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Re-inventing the Ship: Science, Technology and the Maritime World, 1800-1918; 

Don Leggett and Richard Dunn in their introduction set the scene for this new book, aiming to re-invent the history of the ship during the long 19th century. Through their book they intend to bring together a variety of analytical approaches and to contribute to a range of historiographic debates, i.e. Staudemair’s well-known claim that tracing the detailed construction of technology often is considered dull by outsiders. The editors hope that, by reconstructing cultural contexts and social networks through historicist readings we can better understand how the peculiarities of British maritime cultures shaped technology.

Christopher Harvie discusses the re-invention of the ‘symbolic ship’ and British maritime trade and transport through literature and arts, by making intriguing references to Austen, Kipling and Marx. Especially Kipling’s work evoking the Great War helps to demonstrate Harvie’s intriguing approach of shedding new light on familiar topics through the lens of literature. Harvie’s reflections on coal and the coastal trade are another fascinating example of how the historiographic combination of art, culture and technology can lead us to new insights.

Crosbie Smith examines the history of the Royal Mail Steam Packet Company and the various networks that existed between ship owners, engine builders and ship builders. He explores the tensions between ship-owning companies and contractors and looks closely at the sites where social, economic and political change happens. Smith pays special attention to the so-called “Scottish Reformation” where Scottish and North-Eastern companies succeeded to build faster and cheaper steamers. Especially intriguing here is his detailed study of the alterations and changes to designs and the surrounding debates among the different stake-holders and practitioners, for example about the troubled positioning of boilers and crank shafts in the ship’s hull. Crosbie Smith convincingly shows how the employment of skills and practices is dependent on the often complex active engagement of human agents.

Oliver Carpenter places tramp ships in broader cultural context, contrasting different types of tramp ships, from modern well-kept vessels to old rusty „slab-sided tramps” which would reflect badly on business. He uses the Robinson Line, later Stag Line, of Northumberland to examine notions of trust: how ship owners had to trust ship builders, share-holders had to trust shipping companies, merchants had to trust ships, and ship owners had to trust their masters. The role of religious networks is significant here as are the connections between religious networks and public credibility, a point made before by Alison Winter in her work on Victorian science and beliefs. Carpenter demonstrates how the Robinson family’s association with the Methodist Church increased their trustworthiness and how „Weslyan Methodism was the religion of choice for eminent shipbuilders and merchants in the area, and central to establishing networks of trust.” (p. 59).
The family’s attending of church meetings added to the high regard of the family locally which in return helped with both practical business matters and contributed to shareholders’ faith in the Robinson family’s business.

Don Leggett in his chapter „Neptune’s New Clothes: Actors, Iron and the Identity of the Mid-Victorian Warship“ investigates the interaction between engineers, naval officers and ships during a period when new materials and techniques were developed and introduced. Based on the example of the iron cased screw steam frigate „Warrior“, launched in 1860, Leggett questions who was trusted to shape the Victorian navy. He examines what the iron ship meant to the many groups of actors that engaged with it and the debates and controversies surrounding it. He shows how the “iron question” became a political issue for successive Boards of Admiralty in Mid-Victorian Britain as well as a public issue. He reflects on the role of the expert and how practical knowledge at times seemed to matter more than knowledge of its theoretical foundations. He then turns to questions of credibility and how Robert Napier established trust in his shipbuilding skills based on his association with Glasgow and the Clyde and drawing on Scottish networks within and out with the Admiralty. Leggett reminds us that for a full analysis of the Victorian navy it is crucial to examine the interaction between admirals, administrators, engineers and material culture.

Richard Biddle aims to understand how warship design affected labour conditions and the working environment. He focusses on the health of workers in the Royal Dockyard, Portsmouth, based on records from the medical department at the Portsmouth yard. He describes in detail the yard’s facilities and changing frequency, nature and causes of work-related injuries. Biddle points out that recording of accidents became mandatory in 1845 but did not yet include work-related illnesses. With the introduction of steam ships trades changed and several trades became mechanised. Two major changes took place in Portsmouth: embracing steam as means of propulsion and using iron for ship building. This in return led to dockyards – and the work force – to grow in size. While the Portsmouth yard had a surgery for first aid treatment inpatients would be treated in surrounding hospitals. Throughout the 19th century yard workers were entitled to free health care if accidents and illnesses were work-related.

Biddle gives an overview over common hurts: hernias, cuts and bruises, and fractures; serious hurts peaked in the 1850s and 1860s, with the transition to steam and iron. New technologies led to new types of injuries, for example steam induced burn injuries, and boundaries between accidents and illnesses begun to blur. Richard Biddle’s intriguing quantitative and qualitative study illustrates how ship building became more hazardous with the advent of iron and steam.

