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Paul, H.J.; Huistra, P.A.; Hagen, S.L. ten

CHAPTER 9

The Mammon Metaphor in American Science: Continuities and Discontinuities, 1890–2010

Herman Paul and Pieter Huistra

1 Introduction

In October 1987, the Virginia geologist Paul Ribbe, president of the Mineralogical Society of America, surprised the members of his society, gathered in Phoenix, Arizona, with a spirited talk on "Mammon and Prestige in Mineralogy and Petrology." What made this address stand out among the other conference papers was not merely its subject matter: the relative prestige of journals in mineralogy, petrology, and geochemistry and the growing competition for federal funding in the American earth sciences. Most remarkable was that Ribbe showed his audience a modified version of Pieter Bruegel's sixteenth-century woodcut, "The Battle about Money," in which the quarreling parties, equipped with spears and swords, wore the names of Princeton, Stanford, MIT, Caltech, and NASA, while the treasure chest they tried to secure was decorated with the letters NSF, referring to the National Science Foundation. Describing Bruegel's woodcut as a "timeless caricature" of conflicts that arise whenever there is money to be distributed, Ribbe apparently believed that this sixteenth-century warning against the vice of avarice somehow spoke to his analysis of a "self-serving funding war" that American earth scientists "waged with ever-increasing intensity."[1] Likewise, Ribbe showed a reproduction of Bruegel's "The Large Fishes Devouring the Small Fishes" as visual commentary on his finding that the NSF's Earth Sciences Division gave no less than a third of its grant money to scholars who had previously won grants – a phenomenon known as the "Matthew effect."[2]

Like Robert Merton, who had coined the Matthew effect in the 1960s, Ribbe added moral force to his diagnosis of the scientific reward system by quoting the gospel of Matthew. Drawing on a centuries-long tradition of warnings against

1 Paul H. Ribbe, "Mammon and Prestige in Earth Science Departments," *The American Mineralogist* 73, nos. 11–12 (1988): 1221–1234, at 1223, 1222.

2 Ibid., 1230; Robert K. Merton, "The Matthew Effect in Science," *Science* 159, no. 3810 (1968): 56–63.

Mammon worship, he specifically cited Matthew 6,24: "No man can serve two masters. For other he shall hate the one, and love the other; or els he shall lene the one, and despise the other. Ye can nott serve God and mammon."[3] Notably, Ribbe did not cite this Bible verse from the Revised Standard Version (1952) or the King James Version (1611), but from the oldest English translation of the Greek New Testament, by William Tyndale (1526), as if he sought to emphasize its ancient origins. In the published version of the talk, this effect was even stronger, as the quotation was given in a quasi-archaic script, as wisdom from before the era of the modern typewriter. One wonders: How did this emphasis on the ancient pedigree of the Mammon metaphor relate to Ribbe's concerns about American science funding in the 1980s? Why would someone worried about a modern trend stress the ancient nature of his moral resources? Could it be that the antiquity of Ribbe's examples somehow added to the rhetorical force of his critique of the new?

In tracing how and why American scientists since the Gilded Age have been using the Mammon metaphor, this chapter contributes to a line of research on how scientists define, develop, and defend their "vocation" in response to perceived threats.[4] At first sight, this seems to amount to a study of what Lorraine Daston calls the "moral economy of science," or the web of beliefs, values, and attitudes on which scholars draw in defining their work.[5] Increasingly, however, scholars emphasize the rhetorical dimension of concepts like the scientist's "calling" and, more generally, the rhetorical boundary work that is going on in scientists' warnings against "temptations" that threaten their sense of integrity.[6] For instance, the trope of "pure science" that Henry A. Rowland and other late nineteenth-century scientists employed against the perceived ills

3 Ribbe, "Mammon and Prestige," 1222.

4 E.g., Steven Shapin, *The Scientific Life: A Moral History of a Late Modern Vocation* (Chicago, IL: University of Chicago Press, 2008); Paul Lucier, *Scientists and Swindlers: Consulting on Coal and Oil in America, 1820–1890* (Baltimore, MD: Johns Hopkins University Press, 2008); Rebecca M. Herzig, *Suffering for Science: Reason and Sacrifice in Modern America* (New Brunswick, NJ: Rutgers University Press, 2005). On the Weberian connotations of "vocation," see Steven Shapin, "Weber's *Science as a Vocation*: A Moment in the History of 'Is' and 'Ought,'" *Journal of Classical Sociology* 19, no. 3 (2019): 290–307.

5 Lorraine Daston, "The Moral Economy of Science," *Osiris* 10 (1995): 2–24.

6 See, e.g., Christiaan Engberts, *Scholarly Virtues in the Nineteenth-Century Sciences and Humanities: Loyalty and Independence Entangled* (Cham: Palgrave Macmillan, 2022); Alexej Lochmatow, *Public Knowledge in Cold War Poland: Scholarly Battles and the Clash of Virtues, 1945–1956* (Abingdon: Routledge, 2024). The concept of "boundary work" was developed by Thomas F. Gieryn, "Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists," *American Sociological Review* 48, no. 6 (1983): 781–795.

of industrial research funding does not imply that "purity" was an accepted standard, let alone that Rowland himself was as "pure" a researcher as he summoned his colleagues to be. "Pure research" was rather an image of uncompromised devotion to scientific work that Rowland and others rhetorically invoked in alerting their colleagues to the dangers of money-driven industry interfering in scientific research.[7] It served as a rhetorical frame in a moralizing discourse about science and its fraught relations with neighboring fields like industry and politics.[8] Similarly, if this chapter examines how and why Ribbe and his predecessors from the late nineteenth century onwards used the Mammon metaphor, it does so to understand how scientists responded to changing constellations of science and money and how they justified their criticisms of money becoming too important a factor.

As the image of Mammon symbolically refers to a non-virtuous obsession with money and profit, this chapter also contributes to the history of scholarly virtues and vices.[9] Unlike most existing literature, however, it focuses not on a single virtue or vice term, such as avarice or greed, but on a figuration of vicious conduct: a metaphorical representation of one or more scholarly vices in the form of a symbol, emblem, or proverb. Examples include the pedant and the charlatan, but also "Froude's disease" (named after the English historian James Anthony Froude, whose sloppiness or lack of accuracy outraged some of his colleagues) and "idols of the mind" (the English name of the *idola mentis* that Francis Bacon listed in his *Novum Organum*).[10] In giving flesh and blood to abstract notions of vice, these figurations resembled vocational identities like "the philosopher" (a pejorative label that empirically-minded scholars

7 Paul Lucier, "The Origins of Pure and Applied Science in Gilded Age America," *Isis* 103, no. 3 (2012): 527–536; Graeme Gooday, "'Vague and Artificial': The Historically Elusive Distinction between Pure and Applied Science," *Isis* 103, no. 3 (2012): 546–554.

8 We use "field" in a loosely Bourdieusian sense as referring to systems of social positions (science, politics, industry) that encourage people to acquire certain forms of capital (cultural, economic, social) and display a corresponding *habitus* (habits, skills, dispositions). See *Bourdieu's Theory of Social Fields: Concepts and Applications*, eds. Mathieu Hilgers and Eric Mangez (London: Routledge, 2015).

9 Recent contributions include Herman Paul and Alexander Stoeger, *Dogmatism: On the History of a Scholarly Vice* (London: Bloomsbury, 2024); Herman Paul, *Historians' Virtues: From Antiquity to the Twenty-First Century* (Cambridge: Cambridge University Press, 2022); Alexander Stöger, *Epistemische Tugenden im deutschen und britischen Galvanismusdiskurs um 1800* (Paderborn: Wilhelm Fink, 2021); *Epistemic Virtues in the Sciences and the Humanities*, eds. Jeroen van Dongen and Herman Paul (Cham: Springer, 2017).

