* (New York: Palgrave Macmillan, 2011), pp. 63–6.

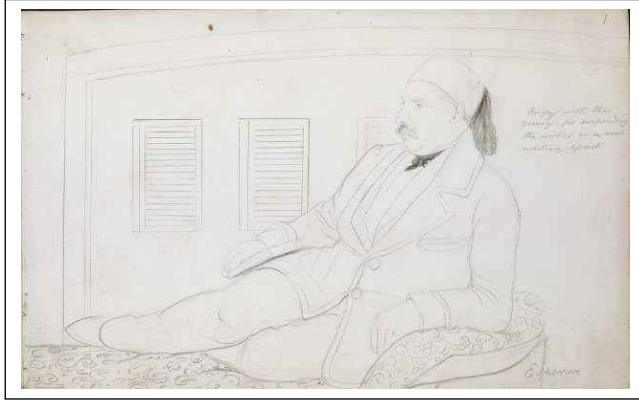


Figure 1. Sketch of Joseph Hekekyan c. 1858, signed Esperon. Caption reads “angry at the Viceroy for suspending the works in a most arbitrary spirit.” (c) British Library Board, MS37454.1.

mills, trained students from Qasr al-Ayni College in geometry and mechanics, headed the new Polytechnic engineering school in Bulaq, and helped establish the Egyptian School in Paris.⁴⁰ He was also engaged in several additional government projects; he was president of the Board of Health from 1849, oversaw the construction of roads and bridges, and directed three coal mining expeditions into the Egyptian deserts.

Hekekyan was one of several Europeanized Armenians who were educated abroad and became members of Egypt’s bureaucratic elite during the reign of Muhammad Ali. They were multilingual, held high-ranking government positions (commonly as translators, in education, or foreign affairs and commerce), and enjoyed close ties to European consuls. In an effort to extend their personal power and influence, Armenian officials strategically advocated on behalf of European, rather than Turkish or Egyptian interests.⁴¹ Hekekyan illustrates this point. His background and education alienated him from his adopted Egypt. He was raised among polite gentry and returned from overseas as Joseph, not Yusuf. He spoke several European languages but had temporarily forgotten his native Turkish. He even dressed differently, wearing gloves and stockings, and sporting a large moustache (Figure 1). He did not fit neatly into other cultural subsets. He was not a British citizen, nor an Egyptian; he had studied in Britain when Muhammad Ali had sent forty-four Egyptian students to study in Paris. Donald Reid argues that, following his return to Egypt, Hekekyan increasingly embraced “European stereotypes of Muslim fanaticism,” partially because his closest friends were European visitors and settlers.

40. Ahmed Abdel-Rahim Mustafa, “The Hekekyan Papers,” in Peter Malcolm Holt (ed.) *Political and Social Change in Modern Egypt: Historical Studies from the Ottoman Conquest to the United Arab Republic* (London: Oxford University Press, 1968), p. 69; Darrell Dykstra, “Joseph Hekekyan and the Egyptian School in Paris,” *Armenian Review* 35 (1982): 165–82; Sedra, *From Mission to Modernity*, pp. 75–83 (note 39).

41. Hunter, *Egypt under the Khedives*, pp. 92–3, 111–7 (note 17).

Egyptian colleagues regarded him as an “English infidel” while westerners thought he was “a very exceptional type of the Europeanized Oriental.”⁴² He was particularly fond of British progressive ideologies such as industrial growth, free trade, and the superiority of European civilization.

Hekekyan’s British partiality and idiosyncrasy affected his attitude towards the contested antiquities ordinances of the era. Muhammad Ali’s 1835 *Antiqakhana* decree sought to restrict the European exportation of Pharaonic materials and to establish a national museum in Ezbekiyeh. The Pasha enlisted the Egyptian scholar and technician Rifa’a al-Tahtawi to manage the collection and Hekekyan to design the building (although it was never built). While Tahtawi, an Egyptian-born, French-educated Muslim, focused his scholarly efforts towards educating his fellow Egyptians about their Pharaonic heritage, Hekekyan deliberately channeled western concerns for antiquities conservation, believing artefacts would fare better under the protection of European museums.⁴³ Hekekyan also cofounded the Egyptian Society in Cairo (or Société Égyptienne), which had been established in 1836 to replace the defunct Institut d’Égypte. The society was a rendezvous for Europeans traveling through the country and its members included Hekekyan’s British colleagues Harris and Murray. As an Armenian in the Egyptian court, Hekekyan had enjoyed French and Ottoman protection under the reign of Muhammad Ali. When political circumstances changed in 1850, Hekekyan found himself concerned for his family’s safety and urgently wrote Briggs to ask for “English protection.”⁴⁴ Hekekyan resigned from the government’s service a year later, supposedly because of his chronic ophthalmia. Horner’s 1851 research proposal was timed well. Hekekyan’s agreement to work for him reinforced his British allegiance.

As excavation plans were negotiated, the project quickly expanded from “the sinking of a few pits” to a huge geological project requiring many bodies. Fieldwork began in June 1851 around the still-standing obelisk of Sesostri I in Heliopolis near Cairo. The next three summers’ work was performed around the fallen colossal statue of Ramses II

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42. Mustafa, “Hekekyan Papers,” p. 69 (note 40); David G. Jeffreys, “Joseph Hekekyan at Heliopolis,” in Anthony Leahy and William John Tait (eds.) *Studies on Ancient Egypt in Honour of H. S. Smith* (London: Egypt Exploration Society, 1999), p. 158; Reid, *Whose Pharaohs?*, pp. 49, 59–63 (note 35); David G. Jeffreys, “Introduction: Two Hundred Years of Ancient Egypt: Modern Egypt and Ancient Archaeology,” in David G. Jeffreys (ed.) *Views of Ancient Egypt since Napoleon Bonaparte: Imperialism, Colonialism and Modern Appropriations* (London: UCL Press, 2003), p. 9.
43. Reid, *Whose Pharaohs?*, pp. 54–63 (note 35); Elliott Colla, *Conflicted Antiquities: Egyptology, Egyptomania, Egyptian Modernity* (Durham, NC: Duke University Press, 2007), pp. 116–20.
44. Joseph Hekekyan to Samuel Briggs, 29 April 1851, 37452.48–9, Hekekyan MSS. Most Armenian high officials were relatives and part of a bureaucratic faction, enjoying group protection. Hekekyan and his wealthy brother-in-law Artin Bey, Egypt’s Director of Foreign Affairs and Commerce, were both vocally critical of the new Khedive’s autocratic power. Artin Bey fled Egypt in 1850 with a large sum of money, which angered Abbas Pasha and prompted Hekekyan’s fears over his family’s safety. See Hunter, *Egypt under the Khedives*, pp. 112–15 (note 17) and Mustafa, “Hekekyan Papers,” p. 70 (note 40).

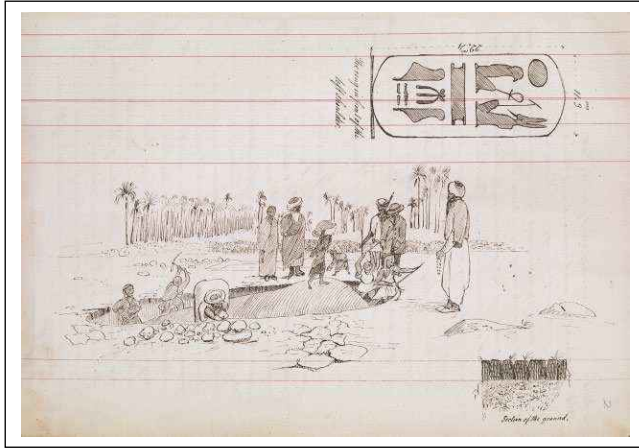


Figure 2. Sketch of fieldwork in progress. Hekekyan, standing center, was always differentiated by his suit and hat and because he never drew himself digging, but only pointing or writing. Hekekyan was accompanied by a number of Egyptian supervisors, foremen, and laborers, including children. (c) British Library Board, MS37453.2.

in nearby Memphis, while ninety-five additional probings were made along the Nile flood plain. The work was no small feat. Excavations took four years of fieldwork and cost more than 3,000 guineas expenditure. Some funding, approximately fifty pounds, came from the Royal Society of London, but the cost was mostly offset by the Ottoman–Egyptian government.

British and French archaeological concessions in Egypt during the early decades of the nineteenth century were decentralized. As part of Muhammad Ali’s corvée labor policy and development of a partial wage economy in reforming Egypt, he and his Ottoman governors commissioned village *shaykhs* to enlist local excavators, including men, women and children. As Wendy Doyon shows, the workforce normally included several experienced foremen, or *ru’asa* (singular *ra’is*), who represented “a new class of go-betweens with a kind of diplomatic status.”⁴⁵ The excavations in Heliopolis and Memphis indicate these labor practices continued during Abbas Pasha’s transitional reign, from 1848 to 1854. Throughout Hekekyan was assisted by several military and engineering officers appointed to him by the Viceroy, particularly Hekekyan’s friend Omar Effendi, the Adjutant of Artillery who had similarly studied statistical geography, natural philosophy, and English in Britain.⁴⁶ Hekekyan appointed his engineering students from the Polytechnic School as site supervisors because they were “practiced in the art of surveying.” His drawings suggest additional foremen oversaw excavations (Figure 2).

45. Wendy Doyon, “On Archaeological Labor in Modern Egypt,” in William Carruthers (ed.) *Histories of Egyptology: Interdisciplinary Measures* (London and New York: Routledge, 2015), pp. 141–56.

46. Journal Entry, 37448.56, Hekekyan MSS.

Approximately sixty local Egyptian youths, peasant farmers, and Bedouin were recruited and subdivided into groups of ten for maximum productivity.⁴⁷ As was typical, tasks were organized according to class, gender, and age; foremen managed workers, men cleared stones and dirt using their own hoes, boys (and possibly girls) carried dirt away in baskets, while women provided food and water.⁴⁸ This hierarchical and social organization was considered necessary for research on such a large scale. The Egyptian laborers were supervised by Egyptian foremen and engineers higher in rank, who looked to Hekekyan for guidance, who in turn reported to Horner.

