# The Rehabilitation of Olinde Rodrigues

**Mathematics and Social Utopias in France: Olinde Rodrigues and His Times.** *Simon Altmann and Eduardo L. Ortiz, editors, American Mathematical Society, Providence, Rhode Island, 2005, 168 pages, $49.00. Contributors to this volume: Simon Altmann, Richard Askey, Paola Ferruta, Ivor Grattan-Guinness, Jeremy Gray, Eduardo L. Ortiz, Barrie M. Ratcliffe, David Siminovitch, and Ulrich Tamm.*

When I received a message from Eduardo Ortiz, now retired from Imperial College, London, that he had edited a collection of articles on the mathematician Rodrigues, I responded: "Rodrigues? Who is he? Ah, yes: Rodrigues of the Rodrigues Formula?" Eduardo e'd back: "The very same." Well, I knew the formula, but I knew absolutely nothing about the man.

### BOOK REVIEW
*By Philip J. Davis*

I wondered how the editors got on to this (to me) obscure fellow. Well, Ortiz and Altmann are connected in that both are native Argentineans. Ortiz, in his student years, wondered whether Rodrigues was a Spanish mathematician. That turned out not to be the case (he was, in fact, French), but Ortiz later found Spanish origins for Rodrigues that go back to the 15th century. As regards Altmann, also now retired, he was lecturing on the theory of metals when he got interested in Rodrigues's work in connection with Euler rotations in crystallography.

Standard histories of mathematics give Rodrigues short shrift. Boyer-Merzbach doesn't mention him. Morris Kline gives the Rodrigues formula as I knew it:

$$P_n(x) = (1/(2^n \, n!)) \, d^n \, (x^2 - 1)^n \, /dx^n,$$

where $P_n$ is the $n$th Legendre (orthogonal) polynomial. Kline also remarks that Rodrigues had another formula for differential geometry, but he says nothing about the man. Grattan-Guinness does a bit better: He mentions the formula, though not explicitly, placing it within special function theory. He adds, "It was found in 1816 by Olinde Rodrigues, one of the early Jewish mathematicians in the modern era, as part of his doctoral thesis in the French Université system." The *CRC Concise Encyclopedia of Mathematics* offers Rodrigues's curvature identity and notes that Rodrigues gave an operator definition of a function but, strangely, fails to cite the $P_n(x)$ formula displayed above. Search engines do much better with Rodrigues, inevitably making one wonder about the future of books. But speculating on that topic is for another time.

What we have in the present volume is a collection of ten articles covering (1) Rodrigues's family and personal life, including the position of Jews in early 19th-century France, (2) Rodrigues's mathematical work, (3) post-Rodrigues mathematical developments that can be seen as relating to his work, (4) Rodrigues's close association with the social utopian Saint-Simon and, after the latter's death, his relation to the Simonian movement, and (5) the early feminism of Rodrigues and his wife, Euphrasie.

Knowledge of the life of (Benjamin) Olinde Rodrigues (1794–1851) has been assembled from a large variety of derivative sources. Rodrigues was born into a wealthy banking family. He got his doctoral degree from the Université de Paris in 1815. In that same year, restoration of the reactionary Bourbon monarchy under Louis XVIII closed off all possibilities of a university position for Rodrigues; one assumes that he would have preferred such a career. Undaunted, however, he went into the insurance business, producing with a colleague actuarial tables that would be used in France throughout the 19th century. He later became a very successful banker.

Rodrigues produced only 17 mathematical papers but wrote extensively about social, economic, and political matters, on banking and on alleviating problems of labor. From 1816 to 1837, Rodrigues produced no mathematical papers. Between 1838 and 1845, he wrote eight, including one on transformation groups

*The social consciousness of some few but often very prominent mathematicians can be so strong as to overcome their desire to produce more and more mathematics.*

that some consider his chef-d'oeuvre. Taken at face value, this is a remarkable achievement. How many of us could get back into mathematical shape after doing something else (writing reviews or becoming a provost, say) for two decades? Perhaps Rodrigues was theorematizing all along but didn't have the time to write up his findings properly. He left no personal papers, so we can't tell. We can safely conjecture, though, that he kept abreast of the contents of the mathematical journals of the day.