10 On "Froude's disease," see Ian Hesketh, "Diagnosing Froude's Disease: Boundary Work and the Discipline of History in Late-Victorian Britain," *History and Theory* 47, no. 3 (2008): 373–395.

attached to colleagues insufficiently averse to speculation) and "the politician" (invoked as an epitome of charisma or passion – usually not a virtue for scholars).[11] What makes such figurations of vice a rewarding subject of study is their persistence over time, or their ability to maintain themselves in different contexts even if their meanings changed along the way. This chapter examines: What was it that made the metaphor of Mammon persist in twentieth-century American academia despite major changes in science and society?

Finally, in exploring this question, the essay also seeks to shed light on how and why people appeal to the past in responding to present-day challenges. If the examples discussed in this chapter show anything, it is that invocations of Mammon, while very different in terms of targets and contexts, often shared a certain *logic* – a type of reasoning in which mind and matter, spirit and flesh, or truth and money appeared as incompatible categories – as well as a broadly similar *rhetoric*. When American scientists warned against Mammon, they did so, in most cases, to criticize something "new" (growing indifference to liberal arts education, the emergence of competitive research funding schemes, the proliferation of scientific prizes and awards) with an appeal to the "old" (Matthew 6,24 in an archaic font). The intriguing question then is how Mammon could fulfill this rhetorical function in an age when most American scientists no longer had first-hand knowledge of the Bible. How much moral authority did Matthew 6,24 enjoy in an increasingly post-Christian society? To what extent could scientists expect their audiences to be familiar with the figure of Mammon?

In exploring these questions, this chapter engages with a more theoretical body of literature on the rhetoric of "anchoring" – the activity of making not-yet-familiar things accessible or acceptable by linking them to well-known ideas or practices. Whereas scholars of rhetoric so far have focused mainly on the anchoring of innovation, this chapter examines an inverse type of anchoring: a dismissive engagement with new situations by means of old repertoires.[12] Moreover, while existing scholarship on anchoring has focused almost exclusively on the *activity* of appealing to past authorities, the case of Mammon

11 Sjang ten Hagen and Herman Paul, "The Icarus Flight of Speculation: Philosophers' Vices as Perceived by Nineteenth-Century Historians and Physicists," *Metaphilosophy* 54, nos. 2–3 (2023): 280–294; Herman Paul, "'I Am Not a Politician': Professional Boundary Work in Wilhelmine Germany," *Journal of Modern European History* 18, no. 3 (2020): 237–242.

12 Ineke Sluiter, "Anchoring Innovation: A Classical Research Agenda," *European Review* 25, no. 1 (2017): 20–38; Ineke Sluiter, "Old Is the New New: The Rhetoric of Anchoring Innovation," in *The Language of Argumentation*, ed. Ronny Boogaart, Henrike Jansen, and Maarten van Leeuwen (Cham: Springer, 2021), 243–260.

allows us to add that such appeals presuppose an anchor that is both *available* to speakers and *recognizable* to their audiences. Therefore, if this chapter focuses on twentieth-century uses of the metaphor, it does so not merely to add to existing studies of the Mammon motif, which so far have hardly reached beyond the nineteenth century.[13] More importantly, it examines recent uses of the metaphor to examine how an old anchor could remain rhetorically useful in discursive settings where familiarity with its original context could no longer be assumed. What explains the persistence of a Biblical image among scientists in a largely secular age?

Drawing on a corpus of texts gathered through the usual databases – JSTOR, Google Scholar, Google Books – this chapter proceeds in four steps.[14] In the first two sections, it examines how a broad array of American scientists from the 1890s to the 2000s used the Mammon metaphor in diagnosing a range of money-related challenges.[15] (Throughout this chapter, we use the word "scientists" in its broadest possible meaning, also encompassing academics who would nowadays be classified as social scientists or humanities scholars.)[16] If these first sections show how malleable the Mammon metaphor was, in terms of the meanings it allowed for, the third section identifies an important

13 Eugene McCarraher, *The Enchantments of Mammon: How Capitalism Became the Religion of Modernity* (Cambridge, MA: Belknap Press, 2019), 23–124; David Landreth, *The Face of Mammon: The Matter of Money in English Renaissance Literature* (Oxford: Oxford University Press, 2012); Norman Russell, *The Novelist and Mammon: Literary Responses to the World of Commerce in the Nineteenth Century* (Oxford: Clarendon Press, 1986).

14 The search terms "Mammon" and "science" yielded thousands of hits, most of which fell outside the scope of this article (e.g., because they concerned the Christian Science movement or the image of Mammon in Renaissance literature). Focusing on American scientists who used the Mammon metaphor in commenting on the science system (universities, funding agencies, publication strategies, and the like), we selected 54 sources suitable to serve as the primary source base for this chapter.

15 This focus on the United States does not imply that American scientists were alone in invoking the Mammon metaphor. British and Irish scientists like John Tyndall (whom we will discuss below) and Arthur Rigg ("the man of science cannot serve two masters; he cannot serve science and mammon") used the metaphor already in the 1870s, followed by German authors such as Oswald Stein around 1880. See John Tyndall, *Lectures on Light: Delivered in the United States in 1872–'73* (New York: D. Appleton and Company, 1873), 189; Arthur Rigg, "On the Energies of the Imponderables with Especial Reference to the Measurement and Utilisation of Them," *The Chemical News and Journal of Industrial Science* 28, no. 710 (1873): 5–7, at 7; Oswald Stein, *Vergangenheit, Gegenwart und Zukunft der nationalen Wirtschaftspolitik: Ein Handbuch für das deutsche Volk* (Leipzig: Georg Frobeen & Cie., 1880), 129.

16 On nineteenth-century understandings of "science" encompassing the *Geisteswissenschaften*, see Denise Philipps, "Francis Bacon and the Germans: Stories from When 'Science' Meant '*Wissenschaft*,'" *History of Science* 53, no. 4 (2015): 378–394.

continuity in discontinuity. In a majority of cases, Mammon was invoked to unmask a seemingly new trend in university management or science funding as yet another manifestation of a love of money that had historically been identified as incompatible with worship of the one true God. If this "anchoring" helps us understand the rhetorical effectiveness of quoting Matthew 6,24, the fourth section addresses the follow-up question of how Mammon remained available as a piece of moral wisdom in an increasingly secular age. Drawing on a broad range of sources, this final section argues that Mammon transformed into a proverbial expression, which even found its way into American popular culture, though without losing its religious connotations. It shows that scientists worried about an increasingly money-driven science system did not hesitate to draw on proverbial wisdom to add moral force to their boundary work between science, politics, and industry.

2 Medical Patents and Materialistic Civilization (1890–1930)

James Lewis Howe's 1890 lecture, "The Aim and Future of Natural Science," is a good place to start, as it is one of the oldest examples of a text in which Mammon and American science are explicitly brought to bear upon each other. As a professor of chemistry at Central University in Richmond, Howe was part of a field in which scientific discoveries succeeded each other so rapidly that confidence in the future of science seemed fully warranted.[17] Howe had his worries, however, about the motives of many a colleague. As he explained in an address to the Polytechnical Society of Kentucky, "the aim of science is twofold: we study science that we may know the truth, and that we may utilize that truth for the material and moral advantage of humanity." While Howe, not unlike Rowland and other devotees of "pure science," spoke most highly about the first of these aims, he also emphasized how noble it was to serve the "philanthropic" cause of enhancing "the comfort and convenience of mankind."[18] The pursuit of this second aim, however, was ridden with risks. In typically Victorian language,[19] Howe pointed to the "incentive" of privileging personal gains over societal benefits, the "temptation" of engaging in industrial rather than scientific research,

17 See, e.g., John W. Servos, *Physical Chemistry from Ostwald to Pauling: The Making of a Science in America* (Princeton, NJ: Princeton University Press, 1990), 46–99.

