

Space barons

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My first encounter with what would become Richard Branson's business empire was in 1981. BBC DJ John Peel played a track, "Act of Affection," from the Wailing Souls' new album *Fire House Rock*. I liked the song. Skeptical that I'd find the LP in my local record store, I bought it from Branson's mail-order company, Virgin Records.

I hadn't thought much about Branson and his businesses until this past summer. On 11 July he and five others flew aboard Virgin Galactic *Unity 22* to the edge of space. Nine days later, former Amazon CEO Jeff Bezos made his own trip to the edge of space with three others aboard his company Blue Origin's *New Shepard*.

Although Branson founded Virgin Galactic to make money taking wealthy tourists into space, he sounds genuinely proud of the hundreds of jobs for astronautical engineers and others that Virgin Galactic and its partner companies have created. Blue Origin also wants to be paid to take people and cargoes into space, yet Bezos's space quest sounds visionary and altruistic. To quote a 2016 interview with him in *Insider*: "When it comes to space, I see it as my job to build infrastructure the hard way—I'm using my resources to put in place heavy-lifting infrastructure so the next generation of people can have a dynamic, entrepreneurial explosion into space. . . . I want thousands of entrepreneurs doing amazing things in space, and to do that we need to dramatically lower the cost of access to space."

Reactions to the rival space barons among the people I follow on Twitter and Facebook were uniformly negative. How could Branson and Bezos spend so much money to send themselves into space? Surely, there are more deserving causes. What about mitigating climate change, abolishing poverty, or eliminating tropical diseases?

The indignation brought to mind my friend Patrick McCray's feature article "The contentious role of a national observatory" (*PHYSICS TODAY*, October 2003, page 55). Whereas in most rich countries, governments fund big astronomy facilities, in the US, many of the largest telescopes have been funded by rich benefactors.

Real estate investor James Lick (1796–1876) left money in his will to the University of California to build what would become the Lick Observatory. Railroad financier Charles Yerkes (1837–1905) paid for the University of Chicago's Yerkes Observatory. The foundation established by oil magnate John D. Rockefeller (1839–1937) paid for Caltech's Palomar Observatory. More re-

cently, the foundation established by Intel cofounder Gordon Moore (born in 1929) committed \$200 million to help pay for the construction of the Thirty Meter Telescope (TMT), a project led by Caltech and the University of California.

In his article, McCray recounted how the privileged access of a few elite universities to the biggest telescopes retarded the development of equivalently powerful national facilities that could serve astronomers at all US universities. The conflict persists. Although the TMT and its rival, the Giant Magellan Telescope (GMT), each have international partners, the two projects are essentially private, not national.

Equity of access aside, is it a bad thing when rich people fund science? Without the largesse of Lick, Yerkes, Rockefeller, and their philanthropic successors, the big telescopes they funded might not have been built at all. Arguably, by not funding a TMT- or GMT-sized telescope, which each have a roughly \$1 billion price tag, NSF could afford the equally expensive Laser Interferometer Gravitational-Wave Observatory.

Lick, Yerkes, and Rockefeller are numbered among the robber barons of the Gilded Age. Among the most ruthless and successful of them all was railroad magnate Jay Gould (1836–92). Unlike the trio of telescope builders, today Gould is known, if at all, only for his unscrupulous business practices and vast wealth.

Compared with funding a giant telescope, taking a joyride in space seems frivolous, which might account for the negative reaction I found on social media to Branson's and Bezos's ventures. Perhaps compounding the image problem, science fiction abounds in sinister space corporations, such as Tyrell in *Blade Runner*, Weyland-Yutani in the *Alien* movies, Tessier-Ashpool in *Neuromancer*, and Mao-Kwikowski Mercantile in *The Expanse*.

Still, our sun will eventually turn into a red giant and incinerate life on Earth. To survive, humanity will need a new, distant haven that only spacecraft can reach. In so far as commercial space travel will make that possible, we should commend it however grudgingly.