In 1823, during Rodrigues's hiatus from mathematics, Claude Henri de Rouvroy, Comte de Saint-Simon (1760–1825), entered his life. Their initial encounters were so bizarre that the story is worth outlining. Saint-Simon, a visionary aristocrat who fought in the American Revolution at the Battle of Yorktown, not only survived the Terror (1793–94) but made a lot of money as a result of it, through land speculation; he then lost the money through bad outlays. A charismatic and somewhat megalomaniacal figure, Saint-Simon had vast plans for the reorganization of society along utopian socialistic/industrial/scientific lines that would constitute a lay religion.

In January of 1823, Rodrigues met Saint-Simon at the home of a banker friend, a certain Ardoin, and was immediately taken by Saint-Simon's personality and ideas. In March of that year, finding himself totally impoverished, abandoned and desperate, Saint-Simon loaded his revolver and shot himself in the head. One bullet worked; Saint-Simon lost only an eye but was henceforth an invalid. Several months later, Ardoin brought Rodrigues and Saint-Simon together, hoping that Rodrigues would provide financial help. Rodrigues did, and he did much more as well. It was Rodrigues who met the publication costs of *Nouveau Christianisme*, a book in which Saint-Simon expounded his views. Already harboring liberal views, such as the equality of women and of people of all races, Rod-rigues became a leading Saint-Simonian.

Shortly after Saint-Simon's death, in 1825, Rodrigues was responsible for turning these ideas into a movement, which he supported financially. The plot then thickened: Under the leadership of Barthélémy-Prosper Enfantin, a man who had been Rodrigues's pupil at the

Polytechnique (the hiring restrictions having been relaxed) and later his cashier, the movement grew into a cult. By 1832, Enfantin, himself a charismatic megalomaniac, had turned Saint-Simonism into a communalist/utopian/mystic/quasi-religious movement advocating free love. Rodrigues, who had more conventional views on social reform, was totally turned off and broke with Enfantin and with the group that he (Rodrigues) had created.

The experience of being swept away as Rodrigues was follows a pattern: Discarding traditional religious affiliations, one goes over, with religious fervor and often with blindness, to idealizations, social or otherwise. I have seen this with my own eyes. For numerous decades after the Russian Revolution of 1917, mathematicians and scientists espoused the cause of Marxist socialism, often with a strong charismatic figure lurking in the background, be it a Stalin, a Trotsky, or some strong local personality. I think that today the world mathematical community, as a whole, is fairly low on social consciousness. As evidence of this: Bernhelm Boos-Bavnbek in Denmark has published extensively about the connection between mathematics and war. In the last year or so he has lectured on the topic. He reports that his audiences don't really want to hear about such things.

Here's the line-up of contributions: Altmann, Siminovitch, Ratcliffe, and Ortiz describe Rodrigues's times, his family circle, his career as a mathematician, his work as a banker and social reformer. Ferruta writes about "the woman question" within Saint-Simonism. Grattan-Guinness discusses Rodrigues's early (1813–16) work in mathematics. Askey discusses his work on Legendre polynomials and later extensions. Tamm takes on Rodrigues's combinatorics. Gray does the great (1840) paper on transformation groups, and Ortiz winds up the book with Rodrigues's work on rotations and their relation to quaternions.

Ortiz appears to have a penchant for rehabilitation. In a recent article, "Babbage and French Idéologie: Functional Equations, Language, and the Analytical Method," Ortiz rehabilitates and repositions the work of Charles Babbage on functional equations. The volume under review is both a rehabilitation of Rodrigues as regards mathematics and a reminder that the social consciousness of some few but often very prominent mathematicians can be so strong as to overcome their desire to produce more and more mathematics.

*Philip J. Davis, professor emeritus of applied mathematics at Brown University, is an independent writer, scholar, and lecturer. He lives in Providence, Rhode Island, and can be reached at philip_davis@brown.edu.*