Hekekyan and Horner's corresponding relationship was built upon a social contract. Horner, a gentlemanly geologist, would have been all too familiar with the standard literature on observational practices. Both John Herschel and Henry De la Beche spoke to the advantages of a "division of labour" between observer and theorist; this system had benefited geology in particular because any hard worker able to "[set] aside all theoretical views" could prove useful in the field.⁴⁹ Those industrious helpers were expected to observe specific phenomena, record facts numerically and consistently, note the circumstances of their observations, and transmit their records for theoretical analysis. This is precisely what Horner demanded, likely regarding Hekekyan as a specialist field assistant – an essential role in De la Beche's large-scale Geological Survey of Great Britain (whose *Memoirs* Horner greatly admired).⁵⁰ Horner addressed Hekekyan as his "coadjutor on the spot," pointing both to his reliance on and superiority to him. Hekekyan was instructed where to dig, how to probe, observe, collect, record, preserve specimens, and how to ship them to London.⁵¹ By directing the work at a distance, Horner self-identified as his project's primary theoretician.

Horner was "startled to find a gentleman and a scholar" among the officers of the Egyptian government and vetted Hekekyan thoroughly, requesting Briggs send him a character reference.⁵² Briggs confirmed Hekekyan's education in England, his perfect knowledge of English and French, and most importantly, his familiarity with gentlemanly society. Horner was assured that Hekekyan's "principles and feelings are those of an English Gentleman and he justly enjoys the respect and esteem of all who know him."⁵³ This vote

47. Horner, "Recent Researches near Cairo," (1855), p. 121 (note 28); Horner, "Recent Researches near Cairo," (1858), pp. 54–5 (note 31).

48. For more on Egyptological labor in the nineteenth and early twentieth centuries, see Doyon, "On Archaeological Labor" (note 45) and Stephen Quirke, *Hidden Hands: Egyptian workforces in Petrie excavation archives, 1880–1924* (London: Duckworth, 2010).

49. John F.W. Herschel, *A Preliminary Discourse on the Study of Natural History* (London: Longmans, Rees, Orme, Brown, and Green, 1831), pp. 131–4; Henry De la Beche, *How to Observe: Geology* (London: Charles Knight, 1835), pp. iii–iv.

50. James A. Secord, "The Geological Survey of Great Britain as a Research School, 1839–1855," *History of Science* 24 (1986): 223, 235, 254.

51. Leonard Horner to Joseph Hekekyan, 27 April 1851, 37459.5–6 and 37460.3–4, Hekekyan MSS; Leonard Horner to Joseph Hekekyan, n.d., 37460.43, Hekekyan MSS.

52. Leonard Horner to Anthony Charles Harris, 18 December 1852, 37459.54–5, Hekekyan MSS.

53. Samuel Briggs to Leonard Horner, June 1852, 37459.58–9 and 37460.35–6, Hekekyan MSS.

of confidence was a necessary precondition to the Egyptian excavations. Horner would need to rely on gentlemanly trust to become a virtual witness from afar.⁵⁴

Hekekyan fulfilled his contract with Horner zealously by inscribing his observations in thorough field records. These paper spaces – notebooks, journals, correspondence, reports, drawings, and maps – were proxy pictures.⁵⁵ They stood in the field's place, mobilizing information between the field site and Horner's study, and acting as substitutes for parts of the field that, unlike small artefacts and soil samples, were not transportable and therefore inaccessible to Horner. Hekekyan recorded his daily observations, the progress of work, the nature of the soil, and the water levels in field notebooks. He later redacted all the information into a journal, where the data was presented in narrated form. He included numerical tables and lists with dates and times of observations and measurements of the Nile's elevation in ancient Egyptian cubits, English inches, and French meters. This was helpful for Horner's comparison with Girard's earlier work, but also crucial in an era when European surveys in the Orient were focused on representing ancient objects through their own metrological standards.⁵⁶ Moreover, Hekekyan provided outstanding visuals: plans and cross-sections of the excavation areas, detailed topographical maps, watercolors and more. He developed a unique system for stratigraphic units, making both simple and complicated versions (Figure 3). This geological tool was entirely new to Egyptology, where it was used for the first time to date artefacts, independent of historical records or inscriptions. Hekekyan's visual language was equally informed by his communication with Horner, his engineering background, his education in natural philosophy and geology, and his artistic expertise. His journals and drawings provided the basis for Horner's analysis.

While he performed his duties thoroughly, Hekekyan did not accept the role of passive informant or assistant – he aspired to gentlemanly status. He identified as quasi-British, was acquainted with wealthy European naturalists and travelers, and he was not paid personally for the fieldwork. He presented himself as superior to his Egyptian students and laborers, as evident through the sketches of fieldwork he sent Horner. Hekekyan consistently drew himself in a suit and hat while pointing to his underlings or writing in his notebook (Figure 2). He often redrew the same excavation scene between his notebook, journal, and final report, strategically removing peasants and fieldworkers and instead portraying himself as the master surveyor with an objective overview of the site (Figure 4). Hekekyan also used Horner's project to further his own agenda. He desired acknowledgment for his artistic ingenuity, his knowledge of geology, archaeology, and engineering, and above all, his theoretical input. Over the four years of fieldwork for Horner, Hekekyan simultaneously excavated nearby areas and began writing his own monograph on Egyptian chronology, which he intended for publication in Britain. Therefore, there was some tension between both parties' expectations. It benefited both

54. Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton: Princeton University Press, 1985), pp. 60–5; Steven Shapin, *A Social History of Truth: Civility and Science in Seventeenth-Century England* (Chicago: University of Chicago Press, 1994), p. 245.

55. On proxy pictures see Rudwick, *Bursting the Limits of Time*, pp. 75–80 (note 14).

56. Schaffer, "Oriental Metrology" (note 12).

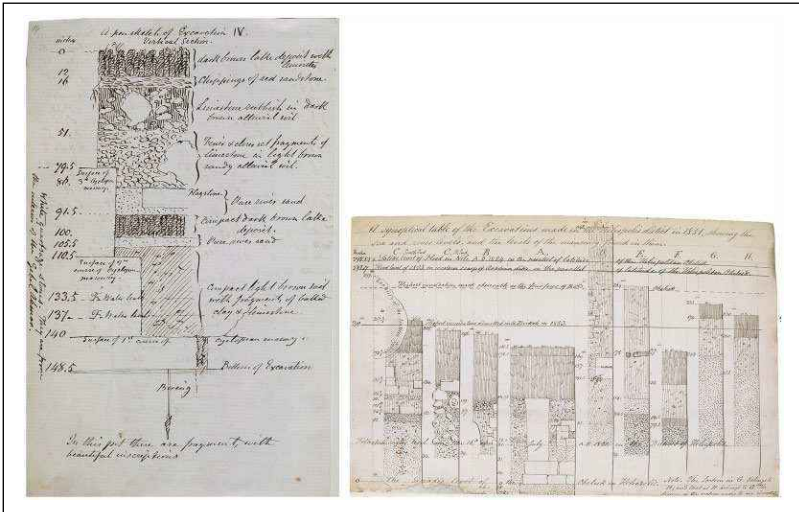


Figure 3. A detailed stratigraphy of one boring with soil descriptions (left). Stratigraphies of several borings arranged alongside one another (right). (c) British Library Board, MS37459.455 and MS37459.572.

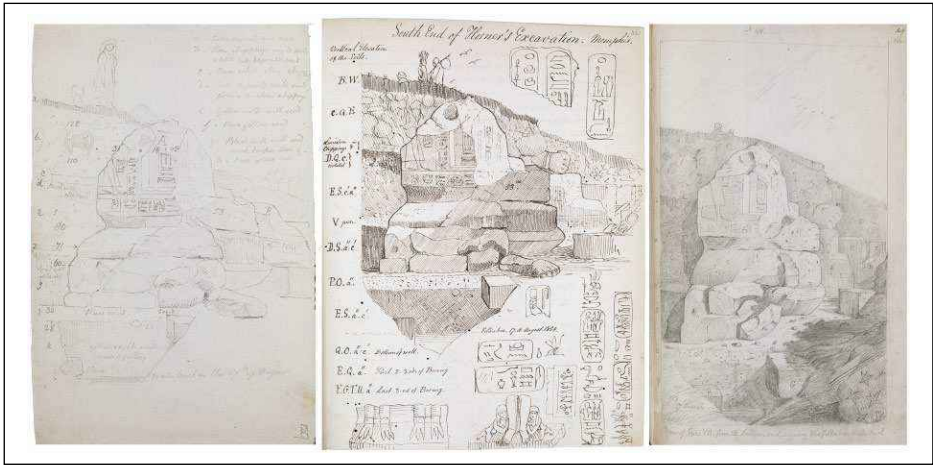


Figure 4. Three sketches of the base of an obelisk in Memphis. The first is from Hekekyan’s field notebook, 1854 (left). The letters on either side are soil descriptions and two workers were drawn above the trench for scale and context. The image was transformed for Hekekyan’s journal (center), where he added more visual detail in the antiquities and stratigraphy and replaced the simple letters with a complicated referencing system, explained in the body of the surrounding text. He also highlighted the hieroglyphs from the monument, changed the placement of the two workers, and added himself beside them. The last version (right) was sent to Horner with the final field report in 1857. Hekekyan omitted all workers, showing only himself on a donkey atop a more detailed landscape. A new referencing system was explained in the accompanying text. (c) British Library Board, MS37454.129, MS37452.261, and MS37459.566.

Section of the first Shaft and deepest boring at the Statue of RAMESSES II.