18 James Lewis Howe, "The Aim and Future of Natural Science", *Science* 16, no. 404 (1890): 239–244, at 239. Cf. H.A. Rowland, "A Plea for Pure Science," *Science* 2, no. 29 (1883): 242–250.

19 Léjon Saarloos, "The Scholarly Self under Threat: Language of Vice in British Scholarship (1870–1910)," Ph.D. thesis Leiden University, 2021.

and the "prostitution" of science that such wrong priorities brought about. "It seems often as if unhappily by far the greatest number of the devotees of science are devotees merely for the money in it, like the money-changers whom Christ drove from the temple precincts." Invoking yet another Biblical image, Howe portrayed the "worshipper" belonging to this league of quasi-scientists as someone who had "turned his back on the pure shrine of truth, and bowed his knee to the shrine of Mammon."[20]

Howe's invocation of Mammon drew on two discourses that had so far developed largely independent from each other. The oldest of these was a moral-religious discourse in which Mammon, the old Aramaic word for "riches," signified an excessive love for money. Although warnings against the dangers of earthly treasures went all the way back to Jesus as portrayed in the gospels – "It is easier for a camel to go through the eye of a needle, than for a rich man to enter into the kingdom of God" (Matthew 19,24 KJV) – the Mammon metaphor had become a tool for moral critique only in response to the emergence of a capitalist order in early modern Europe. In his epic poem *The Faerie Queene* (1590–6), Edmund Spenser had called Mammon the "greatest god below the skye," while John Milton, in *Paradise Lost* (1667), had depicted him as the demon of possessive individualism.[21] In more recent times, critics like John Ruskin and Thomas Carlyle had rebuked the "brutish empire of Mammon" for ruining humankind by valuing profit over anything else.[22] Applying this argument to the pursuit of science in a capitalist country, the Irish physicist John Tyndall had summoned his American audience in 1873 not to confuse Mammon and science: "Not as a servant of Mammon do I ask you to take science to your hearts, but as the strengthener and enlightener of the mind of man."[23]

The choice that Tyndall had insisted upon – serving science for money's sake or for its own end – was an important theme in the second discourse on which Howe drew: the then ongoing American debate about "pure" and "applied" science. As Paul Lucier has shown, most advocates of pure science were not opposed to applied or industrial research *as such*, but rather to its damaging effects on scientists' motivation: "Purity referred to motivation – truth before gain."[24] Like others, Howe felt no need to distinguish sharply between a corruption of scientific integrity and Mammonism in society at

20 Howe, "Aim and Future," 239, 240.
21 McCarraher, *Enchantments of Mammon*, 39, 41. See also Landreth, *Face of Mammon*.
22 McCarraher, *Enchantments of Mammon*, 75.
23 Tyndall, *Lectures on Light*, 189.
24 Lucier, "Origins," 531.

large: "There is no doubt that the greed for gain is one of the darkest stains upon the escutcheon of our boasted nineteenth-century civilization."[25] Nonetheless, Howe believed that scientists faced challenges specific to their profession, such as the patenting of scientific inventions. Consistent with his aversion to personal gain, Howe claimed that "any great discovery is the property, not of its discoverer, but of all humanity." He therefore sharply dismissed the emerging trend of scientists patenting their discoveries, especially in medicine.[26]

In three respects at least, Howe's 1890 lecture was representative of how American scientists around the turn of the century spoke about Mammon. What is perhaps least important, yet worth signaling, is that the metaphor did not appear in one of Howe's technical chemical papers, but in the metascientific genre of moral commentary on trends, opportunities, and threats in the field. Precisely to the extent that Mammon served as a diagnostic label for scientists' misguided motivations or, more broadly, the ills of capitalist society, it was used not *in* science, but in talks and essays *about* science. Secondly, Howe's lecture in Kentucky was representative in focusing on issues of motivation. Whenever scientists criticized Mammon worship, they contrasted this worship with "unselfish devotion to truth" or "freedom from vain, worldly ambitions." The astronomer who wrote these words even went so far as to say that discoveries of the kind made by William Huggins, his celebrated English colleague, would never be attainable by "those who worship mammon."[27] Diagnoses of Mammon-related ills therefore typically went hand in hand with moral exhortations to follow the example of well-intended men of science. As medical scholar William Osler wrote in 1904, shortly before leaving Johns Hopkins Hospital for Oxford University: "There is no more potent antidote to the corroding influence of mammon than the presence in a community of a body of men devoted to science."[28] Finally, in focusing his ire on medical patenting, Howe drew attention to a practice that more of his colleagues regarded as "proof of the profit motive."[29] When the American Medical Association

25 Howe, "Aim and Future," 240.

26 Ibid., 239.

27 T.J.J. See, "Tribute to the Memory of Sir William Huggins," *Popular Astronomy* 18, no. 7 (1910): 387–397, at 391, 397. See also J. Merritt Matthews, "The New Aspects of Chemical Science," *The Journal of Industrial and Engineering Chemistry* 8, no. 12 (1916): 1147–1148, at 1147.

28 William Osler, *Aequanimitas: With Other Addresses to Medical Students, Nurses and Practitioners of Medicine* (London: L.K. Hewis, 1904), 29.

29 Lucier, "Origins," 533 and, more broadly, Paul Lucier, "Court and Controversy: Patenting Science in the Nineteenth Century," *The British Journal for the History of Science* 29, no. 2 (1996): 139–154.

successfully tried to increase the opportunities for medical scientists to patent their discoveries, the Association's founder, Nathan Smith Davis, asked with indignation: "Surely this would be progress, but in what direction – that of science and honor, or that of mammon and dishonor?"[30]

If patenting was one concrete practice triggering uses of the Mammon metaphor, another one, widely discussed in the first quarter of the twentieth century, was curriculum reform in colleges that no longer saw training in classical philology as the best preparation for twentieth-century American life.[31] Already in 1902, the philologist James Taft Hatfield from Northwestern University lamented that "the one great, common foe of our whole profession is Mammon, stifling ruthlessly the poetic impulses in the hearts of generation after generation of American youth."[32] Likewise, Albertus Augustus Trever, a professor of Greek at Lawrence College, recognized the evil influence of "the old Mammon of the 'bread-and-butter' practical" in the trend to replace Greek and Latin language classes with supposedly more useful courses.[33] A decade later, Theodore O. Wedel, a future Episcopal church leader then still teaching English at Carleton College, also feared that classes on medieval poetry would be replaced by courses on gas engines – a subject that he considered inappropriate for a college that had not been founded to "serve Mammon or the gods of the market place." Interestingly, while this phrase already combined Matthew 6,24 with Francis Bacon's idols of the marketplace, Wedel also warned against the "the goddess of getting-on in the world" that he saw being venerated by the likes of George F. Babbitt, the title hero of Sinclair Lewis' 1922 novel. Just as Lewis had satirized the vacuity of middle-class materialism in the United States, so Wedel held materialist ambitions responsible for the hollowing out of liberal education: "Our pioneers had a great deal

30 Nathan Smith Davis, "Proposed Revision of the Code of Ethics of the American Medical Association: Report of the Committee on Revision," *Journal of the American Medical Association* 22, no. 15 (1894): 556–558, at 557. Context and background are discussed in Robert Baker, *Before Bioethics: A History of American Medical Ethics from the Colonial Period to the Bioethics Revolution* (Oxford: Oxford University Press, 2013), 199–231.

