



understanding of the most persistent structures of post-Second World War biosciences. Gone are the days in which molecular biology can be given broad primacy as *the* transformative agent of change in the second half of the twentieth century. Instead, Matlin's work argues that we should be looking more carefully at the experimental approaches that emerged in this period. The hyper-reductionism of molecular biology ultimately was not nearly as successful at understanding the biology of life as the way cell biologists deployed molecular techniques in a more contextually sophisticated epistemic approach that still resonates to this day.

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## **Amanda Lanzillo, *Pious Labour: Islam, Artisanry, and Technology in Colonial India***

**Berkeley: University of California Press, 2024. Pp. 246. ISBN 978-0-520-39857-3. £30.00 (paperback).**

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Technical manuals are curious historical sources. The insight they offer into processes and technologies of artisanal creation can certainly be valuable, but as storytelling devices these texts confound historians by how much they do not say. In *Pious Labour*, Amanda Lanzillo reads vernacular manuals and community histories from colonial north India (nineteenth to twentieth centuries) as exemplary sources for understanding religion, class and their intersections with artisan identity during industrialization. Whereas scholars have shown the importance of small workshops and local production in relation to the factory, the author uses her unique evidence base to paint a picture of distinct labouring communities, combing both colonial and small community archives to elucidate the broader context for labour, technology and the technical authority of Muslim artisans. Lanzillo responds to Projit Mukharji's call in *Doctoring Traditions* (2016) for understanding the 'braiding' of science and other kinds of knowledge by demonstrating how knowledge and Muslim artisan identity change in relation to one another.

The author deliberately refuses to disentangle the technical and religious practices of Muslim artisans, instead using her cases to ask bold questions about both the importance of piety for artisanal production and the crucial role class and labour have played in the history of Islam in South Asia. Lanzillo's analysis is sharpest in attending to class hierarchies within the South Asian Muslim community, highlighting how artisans contested encroachments on their practices and knowledge authority. The chapters of *Pious Labour* are fascinating intellectual journeys, utilizing a wealth of primary and secondary material to render artisan life as vividly as possible, putting texts into context with an almost ethnographic sensibility.

The first chapter addresses the labour of lithography; that is, the work of artisans in both government and community presses. Lanzillo places press workers in the context of scribal cultures, the language traditions of Islamate South Asia, and the genesis of Indian newspapers and presses. This history is brought up to the late colonial period

through discussions of changing caste and educational norms for lithographic work, the unionization of press workers and consequent labour strikes, which were among the earliest to manifest in the history of South Asian labour movements. The author attends to how the labour of press workers created the very texts which are central to her analysis, and indeed many of the texts upon which historians of South Asia draw.

The second chapter on metallurgy opens with a fascinating excerpt from an 1872 text – the title translates to *The Gift of Plating through Electricity* – which places the novel technology of electroplating within a genealogy of Islamic alchemy. Writing about alchemical change in Urdu is a tradition to which the author, Hafiz Anwar ‘Ali, professes lineage and from which he claims authority. The category of *kimiya* characterizes the work of artisans like ‘Ali, as artisanal chemical practices that existed between traditional alchemy and modern chemistry. Here we get tantalizing insight into the nature of local chemical knowledge, such as how acids for electroplating were derived from unripe apricots. Lanzillo also demonstrates how we can infer the text’s reception through details such as the inclusion of visual aids, the format of question and answer and the usage of verse, which points to a practice of reading aloud. Such techniques are carried forward in other chapters, making explicit the author’s unique methodology.

The subject of the third chapter is tailoring, a practice which was taken up by different communities for different ends. Muslim artisans claimed sewing as a respectable tradition for men, and Muslim women claimed sewing as an important skill for the economic and moral uplift of their sex. Building on important scholarship by David Arnold and Nira Wickramasinghe, Lanzillo explores how Muslims related to the sewing machine both in text and in practice. In this chapter, as in all of them, the author deftly illustrates how material, text, identity and economic change went hand in hand in ways that cannot be easily separated.