Layer#.	Thickness of layer†.	Depth of the bottom of the layer from the surface of the ground.	Nature of the soils.
	inches.	inches.	
I.	7-875	The surface layer at the superior ridge of the excavation, a brown sandy argillaceous earth, with a mixture of white sand, and small fragments of limestone and burnt brick. It closely resembles the standard specimen E, described in Part I. of this Memoir, page 127.
II.	23-625	31-500	Undistinguishable from I., except in being of a lighter colour.
III.	15-750	47-250	Scarcely distinguishable from I., except in being more indurated, like dried clay, and containing fragments of pottery.
IV.	31-500	78-750	Similar in all respects to III.
V.	35-375	114-125	Scarcely distinguishable from II. and III.
VI.	27-500	141-645	Almost identical with V., with fragments of limestone and brick.
VII.	15-750	157-375	Very similar to III. and VI., with fragments of burnt brick.
VIII.	39-375	196-750	Nearly identical with VII.
Boring layers.			16 feet, 4½ inches. Filtration water, 4 August, 1852.
IX.	8-000	204-75	Light brown sandy argillaceous earth, with fragments of burnt brick.
X.	48-000	252-75	Dark brown argillaceous earth, with fragments of burnt brick and particles of pottery.
XI.	48-000	300-75	Similar to X., with fragments of limestone.
XII.	24-000	324-75	Similar to X., with fragments of burnt brick and pottery.
XIII.	12-000	336-75	Similar to IX., with fragments of burnt brick, pottery and limestone.
XIV.	12-000	348-75	A mixture of IX. and transparent quartzose sand.
XV.	12-000	360-75	Similar to XIV., but the earth of a lighter colour.
XVI.	24-000	384-75	Shining black sand, composed of rounded and crystalline grains of magnetic iron, and a few round grains of transparent quartz.
XVII.	12-000	396-75	Same as preceding, with a mixture of argillaceous earth.
XVIII.	12-000	408-75	Same as XVI.
XIX.	12-000	420-75	Same as XVII.
XX.	12-000	432-75	Same as XVII., with darker-coloured argillaceous earth.
XXI.	24-000	456-75	Same as XX., but with fragments of burnt brick and pottery.
XXII.	24-000	480-75	Same as XVI.
			40 feet from the surface of the ground.

Figure 5. The deepest excavated strata under the statue of Ramses II as presented by Horner. Layer XXI was notable because it contained “fragments of burnt brick and pottery.” From Leonard Horner, “An Account of Some Recent Researches Near Cairo . . . Part II,” *Philosophical Transactions of the Royal Society of London* 148 (1858): 58.

Horner and Hekekyan to promote the latter’s identity to legitimize the research. However, for the conclusions to be accepted by Britain’s scientific elite, Horner needed to present them as his own.

Hekekyan’s textual and visual tools allowed Horner to become an authority at a distance and to recreate Heliopolis and Memphis in his London study. Once received, Horner laid all the maps, drawings, reports, and correspondence on his desk and began to “extract and arrange” them.⁵⁷ While Hekekyan’s drawings were necessary, it was not obvious to Horner that they were appropriate for his geological audience. He did not showcase any of them in his presentations to the Royal Society in 1855 or 1858, or in the subsequent publications. Instead, Horner synthesized everything into a handful of lists, plans, and stratigraphies (Figure 5). His factory job was a resource for this transformation of data. There he was concerned with inspecting technical systems and labor forces managed by others, and this experience proved useful when judging Hekekyan’s activities from afar. Horner’s geological lists were further inspired by his factory reports. Like those produced under his colleague De la Beche for the Geological Survey, Horner’s

57. Leonard Horner to Joseph Hekekyan, 6 July 1852, 37459.103 and 37460.50–1, Hekekyan MSS.

were similarly modelled after large population surveys, part of the social and educational reforming movements of the era.⁵⁸ Horner's visuals would have been familiar to his geological audience, who were used to viewing large tables of statistical data.

Horner intended to address the archaeological results in a separate monograph, although this was never completed. Most of the artefacts were apparently inappropriate for presentation to the Royal Society because of their historical character.⁵⁹ Nonetheless, Horner listed some of the more important objects in his second paper. One set of artefacts was so remarkable that it served as the basis for his conclusions. In the lowest depths of one excavation pit, thirty-nine feet below the statue of Ramses II, Hekekyan's workmen used their boring instrument to retrieve a soil sample and found fragments of burnt brick and pottery contained within it. Horner had the fragments shipped to London where he showcased them to the Royal Society and described their importance in the *Philosophical Transactions*. He also explained his method for analyzing the rate of sediment increase. Horner took Hekekyan's measurements of the sedimentary deposits that accumulated above the foundation of the Egyptian monuments, divided that amount by the number of centuries that had elapsed since they were erected, and applied that same chronometric scale to the sediments below the monuments. He calculated that near Cairo, the Nile river had risen approximately three-and-a-half inches per century. Accordingly, the entirety of Dynastic Egypt belonged to the recent geological period. The archaeological finds were "a record of the existence of man" 13,371 years earlier, suggesting that humans were civilized enough at that time to "fashion clay into vessels."⁶⁰

Horner did not ignore the second-hand nature of his analysis but instead promoted Hekekyan in the *Philosophical Transactions*, portraying him as an exceptional Europeanized Oriental and referring to him as his "very able coadjutor." In the body of the 1855 paper, Hekekyan was described as "an Armenian gentleman resident in Cairo" with "an earnest desire to be employed in a scientific enquiry of this nature." By the 1858 paper, Hekekyan's lengthy biography was relegated to the appendix. There Horner emphasized how entirely rare it was "that a subject of the Grand Sultan, and one resident in Egypt, should be distinguished by attainments in science and literature." He highlighted Hekekyan's intellectual and bodily suitability for the work and sold him as a better alternative than himself. Hekekyan was uniquely qualified to supervise the excavations because they "could not have been undertaken by a European, by any one not thoroughly inured to the climate of Egypt." Hekekyan had a rare combination of skills. He was "acquainted with pursuits in physical science," he was "familiar with the language of the numerous persons to be employed, of whom a large proportion must be common labourers," and yet, "he writes English like a native." Horner marketed him as a trustworthy gentleman of science without whose help the work would not have been accomplished.⁶¹ Hekekyan was a go-between – an agent mobilizing his observations through correspondence, notes, and sketches, and translating and mediating between

58. Secord, "Geological Survey" (note 50).

59. Leonard Horner to Joseph Hekekyan, 2 January 1864, 37459.770, Hekekyan MSS; Horner, "Recent Researches near Cairo," (1855), p. 132 (note 28).

60. Horner, "Recent Researches near Cairo," (1858), pp. 71–6 (note 31).

61. Horner, "Recent Researches near Cairo," (1858), p. 78 (note 31).

Arabic-speaking fieldworkers and students, Turkish-speaking government officials, and English, French, and German-speaking scholars. British audiences may have been temporarily disposed to welcoming Hekekyan, who identified as an Ottoman and British ally in the wake of the Crimean War. And yet, Hekekyan could not be pigeonholed. He maintained a liminal status that put Horner in a double bind: Hekekyan both intrigued and agitated audiences in Britain.

The geological chronology's reception

Egyptological disagreements

The first to review Horner's paper was biblical chronologist and Egyptologist Samuel Sharpe, best known for helping prepare the Egyptian court at the 1854 Sydenham Crystal Palace. Sharpe was president of the eclectic Syro-Egyptian Society of London, a group whose members were the public face of British Egyptology and closely associated with the Unitarian movement. The society's aim was to "establish a secular, chronological context for biblical events," and members were sympathetic to dissenting chronologies and rational interpretations of scripture.⁶² Sharpe discussed Horner's results in a meeting of 8 March 1859 and claimed his conclusions rested on two faulty assumptions. First, he challenged Horner's analysis of the Nile sediments' secular increase. Sharpe pointed out that a large embankment would have likely surrounded the statue of Ramses II in antiquity preventing any mud from being deposited around it. It would only be possible to measure alluvial deposits from the period in which the city was abandoned, and the enclosure wall neglected – a date which could not be known for certain. The sediments had likely been deposited only in the last eight hundred years.⁶³ Horner read Sharpe's critique after it was summarized in the *Athenaeum* and the two corresponded on the matter. Sharpe explained that Horner's findings were impossible for a second reason –there were no buildings in Egypt as old as 2000 BCE, therefore no mud brick could exist from that time. While there could be pottery that dated to an earlier period, he wrote: "your diggings near Memphis hardly proves even that."⁶⁴ The author of an unsigned article in the *Quarterly Review* agreed that "there is not a single known structure of burnt brick" in pre-Roman Egypt.⁶⁵

Both criticisms were problematic for Horner, who complained to his daughter, "If, as is probable, there was an embankment, Sharpe's objection is good; but as to the amount to which it will affect the rate of secular increase, nothing can be said until we know at what period the Nile inundation again overflowed the site . . ." ⁶⁶ Horner followed up with Harris and Hekekyan, to whom he sent copies of both reviews. Harris thought that Sharpe's embankment theory was probably correct; however, he had examples of burnt

62. Gange, *Dialogues with the Dead*, pp. 95–120 (note 9).

63. "Societies: Syro-Egyptian" (editorial), *The Athenaeum*, 19 March 1859, p. 293.

64. Samuel Sharpe to Leonard Horner, 13 April 1858, 2216.27–8, Horner Papers, National Library of Scotland (hereafter cited as Horner MSS).

65. [Sir William Smith], "Bunsen's Egypt and the Chronology of the Bible," *Quarterly Review* 105 (April 1859): 421.

66. Lyell, *Memoir of Leonard Horner* 2, pp. 285–6 (note 33).

brick with hieratic inscriptions in his private collection that suggested the second criticism was unfounded. Sharpe's critique was overall "worthy of attention" but his calculations were probably wrong.⁶⁷ Pleased with this feedback, Horner surmised that the article in the *Quarterly Review* "was in part at least, written in the British Museum, and it will not be difficult for me, I apprehend, to point to pottery in that collection more than a thousand years old before the existence of Rome."⁶⁸

Hekekyan's response did not come quickly and Horner grew frustrated. He worried that Sharpe was correct that the pottery fragments were Roman, not Egyptian: "Now is this assertion true? If it is, then it is a most astounding and incomprehensible fact that you found fragments of burial brick at the lowest depths in so many of the borings excavations!"⁶⁹ Hekekyan was occupied performing additional excavations and compiling his monograph. He eventually replied to reassure Horner that Egyptians undoubtedly made burnt brick thirteen thousand years earlier. There was simply a problem of preservation, so "the ruins of only a few of the most solid have survived dilapidation to our time."⁷⁰ While Hekekyan was not personally acquainted with Sharpe, he promised to send the scholar "a list of eight geochronological sections" to prove his point. However, this never came to fruition.⁷¹

Two years later Hekekyan was finally close to finishing his book and told Horner that it "will contain embodied in it my answer to the attacks made on the general results of your late researches."⁷² Published with Horner's assistance in London, his book was titled *A Treatise on the Chronology of Sirodianic Monuments* (1863). It introduced the term "geo-astronomy" and suggested that the Pharaonic dynasties recorded by the Egyptian priest Manetho in the third century BCE were based on astrogeological Nile observations. Ancient Egyptian monuments, he believed, were designed with advanced knowledge and concretized measurements relating to the movement of Sirius. He attempted to show that those who built Sirodianic monuments were far more skilled than their modern descendants and that the Egyptian race had not evolved unidirectionally.⁷³ This view was inspired by the French savants Hekekyan regularly cited, especially Girard, who attempted to recover and repurpose what he believed was the extreme metrological precision contained within Egyptian hydraulic monuments.⁷⁴ Hekekyan appropriated this Napoleonic idea in order to align himself with those superior ancients and their European descendants.