31 David O. Levine, *The American College and the Culture of Aspiration* (Ithaca, NY: Cornell University Press, 1986), 89–112. On the nineteenth-century background of the debate, see Eric Adler, *The Battle of the Classics: How a Nineteenth-Century Debate Can Save the Humanities Today* (Oxford: Oxford University Press, 2020).

32 James Taft Hatfield, "Scholarship and the Commonwealth," *PMLA* 17, no. 3 (1902): 391–409, at 394.

33 Albertus Augustus Trever, "The Other Side," *The Classical Journal* 10, no. 13 (1914): 106–114, at 110.

more respect for the unworldly scholar, even the scholar of Greek, than does Mr. Babbitt of Zion City."[34]

Compared to Howe's warnings in the 1890s, Wedel's invocation of Mammon, hand in hand with Babbitt, was both similar and different. What was similar was the normative contrast drawn between a pure devotion to science and an impure pursuit of worldly success, financially or otherwise. In language similar to Howe's, Wedel claimed that a college had to be "free from servitude to the market place, not bowing down before the tyranny of modernity."[35] Different, however, was the level of analysis and, consequently, the assignment of responsibility for resisting the lure of Mammon. While Howe, following nineteenth-century custom, had summoned individual scientists to withstand the temptations of Mammon, Wedel's criticism was targeted at the evils of "an industrialized, materialistic civilization," embodied by a corporate capitalism that was increasingly intruding on American colleges.[36] Who or what could realistically be expected to stop these mighty powers? Drawing on another Sinclair Lewis novel, *Arrowsmith* (1925), Thomas Leblanc, a professor of medicine at the University of Cincinnati, argued in *Science* that "the wavering allegiance between Truth and Mammon" had become a fact of life. So instead of reminding scientists of their moral duties, Leblanc maintained that Lewis' novel offered a realistic picture of the dilemmas inherent to contemporary university life.[37] This was, by and large, also the conclusion that Upton Sinclair, just two years earlier, had reached in *The Goose-Step*, his fierce critique of American higher education. In an oft-quoted phrase, Sinclair portrayed the American college president as spending "his time running back and forth between Mammon and God, known in the academic vocabulary as Business and Learning."[38] Nonetheless, Sinclair's satirical account did not allow for the conclusion that this was simply how things worked. His lavish use of pejorative terms suggests that Mammon, too, served as a word of warning, just as it had done for Howe, Davis, Osler, and other American scientists around 1900.[39]

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34 Theodore O. Wedel, "The Liberal College and the High School: A Plea for Co-operation," *The Classical Journal* 21, no. 8 (1926): 607–612, at 608, 609.

35 Ibid., 607.

36 Ibid., 609.

37 Thomas J. Leblanc, review of *Arrowsmith*, by Sinclair Lewis, *Science* 61, no. 1590 (1925): 632–634, at 634. For further discussion, see Shapin, *Scientific Life*, 60–63.

38 Upton Sinclair, *The Goose-Step: A Study of American Education* (Pasadena, CA: the author, 1923), 386.

39 See Lauren Coodley, *Upton Sinclair: California Socialist, Celebrity Intellectual* (Lincoln, NE: University of Nebraska Press, 2013), 88–89.

3 Foundation Money and Scientific Prizes (1930–1990)

If we expand the time frame to cover the decades from the 1930s up until the 1980s, the first thing to observe is the long-term persistence of some of the arguments put forward in the early decades of the century. Sinclair's complaints about universities becoming temples of Mammon were repeated in the 1930s by zoologist Paul Bartsch, who feared that Mammon, together with a deity called Mechanus, was in the process of dethroning Minerva, the old goddess of wisdom and symbol of learning.[40] Similar worries were articulated in the 1940s by Berkeley French professor Mathurin Dondo ("Mammon is the omnipotent god").[41] Even more persistent was the late nineteenth-century contrast between pure and applied science. It was this dichotomy that chemist Thomas Swann Harding invoked in his plea to keep research free from monetary interests ("The effort of a scientist to preserve professional integrity and serve Mammon at the same time is fraught with inevitable disaster – to the integrity")[42] and that led psychologist Saul Rosenzweig to complain that "the irresistible charms of mammon" were responsible for clinical psychology neglecting its scientific duties.[43] As late as 1971, sociologist Robert Nisbet cautioned his colleagues to stay far from those areas of society "where Mammon rules."[44]

Simple repetitions of old diatribes against Mammon, however, ran a risk of becoming obsolete, especially when failing to take into account how substantially the American scientific landscape was changing after World War II, also with regard to its funding structures. While research money from foundations like Rockefeller fueled innovation in fields as diverse as medicine, biology, and the social sciences,[45] the emerging Cold War led the American federal

40 Paul Bartsch, "Today – Yesterday – and Tomorrow in Nature Study," *School Science and Mathematics* 37, no. 8 (1937): 920–924, at 920.

41 Mathurin Dondo, "Do the Humanities Humanize?" *Bulletin of the American Association of University Professors* 33, no. 1 (1947): 141–52, at 149.

42 T. Swann Harding, *The Degradation of Science* (New York: Farrar & Rinehart, 1931), 310. Harding's intervention is discussed at greater length in Peter J. Kuznick, *Beyond the Laboratory: Scientists as Political Activists in 1930s America* (Chicago, IL: University of Chicago Press, 1987), 41–42.

43 Saul Rosenzweig, "Imbalance in Clinical Psychology," *American Psychologist* 5, no. 12 (1950): 678–680, at 679.

44 Robert A. Nisbet, "The Future of the University," *Commentary* 51, no. 2 (1971): 62–71, at 63. See also Robert A. Nisbet, *The Degradation of the Academic Dogma: The University in America, 1945–1970* (New York: Basic Books, 1971), esp. 52–53, 81–83.

45 E. Richard Brown, *Rockefeller Medicine Men: Medicine and Capitalism in America* (Berkeley, CA: University of California Press, 1979); Lily E. Kay, *The Molecular Vision of*

government to invest in politically useful knowledge as produced by scholars of Russia and China.[46] These and other mid-century changes left their mark on how scientists used the Mammon metaphor. When in 1950 members of the American Physical Society heard their president, Francis Wheeler Loomis, lash out against physicists who "deserted to mammon" by trying to make a profit, it could seem as if Loomis was repeating Howe or Wedel. His criticism was qualified, however, by the acknowledgment that laboratory work required ever-growing amounts of money ("Somehow, we seem to find ourselves at the mercy of mammon") and, more subtly, by the claim that making money should not be a scientist's "primary concern" (which seemed to leave room for academics pursuing it as a secondary aim).[47] Unlike Howe, then, Loomis did not advocate uncompromised asceticism. By substituting the ideal of indifference to money with that of vigilance – monetary considerations should not take precedence over scientific ones – Loomis gave a new twist to an old argument.

New challenges, however, also prompted new applications of the Mammon metaphor. Just as Howe and Hatfield in earlier days had criticized what they had seen as dangerous new trends, so American scientists in the decades after World War II invoked Mammon to warn against new threats. Clearly, one new challenge was the rise to dominance of funding agencies like the National Institutes of Health (1948) and the National Science Foundation (1950). Looking back on American science in the 1960s, *Science* editor John Walsh commented in verse:

> Research in the late decade
> Has had an ending retrograde;
> In retrospect the budgets show
> An early surge, a late plateau.
> The balance sheet, though, does provide
> Strong entries on the credit side.
> …

Life: Caltech, the Rockefeller Foundation, and the Rise of the New Biology (Oxford: Oxford University Press, 1993); Donald Fisher, *Fundamental Development of the Social Sciences: Rockefeller Philanthropy and the United States Social Science Research Council* (Ann Arbor, MI: University of Michigan Press, 1993).

