the restricted form of Hamilton's principle and make no mention of generalized momenta (which can be particularly valuable in the treatment of impacts in multibody systems) in their discussion of impulse and momentum. This omission appears inconsistent with the authors' inclusion of other formulas and sections associated with multibody systems.

The authors' terse presentation of associated theory will make the book attractive to some users and unattractive to others. Applications-oriented students, instructors, and practitioners will probably approve of this format and like the text, which often reads similar to a handbook with its many useful summary tables of formulas. By comparison, theory and/or fundamentals-oriented individuals will most probably not appreciate it. Thus the appropriateness of this volume as a course text critically depends on the instructor's teaching goals and style. It should serve well as a reference for the practitioner with modest dynamics experience.

On the negative side, the material presented in this book seems to duplicate that presented by the first author in another of his books, *Dynamics of Mechanical Systems.*[4] At roughly 750 pages, that competing text is longer and contains more applications-oriented sections, but it has the same derivations and uses many of the same figures and examples. The discussions are not identical, but they are sufficiently similar (although the order of presentation is somewhat different) that one must have some reservation about the need for this new text.

References

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Newton's Tyranny: The Suppressed Scientific Discoveries of Stephen Gray and John Flamsteed

David H. Clark and Stephen P. H. Clark, W. H. Freeman and Co., 2001, 188 pp., $23.95, ISBN 0716742152

For those of us who make our living applying Newton's laws of motion, enjoying a book that tries to take our hero down a few notches is at best a guilty pleasure. Taken on its own terms, however, *Newton's Tyranny: The Suppressed Scientific Discoveries of Stephen Gray and John Flamsteed* proves to be an entertaining account of a fertile period in the history of science. The authors, David H. Clark and Stephen P. H. Clark, make the case that we owe some gratitude for the technological advances of the eighteenth century to several of Newton's contemporaries, at least one of whom Newton himself may have barred from receiving well-deserved recognition. David Clark is a well-known historian and a former research director at the Engineering and Physical Sciences Research Council in the United Kingdom. Stephen Clark teaches history in London and is David Clark's son. The authors are eager to revise the viewpoint of three centuries of hagiographers (the Clarks' term), which is that Isaac Newton's contributions are those of a selfless, near-saint of a man. Instead, the Clarks interpret events in a way that depicts Newton's actions as self-serving, tyrannical (also their term), and even cruel.

Newton's vengefulness and his habit of alienating his colleagues are well documented. This work is one of several recent revisionist histories that portray Newton as an obsessive, fervidly quarrelsome figure, including Michael White's *Isaac Newton: The Last Sorcerer* (Helix Books, 1998), which describes his involvement with alchemy and heretical Christian beliefs. The contribution of *Newton's Tyranny* to this field is the Clarks' explanation of how Newton hamstrung the career of Stephen Gray, a dyer and amateur scientist.

The book spans several decades, the 1660s through the 1720s, when modern science was in its infancy. Isaac Newton published his *Philosophiae Naturalis Principia Mathematic* during this period. The first edition of that work, published in 1687, builds on the earlier work of Copernicus, Kepler, and Galileo and demonstrates mathematically his universal law of gravitation, among other things. During this time John Flamsteed was Astronomer Royal at Greenwich, where he was engaged in a decades-long effort to provide precise star catalogues and other astronomical observations. Newton hoped to apply his laws to the motion of the moon with the help of Flamsteed's observations. In doing so not only would he confirm his own theories, but by predicting the moon's motion he also hoped to provide a "killer app" for the problem of longitudes, the pressing question of how to determine a ship's longitude at sea. Newton was impatient for Flamsteed's observations. The Clarks argue that Flamsteed's unwillingness to release the observations until they were completed to his exacting standards upset Newton to the point that he malevolently chose to use his influence at court to force the premature publication of Flamsteed's life's work. Ultimately Newton would purge even grudging acknowledgment of Flamsteed's contributions from the second edition of the *Principia*. (John Harrison would famously solve this problem in 1762, when he would demonstrate a clock accurate to 5 s during an 81-day journey from England to Jamaica. His demonstration showed the feasibility of propagating forward a known longitude at the start of a voyage using only simple measurements during the trip. Despite all of Newton's machinations, good clock making rather than ingenious theories cracked this nut.)

The authors argue that Stephen Gray was caught in the middle of the feud between Newton and Flamsteed. Although likely unfamiliar to most readers, Gray dabbled in electrical experiments that paved the way for the next century's astonishing advances in electricity and magnetism. Among these experiments were several that demonstrated that electricity stored in one body could "flow" to a connected body. It was Gray who noted the difference between "vitreous" and "resinous" electrical charge, a distinction that Benjamin Franklin would later recast as "positive" and "negative." In 1729, Gray sent a current 650 ft along a conductor by rubbing a glass tube attached to one end. The Clarks point out that this principle is the basis of electronic communications and argue therefore that Gray deserves recognition as a grandfather of our modern telecommunications revolution. The connection is something of a stretch, considering that Gray never showed the insight into the fundamentals or the implications of his results that was characteristic of those who would follow him.

Gray was also a talented amateur astronomer. He began corresponding with Flamsteed some time before Newton and Flamsteed had their falling out. The Clarks posit that Newton knew of their friendship and that Newton's eventual appointment of Gray as an assistant at Newton's competing observatory at Trinity College was not meant in recognition of Gray's skill as an astronomer, but merely as a sign of disrespect toward Flamsteed. At the same time, they argue that it was Newton who prevented publication of Gray's imaginative experiments in electricity in the *Philosophical Transactions* of the Royal Society merely because of Gray's friendship with Flamsteed. After Newton's death, Gray's work began to be published.

The Clarks' thesis is consistent with Newton's well-known feud with Leibniz over the development of the Calculus, and so their interpretation of these events is certainly plausible. But overall the Clarks' interest is more Stephen Gray than it is Newton. The historical narrative is interlaced with dramatizations of historical facts drawn from correspondence and other contemporary accounts, including some original source material on Gray that has not appeared elsewhere. Despite this documentation, the authors can hardly be said to be balanced in their treatment of this subject. The narrative's hyperbolic, sometimes over-the-top, and often aggressive pursuit of its thesis—that Newton systematically suppressed Gray's work out of self interest and pettiness—is strangely reminiscent of the fervor the Clarks ascribe to Newton. Rather than a rigorous academic exercise, it will probably serve as a pleasant diversion for those interested in the history of science. *Newton's Tyranny* will offer the most appeal for these readers.

Plaques, biographies, and place names commemorate the lives of Newton and Flamsteed. Countless histories of the scientific revolution they helped usher in memorialize their achievements. Unlike Newton and Flamsteed, Gray's work has enjoyed no such fame. Apart from a few academic papers, this book is in fact one of the few ready sources for information on this largely forgotten scientist. Thanks to the Clarks' efforts, their account of Gray's contributions has helped right a wrong that has persisted for more than three centuries.

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