Hekekyan's book only referred to his excavations with Horner allegorically, through a fictional discussion in ancient Heliopolis between Manetho and a visiting Greek scholar. Hekekyan likened himself to Manetho (thus to an ancient chronologist), telling

67. Anthony Charles Harris to Leonard Horner, 21 July 1859, 2216.35–6, Horner MSS.

68. Lyell, *Memoir of Leonard Horner 2*, p. 287 (note 33).

69. Leonard Horner to Joseph Hekekyan, 1 July 1859, 37459.671, Hekekyan MSS.

70. Joseph Hekekyan to Leonard Horner, 20 July 1859, 2216.33–4, Horner MSS.

71. Joseph Hekekyan to Leonard Horner, July 1859, 37459.675–6, Hekekyan MSS.

72. Leonard Horner to Joseph Hekekyan, 10 April 1861, 37459.741, Hekekyan MSS.

73. Joseph Hekekyan, *A Treatise on the Chronology of Sirodianic Monuments* (London: Taylor and Francis, 1863), pp. v, ix.

74. Schaffer, "Oriental Metrology," pp. 182–4 (note 12).

the Greek about an excavation in Memphis forty years earlier that “was found studded with remnants of the work of man” and “an abundance of baked clay fragments.” That deepest stratum was 8,280 years old and the country had been occupied by humans since that time. The Greek lamented that he does not “know how these things will be received in Athens, where it is the general belief that the world itself was created only 4,004 years before the fall of Troy” – a reference to Ussher’s creation date of 4004 BCE.⁷⁵ Evidently, Manetho’s absolute dates represented Hekekyan and Horner’s chronology while the Greek’s reluctance represented those who dismissed those dates because of their deviance from scripture.

Just prior to the book’s publication, Hekekyan visited England for the London Exposition of 1862, during which time he finally met Horner and dined with his family and the Lyells. After returning to Egypt in 1863, Horner wrote confirming the publication and distribution of Hekekyan’s book. Much to Horner’s disappointment, the book never directly disputed Sharpe. Horner was moreover saddened and shocked “to find that in your conversation with Sir Charles Lyell you left an impression on him, that you consider Mr Sharpe’s objection to be valid. I thought that you considered me right all along on this fundamental posit.”⁷⁶ Hekekyan did not respond before Horner’s death in March 1864, and Sharpe’s criticism remained a problem for the legacy of Horner’s chronological scale.

Geologists’ reluctance

The responses to Horner’s research from gentlemanly naturalists were overwhelmingly respectful. He was Vice-President of the Royal Society at the time of publication and enjoyed the high praise of his peers. Horner was particularly well situated because his Bloomsbury household regularly provided the elite social spaces for scientific discussion and debate.⁷⁷ Darwin was a regular attendee at Horner’s home and refereed both his publications for the Royal Society. He recommended the second be published in full, “considering the importance of any investigation leading to the result that Man had existed in Egypt for between 13,000 & 14,000 years.” He believed the article would be “of great assistance to some future investigator.”⁷⁸ Most members of the scientific establishment eventually deduced Sharpe’s embankment theory obliterated Horner’s specific conclusions, but they nevertheless believed his research was highly valuable. They agreed that the method by which Horner came upon his data – through Hekekyan’s keen observations and detailed records – was more than satisfactory.

This was emphasized in some of the early books on prehistory. Many dismissed Horner’s conclusions but repeated his words verbatim that Hekekyan was “well qualified

75. Hekekyan, *Chronology of Sirodianic Monuments*, pp. xiii–xiv, xxx–xxxii, xxxiii (note 73).

76. Leonard Horner to Joseph Hekekyan, 21 November 1863, 37459.766, Hekekyan MSS.

77. James A. Secord, *Victorian Sensation: The Extraordinary Publication, Reception, and Secret Authorship of Vestiges of the Natural History of Creation* (Chicago: University of Chicago Press, 2000), pp. 410–6.

78. Frederick Burkhardt et al. (eds.), *The Correspondence of Charles Darwin*, vol. 7, 1858–1859 (Cambridge: Cambridge University Press, 1991), p. 53.

for the task” and that the work was very important. In *Prehistoric Man* (1862), Daniel Wilson compared Horner’s conclusions to other suspect archaeological claims, cautioning his readers that man-made objects are frequently given incorrect and premature dates. Horner’s “speculations relative to the age of pottery and burnt brick” were uncertain, but “his researches were carried out on a comprehensive scale, by observers well qualified for the task.”⁷⁹ In *Pre-historic Times* (1865), John Lubbock praised Horner’s thoroughness but thought “the calculations very doubtful.” He reasoned that the pedestal of the fallen statue of Ramses II could have been at a lower or higher elevation in antiquity than Horner proposed – either way, his dating would be incorrect. Lubbock also grappled with the embankment issue and could not accept Horner’s claims without reservation. He nonetheless conceded that “his experiments are of great importance.”⁸⁰

Horner found his most ardent geological supporter in Lyell. Early in 1859, Lyell proudly advertised Horner’s papers on Egypt, “proving that pottery was made there 13,000 years ago.”⁸¹ Yet a few months later in his presidential address to the British Association for the Advancement of Science (BAAS), he focused on the antiquity of man but did not even mention Horner.⁸² This was likely because Lyell had failed to dispel the doubts from Sharpe’s embankment theory in the interim. However, in preparation for his *Geological Evidence for the Antiquity of Man*, Lyell strove to defend Horner against the criticism that his burnt bricks were Roman. He consulted Samuel Birch, the Keeper of Oriental Antiquities at the British Museum, while dining together at Horner’s home in 1860. Birch confided that Sharpe and the *Quarterly Review* were wrong because he had two burnt bricks in his collection with hieroglyphic inscriptions that were from the second millennium BCE.⁸³ On the topic of Horner’s methods, Lyell also told his readers about Hekekyan who “was in every way highly qualified for the task.” The sixty workmen were also suitable because they were “men inured to the climate and able to carry on the sinking of shafts and borings during the hot months . . . in a season which would have been fatal to Europeans.” Lyell defended Horner against any racial suspicions that “Arabs can always find whatever their employers desire to obtain” and argued anyone “well acquainted with the sagacity and energy of Hekekyan Bey” would not “suspect him of having been deceived.”⁸⁴ There may have been flaws with the final conclusions, but according to Lyell and his colleagues, Hekekyan and Horner’s collaboration was entirely credible.

79. Daniel Wilson, *Prehistoric Man: Researches into the Origin of Civilisation in the Old and the New World* (Cambridge: Macmillan & Co., 1862), p. 48.

80. John Lubbock, *Pre-Historic Times: As Illustrated by Ancient Remains, and the Manners and Customs of Modern Savages* (London: Williams and Norgate, 1865), pp. 320–3.

81. Katharine M. Lyell (ed.), *Life, Letters and Journal Sir Charles Lyell*, vol. 2 (London: John Murray, 1881), p. 320.

82. Sir Charles Lyell, “On the Occurrence of Works of Human Art in Post-Pliocene Deposits,” in *Report of the Twenty-Ninth Meeting of the British Association for the Advancement of Science* (London: John Murray, 1860), pp. 93–5.

83. Charles Lyell to Samuel Birch, 16 December 1861, MS 3477, Middle East Library, British Museum; Lyell, *Antiquity of Man*, p. 37 (note 3).

84. Lyell, *Antiquity of Man*, pp. 33–6 (note 3).

Geologists' tepid reactions to Horner's chronology can be understood as a reflection of their attitudes towards absolute dating. Victorian geologists eagerly assigned relative chronologies to strata by the objects, rocks, or fossils found within them, arguing that one layer was sequentially older than another. However, attempts to definitively date any of those objects were controversial. Prehistoric artefacts without inscriptions on them were even harder to read than rocks. Many avoided doing so or commenting about those who did. Lyell shared Horner's ideologies and therefore did not shy away but settled on roughly one hundred thousand years for the age of humans in *Antiquity of Man*.⁸⁵ The precision of Horner's 13,371 figure was irrelevant, as Horner's general claim for remote antiquity supported Lyell's. Geologists such as Lubbock, who similarly dismissed Horner's absolute dates but highlighted the importance of the research, ultimately conceded one hundred thousand years or more for the age of man.

Others thought Lyell's figure was too extreme and settled on the ten thousand years proposed by geologist Joseph Prestwich. Among the latter camp were John Phillips and James David Forbes, neither of whom were supporters of Lyell's uniformitarianism.⁸⁶ In their anonymous reviews of Lyell's book, both criticized Horner for assigning absolute dates to his strata, suggesting there was not enough data to do so with certainty. Phillips, who had previously had a good relationship with Horner, said the estimation of the strata was vague and mocked Lyell for allowing "that Egyptologists regard the experiments as inconclusive, and the period consumed in the deposition . . . as still undetermined." The calculations from the alluvial sediments of both the Mississippi and Nile were "manifestly inadequate" to support the "immense antiquity" of humans in Europe.⁸⁷ Forbes similarly wrote that Horner's calculations were "liable to even greater uncertainties" than Lyell's from the Mississippi Valley. Forbes highlighted all the "very serious doubts" that had been raised against the calculations by Egyptologists, then thanked Lyell for explaining them and absolving the reader "from the task of analyzing these considerations."⁸⁸ Both followers of Lyell and Prestwich thought the Egyptologists' critiques invalidated Horner's absolute dates; only the former agreed that the general claim could be retained because his methodology and analysis were sound.

