

David A. West. *Darwin's Man in Brazil: The Evolving Science of Fritz Müller.* Tallahassee: University Press of Florida, 2016. 344 pp. \$79.95, cloth, ISBN 978-0-8130-6260-0.

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Commissioned by Casey M. Lurtz (Johns Hopkins University)

David West's detailed study on the life and work of Fritz Müller, an evolutionary biologist and colleague of Charles Darwin, is the culmination of three decades of inquiry. The depth and scope of research on this singular figure is impressive, spanning five countries and drawing on a startling number of archives, universities, libraries, and other institutions. Although West himself was trained in genetics and ornithology at Cornell University, he became interested in butterflies and began researching in Brazil. West became interested in Müller after a butterfly-oriented research trip to Brazil in 1982, undertaken in the midst of his long career teaching biology at Virginia Tech University from 1962 to 1998. Thus inspired, West and his spouse Lindsay embarked on a study of the life and work of Fritz Müller, a life that was marked by both scientific accomplishment and personal tragedy. The result is a thorough examination of a human figure and a scientist's achievements.

Unlike other scientists who conducted natural history in South America, Müller is not well known. He didn't write intrepid tales of adventure nor, apparently, did he pen the racist clichés about living in Brazil that were *de rigueur* during his lifetime. Appealingly, there are no conquest narratives. Rather, Müller published papers about butterflies, fertilization of orchids, honeybees,

climbing plants, crustacean, termites, and leaf-cutter ants. One of the things that the reader of this book will quickly note is the detail, care, and precision Müller took with his studies. His conclusions and analysis are the result of steady observations sustained over time and seem a striking contrast to the harried and pressured way in which science is often conducted today.

West begins Müller's biography with a chapter on his early life in Germany. Müller went to university to become a physician, but because he was a professed atheist, was denied a diploma. In one of his most interesting chapters, West describes how Müller refused to pledge a Christian oath that required he say, "so help me God and his sacred Gospel" (p. 27). Although Müller tried to petition out of having to say the phrase, he was refused. Ultimately he finished his medical training but did not receive a degree and so became a private tutor after graduation. Eventually he moved to southern Brazil as part of a new colony established by Hermann Blumenau, a German chemist. Although I would have liked more information about the history of German colonization of Brazil and the impact those colonists had in Brazil, West does say that Müller's desire to relocate was not driven by the lure of Brazil. Rather, Müller wanted to escape the unbearable persecution of nonbelievers and nondenominational associations in

Germany. Brazil was an avenue toward a life of freedom. Müller also saw Brazil as an opportunity to use his medical training in a place where doctors were scarce. While he did use his medical training, he also taught students at the provincial lyceum arithmetic, algebra, geometry, and natural history. Eventually he tired of teaching and proposed to the province that he become a “provincial naturalist,” collecting and studying the native and foreign plants of the area and ascertaining how best to cultivate and distribute them, a position he held for many years. Thus, West depicts Müller as both a pioneer and man of conviction. Although most of us are aware that evolution was controversial because of its questioning of religious creationism, the chapter communicates the struggle, depth, and impact this tension had for individuals such as Müller.

Ultimately, West seeks to situate Müller within Darwin’s networks, giving Müller the recognition he deserved as one of evolution’s key interlocutors. He succeeds in showing the ways in which Darwin relied on Müller for important field observations and experiments as well as the way in which Müller relied on Darwin for inspiration, support, and direction. In Müller’s first book *Für Darwin* (Facts and Argument for Darwin), Müller tests Darwin’s theories through an analysis of crustacea. Rather than rejecting Darwin outright, he conducted experiments in painstaking detail to support the tenets of Darwinism, contributing to the eventual acceptance of evolutionist thinking. West notes that Darwin believed that Müller’s book was “perhaps the most important contribution in support of his [Darwin’s] ideas” (p. 93). This argument is furthered by West’s chapter on the scientist’s testing of whether butterflies are born knowing exactly which flower had nectar, or if this skill was learned, and his later research on predation in butterflies. Müller’s research suggested that butterflies learn by experience which flower head has nectar, something that was confirmed a century later. As well, Müller’s research into the ways butterflies adopt the warning traits

of other butterflies to ward off similar predators, known today as Müllerian mimicry, was an important means of demonstrating both Darwin and Müller’s claims that natural selection was a principle for change. Although Müller is not well known, West argues that his research was influential in the scientific community and should be recognized.

Amongst the ample documentation of Müller’s individual experiments and research papers is a noteworthy subplot about the way in which scientific knowledge functioned and circulated in the mid-to-late 1800s. Müller’s observations were precise and time-consuming. For example, he watched the pollination of the lantana plant to claim, rightly, that old flower heads were kept to remain conspicuous to pollinators. What becomes evident throughout West’s treatment of Müller’s detailed and honed observation was that science was as much a human network as it was an intimate relationship with the natural world. His teachers in Germany, for example, were professors who had been influenced by Alexander von Humboldt and his collections from South America. As the only Darwinist in Brazil, Müller relied on a global network of scholars, mostly located in Europe and the United States, to advance scientific understanding of evolutionary theory. Papers were circulated through colleagues and correspondence, sometimes taking years to come full circle.

The majority of the text focuses on the science of Müller. Consequently, the main audience will be those interested in a history of evolutionary biology. Although nonscientists are not precluded from enjoying the book, for those without an interest in this area, the discussion of Müller’s experiments and his findings would be enhanced by a general knowledge of evolution and even the ways in which evolutionary biology is understood today. As a non-STEM reader, I often found myself wondering about the present-day implications of Müller’s observations and experiments. Although

West does a good job in pointing out how Müller's studies and conclusions figure today, the amount of information can be blurring for those without a specialization in the field. In this sense, there is a missed opportunity of bringing Müller's contribution to a wider audience in that, with the exception of the butterfly chapter, the work is perhaps too dense to be of interest to a broader or more casual audience. My sense after reading the book was that West's intention was to be a serious and thorough examination of a not well-known scientist, a scientist's scientist if you will, and in that he succeeded.

All that said, I would have liked more information about the politics surrounding Müller and the German colony in Brazil. A deeper contextualization of the ways in which Müller and the colony were received in Brazil at the time is particularly deserved since West discusses the way in which, although Müller was located in Brazil, he was still very much in a European world of science. Many of the colonists did not want to lose their German identity, language, or habits and become too Brazilian in either language or behavior. This piqued my curiosity and I wanted to understand more about the politics and history around the colony and how other scientists in Brazil impacted Müller's work. I wondered about settler colonialism and the way in which scientific pursuits, even if they contributed to our understanding of evolution, have a wider reach. Were foreigners better received than locals? Was their scientific study treated differently? Why was a German doctor chosen as the provincial naturalist? Was the knowledge Müller gained by being in Brazil known by indigenous groups who lived in the area? Who did he have contact with? In one sense, Müller was similar to Humboldt in the quantity of collecting and observation he acquired. In another sense he was vastly different, conducting fieldwork for life in a growing colony. These connections might have been made clearer and would have supported West's argument about the unique qualities of Müller as a scientist as

well as the exceptional qualities of his contributions and research. Finally, I wanted more information about whether or not Müller's work impacted the collective understanding of, and study of, race at the time. West mentions his correspondence with Alexander Agassiz, son of the famous polygenist Louis Agassiz, and a discussion of the ways his research did or did not impact understandings about race would have been welcomed.

Still, the extensive research about Müller is impressive and I hope this book will do what it intended—spur thinking and further research into the life of Müller, providing his contributions with the recognition they deserve. This is not inconsequential.

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