The following two chapters – Chapters 4 and 5 – both address labour related to railways and public works, the former through carpentry and the latter through boiler-making. The two chapters share many common issues, such as formal recruitment schemes for labour, migration of labour to cities and workshops, industrial education, and the encroachment of middle-class ideologies on the authority of these technical knowledge traditions. The author pays close attention to class formations, through mechanisms such as wages, educational qualifications and the intended audiences of certain texts based on writing style and implicit biases. The context of the burgeoning industrial economy in colonial India is one of which the author is astutely aware; however, readers unfamiliar with this might find the wider picture difficult to ascertain. In this way, Lanzillo’s community-focused approach for the chapters has some drawbacks for how we understand the broader landscape of industrial and artisanal labour in South Asia.

The final chapter addresses stonemasonry and the construction of mosques and tombs, where the labour in question has direct links to religious practice. Yet the texts the author introduces argue that the expression of Muslim identity was inherent in all forms of construction and architecture. Public-works departments also feature here, as a major employer for stonemasons and the like. This is one area where the proliferation of engineering education displaced artisanal stonemasons as the ultimate authority for building construction, even as their labour remained highly valued.

The conclusion boldly posits that Partition was a violent and disruptive force in the history of artisan Islam, making it difficult to trace the histories of these communities into the postcolonial period. Lanzillo urges readers nevertheless to see artisans as a crucial part of the Islamic history of South Asia. This masterful book contributes to the history of technology, labour history, religious studies and modern South Asian history.

Historians of science who have argued for the vital agency of artisans in the production of knowledge will find many resonances and much to learn from this work.

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## Catherine Jackson, *Molecular World: Making Modern Chemistry*

**Cambridge, MA: MIT Press, 2023. Pp. 460. ISBN 978-0-262-54554-9. \$75.00 (paperback).**

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Synthetic chemistry has always been about making molecules, but not in the way we might expect. In *Molecular World: Making Modern Chemistry*, Catherine M. Jackson provides a compelling alternative history of the origins of synthesis in the nineteenth century. Existing histories of synthetic chemistry have largely focused on structure theory, arguing that it enabled chemists to modify molecular structures in order to produce desired targets. As Jackson points out, these histories have resulted in a contradictory and unsatisfactory image of chemistry in this period. Instead, Jackson shifts the emphasis from *molecules* to *making*. The central claim is that synthesis was never about making target molecules, but originated as an investigative tool, thus challenging us to reconceive the foundations of synthetic chemistry as built ‘on practice not theory’ (p. 10). Drawing from two decades of historical research and training as a synthetic organic chemist, Jackson makes a persuasive case for reorienting the narrative of organic synthesis around experiment and practice and forms an important contribution to studies in the history of chemistry, scientific practice and material culture.

In contrast to today’s definition, synthesis in the 1840s, Jackson contends, was a method that enabled chemists to identify molecular formulae as well as to develop theories about what molecules are made of. Only by the end of the nineteenth century did synthesis mean something more recognizable to us today – the purposeful production of naturally occurring substances in the laboratory. This transformation was facilitated by ‘laboratory reasoning’ (pp. 8–9), the concept that Jackson uses to describe how chemists mediated experiment and theory in this period. Though it resists easy definition, a shorthand might be to define it as how new empirical knowledge was gained from a shared methodological, technical, theoretical and instrumental base, or, conversely, that it was not cutting-edge theories driving forward the scientific process. For those who have spent time in a laboratory, this might be more intuitive, but for others, the essence of the phrase can be grasped from the detailed analysis of numerous archival sources across the book’s nine chapters.

Jackson argues that the distinctively modern chemistry in the book’s subtitle was achieved through this laboratory reasoning. ‘Experimental order’ (p. 309), and all its reactions, reagents and glass tubes, rather than structure theory, is what enabled the development of abstract three-dimensional molecules and the molecular world that we associate with chemistry today. Within this framing, the otherwise curious lack of molecular diagrams