Credibility at stake

In contrast to the geologists, the Tory *Quarterly Review* suggested Horner's chronology was not credible because he had not been to Egypt to supervise the work personally, and indeed because no European had directly witnessed the excavations. The anonymous author was (Sir) William Smith, a lexicographer known for making classical and biblical history accessible to a wide audience. Smith's popular approach mimicked those of the earlier scriptural geologists and opposed elite geologists like Lyell, who had long been accused of only producing complicated works restricted to scientific experts. Smith

85. Lyell, *Antiquity of Man*, p. 204 (note 3).

86. Van Riper, *Men among the Mammoths*, pp. 151–65 (note 4).

87. [John Phillips], "Antiquity of Man," *Quarterly Review* 114 (1863): 384, 416; Jack Morrell, *John Phillips and the Business of Victorian Science* (Aldershot: Ashgate, 2005), pp. 360–3.

88. [James D. Forbes], "Lyell on the Antiquity of Man," *Edinburgh Review* 118 (1863): 289.

dismissed Horner's research supposedly because it was lacking first-hand observations and relied instead on unknown field informants.

Mr Horner is both a sound geologist and a man of honour, and he certainly would not intentionally deceive us. But unfortunately, his testimony in this case is of little or no value, as he is not an independent witness, but simply a reporter of the observations of others. If he had been personally present, and had seen with his own eyes the boring-instrument bring up from a depth of thirty-nine feet of Nile-deposit a piece of pottery, we should have the testimony of a worthy and competent witness; but his mere belief of the alleged fact, without personal observation, is of no value whatever in a scientific point of view . . . We know nothing of the credibility or competency of the person or persons who made the discovery. But we do know that in all such cases, whatever is wanted is always found . . . all who have had experience in these matters attach no importance to such specimens, unless the alleged discoverer is a scientific observer of whose character and competency there can be no question.⁸⁹

The damning review concluded that “instead of establishing the existence of man in Egypt more than 13,000 years” ago, all Horner supplied was “convincing proof of the worthlessness of [his] theory.”

Many of the negative reviews that followed cited Smith and highlighted the absurdity of Horner's reliance on someone they claimed was a virtually unknown informant. The Assyriologist Reverend Edward Hincks thought it likely that Horner's potsherd was “a contrivance of some Arab Douster-swivel” – a reference to a German swindler in Walter Scott's *The Antiquary* (1816).⁹⁰ Smith's article was also quoted by Reginald Stuart Poole, a young numismatist at the British Museum who had spent years living and working in Egypt with his uncle, famed Orientalist Edward William Lane. Poole had published *Horae Aegyptiacae, or the Chronology of Ancient Egypt* (1851) at the age of seventeen and quickly became a proponent of an Egyptian chronology that agreed with Biblical accounts and was supported by fixed astronomical dates supplied by George Airy.⁹¹ He was one of a small handful of traveling Egyptologists known for their first-hand explorations. By contrast, members of the Syro-Egyptian Society such as Sharpe and Birch never went to Egypt. They relied on travelers, collectors, and antiquaries to observe and communicate information back to them. Horner was grouped with the latter.

In an appendix to the sixth edition of his uncle's *Manners and Customs of the Modern Egyptians* (1860), Poole described Horner's excavations as “a series of so-called scientific investigations (not conducted by himself).” He reiterated that Horner's conclusions were not trustworthy because he did not go to Egypt personally. He further objected to the geologist widening his disciplinary scope to include historical dates.

89. [Smith], “Bunsen's Egypt,” pp. 418–21 (note 65).

90. Dr. Rev. Edward Hincks, “Bunsen's Egypt,” *Dublin University Magazine* 54 (July 1859): 21.

91. Reginald Stuart Poole, *Horae Aegyptiacae, or the Chronology of Ancient Egypt* (London: John Murray, 1851), p. 217; Reginald Stuart Poole, “Chronology,” in William Smith (ed.) *A Dictionary of the Bible*, vol. 1 (London: John Murray, 1863), p. 327.

If Mr Horner had confined himself to the purely scientific question, the depth, etc. of the plain of Egypt in various sections, his results, supposing them to be trustworthy, would have been a contribution to the literature of the subject, and would have given important help to any really historical facts hereafter to be obtained . . . Mr. Horner's so-called historical facts being worthless, we may be asked what prospect there is of trustworthy evidence that may establish a synchronism between science and history. The chance appears remote, indeed.⁹²

Poole argued that geologists should stick to rocks and sequencing sedimentary layers while chronologers like himself continued to preside over human history. In his view, their research programs and disciplinary authorities were only compatible if distinct. These attacks on Horner's locality and Hekekyan's expertise were undoubtedly frustrating for Horner, who had gone to great lengths to confirm Hekekyan's trustworthiness. Horner's geological colleagues approved of the collaboration, as did Sharpe, who told Horner "I can see no fault in the manner in which your investigations have carried on. I think them most valuable."⁹³ Despite Horner's best efforts to certify him, there was permanent racial distrust of Hekekyan; it was only mobilized by those who considered it beneficial to their agendas. Poole and Smith criticized Horner's methodology and questioned Hekekyan's credibility because the historicity of scriptural chronology was threatened by Horner and Hekekyan's geological chronology.

Scriptural chronology and the German threat

The negative reviews were exacerbated by Horner's close association with Christian Charles Josias von Bunsen, a high-ranking Prussian protestant diplomat and scholar in Britain, a proponent of German higher criticism and comparative philology, and one of the most influential and controversial writers on ancient Egypt from the 1840s through 1860s.⁹⁴ Bunsen's most divisive work was his five-volume *Egypt's Place in Universal History*, which garnered wide attention in Britain following the German to English translations of the first three volumes in 1848, 1854, and 1859. Bunsen argued Egyptian texts supported the chronologies supplied by classical authors. The books were part of his larger research program on universal linguistic diffusion. His chronology was accepted by fellow continental Egyptologists Lepsius and Vicomte Emmanuel de Rougé, and his good friend Birch, who edited the final two English volumes posthumously, calling them "the most critical work yet published on the subject of Egyptian history."⁹⁵

Horner quoted Bunsen in his publication and Bunsen included a summary of Horner's research in the introduction to his third English volume. The affiliation was mutually beneficial as both men corroborated one another and attempted to push back human

92. Reginald Stuart Poole, "On the Increase of the Nile-Deposit," in Edward William Lane, *An Account of the Manners and Customs of the Modern Egyptians*, 5th ed. (London: John Murray, 1860), pp. 593–8.

93. Samuel Sharpe to Leonard Horner, 27 April 1859, 2216.29–30, Horner MSS.

94. John Rogerson, *Old Testament Criticism in the Nineteenth Century: England and Germany* (London: SPCK, 1984), pp. 121–9; Gange, *Dialogues with the Dead*, pp. 98–101 (note 9).

95. Quoted in Gange, *Dialogues with the Dead*, p. 98 (note 9).

antiquity beyond the traditional 6,000 years – Horner to 13,000 and Bunsen to 20,000. Bunsen defended Horner’s argument and assured his readers that Horner’s evidence was well grounded. He labelled Horner’s research “historical, not geological” because “the soil which has been penetrated is exclusively historical soil, coeval with mankind.”⁹⁶ Together, Horner’s chronology and Bunsen’s linguistic history attempted to blur disciplinary boundaries between geology and ancient history.

Horner’s papers were reviewed alongside Bunsen’s universal history in 1859 and both authors received similar criticisms. Smith also rejected Bunsen’s chronology and accused him of hypocritically denying the authenticity of the Bible but using other ancient sources uncritically. Bunsen had “blind faith” in the Greek writers who were not “independent witnesses” to Egyptian civilization. Smith initially thought Bunsen might have “scientific corroboration” because Horner presented “at first sight something more tangible than his linguistic theory.” But like Bunsen’s Greek authors, Horner was not an independent witness, and his pottery was “no more likely than Mr. Bunsen’s chronology, to compel us to abandon our faith in the old Hebrew records.”⁹⁷

This fight over ownership of chronological expertise was engulfed in wider debates about Scriptural authority and Biblical criticism. Evangelical fears over radical chronologies eased slightly by the early 1860s, but many, including Smith and Poole, continued to endorse a traditional Mosaic timeline for civilized humans. Smith claimed to be uncompromised by religious convictions but admitted he considered “the chronology of the Scriptures to be more credible” than Bunsen’s classical authors or Horner’s geological strata.⁹⁸ Poole, who wrote on Egypt and chronology in Smith’s influential three-volume *Dictionary of the Bible* (1863), similarly found Bunsen’s history “repugnant to the Bible.” He argued Bunsen was eager to accept Horner’s chronology merely because it “fitted his elastic chronology with sufficient accuracy.”⁹⁹

Many nonconformists defended Bunsen’s chronology despite the controversy. The Unitarian minister John Kenrick, a prominent member of the Syro-Egyptian Society, who had himself written on human prehistory, endorsed Bunsen. Kenrick hoped that the thoroughness of the work and Bunsen’s character would “protect him from the outcry of impiety, so often raised against those who call in question opinions supposed to involve the authority of Scripture.”¹⁰⁰ Bunsen always knew his Egyptian history would be contentious for this reason and did not want “to be misunderstood or abused as an unbeliever.”¹⁰¹ He thought himself a pious person who fought against religious dogmatism, and like his

96. Christian C.J. Bunsen, *Egypt’s Place in Universal History*, trans. by Charles H. Cottrell, vol. 3 (London: Longmans, Green & Co., 1859), p. xxvi.

97. [Smith], “Bunsen’s Egypt,” p. 401 (note 65); Gange, *Dialogues with the Dead*, pp. 98–9 (note 9).

98. [Smith], “Bunsen’s Egypt,” pp. 384–5 (note 65).

99. Poole, “Nile-Deposit,” p. 594 (note 91); Poole, “Chronology,” p. 325 (note 90); Reginald Stuart Poole, “Egypt,” in William Smith (ed.) *A Dictionary of the Bible*, vol. 1 (London: John Murray, 1863), p. 506.

100. John Kenrick, “The Chevalier Bunsen on the History of Egypt,” *The Prospective Review* 2, 31 January 1846, p. 30; Gange, *Dialogues with the Dead*, p. 104 (note 9).

