

tween Bateson and his best-friend-turned-bitterest-enemy, W. F. R. Weldon. Although Schwartz skirts the critical larger social issues at play in the debate, he beautifully explains the science that so passionately stimulated these scientists. When Bateson, nerves already a-jangle on the way to a public showdown with Weldon, gets into a handsome cab pulled by a horse whose tail seems to contradict Bateson's argument for the Mendelian inheritance of equestrian coat color, one can almost taste the stomach acid.

Most notably, Schwartz attempts to dethrone Thomas Hunt Morgan. He doesn't deny the pioneering Drosophilist's occasional brilliance or his ability to recognize when he must relinquish his stubborn antipathy to a good theory (a quality he shared with Bateson). But he limits Morgan's contributions to the establishment of the cytological basis of sex-linked inheritance and claims that Morgan cleared a path for the chromosome theory of heredity "contrary to his deepest wishes" (p. 176). He ignores what Horace Judson called "Morgan's deviation," his remarkable career-long trajectory from embryologist to geneticist and back to developmental biologist. Instead, he portrays Morgan as a dogmatic empiricist, calls him "loud and slightly obtuse," and lets his hero Bateson express what he himself seems to feel: "Morgan is a blockhead" (p. 174). Further, Morgan's famous students Alfred Sturtevant and Calvin Bridges get a pen-lashing, with the former portrayed as a sycophant and the latter as a thief.

Schwartz gets these views from the third of Morgan's most famous "fly boys," Hermann Joseph Muller. The brilliant and highly defensive Muller always felt he got a raw deal in the Morgan lab, and Schwartz becomes his mouthpiece. In Chapter 10 the book morphs; the last hundred pages are no longer a history of genetics but a minibiography of Muller. Effectively drilling through the small Muller archive at Cold Spring Harbor and the massive one at Indiana University, Schwartz continues to be resourceful and often perceptive, but his love for Muller and his bias against contextualizing the science hurt him here. Few scientists in the history of genetics have been as guided by political and moral principles as H. J. Muller. Although Schwartz addresses Muller's communism in rich detail and at least acknowledges his eugenics, he gives us no real insight into where these ideas came from. When Muller's eugenics eventually appears, Schwartz treats it blandly, without explaining how human improvement guided Muller's scientific choices. He doesn't examine *Out of the Night*, Muller's popular eugenics book, or any of his other eugenic writings. Nor

does he discuss Muller's post-Nobel career as a public figure: for a time he was the most famous American biologist and the leading spokesman on the dangers of radiation. Schwartz provides materials for the study of Muller, but the much-needed reinterpretation of the black sheep of the fly group requires a biographer willing to grapple with his complex nature and problematic social views.

The "... to DNA" part of the book is achieved in a breezy epilogue. Like a tour guide who needs a cigarette, Schwartz shoves us toward the museum exit, waving a finger at Watson and Crick—sorry, no time for the genetic code—gene-mapping, RFLPs, the gene for Huntington's disease, the Human Genome Project, and the HapMap. In the closing paragraphs, he hints at the association between modern genomics and Muller's eugenic vision, a vital theme whose full treatment awaits future works.

Only important books are worth criticizing. *In Pursuit of the Gene's* readability makes it a good choice for undergraduates, and its revisionist narratives make it something for scholars to reckon with.

NATHANIEL COMFORT

**Asif A. Siddiqi.** *The Red Rockets' Glare: Spaceflight and the Soviet Imagination, 1857–1957.* xiv + 402 pp., illus., tables, index. New York: Cambridge University Press, 2010. \$85 (cloth).

*The Red Rockets' Glare* covers a hundred years of Russian and Soviet popular fascination with spaceflight, from the birth of the visionary Konstantin Tsiolkovskii to the launch of *Sputnik*. This thoroughly researched book draws on extensive Russian archives to challenge several basic assumptions of the historiography of the Soviet space program: that this program had roots in the Bolshevik embrace of science and technology; that the Great Terror dealt a severe blow to nascent Soviet rocketry; and that the state played the key role in a postwar space initiative, resulting in the launch of *Sputnik*. Asif Siddiqi assertively shifts the agency to informal networks of space enthusiasts, which operated outside official settings and subtly influenced state policy by arousing a broad public interest in spaceflight. This engaging and provocative book brings the prehistory of Soviet cosmonautics to the forefront of debates among historians about the interaction of science and technology with wider culture and about the role of govern-

ments in shaping “Big Science” or, in this case, “Big Technology.”

