

“His Name Does Not Appear”: Missing Voices in Ocean Science and the Invisible Technician at Sea¹

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This article identifies voices missing from the scientific maritime on two floating laboratories early in the history of oceanography: HMS Challenger in the 1870s and the oceanographic yachts of Prince Albert I of Monaco from the 1880s to 1920s. Using ships’ logs, field journals, personal letters, and newspapers, it elucidates the vital contribution of enlisted sailors, lab technicians, photographers, and illustrators – including women and people of color – to the development of scientific understanding of the oceans. Restoring these actors to their proper place in the record also contributes to an ongoing conversation about the construction of scientific knowledge and authority.

Cet article met en lumière les voix oubliées des sciences maritimes à bord de deux laboratoires flottants des débuts de l’océanographie : le HMS Challenger dans les années 1870 et les yachts océanographiques du prince Albert I^{er} de Monaco des années 1880 à 1920. À l’aide de journaux de bord, de carnets d’observation, de correspondances personnelles et de journaux, il révèle la contribution essentielle des marins, des techniciens de laboratoire, des photographes et des illustrateurs – notamment des femmes et des personnes de couleur – au développement de la compréhension scientifique des océans. Redonner à ces acteurs la place qui leur revient dans l’histoire

¹ Eileen V. Brunton, *The Challenger Expedition, 1872–1876: A Visual Index*, 2nd ed. ([UK] Natural History Museum, 2004), 16. Brunton was referencing an expedition photographer’s exclusion from the crew list.

contribue également au débat continu sur la production du savoir et de l'autorité scientifiques.

Decades past the point when history was considered the exclusive domain of “Great Men,” many voices remain missing from the broad historical narrative. This is not an easy silence to fill. Listening to those voices can be a difficult and complicated process. The problem is apparent across the field, as each historical subdiscipline has done increasing work to recover the voices of the populations missing from its received historiography. Maritime historians, spurred on by Marcus Rediker, Daniel Vickers, W. Jeffrey Bolster, and others, have spent the last few decades turning their attention from dashing sea captains and lords of admiralty to able-bodied seamen, cooks, engineers, and fishers, not all of them white, while Lisa Norling and others have reminded us that women, too, played fundamental roles in the maritime enterprise.² In the history of science, Steven Shapin noted in 1989 that historians “have shown little inclination to study the roles of technicians or other support personnel involved in making and recording scientific knowledge.” Yet recovering the work of this “invisible technician,” as Shapin calls the role, “is partly a practical [problem]: the historical record contains little evidence concerning support personnel, and what evidence there is requires careful interpretation.”³ In the history of ocean science, these two invisible populations – commoners and laboratory assistants – overlap, and they are even harder to detect when they include women or people of color. Scientists and naval officers on ocean-going research vessels rarely mention the men and women who built, operated, and repaired their equipment, assisted them in their laboratories, and recorded their work in words and images, yet the work of these sea-going invisible technicians was vital to the formation and development of the ocean sciences and to the emerging body of scientific knowledge about every facet of the global ocean.

In this paper I identify and attempt to recover, at least in part, the experiences

² Peter Linebaugh and Marcus Rediker, *The Many-Headed Hydra: Sailors, Slaves, Commoners, and the Hidden History of the Revolutionary Atlantic* (Beacon Press, 2000); Daniel Vickers, *Young Men and the Sea: Yankee Seafarers in the Age of Sail* (Yale University Press, 2005); W. Jeffrey Bolster, *Black Jacks: African American Seamen in the Age of Sail* (Harvard University Press, 1997); Lisa Norling, *Captain Ahab Had a Wife: New England Women and the Whaleshery, 1720–1870* (University of North Carolina Press, 2000).

³ Steven Shapin, “The Invisible Technician,” *American Scientist* 77, no. 6 (1989): 554. Antony Adler has argued that as ships are increasingly data-gathering platforms which provide input for analysis ashore, the entire ship has become an invisible technician; “The Ship as Laboratory: Making Space for Field Science at Sea,” *Journal of the History of Biology* 47, no. 3 (August 2014): 333–62.

of technical assistants of various kinds on board ocean-going research vessels in the late nineteenth and early twentieth centuries, by looking at the 1870s HMS *Challenger* Expedition and two turn-of-the-twentieth-century expeditions by Prince Albert I of Monaco. This period was significant to the scientific exploration of the ocean and the establishment of oceanography as a field of study and career path. These stories are not complete because recovering them is difficult. Some of these actors can be only partially identified; others are still missing. The resulting understanding of how science was done at sea is necessarily patchy, but it is clearer than has hitherto been available. This attempt thus not only amplifies forgotten voices but also elucidates important aspects of the development of ocean science disciplines and of our understanding of the physical world. In doing so, it suggests a useful thread of inquiry for future development of the field.