101. Baroness F.W. Bunsen, *A Memoir of Baron Bunsen*, vol. 1 (London: Longmans, Green, and Co., 1868), pp. 464–5.

fellow German biblical critics, claimed to only seek the truth. Bunsen defended himself against the “theologians” and the “zealots,” musing that “one might have supposed that in the nineteenth century chronological and purely philological research would be very safe against these hateful charges of being dangerous and pernicious.” Unfortunately, he considered Poole part of a “growing systematic opposition to all free and independent research.”¹⁰²

The feud between Bunsen and Poole was not unprecedented. Bunsen was equally critical of Poole’s *Horae Aegyptiacae* calling the book “a failure from beginning to end.” It was full of “arbitrary assumptions” specifically made to complement biblical chronology, “which he has taken under his protection.”¹⁰³ Poole in return criticized Lepsius’s *Die Chronologie der Aegypter* (1849) and Leonora and Joanna Horner’s translation of Lepsius’s *Letters from Egypt, Ethiopia, and the Peninsula of Sinai* (1853), arguing that Lepsius was “going out of his proper sphere of usefulness to join himself to a party which rejects everything in the Bible.”¹⁰⁴ Members of this party were the lions of Egyptian philology – Bunsen, De Rougé, and Birch – none of whom had been to Egypt. Lepsius’s Egyptian expedition may have earned him respect from the traveling Egyptologists, but that credibility was questioned when he aligned himself with the biblical critics. It is unsurprising that Bunsen and Horner believed Poole to be the author of the scathing article in the *Quarterly Review*. Bunsen told Horner that the article did not warrant a response.

No, my dear Mr. Horner, not one word shall I answer Mr. Poole’s article! Nothing is to refute when there is not a single, really argued account to match. The tone & tenor is that of the writings of a whipped schoolboy. Rougé gave him 10 years ago a very well meant admonition. I endorsed it (in my preface) which was the least I could do, after the immature and fanatical book he had written against Lepsius and my (and indeed against all since) chronology of Egypt . . . However it be, I have better things to do than answer so stupid an article. The [?] of your excavations I should think ought to be treated in the same way, silence of contempt. What fact or argument has he brought forward?¹⁰⁵

The continental Egyptologists and their British supporters were further disassociated from Poole by their disciplinary affiliations. Historians have shown that by mid-century, professional alliances had formed between German historicism, liberal Anglican historians, and British geologists, such as Horner and Lyell.¹⁰⁶ Those involved were united by an appreciation for the Roman history of Barthold Georg Niebuhr and the school of

102. Christian C.J. Bunsen, *Aegyptens Stelle in der Weltgeschichte: Geschichtliche Untersuchung in fünf Büchern*, vol. 3 (Hamburg: F. Perthes, 1845), p. 29; Kenrick, “Chevalier Bunsen,” pp. 26–7 (note 99).

103. Bunsen, *Egypt’s Place in Universal History* 3, pp. 30–1 (note 95).

104. Reginald Stuart Poole, “Egypt, Ethiopia, and the Peninsula of Sinai,” *Journal of Sacred Literature and Biblical Record* 6 (July 1854): 315, 330.

105. Christian C.J. Bunsen to Leonard Horner, 16 July 1859, 2216.31–32, Horner MSS.

106. James R. Moore, “Geologists and Interpreters of Genesis in the Nineteenth Century,” in David C. Lindberg and Ronald L. Numbers (eds.) *God and Nature: Historical Essays on the Encounter between Christianity and Science* (Berkeley: University of California Press, 1986), pp. 332–5; Stocking Jr., *Victorian Anthropology*, p. 37 (note 4).

comparative philology that he represented. Unitarian Egyptologists Kenrick and Sharpe shared this affinity.¹⁰⁷ Bunsen too enjoyed a close relationship with Niebuhr and dedicated the first volume of his Egyptian chronology to him. Bunsen also utilized geological terminology; his “law of [language] development” was based on a close reading of “linguistic strata.”¹⁰⁸ These geologists, philologists, and historians aligned in their belief that a historicist approach, based on empirical evidence, would produce the most truthful accounts of the early stages of civilization.

Bunsen and Horner’s opinions were consequently defended very publicly by the liberal churchman Rowland Williams in the influential *Essays and Reviews* (1860). Williams wrote that before them, archaeologists unanimously believed that “Biblical chronology was too narrow in its limits.” While Bunsen’s twenty thousand years might be extreme, it would be difficult to disprove. As for Horner, “if pottery in a river’s mud proves little, its tendency may agree with that of the discovery of very ancient pre-historic remains in many parts of the world.” Bunsen’s comparative linguistics “plead as convincingly as the succession of strata in geology, for enormous lapses of time.”¹⁰⁹

Essays and Reviews was widely read and criticized. Bishop Samuel Wilberforce condemned the publication, claiming the essays merely strung together “already abundantly repelled objections and fallacies of German rationalism.” Much of Wilberforce’s criticism focused directly on Bunsen and William’s “daring flippancy.”¹¹⁰ In response, Lubbock drafted a letter in support of *Essays and Reviews* to the Archbishop of Canterbury in 1861, proclaiming to “welcome these attempts to establish religious teachings on a firmer and broader foundation.” Horner, Lyell, and Darwin were among the co-signers of the address.¹¹¹ The letter cemented a union between historical critics and geologists in opposition to evangelical theologians. It appears Smith, Poole, and others attacked Bunsen and Horner’s chronologies, in part, because they were unfaithful to scripture and represented a branch of continental Egyptology that was closely affiliated with the German higher critics and their geological allies in Britain.

The chronological problem of human origins

Horner and Bunsen’s Egyptian chronologies also proved useful for members of the Ethnological Society of London investigating the origins of the earliest human races. The founder James Cowles Prichard had propounded an ethnology that relied heavily on

107. Gange, *Dialogues with the Dead*, p. 107 (note 9).

108. Bunsen, *Egypt’s Place in Universal History* 3, p. xxvi (note 95); Christian C.J. Bunsen to Leonard Horner, 16 July 1859, 2216.31–2, Horner MSS.

109. Dr. Rowland Williams, “Bunsen’s Biblical Researches,” in John William Parker (ed.) *Essays and Reviews* (London: John W. Parker and Son, 1860), pp. 54–5.

110. Samuel Wilberforce, “Essays and Reviews,” *Quarterly Review* 109 (January 1861): 299.

111. Horace Hutchinson, *Life of Sir John Lubbock*, vol. 1 (London: MacMillan and Co., 1914), pp. 57–8; William H. Brock and Roy M. MacLeod, “The Scientists’ Declaration: Reflexions on Science and Belief in the Wake of *Essays and Reviews*, 1864–5,” *British Journal for the History of Science* 9 (1976): 45; Moore, “Geologists and Interpreters of Genesis,” p. 342 (note 105).

philology and biblical chronology to demonstrate the unity of mankind. Prichard and Bunsen presented alongside one another at the 1848 meeting of the BAAS. Bunsen claimed then that “Egyptological discoveries are most intimately connected with the great question of the primeval language and civilization of mankind” and that they supported “the opinion of the high, but not indefinite antiquity of human history,” as well as “the hypothesis of the original unity of mankind and of a common origin of all languages of the globe.”¹¹² Bunsen’s universal history took a diffusionist approach, arguing that ancient people migrated from East to West and brought languages with them. This was complementary to the monogenist umbrella under which the Ethnological Society functioned. Prichard ultimately accepted Bunsen’s twenty thousand years because it allowed enough time for human races to develop from a common origin.¹¹³ In the new Darwinian context of the early 1860s, members like Lyell and Lubbock were still thinking about human antiquity in a monogenist framework. They thus regarded Bunsen’s and Horner’s chronologies as a part-solution to the problem of civilization – this being the challenge confronting ethnologists, philologists, and geologists to explain human diffusion and racial variety in a relatively short period of time.

In contrast, society members who were part of a growing opposition of polygenists – those who believed in multiple origins for the human species – rejected Bunsen’s chronology. Poole was one of these vocal opponents. He contributed to an apologetic movement that used pre-Adamite polygenism to harmonize archaeology, anthropology, philology, and geology with Genesis.¹¹⁴ Poole’s uncle Edward William Lane anonymously provided a pre-Adamite theory in *The Genesis of the Earth and of Man* (1856), using his expertise in Semitic languages. Poole edited the expanded second edition in 1860. Poole supported Lane’s argument that there were two distinct human sources for linguistic traditions: a civilized Caucasian race descended from Adam and a barbarous pre-Adamite race that had produced crude flint tools. The latter had originated in the Nile Valley and spread through Africa and Asia.¹¹⁵ Poole and Lane used the pre-Adamite theory to defend the biblical creation date and reconcile it with the recent geological evidence for remote human antiquity. They added a note to the second edition summarizing the errors in Horner’s research and concluding it merely

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112. Christian C.J. Bunsen, “On the Results of the Recent Egyptian Researches in Reference to Asiatic and African Ethnology, and the Classification of Languages,” in *Report of the Seventeenth Meeting of the British Association for the Advancement of Science* (London: John Murray, 1848), p. 299.
113. James Cowles Prichard, “Note on the Biblical Chronology,” in *Researches into the Physical Unity of Mankind*, 3rd ed., vol. 5 (London: Sherwood, Gilbert, and Piper, 1847), pp. 552–70; George W. Stocking Jr., “From Chronology to Ethnology: James Cowles Prichard and British Anthropology 1800–1850,” in George W. Stocking Jr. (ed.) *Researches into the Physical History of Man*, by James Cowles Prichard (Chicago: University of Chicago Press, 1973), pp. xcvi–xcvii; Stocking Jr., *Victorian Anthropology*, pp. 48–53, 57–8, 74–5 (note 4).
114. Van Riper, *Men among the Mammoths*, pp. 169–71, 181 (note 4); David N. Livingstone, *Adam’s Ancestors: Race, Religion, and the Politics of Human Origins* (Baltimore: Johns Hopkins University Press, 2008), pp. 100–3.
115. Reginald Stuart Poole, “The Ethnology of Egypt,” *Transactions of the Ethnological Society of London* 2 (1863): 260–4.

showed that Egypt was inhabited by uncivilized humans thousands of years before Adam and Eve.¹¹⁶

Poole used his uncle's book and the ethnological society as additional platforms to attack Bunsen's monogenist chronology. The book's preface accused Bunsen of being "the representative of a school" who believes in "the unity of origin of the human race."¹¹⁷ At an 1862 meeting of the society, after President John Crawfurd read his polygenist paper on the antiquity of man, Poole agreed that "no period of time could account for the growth of such languages" in the manner that Bunsen had suggested. Similarly, he argued stone, bronze, and iron tools in the archaeological record were evidence of different races, rather than successive periods in time. For him, neither language diffusion nor prehistoric artefacts were absolute evidence of the antiquity of one human species.¹¹⁸ The explanation offered by Poole for his continued rejection of Bunsen and Horner's chronologies varied. Elsewhere he denounced their credibility based on their lack of field experience and deviance from scripture. Here he denied their joint supposition of a single human origin to secure his role as a leading pre-Adamite theorist and polygenist ethnologist.