46 David L. Szanton, "Introduction: The Origin, Nature, and Challenges of Area Studies in the United States," in *The Politics of Knowledge: Area Studies and the Disciplines*, ed. David L. Szanton (Berkeley, CA: University of California Press, 2004), 1–33.

47 F. Wheeler Loomis, "Can Physics Serve Two Masters?" *Bulletin of the Atomic Scientists* 6, no. 4 (1950): 115–120, at 119, 127.

> By grace of Hill, Fogarty and Shannon,
> NIH prospered with science and mammon,
> ...
> NSF's theme was "funds denied,"
> While Waterman, Haworth, and McElroy tried.[48]

Although Walsh's overall picture of American science in the 1960s was not exactly positive, his use of Mammon was ambiguous. When he identified Mammon as the cause of NIH's flourishing, the metaphor seemed to refer, without clear pejorative connotations, to the large amounts of federal money that Hill, Fogarty, and Shannon had managed to secure for the NIH.[49] In this respect, it seems as if he was using Mammon, without much apparent concern, as synonymous with research money.[50] At the same time, however, Walsh's poem conveyed dissatisfaction with jobs going to "familiar names from familiar places," with empty phrases like "spinoff" and "paradigm" entering academic parlance, and with scientists losing their aura of "a priesthood or fifth estate."[51] Moreover, at the time of writing, the budgetary policies of newly appointed NSF director William McElroy were sparking a fierce controversy, with the NSF facing accusations of giving up on basic science and taking on "a new, opportunistic role as supporter of problem-oriented, applied research."[52] In this strained context, Walsh's use of the term Mammon – a word that did not rhyme too well to Shannon, in the previous line – might also be interpreted as

48 John Walsh, "The Nineteen-Sixties: A Not So Fond Farewell," *Science* 166, no. 3913 (1969): 1605. James C. Hill and James A. Shannon fulfilled leadership roles at the NIH; John E. Fogarty was a congress member who helped secure funding for expansion of the NIH; Alan T. Waterman, Lelond J. Haworth, and William D. McElroy were consecutive presidents of the NSF.

49 Stephen P. Strickland, *Politics, Science, and Dread Disease: A Short History of United States Medical Research Policy* (Cambridge, MA: Harvard University Press, 1972), 158–183.

50 Although such "neutral" uses of the term are rare, they occur in more recent British sources such as the editorial "In No One's Best Interest," *Nature* 248, no. 6978 (2004): 1 and Jacky Law, *Big Pharma: How the World's Biggest Drug Companies Control Illness* (London: Constable & Robinson, 2006), 125.

51 Walsh, "The Nineteen-Sixties," 1605.

52 Walter G. Peter III, "McElroy Explains NSF Budget Stand," *BioScience* 21, no. 14 (1971): 775–777, at 775. Walsh himself would chronicle the controversy in John Walsh, "National Science Foundation: The House That McElroy Built," *Science* 175, no. 4021 (1972): 502–504 and John Walsh, "National Science Foundation: Managing Applied Research," *Science* 175, no. 4022 (1972): 611–614. See also Mark Solovey, *Social Science for What? Battles over Public Funding for the "Other Sciences" at the National Science Foundation* (Cambridge, MA: MIT Press, 2020), 135–166.

implying criticism, even if much more reserved than Graham Parker's complaint about "professors who have sold their academic pseudo-scholarly souls to the mammon of foundation money."[53]

While these authors unambiguously located Mammon in the offices of NSF and NIH, others identified it more broadly with funders, private or public, who tempted scientists to sell their academic conscience in exchange for lavish checks. Along these lines, electrical engineer John Robinson Pierce warned against the "Mammon worship" of colleagues who seemed unable to resist the temptation of accepting "huge sums of money" earmarked for work on "ends that scientists have neither the knowledge to reach nor highly promising avenues of approach."[54] Cell biologist Philip Siekevitz likewise criticized the growing popularity of research prizes for triggering an unhealthy desire for money,[55] while microbiologist and Nobel Prize winner Salvador Luria spoke of "worship in the temples of Mammon" in condemning scientists for contributing to the Cold War weapons race.[56] Each in their own way, these authors applied the Mammon metaphor to new contexts, while retaining its moral message of money and truth being ultimately incompatible.[57]

4 Then and Now: a Time-Honored Anchor

And so we might go on citing more recent examples of scientists who quoted Matthew 6,24 in cautioning against commercialization of genomics research or in criticizing funding schemes that seemed to transform academia into a

53 Graham Parker, review of *Crime, Law, and the Scholars: A History of Scholarship in American Law* by Gerhard O.W. Mueller, *The Canadian Bar Review* 48, no. 4 (1970): 801–809, at 806. Clearly dismissive was also Robert Nisbet's ironic question: "Is the day too far off when one can expect to overhear an undergraduate saying, 'Take Jones' course; he just got half a million from NIH' …?" Robert A. Nisbet, "Conflicting Academic Loyalties," in *Improving College Teaching*, ed. Calvin B.T. Lee (Washington, DC: American Council on Education, 1967), 12–34, at 27.

54 J.R. Pierce, "A Time to Take Stock," *Science* 172, no. 3979 (1971): 115.

55 Philip Siekevitz, "On Prizes," *Science* 202, no. 4368 (1978): 574; Siekevitz, "Of Patents and Prizes," *Trends in Biochemical Sciences* 5, no. 9 (1980): vi–viii.

56 Salvador Luria, "Reflections on Democracy, Science, and Cancer," *Bulletin of the American Academy of Arts and Sciences* 30, no. 5 (1977): 20–32.

57 Other late twentieth-century examples include David Williamson, "The Grant Game: or, The Perpetual Pursuit of Federal Funds for Scientific Research," *Princeton Alumni Weekly* 89, no. 12 (1989): 16–21; Edward W. Said, *Representations of the Intellectual: The 1993 Reith Lectures* (New York: Pantheon, 1994), 69; Richard L. Gregory, *Even Odder Perceptions* (New York: Routledge, 1994), 45.

"temple of Mammon."[58] In the early twenty-first century, books with titles like *The Price of Truth* and *Science for Sale* continued to deplore the "visibly tightening linkage of science and mammon."[59] Likewise, authors did not stop applying the metaphor to new contexts, such as academic publishing. While Marsh Jeanneret, the long-time director of the University of Toronto Press, chose *God and Mammon* as the title for his book on the twofold aim of the sector – promoting scientific work and making a profit – Richard Roberts replaced the "and" with "or" in urging university presses to decide, in light of new initiatives like PubMed (a database providing free access to abstracts of medical literature), "whether they support science or Mammon."[60]

Does this suggest that the Mammon metaphor was flexible enough to be applicable to almost any money-related aspect of scientific work? It seems indeed as if the history of the Mammon metaphor in American science mirrors how the relations between scientists, research money, and commercial uses of research have evolved over time, with new areas of application signaling new moments of tension within this field of forces. What this response would fail to capture, however, is that in almost all cases, Mammon was not simply synonymous with money, but a morally evaluative lens through which money was interpreted. By quoting or paraphrasing Matthew 6,24, scientists encouraged their audiences to see science and money as essentially antagonistic. This is not to say, of course, that they distrusted money *as such*: they used Mammon to identify *specific* trends or practices in which they perceived economic interests to corrupt science or to compromise scientific integrity. Like the trope of "pure science" that late nineteenth-century scientists used to discredit industrial consultancy and company labs, the Mammon metaphor presupposed a view of science that valued purity over contamination and single-minded devotion to science over careerism or desire for fame.[61] The two

58 Jonathan Marks, "Making Race without Racism?" *Science* 337, no. 6099 (2012): 1174–1175, at 1174; Philip Mirowski, *Science Mart: Privatizing American Science* (Cambridge, MA: Harvard University Press, 2011), 2–3.