Siddiqi locates the origins of the Russian space fad in cultural traditions that preceded the Bolshevik drive toward technological modernity. He traces the prerevolutionary public fascination with spaceflight to science fiction writings, popular science works, and mystical teachings of Cosmist philosophers. The Bolshevik revolution, according to Siddiqi, did not produce a major break in this tradition, but merely energized these trends by adding a utopian technological component.

Popular imagination began merging with practical engineering in the 1930s, as groups of rocketry enthusiasts started self-organizing into research laboratories with little or no support from the state. This remarkable portrayal of “science from below” (p. 8) stands in stark contrast to the traditional historiographic picture of increasing centralization and state control of Soviet science under Stalin. The consolidation of these groups into government-supported structures occurred on their own initiative, rather than as a result of pressure from above. This pact with the state eventually backfired, however, as several leading rocketry engineers, including the future Chief Designer Sergei Korolev, suffered prosecution during the Great Terror. Siddiqi shows that, contrary to popular myths, these purges were not a punishment for space aspirations but the result of local technical disputes, and they did not fundamentally alter the trajectory of Soviet rocketry research.

Siddiqi painstakingly documents the Soviet government’s concerted effort to recover and appropriate German rocket technology and expertise at the end of World War II. He argues that during that period a close-knit, informal social network of military and civilian rocketry specialists was formed; this became the backbone of the Soviet missile and space programs and later spread its influence over the entire defense industry. Siddiqi’s argument might be extended beyond the spaceflight case to suggest that one might look for the roots of major achievements of Soviet science and technology under Stalin in patterns of collaboration across informal social networks, rather than in the bureaucratic mechanisms of the Stalinist state.

Siddiqi’s enthusiasm for the role of “informal” postwar networks might be moderated somewhat, however, by the fact that practically all the members of these networks were working in linked government structures. Their informal networks emerged in response to government needs, as a means to overcome barriers and bottlenecks in the state bureaucracy. Although

the state did not directly organize these networks, it created the conditions and the need for them. The postwar networks of rocket engineers and managers were thus quite different in their origin and mode of operation from the loose voluntary associations of amateur space enthusiasts of the 1920s and early 1930s. Perhaps the rigid opposition “the state bureaucracy vs. informal networks,” maintained throughout the book, might be qualified by pointing to “hybrid” informal networks that originated within state structures. It is worth comparing space engineers’ networks to similar networks in Soviet biology, whose complex interactions with the Soviet science bureaucracy have been thoroughly analyzed by Mark B. Adams and Nikolai Kremontsov.

The crucial step from the first Soviet ICBM to *Sputnik*, Siddiqi argues, was made possible by an unusual alliance between informal networks inside and outside the secret Soviet missile program. Leading rocketry engineers, fascinated with the idea of spaceflight, could not speak out publicly, but they found effective spokespersons in space enthusiasts among journalists and popular science writers. This skillful shaping of public opinion armed the leaders of Soviet rocketry with arguments that eventually persuaded the Soviet political leadership and led to the launch of *Sputnik* on top of a modified ICBM.

While Cold War–era historiography largely treated popular Soviet discourse on science and technology as part of state propaganda, Siddiqi makes a strong case for reevaluating such simplistic notions. The *Sputnik* story suggests that the Soviet space fad was initiated by well-connected groups of space enthusiasts who used government-controlled media channels to further their own agenda, which had little to do with the state’s political or ideological priorities. Moreover, instead of passively reflecting state policies, the popular Soviet fascination with spaceflight directly affected the top-level decision to launch *Sputnik*. Siddiqi argues that the Soviet state followed, rather than directed, mass enthusiasm for space exploration. It is worth asking, however, what role the state had played in shaping the cultural environment that gave rise to such enthusiasm.

Historians who study any large, state-supported scientific or technological projects will find many fresh insights in Siddiqi’s book. The rich cultural and social fabric of *The Red Rockets’ Glare* perfectly complements his previous books that addressed political, institutional, and technical aspects of the history of Soviet cosmonautics.

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