When the polygenists broke away in 1863 to establish the competing Anthropological Society of London, Poole followed and was elected a local secretary.¹¹⁹ James Hunt, the president and anonymous editor of the new society's *Anthropological Review*, similarly asserted the vast age of humans. Like Poole, he believed all savage races developed their languages independently.¹²⁰ Hunt sarcastically lambasted Lyell in the very first volume for including Horner's Egyptian research in his book on human antiquity. He targeted Hekekyan's credibility.

We are sorry to find that Sir Charles Lyell has thought it worthwhile to notice such absurdities. Because some burnt brick was found sixty feet deep, therefore it must be twelve thousand years old! At least Hekekyan Bey, an Armenian, vouches for the pottery being found at that depth, and no doubt correctly. To waste money of the Royal Society, and to occupy the paper and print of the *Philosophical Transactions*, was bad enough, but to base a chronology on the evidence of Mr Horner adduced was preposterous.¹²¹

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116. [Edward William Lane], *The Genesis of the Earth and of Man*, ed. by Reginald Stuart Poole, 2nd ed. (London: Williams and Norgate, 1860), pp. 289–91.
117. Reginald Stuart Poole, "Editor's Preface," in [Lane], *Genesis of the Earth and of Man*, p. xvii (note 115).
118. John Crawfurd, "On the Antiquity of Man from the Evidence of Language," *Transactions of the Ethnological Society of London* 2 (1863): 179–81.
119. Ordinary Meeting, 7 July 1863, *Transactions of the Anthropological Society of London* 1 (1863): xxvi; Stocking Jr., *Victorian Anthropology*, pp. 245–57 (note 4); Efram Sera-Shriar, *The Making of British Anthropology, 1813–1871* (London: Pickering & Chatto, 2013), pp. 106–45.
120. On Hunt as the anonymous editor of the *Anthropological Review*, see Efram Sera-Shriar, "The Scandalous Affair of the Anthropological Review: Hyde Clarke, James Hunt and British Anthropology in the 1860s," in Bernard Lightman and Bennett Zon (eds.) *Victorian Culture and the Origin of Disciplines* (Cambridge: Cambridge University Press, forthcoming).
121. [James Hunt], "Lyell on the Geological Evidence of the Antiquity of Man," *The Anthropological Review* 1 (1863): 131–2.

Hunt opposed the Egyptian research because it supported Bunsen's monogenism; his racial distrust of Hekekyan was a convenient justification for his criticism. However, he took even greater issue with Horner's objective to determine absolute dates. Hunt accepted that recent geological and paleontological discoveries in Europe and North America, such as flint implements and human fossils, were compelling evidence of remote human antiquity. Humans were so old, he reasoned, that any attempt to assign even approximate dates to their age was entirely absurd. In his first presidential address to the Anthropological Society and in the first volume of the *Anthropological Review*, Hunt criticized Bunsen and Horner's chronologies for this reason. He explained that "the naturally slow progress among primitive people . . . render the calculation to fix the age of mankind nearly impossible," and "it belongs to Egyptologists and chronologists to separate the fabulous from the probability of these computations." Readers were instructed not to dwell on Horner's figure of 13,371 years for civilized humans in Egypt because his theory was worthless. He suggested Lane and Poole offered a pre-Adamite theory that was far more plausible and credible, not only because it explained how Egyptian civilization was already advanced only a short time after the biblical deluge, but because it did not calculate the age of man. Just like the reluctant geologists who only endorsed relative dating techniques, Hunt opposed Horner, Bunsen, and Lyell's absolute dates. He claimed that calculations to fix human chronology, whether on geological, archaeological, or linguistic evidence, were conjectural and an example of the poor "method of inquiry" that had been employed by anthropologists. Hunt instead promoted a new science of man that was based on "facts" and not "idle speculation," such as that apparent in Horner and Bunsen's publications.¹²² His rejection of the geological chronology was therefore part of a strategy to legitimize his new society and the methodological direction he hoped it would take.

Leonard Horner and the antiquity of man

Human antiquity was a controversial geological issue for the first half of the nineteenth century. With few exceptions, gentlemanly geologists in Britain cautiously avoided discussing human chronology, especially in meetings of the Geological Society, fearing the religious and theoretical implications.¹²³ Man's appearance on earth marked the beginning of the most recent epoch in geological time. Therefore, estimating the age of the human species required taking a stance on biblical authority, as well as revising the temporal basis of the Quaternary period itself. The strongest cases for a lengthy human period were through identifications of flint tools. These had been found by naturalists in European caves from the late eighteenth century, often alongside human fossils and bones of extinct animals. Until the 1850s, British geologists rejected flint tools as dubious, either because their investigators were considered untrustworthy or because of the

122. James Hunt, "On the Study of Anthropology," *Anthropological Review* 1 (1863): 6; [James Hunt], "Notes on the Antiquity of Man," *Anthropological Review* 1 (1863): 63–5.

123. Some exceptions were generally limited to popular books, see Van Riper, *Men Among the Mammoths*, pp. 69–73 (note 4).

complexity of cave stratigraphy.¹²⁴ The year Charles Darwin published *On the Origin of Species* was also a landmark for the disciplinary development of prehistoric archaeology. Some historians regard the year 1859 – when Hugh Falconer, Joseph Prestwich, and John Evans carefully documented and announced their discoveries of hand-axes in Brixham Cave and the Somme Valley – so consequential that they have dubbed it a “revolution in human time.”¹²⁵ The credibility of these discoveries encouraged similar proclamations by geologists William Pengelly and John Flower in the months following, and eventually, legitimization by Lyell in his address to the BAAS in September 1859. Flint tools were finally accepted by the scientific elite as sound evidence of human antiquity.¹²⁶ The study of human prehistory in Britain, previously the scholarly domain of philologists and text-based chronologists, quickly became the subject of inquiry by geologists, anthropologists, and evolutionary theorists.

Horner spearheaded this mid-century shift in geological focus. His 1847 presidential address to the Geological Society was partly responsible for the ensuing flurry of interest in recent chronology, as it gave members the new freedom to pursue the topic. Unlike flint tool enthusiasts, Horner believed that *sedimentation* was the key to proving remote human antiquity and to defining the start of the last geological epoch. Horner made arrangements for his Egyptian research in 1851 and published his findings in 1855 and 1858, expecting that geologists might now consider human chronology on the condition that evidence was presented by a trustworthy source such as himself. While Horner’s research was not received as he had hoped, and his absolute dates were rejected by most of his colleagues, he did not fail entirely. His project contributed significantly to the scientific acceptance of the antiquity of man by encouraging its discussion among geologists. His final presidential address in 1861 also focused on human antiquity and was of strategic importance to his cause. Horner summarized the recent flint tool discoveries before mentioning his and Bunsen’s Egyptian researches, and Rowland William’s comments in *Essays and Reviews*. He argued that his geological chronology, along with these other philological, archaeological, and geological studies, “has been gradually producing an impression in the minds of earnest thinkers that the first appearance of man on the earth must be carried far beyond the time hitherto usually assigned to it.”¹²⁷

Horner also used his presidential authority to address the theological opposition on its own grounds. He blamed the widely held belief that humans had only existed very recently on the marginal note that appeared alongside the first sentence of most Bibles: the creation date of 4004 BCE. He argued this number was merely one of

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124. Van Riper, *Men among the Mammoths*, pp. 60–64 (note 4); Rudwick, *Bursting the Limits of Time*, pp. 279–87 (note 14); Trigger, *History of Archaeological Thought*, pp. 139–41 (note 8); Rudwick, *Worlds before Adam*, pp. 407–16 (note 24); Gamble and Moutsiou, “Time Revolution of 1859,” p. 46 (note 4).
125. Grayson, *The Establishment of Human Antiquity*, pp. 199–220 (note 4); Stocking, *Victorian Anthropology*, pp. 69–74 (note 4); Gamble and Moutsiou, “Time Revolution of 1859” (note 4); Gamble and Kruszynski, “Stone That Shattered the Time Barrier” (note 4).
126. Van Riper, *Men among the Mammoths*, pp. 74–143 (note 4).
127. Horner, “Anniversary Address,” (1861), pp. lxvi–lxx (note 16).

many proposed by chronologists. He was concerned about the confusion that would inevitably confront any young person who was told at school that the earth was only 6,000 years old, and was then told in a geological lecture that the earth was probably half a million years old. The only solution was to remove Ussher's note: "It is untrue, and therefore it is mischievous."

Horner's controversial statements solicited a wide-range of private responses from friends. Fellow gentlemen of science endorsed and applauded him. Darwin had written reservedly in the first edition of *Origin* that "Mr. Horner's researches have rendered it in some degree probable that man sufficiently civilized to have manufactured pottery existed in the Valley of the Nile thirteen or fourteen thousand years ago." After the poor reception of the geological chronology, Darwin removed his reference to Horner for the American revised edition in 1860.¹²⁸ He nevertheless wrote to Horner enthusiastically in 1861,

I thought that I had read up pretty well on antiquity of man, but you bring all the facts so well together in a condensed form, that the case seems much clearer to me. How curious about the Bible! I declare I had fancied that the date was somehow in the Bible. You are coming out in a new light as a Biblical critic!¹²⁹

Henry Petty-Fitzmaurice, a Whig compatriot from Edinburgh, was relieved. He had "never read a statement so clear, and convincing." The antiquity of man was "no longer possible to doubt," and he was "glad to be able to indulge that opinion without having [his] Scriptural faith impeached." The physician Richard Fowler applauded Horner's remarks on Ussher, which he had no doubt were "the cause of the clamour which the over religious public had raised against Geologists for writing up the mountain to be older than Moses." The educationalist Richard Dawes agreed entirely about Horner's concern for the youth. He thought it was courageous to "quote the *essays and reviews* notwithstanding the anger of the Bishops."