Anne-Flore Laloë reflects on the ship as scientific instrument and space of science and takes forward Richard Sorrenson’s fundamental study of “The ship as a Scientific Instrument in the Eighteenth Century“ (1996). She analyses the 19th century ‘non-discovery’ of seafloor ooze, named *Bathybius haeckelii* at the time in recognition of the biologist Ernst Haeckel. Thomas Henry Huxley, English biologist on board of HMS *Cyclops*, studied and described the ‘ooze’ in 1868 after taking seafloor samples in preparation for laying telegraph cables between Ireland and Newfoundland. Huxley believed he had found the missing link
between an-organic and organic matter, a part vegetable and part animal creature, feeding on minerals. He was soon proved wrong when other experimenters found that the ooze was in fact calcium sulphite contained in seawater that had crystalized under the influence of the alcohol used for preservation. Lalœ traces the story of the making and unmaking of *Bathybius* through various spaces, including ships and laboratories, thereby situating scientific inquiry in broader narratives about spaces of knowledge and practice. Richard Dunn investigates two navigational instruments, William Thompson’s (later Lord Kelvin) magnetic compass and his mechanical depth sounder, and tries to understand “How the development of new and improved instruments facilitated and necessitated changes to the arrangement and operation of the ship.” (p. 131). Dunn situates this development in the history of the compass as the ship’s most important instrument and explains how the challenge in the 19th century remained how to correct for the deviations caused by various factors, especially the ship’s iron or steel hull. In response to this problem George Airy, the Astronomer Royal, devised a method in the 1830s to compensate for these deviations with magnets and iron. As each ship had unique magnetic characteristics a ship-by-ship approach became necessary. Thompson introduced a compass that could be corrected on the ship in intervals by means of movable magnets and soft iron spheres and hence was different from the established Admiralty Standard Compass that would not be further corrected once installed. Dunn traces in detail how first shipping lines and then the Royal Navy implemented Thompson’s newly invented compass and sounder, including extensive on-board trails. He demonstrates how different technologies were mediated between designers, practitioners and the environments they were used in. Duncan Redford analyses the controversial perception of the submarine by both the Royal Navy and the British public during the late 19th and early 20th century. The submarine was initially perceived as a sign of weakness, not strength, as only “weaker powers” would employ submarines. He describes in detail how the Navy’s infatuation with “fleet work” and battle fleets both enabled and disabled it to integrate the submarine. Participation of submarines in large fleet exercises was crucial for the acceptance of the submarine as a new weapons system. However, this was not straightforward as “instead of exploring the capabilities of the submarines in service at the time, the exercises were organised in a manner almost guaranteed to produce results that favoured the surface fleet and the battleship.” (p. 163). Submarine Service responded by presenting itself as primarily a surface weapon and tactical unit and matters changed from 1913 onwards, after the completion of a series of large fleet manoeuvres. Following these manoeuvres the Navy became aware that new generations of submarines had an increased radius of action which would make them suitable for flotilla defence or closed blockades thereby making them superior to the torpedo boat. However, perception of the submarine as a surface weapon did not help its development as an underwater weapons system and many designs were seriously flawed, from propulsion to hull design to communication technology.
Redford concludes that not until the advent of the nuclear submarine the integration into the naval fleet was fully achieved.

William M. McBride takes us to the United States and its aim to build “exceptional” ships suited for the Pacific Ocean and looks at various episodes of American exceptionalism. American naval engineers were sent for training to Greenwich (the preferred choice because of its Royal Navy connection), Glasgow or Paris to familiarise themselves with existing naval engineering. But new American designs differed, with an emphasis on cruisers with better armour, higher gun power and more coal load in order to increase operational range. McBride describes in detail experimental trials with three-propeller propulsion and the eventual return to twin turbine propulsion and how range and hence propulsion economy became more crucial than speed. Further experimental testing led to improved hull design, enabling “fuller” ships with larger volume and the ability to carry more ammunition, coal and other supplies. McBride in his study draws on reports by J. Harvard Biles of Glasgow University, one of Britain’s leading naval architects, who followed the American naval architecture development closely and commented on it in considerable detail, offering an interesting contemporary external perspective on late 19th and early 20th century naval engineering in the United States.

Andrew Lambert provides the epilogue to this intriguing and multi-faceted book. He reflects on the many themes presented in the previous chapters and the continuously changing role of the ship in the long 19th century. Lambert summarises that “the link between science, technology, ships and engines, and art, culture, history and politics is hard to define, and lacks the predictable linearity of histories constrained by a qualifying prefix, but it promises far richer insights.” (p. 218). He adds several of his own insights into the subject, for example the role of the painter J.M.W. Turner in incorporating the concept of ‘steam’ in British historic identity. Lambert concludes: “Integrating the ideas and insights of historians of technology, business, literature, culture, politics and organisations around a core theme provides an unusual degree of synergy that should encourage future students to be inclusive, ambitious and above all anxious to find new questions.” (p. 218).

The book is complemented by a concise and well-edited index.