59 Daniel Greenberg, *Science for Sale: The Perils, Rewards, and Delusions of Campus Capitalism* (Chicago, IL: University of Chicago Press, 2008), 2. See also David B. Resnik, *The Price of Truth: How Money Affects the Norms of Science* (Oxford: Oxford University Press, 2007), 3–34; M. Norton Wise, "Thought on the Politicization of Science through Commercialization," *Social Research* 73, no. 4 (2006): 1253–1272, at 1262.

60 Marsh Jeanneret, *God and Mammon: Universities as Publishers* (Urbana, IL: University of Illinois Press, 1989); Richard J. Roberts, "PubMed Central: The GenBank of the Published Literature," *PNAS* 89, no. 2 (2001): 381–382, at 382.

61 On scientists' centuries-old distrust of desire for fame and money, see Sari Kivistö, *The Vices of Learning: Morality and Knowledge at Early Modern Universities* (Leiden: Brill, 2014).

commonplaces could be used in tandem – Mammon naming the evil to which pure science was the antidote – precisely because both agreed that "the love of money is the root of all evil" (1 Tim. 6,10, KJV).[62] Despite the Mammon metaphor being flexible enough to find application in ever-new contexts, the *logic* implied in these warnings was thus broadly similar: true devotion to the cause of science is incompatible with concerns about money. As Maurice C. Hall put it in 1933: "There is a certain incompatibility between the service of science and the service of the god called Mammon."[63]

From a *rhetorical* point of view, however, it is not immediately evident why scientists from very different backgrounds – they did not fit a single political or religious mold – used old Biblical language in discussing modern challenges like competitive research funding and commercial genetics. What was the rationale for drawing on an ancient Bible verse in a century known for its fascination with science as an agent of progress and modernization?[64] Was the term a relic from "Christian America," likely to disappear with the continuing secularization of American science? Or was it a rhetorical strategy to challenge new realities in terms of old repertoires, to the point of quoting Matthew 6,24 in sixteenth-century spelling and in an archaizing font?[65] Although the first answer is not completely beside the point – we will return to the secularization of American academia in section 4 – Ribbe's typographical emphases on Mammon's ancient roots invite us to consider the second hypothesis first. What, if anything, was the rhetorical purchase of the Mammon metaphor?

The concept of "anchoring" as developed by students of rhetoric proves helpful in understanding the term's appeal. Ineke Sluiter uses it to explain why people, past and present, often seek to justify new things by linking them to old ones (think of the image of an envelope that serves as a symbol for email or the power sockets of electric cars that are modeled after the fuel tank openings of gasoline cars). Sometimes, the use of recognizable visual language is little more than a means for explaining not-yet-familiar things in familiar terms.

62 Lucier, "Origins," 531.

63 Maurice C. Hall, "Playing the Scientific Game," *The Scientific Monthly* 36, no. 4 (1933): 324–332, at 328.

64 *World's Fairs in the Cold War: Science, Technology, and the Culture of Progress*, eds. Arthur P. Molella and Scott Gabriel Knowles (Pittsburgh, PA: University of Pittsburgh Press, 2019); Robert W. Rydell, *World of Fairs: The Century-of-Progress Expositions* (Chicago, IL: University of Chicago Press, 1993).

65 We use the term "repertoires" as defined in cultural repertoire theory: Ann Swidler, *Talk of Love: How Culture Matters* (Chicago, IL: University of Chicago Press, 2001); Paul McLean, *The Art of the Network: Strategic Interaction and Patronage in Renaissance Florence* (Durham, NC: Duke University Press, 2007), 1–34.

On other occasions, however, invoking the old is a strategy for justifying the new, be it new religions (Christianity as a "fulfillment" of Judaism) or new political regimes (fascist Italy as a "new Rome"). In the latter cases, historical anchors are used to add credence or weight to new phenomena.[66] While this may sound familiar to historians who have long been using concepts like "invented traditions" and "sites of memory" (*lieux de mémoire*) in explaining why modern nation-states tried to bolster their imagined identities with references to an idealized past,[67] the concept of anchoring draws attention, not to people's *motives* for remembering or commemorating past events, but to their *strategies* for legitimizing new products, political regimes, or social constellations. Moreover, whereas historians often treat appeals to past authority as typical of societies with a "traditional" regime of historicity (in which the past has greater authority than either the present or the future), Sluiter and her colleagues show that historical anchoring has not disappeared with the rise of "modern" and "postmodern" regimes of historicity.[68] Judging by television advertising and smartphone apps, historical anchors fulfill a legitimizing role even in an age fascinated with innovation. The habit of invoking time-honored authorities "is not a bug in an overall innovative society: it is a feature. Innovations may become acceptable, understandable, and desirable when relevant social groups can effectively integrate and accommodate them in their conceptual categories, values, beliefs and ambitions."[69]

Varying on this argument, we might say that American scientists used Mammon as an anchor, not to vindicate new trends in academic policy or science funding, but to justify the moral grounds from which they believed to be able to criticize new challenges like scientific patenting, capitalist entrepreneurialism, and the academic publishing business. The Mammon metaphor, in other words, allowed scientists to present their moral stances as backed by a venerable tradition. Also, as some of our examples clearly illustrate, the

66 Roald Dijkstra, "Peter, Popes, Politics, and More: The Apostle as Anchor," in *The Early Reception and Appropriation of the Apostle Peter (60–800 CE): The Anchors of the Fisherman*, ed. Roald Dijkstra (Leiden: Brill, 2020), 3–25; Aurora Raimondi Cominesi, "The Past on the Wall: Anchoring Political Innovation in the Decoration and Architecture of the Imperial Residences on the Palatine (44 BCE–235 CE)," Ph.D. thesis Radboud University Nijmegen, 2019.

67 *The Invention of Tradition*, eds. Eric Hobsbawm and Terence Ranger (Cambridge: Cambridge University Press, 1983); *Les lieux de mémoire*, 7 vols., ed. Pierre Nora (Paris: Gallimard, 1984–1992).

68 François Hartog, *Régimes d'historicité: présentisme et expériences du temps* (Paris: Du Seuil, 2003).

69 Sluiter, "Anchoring Innovation," 23.

metaphor enabled them to unmask seemingly new trends in academia as manifestations of an old evil: the well-known sin of greed, avarice, or love of money that the Christian tradition had identified as incompatible with true worship of God (with "God" now denoting pure science, undiluted scientific aspiration, or a work ethic untainted by selfish desires).[70] Invoking Mammon therefore amounted to challenging the "newness" of the threats at stake by a rhetorical move that Hayden White would have called metaphorical: it reduced the new to something known since old times.[71] The anchoring at work here might therefore be specified as a form of "inverse anchoring." Instead of justifying the new, the old was invoked to challenge the new.

Interpreting the Mammon metaphor as a historical anchor has two advantages. First, it can explain why authors made few attempts to hide the ancient religious origins of the Mammon metaphor or even emphasized its antiquity by referring to "ancient Mammon" or "the old Mammon … dressed up to deceive."[72] Precisely because love of money had from Biblical times onwards been perceived as threatening the soul, Mammon was a rhetorically expedient label for criticizing practices that were seen as corrupting science. Secondly, the anchoring perspective allows us to recognize both continuities and discontinuities in how American scientists used the Mammon metaphor. While its specific connotations changed from context to context, thereby creating discontinuities on the level of meaning, the logic of contrasting purity with pollution recurred over time, as did the rhetoric of challenging new threats by means of time-honored repertoires. The anchoring perspective thus reveals a continuity that would easily remain invisible as long as we limit ourselves to tracing changing meanings of the metaphor.

