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Chandra Mukerji, *Impossible Engineering: Technology and Territoriality on the Canal du Midi*. Princeton, N.J.: Princeton University Press, 2009. 304 pp. ill., maps, notes, bibliography, and index. \$ 35.00 U.S. (hbk.) ISBN: 9780691140322.

Review by Stephen Miller, University of Alabama at Birmingham.

Chandra Mukerji, a professor of communication and science studies, makes the case in this book about the Canal du Midi, a waterway built across Languedoc in the seventeenth century to link the Atlantic Ocean to the Mediterranean Sea, that the project emerged out of a new political logic, “impersonal rule,” and gave this logic potency at the expense of patrimonial governance. The Canal du Midi formed part of a Louis XIV’s propagandist effort to promote France as the New Rome, the center of a new European Empire. Mukerji argues that Louis XIV intended for the Canal du Midi, and other engineering projects of this sort, to make the country take on a perfect orderliness like the gardens of Versailles. Colbert, and the commission of nobles he convoked to evaluate the project, showed no interest in the Canal as a means of linking towns for commercial purposes. The minister wanted it for the navy, and the commissioners laid down the route in a manner intended to avoid the major towns and politically volatile settings.

Pierre-Paul Riquet, the entrepreneur who pitched the idea to Colbert, and who oversaw most of the construction, hoped to enhance his standing in Versailles and place his son in high office. He also hoped to gain tolls from the traffic on the Canal through his domains. Riquet insisted that part of the price for the Canal be his family’s ennoblement and the expansion of his fief to include the waterway itself. If the Canal du Midi ended up linking several towns of Languedoc, Mukerji contends, it was only because Riquet sought to benefit from the trade across his domains. He thus had the Canal include a port in Castelnaudary and a basin in Naurouze located where cargo coming from Revel would be transferred to and from large boats.

The crown created one of the funds for the construction of the Canal by authorizing Riquet, an experienced tax farmer, to foist the gabelle on Roussillon. This new salt tax, Mukerji recounts, provoked a fiscal rebellion, which in turn led to tardiness in the influx of funds for the project. Riquet had to use his own fortune to keep the construction of the Canal going. His family members inherited his debts, and to raise the money needed to complete the Canal, had to cede portions of it as fiefs, although they retained the rights in perpetuity. Those who purchased portions of the Canal from Riquet’s family acquired the right to skim off part of the profit of the commerce along the waterway.

The progression of the Canal from Toulouse eastward toward the Mediterranean involved engineering feats worthy of Riquet’s ennoblement and the sun king’s grandeur. Mukerji provides a crisp and absorbing account of as many engineering details as non-specialists could understand. The first half of the Canal to Trèbes required an elevation of 54-57 meters and then a descent of 113, at least 40 locks, and a trench of nearly 2 meters, 9 across on the bottom and 17 wide at the surface. Many of the initial locks failed to remain functional on account of sedimentation and water pressure. But as the builders experimented with solutions, they developed oval locks, which proved strong enough in diverse locations and soils to withstand the weight and stress, and beautiful and original enough to impress the

public. As the Canal mounted through the continental divide and the Montagne Noire, Riquet's builders had to divert springs and streams to fill it with sufficient water and assure the passage of boats. Mukerji provides a gripping account of the doubts, uncertainties, and feelings of triumph Riquet felt as the tests through the highlands succeeded. Colbert was sufficiently impressed to continue to order funding for the remaining construction to the Mediterranean.

Mukerji presents imaginative research to show that the most impressive engineering exploits would not have been possible without the contribution of regional artisans, peasants and women. Local stone cutters chiseled the foundation, and masons erected the walls, of the dam required to store the water needed for the Canal to flow through the Montagne Noire. These artisans used building methods from the shards of classical knowledge scattered across the region at the time of the Roman Empire and preserved in local contexts by the people for their daily needs. The laborers digging the channels knew something of ancient hydraulics and followed the contours of the land as the Romans had for their aqueducts.

Early modern men of letters had been aware for some time of the Romans' use of hydraulic cement but were unaware of the elements and techniques necessary to produce it. Hydraulic cement did not enter into the lexicon of engineering until the eighteenth century. Mukerji shows, however, that hydraulic cement was used on at least two parts of the Canal: the aqueduct-bridge of Le-Pont-Canal de Répudre and the terminus in the port of Sète. Local masons must have continued to use it after Roman times, Mukerji deduces, for the construction of fortresses, harbors, and shipbuilding facilities. Hydraulic cement was a feature of local construction, preserved from the Roman era, which scholars of the seventeenth century had failed to notice.