Other public figures reacted more cautiously. William Gladstone had aligned himself with the Oxonian High Church movement and "wish[ed] well to all who are engaged in the careful collection of facts, and in concluding with caution from them." The Archbishop of Canterbury John Bird Sumner, in possession of Lubbock's letter supporting *Essays and Reviews*, declared that he had long believed in a "pre-Adamite world" and that it is "reasonable to believe that any former system of things should contain creations having the qualities of man than the contrary." The liberal Dean of Westminster and Oxford Professor Arthur P. Stanley thanked Horner: "Every scientific man who writes as you have done, calmly and reverentially on the relations of religion and science, does a substantial service to each."

128. Charles Darwin, *On the Origin of Species by Means of Natural Selection* (London: John Murray, 1859), p. 18; On the removal of the reference, see Frederick Burkhardt et al. (eds.), *The Correspondence of Charles Darwin*, vol. 8, 1860 (Cambridge: Cambridge University Press, 1993), pp. 63, 516–8.

129. This and the following letters appear in Lyell, *Memoir of Leonard Horner* 2, pp. 300–5 (note 33).

In more public spaces, Horner's efforts to push back human antiquity were depicted as an attack on scripture. One reader asked the editor of *The Times* how "Bunsen, Horner, Darwin, and others assign at least 14,000 years as the term of man's existence on earth," while ignoring the biblical flood entirely?¹³⁰ Elsewhere, paleontologist Philip Egerton, another prominent member of the Ethnological and Geological societies, depicted the geological chronology as one example of several recent attempts to clarify man's antiquity and ancestry. This was illustrated in the poem 'Monkeyana', produced anonymously by him for *Punch* on 18 May 1861.¹³¹ The poem was written from the perspective of a gorilla in the Zoological Society Gardens trying to understand his place in nature. The gorilla reviews the contributions of Darwin and the anonymous *Vestiges of the Natural History of Creation* to evolutionary thought, before contemplating Horner's alluvial research.

Leonard Horner relates,
 That Biblical dates
 The age of the world cannot trace;
 That Bible tradition,
 By Nile's deposition,
 Is put to the right about face.

According to the gorilla, Horner's was the first important attempt to trace human lineage, followed shortly by Pengelly and Prestwich's archaeological flint tools, and Richard Owen and Thomas Henry Huxley's debates about the anatomical differences between apes and humans. The poem parodies Horner's project as a geological endeavor to undermine biblical chronology. His alluvial research was apparently successful in demonstrating that "biblical dates" cannot determine the age of the earth, and that the antiquity of man was much older than "that Bible tradition" had long claimed. The poem shows that by 1861, two years before Lyell's influential publication, human antiquity was already a topic of general discussion for the Victorian public and Horner and Hekekyan's Egyptian research was central to that conversation.

Conclusion

The middle decades of the nineteenth century witnessed enormous disciplinary changes to scholarly studies of human antiquity. Horner and Hekekyan's research contributed significantly to this shift. Although their work was quickly overshadowed by the geological acceptance of flint tools in 1859 (which was in turn outshone by Darwin's *Origin*

130. "Works of Art in the Drift," *The Times*, 1 December 1859; "Broken Flint in 'Drift,'" *The Times*, 5 December 1859. The writer, who used the pseudonym Senex, was actually Robert Fitzroy, the captain of Darwin's Beagle voyage who later disapproved of Origin. See Burkhardt et al., *Correspondence of Charles Darwin* 7, p. 413–414 (note 78).

131. [Philip Egerton], "Monkeyana," *Punch* 40, 18 May 1861, p. 206.

of *Species*), their alluvial excavations are noteworthy as one of the earliest geological responses to the contentious human questions that confronted naturalists, scholars, and the public alike in the 1850s.

The episode draws attention to several critical issues in the global history of science and the circulation of field-based knowledge. Hekekyan and Horner's individual roles in the production and dissemination of the geological chronology shed light on European ambivalences towards first-hand 'field' experience and reliance on local labor and knowledge, as well as the moral economy of gentlemanly trust, and concerns with locality, credibility, and expertise. Surprisingly, there was no opposition to the methods of Hekekyan's excavation, possibly because there were relatively few British travelers and residents in the Nile valley and this type of work was unfamiliar to British audiences. Instead, racist objections often focused on the credibility of Hekekyan and his Egyptian supervisors and workmen. Hekekyan's thorough records were practical tools for long-distance knowledge management. Yet Horner had to legitimize Hekekyan, by demonstrating his exceptionalism and trustworthiness, as well as his own hierarchical superiority to Hekekyan, in order to make use of his knowledge. Colonial practitioners often went to great lengths to establish their informants' credibility and produce reliable testimonies. For instance, Kapil Raj and Lawrence Dritsas have each looked at the local intermediaries employed by members of the Royal Geographical Society in the mid-nineteenth century, in the Trans-Himalayan survey and the search for the source of the Nile respectively. In contrasting cases, Raj and Dritsas show that there was rarely British resistance to indigenous collaborators *unless* the knowledge they provided invalidated the geographers' agendas.¹³² Here too, permanent distrust of Hekekyan was not intrinsic to any reviewers of the geological chronology – it was deployed when necessary.

This article has further highlighted the crucial role that ancient Egypt played within discussions about the antiquity of man and the disciplinary transformations both subjects inspired. Egypt was not merely a geographical or temporal focus for natural historians, but a symbolic place of debate. Through this lens, we see the practical ways disciplines changed, as members borrowed and exchanged ideas reciprocally. Egyptologists adapted stratigraphy and empirical fieldwork from geology, geologists and ethnologists relied on the translations and chronologies pioneered by Egyptian language specialists, while Unitarian Egyptologists, Germanizing historical critics, universal chronologists and ethnologists, and Lyellian geologists agreed on a nonliteral, monogenist, and empirical approach to studying the remote human past. From their individual research programs, practitioners brought distinct approaches to Egyptology, whether that was knowledge of engineering, field recording, burnt bricks, languages, or stratigraphy. They were not necessarily contributing to disciplinary specialization, but rather, convening around a common line of questioning.

132. Kapil Raj, *Relocating Modern Science: Circulation and the Construction of Knowledge in South Asia and Europe, 1650–1900* (New York: Palgrave Macmillan, 2010), pp. 212–22; Lawrence Dritsas, "Expeditionary Science: Conflicts of Method in Mid-Nineteenth-Century Geographical Discovery," in Charles W. J. Withers and David N. Livingstone (eds.) *Geographies of Nineteenth-Century Science* (Chicago and London: University of Chicago Press, 2011), pp. 255–78.

Despite its repudiation, geo-archaeological research was especially influential in establishing long-term disciplinary changes. It fostered communication between Egyptology and anthropology and encouraged an intellectual separation between Egyptology and other natural sciences, notably geology and prehistoric archaeology. As an early attempt at absolute dating, the research set the stage for the geochronology of physicist Lord Kelvin, who from the late 1860s gradually succeeded in converting geologists from an indefinite view of earth history to quantifiable chronologies.¹³³ Moreover, Hekekyan's groundwork preceded two crucial late Victorian archaeological developments: detailed field recording and relative dating techniques independent of historical records.¹³⁴ Historians of Egyptology have remarked that Hekekyan was a "pioneer" who "led the way" in this regard, as his drawings anticipated by decades any comparable archaeological visual recording techniques.¹³⁵ Although relative chronological sequences had been used to classify and organize artefactual knowledge earlier in the century (e.g. the archaeological three-age system),¹³⁶ this was the first effort to use stratigraphy of sedimentary deposits to date historical artefacts *in situ*. This practice was not accidental, but a direct result of Hekekyan and Horner's relationship through correspondence. Their mutual reliance in order to achieve personal objectives, their dialogue, individual skillsets, and their need to act at a distance, led to the mobilization of new techniques in new settings.

This application of geological tools to human antiquity, and the debates that followed, was a consequential moment for Egyptology in particular. The subsequent failure of the research helps explain why Egyptologists did not resume discussion of prehistoric (or predynastic) man until the end of the century when pottery analysis was promoted by archaeologists like W.M. Flinders Petrie as the best relative dating scheme, completely independent from earlier universal chronologies. In a broader sense, it clarifies how disciplinary forms changed. Just as the topic of human antiquity shifted after its scientific footing was established in Britain, ancient Egypt continued to be manipulated for different audiences and by many kinds of scholars, including archaeologists, anthropologists, geologists, astronomers, philologists, and more. The story of the first geological chronology of ancient Egypt demonstrates how the natural sciences and the study of antiquities were intertwined in the past and in different local settings: they should not be separated in present histories.

133. Joe D. Burchfield, *Lord Kelvin and the Age of the Earth* (London: The Macmillan Press Ltd., 1975).

134. Gavin Lucas, *Critical Approaches to Fieldwork: Contemporary and Historical Archaeological Practice* (London: Routledge, 2001), pp. 18–36; Gavin Lucas, *The Archaeology of Time* (London and New York: Routledge, 2005), pp. 1–15.

135. Jeffreys, "Joseph Hekekyan at Heliopolis" (note 42); Reid, *Whose Pharaohs?*, p. 62 (note 35); David G. Jeffreys, *The Survey of Memphis, vol. 7, The Hekekyan Papers and Other Sources for the Survey of Memphis* (London: Egypt Exploration Society, 2010), pp. 196–203.

136. Trigger, *History of Archaeological Thought*, pp. 121–38 (note 8); Rowley-Conwy, *Genesis to Prehistory* (note 8); Kasper Risbjerg Eskildsen, "The Language of Objects: Christian Jürgensen Thomsen's Science of the Past," *Isis* 103 (2012): 24–53.

Acknowledgements

Earlier versions of this article were presented at the 2017 annual meetings of the History of Science Society and British Society for the History of Science and at the Budge Symposium “Egyptology and Anthropology” held at the McDonald Institute for Archaeological Research, University of Cambridge, in July 2017. A longer version was presented in January 2018 at the Cabinet of Natural History Seminar in the Department of History and Philosophy of Science, University of Cambridge. I thank James Secord for his indispensable feedback and Nick Jardine, Simon Schaffer, Anne Secord, Richard Staley, and two anonymous reviewers for their insightful comments. I am also grateful to the archivists in the National Library of Scotland, British Library, and British Museum for their help and expertise.


Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was generously supported by a doctoral fellowship from the Social Science and Humanities Research Council of Canada, and grants from Wolfson College and the Department of History and Philosophy of Science, University of Cambridge.

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