5 From Biblical Warning to Proverbial Expression

Yet one may wonder: Doesn't an anchor need to be widely known and respected to be able to fulfill this task of adding moral weight to a scientist's argument? To what extent did this apply to Matthew 6,24 in an age that witnessed major

70 Richard Newhauser, *The Early History of Greed: The Sin of Avarice in Early Medieval Thought and Literature* (Cambridge: Cambridge University Press, 2000); Jonathan Patterson, *Representing Avarice in Late Renaissance France* (Oxford: Oxford University Press, 2015); Jared Poley, *The Devil's Riches: A Modern History of Greed* (New York: Berghahn, 2017).

71 Hayden White, *Metahistory: The Historical Imagination in Nineteenth-Century Europe* (Baltimore, MD: Johns Hopkins University Press, 1973), 34.

72 "The Pseudo-Medical Parasite," *California State Journal of Medicine* 17, no. 6 (1919): 164–165, at 165; Trever, "The Other Side," 110.

changes in the American religious landscape? Over the course of the twentieth century, the degree of religious education provided in American schools and colleges declined,[73] while science, at least for many of its practitioners, developed from a quasi-religious "vocation" into a job that lasted only as long as funding kept flowing.[74] One would expect that this secularization of American science and society affected the rhetorical effectiveness of invoking Mammon, if only because audiences at some point could no longer be expected to be familiar with Biblical imagery. Much the same applies to the scientists themselves, as the authors quoted above were such a diverse lot, in terms of political leanings and religious orientations, that it would be implausible to assume that they were all well-versed in Biblical language.[75] How then, one may ask, did the metaphor remain available as a piece of moral wisdom to which even secularized scientists could successfully appeal?

The answer, we believe, is that the Biblical image of the Mammon gradually transformed into a proverbial expression, accessible to educated people from all backgrounds, though without its religious aura. One indication of this process is the gradual disentanglement of the Mammon metaphor from its Biblical context. While church-going scientists in Gilded Age America often used the Mammon metaphor in combination with other Biblical figures like the Pharisees, the Philistines, Job, the Baal, and the house of Rimmon that Naaman asked Elisha for permission to visit (2 Kings 5,18),[76] later generations increasingly used Mammon as a stand-alone metaphor, dissociated from its original Biblical context. This process was, of course, neither linear nor uniform. As late as 1982, *Science* editor Nicholas Wade, speaking about "God and Mammon in molecular biology," hoped "to throw the money-changers out of the temple and the investment bankers out of the laboratory" – a reference to the story of Jesus driving away the money changers from the precincts of the temple in Jerusalem (Matthew 21,12).[77] As we saw above, Ribbe's 1987 address

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73 *The Secular Revolution: Power, Interests, and Conflict in the Secularization of American Public Life*, ed. Christian Smith (Berkeley, CA: University of California Press, 2003); Jon H. Roberts and James Turner, *The Sacred and Secular University* (Princeton, NJ: Princeton University Press, 2000).

74 Shapin, *Scientific Life*, 21–91.

75 While Ribbe was known as a committed Christian (see Nancy L. Ross, Michael F. Hochella, Jr., and Gordon J. Brown, Jr., "Tribute to Paul H. Ribbe 1935–2017," *Elements* 13, no. 4 [2017]: 288), most of his colleagues cited above did not have such a background.

76 In addition to the examples quoted in earlier sections, see H.E. Shepherd, "Higher Education in the South," *The Sewanee Review* 1, no. 3 (1893): 283–289, at 284 and Hatfield, "Scholarship and the Commonwealth," 395–396.

77 Nicholas Wade, "The Roles of God and Mammon in Molecular Biology," in *From Genetic Experimentation to Biotechnology: The Critical Transition*, ed. William J. Whelan and Sandra Black (Chichester: John Wiley & Sons, 1982), 203–211, at 211.

to the Mineralogical Society was also rich in Biblical references. By the 1980s, however, it had become customary to use the Mammon metaphor as a stock phrase rather than as a Biblical quotation.

This is evidenced not only by the absence of other Biblical references but also by new twists that scientists gave to the term. Although philosopher George Simpson, writing in 1950, still expected his readers to be familiar with Christian hymns when stating tongue in cheek that "'Come, all ye faithful' can be sung in praise of Mammon," his mixing of metaphors marked a sense of distance from the Biblical text.[78] Likewise, authors whose sense of moral realism led them to advocate negotiation with Mammon or even acceptance of its role in modern scientific work – "Whenever scientists serve two masters, compromises will be made" – clearly dissociated themselves from Matthew's condemnation of syncretism.[79] Interestingly, in those rare instances that postwar American scientists attributed the Mammon metaphor to a specific source, Matthew turned out to have lost ground to more contemporary sources. In 1959, medical scientist Frederick Stenn quoted William Osler's warnings against the trap of "mammonish prosperity" ("Are modern doctors living up to Osler standards?"), while a 1978 booklet on academic fundraising commented on the unabated relevance of Sinclair's portrait of college presidents "running back and forth between Mammon and God."[80] Quoting this same line in a 1972 *Science* article, science journalist Deborah Shapley even identified it as an "old adage" – as if it were an anonymous saying that had attained the status of a moral platitude.[81]

Arguably, this is exactly what had happened: the Mammon metaphor had developed from a Biblical warning into a proverbial expression, not only among scientists, but in society at large. Postwar Americans did not need to have attended church or Sunday school to grasp that Mammon was a religiously tainted word of warning against an uninhibited love of money. Even if they no longer listened to sermons or read novels like William Neely Freeman's *Saint Mammon* (1908),[82] they could encounter the solemn "Ye cannot serve God and mammon" in the form of a proverb. Dictionaries of American proverbs from

78 George Simpson, "The Scientist: Technician or Moralist?" *Philosophy of Science* 17, no. 1 (1950): 95–108, at 101.

79 David L. Hull, "Why Scientists Behave Scientifically," *MRS Bulletin* 21, no. 5 (1996): 72.

80 Frederick Stenn, "Sir William Osler," *Quarterly Bulletin of the Northwestern University Medical School* 33, no. 1 (1959): 77–84, at 80; Michael F. Luck and Donald J. Tolle, *Community College Development: Alternative Fund-Raising Strategies* (Indianapolis, IN: R. & R. Newkirk, 1978), 10–11.

81 Deborah Shapley, "New York University: Learning to Live with Red Ink," *Science* 178, no. 4065 (1972): 1072–1075, at 1074.

82 William Neely Freeman, *Saint Mammon: A Novel of American Society* (New York: Broadway Pub. Co., 1908).

Putnam's Complete Book of Quotations, Proverbs and Household Words (1926) to the *Random House Dictionary of America's Popular Proverbs and Sayings* (2000) all included the phrase, with sometimes surprising variations ("Those who set out to serve both God and Mammon soon discover that there is no God").[83] As the century progressed, dictionaries increasingly listed God and Mammon under the more generic phrase "No man can serve two masters," thereby placing the New Testament original on one line with modern variations like "No woman can serve two masters" and "You cannot serve two bosses."[84]

To what extent Mammon had become a proverbial figure is apparent also from its appearances in American popular culture. Both the horror strip *Psycho* (1971) and the comic book series *Spawn* (1992–) featured a character named Mammon.[85] In the Forgotten Realms campaign setting of the "Dungeons & Dragons" game, originating around 1967 but published only in the 1980s, Mammon was the name of an archdevil who ruled over the third layer of hell.[86] Likewise, in the video game "In Nomine" (1997), Mammon emerged as a prince of greed.[87] In "Chrono Trigger" (1995), by contrast, Mammon was the name of a miraculous machine created by guru Melchior, which could generate wealth but also threaten the lives of all video game characters.[88] Finally, apart from the comic book series "God Is Dead" (2003) and the 2005 movie "Constantine,"[89] there was "The Book of Mozilla," a so-called easter egg (hidden message) in Netscape, Mozilla, and other web browsers. Mammon appeared here in 2000 as a thinly veiled reference to Microsoft and its then-popular browser, Internet Explorer, both of which Mozilla, their competitor, liked to portray as possessed

83 W. Gurney Bentham, *Putnam's Complete Book of Quotations, Proverbs and Household Words* (New York: G.P. Putnam's Sons, 1926), 421; Gregory Titleman, *Random House Dictionary of America's Popular Proverbs and Sayings* (New York: Random House, 2000), 385; Burton Stevenson, *The Macmillan Book of Proverbs, Maxims, and Famous Phrases* (New York: Macmillan, 1948), 1507, quoting Logan Pearsall Smith, *Afterthoughts* (London: Constable, 1931), 29.