The contractors brought together women laborers, Mukerji surmises, on the sections of the Canal from the Montagne Noire to the Mediterranean where the knowledge of peasant hydraulic systems became essential. Households of the Pyrenees accustomed to migrant labor, scarce water sources, and distant pastures for their farm animals, had adjusted to their natural surroundings in ingenious cooperative ways to survive. It was the women, Mukerji writes, who had responsibility for household tasks requiring supplies of water and who had communicated and preserved among themselves the knowledge of Roman hydraulics needed to make life possible in their mountainous settings. One contractor responsible for the succession of locks in a staircase at Fonseranes may have employed women from the Pyrenees who had experience building dams to permit the floating of logs on mountain streams to mills. All of this work had been regional and communal in the Pyrenees, and the engineering feat accomplished in Fonseranes may have been facilitated by the peasant women's experience in regional cooperative labors. The engineers and local inhabitants fashioned a new engineering knowledge through collective memory and collaboration.

In this sense, Mukerji argues, the construction of the Canal advanced notions of impersonal rule inimical to the patron-client relations of patrimonial governance. The kings of early modern France, Mukerji suggests, had ceded authority and allocated of privileges in order to gain the loyal followers and personnel needed to build the absolutist state. The king had long relied on men of rank to rule the province, and these elites dominated local political life. Yet local nobles opposed the project and used their connections in Versailles in an effort to discredit Riquet's work and bring construction to a halt. They opposed the king's ambition to build the Canal and demonstrate his stewardship of the land. The skills needed to complete the Canal had nothing to do with the principles of rank. They permitted a bourgeois entrepreneur such as Riquet to mobilize intellectual resources and rise above his station. Mukerji indicates that the conservatism of local nobles succumbed to the power of the crown and to the knowledge and expertise of provincial inhabitants.

These were the dynamics of impersonal rule, and their demonstrated efficiency, once the Canal du Midi was up and running, could not be contained within the patron-client relations on which the regime

rested. Impersonal rule took official duties away from office holders and assigned them according to abstract criteria such as technical proficiency, material measures of usefulness, and engineering effects. "Territorial politics," the wielding of a new intelligence to create an infrastructure that could be called French, Mukerji claims, invested new dignity in interactive and fleeting forms of intelligence and fostered modern forms of political authority.

Mukerji offers Vauban's proposal for a *dîme royale* as an illustration. Vauban oversaw structural improvements to the Canal du Midi to make it functional toward the end of the seventeenth century. This sort of public service, Mukerji suggests, instilled in him an expansive outlook greater than the narrow concerns of personal advantage and rank. Vauban wrote plans for the *dîme royal*, rational fiscal policy and the well-being of the king's people as a continuation of the stewardship principles of good government used to improve the physical wellbeing of the kingdom. But the patronage system vital to the absolutist state was at odds with Vauban's plans for fiscal reform, and Vauban was exiled from the royal court as a madman.

All things considered, *Impossible Engineering* amounts to a fascinating lively-written book. If there is one aspect of the analysis which may not convince historians, it is the veritable impact of territorial politics and impersonal rule on the local nobility. All of Mukerji's references to the nobles make them out to be conservative landowners attached to the feudal past and consistently opposed to innovation. While this depiction no doubt reflects the reality, it is not sufficiently nuanced to encompass the inaugural boat ride, described by Mukerji, in which the leading nobles of Languedoc travelled along the Canal across Languedoc for the provincial inhabitants to see. Historians such William Beik, Jonathan Dewald, and Darryl Dee have noted the extraordinary ability of the nobility to renew itself, adapt to the initiatives of the central power, and remain the dominant class of the monarchy. [1]

In the decades following the opening of the Canal du Midi and the reign of Louis XIV, one is hard pressed to find further examples in which territorial politics and impersonal rule undermined the ascendancy of the nobility. Little progress was made toward the rationalization of the government, the economy or the laws during the eighteenth century. The nobles possessed complete security of tenure within the patron client relations and patrimonial governance of the absolutist state. The French nobility had never been as brilliant as it was in the century of the Enlightenment.

NOTE

[1] William Beik, *Absolutism and Society in Seventeenth-century France: State Power and Provincial Aristocracy in Languedoc* (Cambridge: Cambridge University Press, 1985), pp. 13, 140, 245-6, 295-7, 308, 314; Jonathan Dewald, *The European Nobility 1400-1800* (Cambridge: Cambridge University Press, 1996), pp. 9-10; Darryl Dee, *Expansion and Crisis in Louis XIV's France: Franche-Comté and Absolute Monarchy, 1674-1715* (Rochester, N.Y.: University of Rochester Press, 2009), pp. 60, 104, 144, 151, 162, 167-9, 173.

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