84 Bartlett Jere Whiting, *Modern Proverbs and Proverbial Sayings* (Cambridge, MA: Harvard University Press, 1989), 399. See also *A Dictionary of American Proverbs*, ed. Wolfgang Mieder (New York: Oxford University Press 1992), 402.

85 "Mammon," online at https://comicvine.gamespot.com/mammon/4005-3384 (last accessed February 20, 2025).

86 "Mammon," online at https://forgottenrealms.fandom.com/wiki/Mammon (last accessed February 20, 2025).

87 "Mammon," online at https://innomine.fandom.com/wiki/Mammon (accessed 2025).

88 "Mammon Machine," online at https://chrono.fandom.com/wiki/Mammon_Machine (last accessed February 20, 2025).

89 See the Wikipedia entry "Mammon in Literature, Film, and Popular Culture," online at https://en.wikipedia.org/wiki/Mammon_in_literature,_film,_and_popular_culture (last accessed February 20, 2025).

by greed and lust for profit.[90] While these examples testify to the wide cultural circulation of Mammon in late twentieth-century America, they also further confirm our thesis that the ancient religious connotations of the metaphor could add to its rhetorical force. As Alan Galey has pointed out, "The Book of Mozilla" was modeled after the book of Revelation, complete with chapter and verse numbers and archaizing phrases ("Mammon awoke, and lo! it was naught but a follower").[91] Apparently, one did not need to be a churchgoer to recognize the figure of Mammon, or be raised in a Christian family to encounter one of its modern-day incarnations.[92]

What this shows is that Mammon had entered everyday parlance as a proverbial phrase – an old gem of "generationally tested wisdom" that continued to invoke the authority of the past, more specifically the religious authority of the Christian tradition, even if not necessarily the Biblical context of the New Testament.[93] These proverbial qualities of Mammon, in turn, explain why the metaphor continued to be available as an anchor, even to generations who were no longer brought up with Biblical stories. As a moral commonplace severed from its original Biblical context, Mammon remained powerful enough to serve as a source of moral authority.

6 Conclusion

Why did American scientists invoke the Mammon metaphor in criticizing what they perceived as money-related threats to scientific integrity? Drawing on a broad range of examples from the period 1890–2010, this chapter has shown, first of all, that the metaphor was malleable enough to be applied to ever-new challenges, from scientific consultancy and college reform to competitive funding schemes and scientific prizes. Importantly, however, its either-or logic – "Ye cannot serve God and mammon" – remained largely intact across all contexts. Indeed, it was precisely this insistence on purity of worship

90 "The Book of Mozilla," online at https://en.wikipedia.org/wiki/The_Book_of_Mozilla (last accessed February 20, 2025).

91 Alan Galey, "Reading the Book of Mozilla: Web Browsers and the Materiality of Digital Texts," in *The History of Reading*, ed. Rosalind Crone and Shafquat Towheed, vol. 3 (Basingstoke: Palgrave Macmillan, 2011), 196–214, at 209.

92 On the broader reception of ancient moral tropes in American popular culture, see *The Reception of Ancient Virtues and Vices in Modern Popular Culture: Beauty, Bravery, Blood and Glory*, eds. Eran Almagor and Lisa Maurice (Leiden: Brill, 2017).

93 Wolfgang Mieder, *Proverbs Are Never Out of Season: Popular Wisdom in the Modern Age* (New York: Oxford University Press, 1993), xvii.

that made the Mammon metaphor attractive to scientists who worried about various kinds of commercialization. As this chapter has argued, they used Mammon as an anchor, in the sense that they bolstered their criticism of the "new" with an appeal to the authority of the "old" (i.e., the Christian tradition).

If this anchoring helps explain the persistence of the Mammon metaphor in twentieth-century American science, it might also explain the striking persistence of other seemingly old-fashioned metaphors in scientific discourse. It explains why a book on modern psychology could feature the seven deadly sins in its title, or why a 2019 *Nature* article on the so-called replication crisis could invoke the four horsemen of the Apocalypse.[94] Even readers unfamiliar with Revelation 6 or medieval notions of the seven capital vices were likely to understand these references as underscoring the seriousness of the problem.[95] In passing, this illustrates what Steven Shapin calls the porous boundaries between scientific discourse, on the one hand, and common sense reasoning of the kind expressed in proverbs, on the other. "Present-day learned practices also have their proverbs and other mnemonically robust short genres; proverbial economies are present there too."[96] Proverbs and stereotypes, in other words, were not foreign to scientific discourse, but also appear in scientists' texts – perhaps especially in metascientific texts – as pieces of common wisdom, recognizable figures of speech, and authoritative moral truths.[97]

Although more research would be needed to determine at what moments such invocations of time-honored wisdom were most common, the sources examined in this chapter suggest that perceived intrusions of non-scientific motives or incentives in the realm of academic research were a strong trigger. While the wisdom of the past did not play much of a role in "ordinary science" – Mammon and Bruegel did not make it into Ribbe's mineralogical papers – it did matter as soon as scientists perceived the integrity of their work to be threatened by outside factors. This ties in with recent findings about the use of virtue and vice terms in the sciences and humanities. Although academic educators until far into the twentieth century habitually drew on repertoires of

94 Chris Chambers, *The Seven Deadly Sins of Psychology: A Manifesto for Reforming the Culture of Scientific Practice* (Princeton, NJ: Princeton University Press, 2019); Dorothy Bishop, "Rein in the Four Horsemen of Irreproducibility," *Nature* 568, no. 7753 (2019): 435.

95 On the seven deadly sins in medieval thought, see *The Seven Deadly Sins: From Communities to Individuals*, ed. Richard Newhauser (Leiden: Brill, 2007).

96 Steven Shapin, "Proverbial Economies: How an Understanding of Some Linguistic and Social Features of Common Sense Can Throw Light on More Prestigious Bodies of Knowledge, Science For Example," *Social Studies of Science* 31, no. 5 (2001): 731–769, at 755.

97 See also Herman Paul, "German Thoroughness in Baltimore: Epistemic Virtues and National Stereotypes," *History of Humanities* 3, no. 2 (2018): 327–350.

virtue and vice, the use of vice terms (dogmatism, closed-mindedness) often peaked in response to events like the Darwinian revolution or the Cold War, in which the relationship between science, religion, and/or politics leaped to the forefront of attention.[98] Would it be justified to assume that rhetorical figures like Mammon, the seven deadly sins, and the four horsemen of the Apocalypse were primarily used in similar contexts, where science's relationships with industry, politics, and economics were at stake? It seems as if scientists used these time-honored pieces of wisdom specifically at moments when they wanted their colleagues to recognize that their scientific integrity was at stake. Also in this respect, Ribbe's keynote address was a representative one: it used the Mammon metaphor with great moral earnestness, to identify a threat that American mineralogists should ward off for the sake of maintaining their integrity.

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