Invisible on HMS *Challenger*

The *Challenger* Expedition was a scientific circumnavigation of the world carried out in the naval corvette HMS *Challenger* from 1872 to 1876. Sponsored jointly by the British Royal Navy and the Royal Society of London, the most prominent scientific organization of the nineteenth century, the expedition collected hydrographic, meteorological, and oceanographic data as well as biological and geological specimens from every depth worldwide, visiting every ocean but the Arctic. It was the first major expedition whose actual subject of study was the deep ocean, and one of the best documented.⁴ Extensive archival records exist, comprising ship’s logs, scientists’ field notes, and correspondence.⁵ Fifty volumes of results were published over the next 20 years, and many of the scientists and ship’s officers published their own accounts.⁶

⁴ Short, relatively local, preliminary expeditions conducted by some of the same naturalists on board HMS *Lightning* and HMS *Porcupine* served as proof-of-concept for the naturalists who went on to promote the *Challenger* Expedition. See C. Wyville Thomson, William Benjamin Carpenter, and John Gwyn Jeffreys, *The Depths of the Sea: An Account of the General Results of the Dredging Cruises of H.M.S.S. ‘Porcupine’ and ‘Lightning’ during the Summers of 1868, 1869, and 1870, Under the Scientific Direction of Dr. Carpenter, F.R.S., J. Gwyn Jeffreys, F.R.S., and Dr. Wyville Thomson, F.R.S.* (London, 1873).

⁵ Major collections are in the UK at the Natural History Museum, London; The National Archives, Kew; the National Maritime Museum, Greenwich; and the UK Hydrographic Office, Taunton. Note that the word “scientist” was not yet widely accepted; I am applying the word as it would be used today, thus encompassing the naturalists and the chemist who were assigned to professional positions, did science on board, and published results in their own names.

⁶ These are variously catalogued by series or by individual volume title, and with a slew of authors, but the series editor was *Challenger* veteran John Murray. The volumes are not



Image 1. The science and ship crew of the HMS *Challenger* in 1874. (NOAA Photo Library)

But a surprising number of people are missing from the resulting picture – both literally, from the drawings and photographs, and metaphorically, from our understanding of the expedition. To begin with, most of the photos of the scientific “crew” are in fact of the naturalists and officers. While individual crew members do appear in sketches and photos from the voyage, they are never identified and in fact often appear to represent generic seamen: either bearded men who all wear the exact same facial hair or cherubic youngsters. In the engraving in Image 2, such a cherubic young man does a remarkable job sifting mud in his white uniform; it is telling that we know the name of the dog in this picture but not the sailor. Common sailors are rarely mentioned in the published texts and when they are it is occasional, unofficial, and anonymous, though as both the existing images and naval practice suggest, they did the bulk of the actual work of rigging, hauling, and maintaining equipment under the officers’ eyes.

Crew were also the least likely to leave their own records of the voyage, while naturalists and even officers left memoirs and published their letters and

sequentially numbered overall. Murray, ed., *Report on the Scientific Results of the Voyage of H.M.S. Challenger During the Years 1873–1876 under the Command of Captain George S. Nares and the Late Captain Frank Tourle Thomson, R.N.*, 50 vols. (Edinburgh, 1880–95).



SIFTING DEPOSIT.

Image 2. “Sifting Deposit,” T.H. Tizard, et al., *Narrative of the Cruise of HMS Challenger with a General Account of the Scientific Results of the Expedition*, vol. 1, part 1 of *Report of the Scientific Results of the Voyage of H.M.S. Challenger During the Years 1873-76 Under the Command of Captain George S. Nares, R.N., F.R.S., and the Late Captain Frank Tourle Thomson, R.N.* (London, 1885), 191. The dog is named Sam and belonged to Sublieutenant Lord George Granville Campbell; Campbell, *Log-Letters from “The Challenger,”* new ed. (London, 1881), 88, 92.

journals outside of official reports. In his own retrospective of the voyage, expedition chemist John Young Buchanan, a graduate of the University of Glasgow whose family’s wealth had allowed him to study chemistry across Europe, noted the importance of the usually invisible tasks of daily maintenance necessary to keep the expedition productive. Buchanan pointed out, for instance, that it was not simply luck that made hemp sounding and dredging lines so ideal for the work:

On the contrary, deep-sea sounding-line must, to begin with, be made conscientiously and out of the very best long-fibred hemp, and from the time it is first used until the day it is condemned as being worn it has to be most carefully attended to, especially in warm latitudes. After every sounding it has to be thoroughly dried before being used for the next one, and it has to be constantly surveyed in case of chafes or weaknesses. It was partly to the goodness of the material, but very much more to the unremitting care and watchfulness of those who had charge of it, that after the first beginning only one sounding-line was lost.⁷

⁷ John Young Buchanan, “A Retrospective of Oceanography in the Twenty Years before 1895. Address to the Oceanographical Section of the Sixth International Geographical Congress, held in London, 1895. [From the Report of the Sixth International Geographical Congress, held in London, 1895],” in *Accounts Rendered of Work Done and Things Seen* (Cambridge University Press, 1919), 49–50.

Yet even while noting the work is important, he leaves the workers themselves invisible behind the demonstrative pronoun “those” and the passive voice.

Expedition leader Sir Charles Wyville Thomson’s account mentions the sailors but rarely, most notably when men were killed in the performance of their duties; indeed, the one thing a sailor might do to be recognized by name in an officer’s or naturalist’s account was to die. Even so, when Buchanan recalled the *Challenger*’s record “in freedom from accidents” as “a very brilliant one,” he was not claiming that four accidental deaths in three-and-a-half years at sea were acceptable losses; indeed, he was not talking about human beings at all. He meant that *Challenger* lost to accident, over the course of the voyage, “nine sounding-lines ... and with them thirteen thermometers. During the whole voyage only two temperature-lines were lost with eight thermometers.”⁸

We have few accounts with which to correct this absence. One exists in the form of letters that ship’s steward’s assistant Joseph Matkin wrote home to his family and friends. Collected and kept by the family, they were brought to the attention of historians in the mid-1980s, when many of them were acquired by the Scripps Institution of Oceanography and the Natural History Museum in the United Kingdom. Historian Philip F. Rehbock edited and published them in 1992, providing the only relatively complete account of life on board from a member of the crew. (Though note that Matkin dined in the Chief Petty Officers’ mess, so he was not a lowly deckhand.⁹) Two more sources, though much less extensive, exist in the archives of the National Maritime Museum in Greenwich, in the UK. One consists of meager fragments of a journal apparently kept by Assistant Paymaster Hynes – again, not a mere seaman. It contains little detail of use in reconstructing his experience. The other is a memoir by a sailor named Abraham Smith, who evidently served on board *Challenger* as an engineering petty officer. While it matches the official accounts in broad details, it is short and was written many years later, in Smith’s old age, as a memoir of his entire service. While entertaining and perhaps illustrative of his experience aboard, it cannot be relied upon too heavily.

These sources do give us the broad strokes of an experience not caught in the official accounts, such as Matkin’s account of the theft on Christmas Day, shortly after leaving Portsmouth, of “a Turkey [which] very mysteriously

⁸ Buchanan, “Retrospective of Oceanography,” 42–43. Others died of disease; “Abstract of Voyage of H.M.S. ‘Challenger,’” appendix F in Joseph Matkin, *At Sea with the Scientifics: The Challenger Letters of Joseph Matkin*, ed. Philip F. Rehbock (University of Hawaii Press, 1992), 371.

⁹ Joseph Matkin to Sarah Craxford Matkin (mother), 29 December 1872, M3, Natural History Museum Library and Archives (hereafter NHM), in Matkin, *At Sea with the Scientifics*, 27.

disappeared just as it was ready to go on the table [in the officers’ mess] & it has never been heard of since.” A roast goose met the same fate a couple of days later, though some “fragments” of it were found, with salt, up in the main top rigging the next morning.¹⁰ Later, in the Pacific, the crew staged illicit late-night fights between the ship’s tomcat and the captain’s pet cat; the latter, Matkin reported, “generally gets licked.”¹¹ The scientists and officers both report nothing but felicitous relations throughout the voyage, but the theft of food from the officers’ mess, the abuse of the captain’s hapless pet, along with a soaring desertion rate, suggest an undercurrent of unhappiness in the crew not reflected in the official accounts.

Between Matkin’s account and clues in other places we catch whispers of other missing voices aboard. The first is J.J. Wild, scientific illustrator and secretary to the chief naturalist. Wild is not quite missing from the record; Thomson mentions him in his description of the ship’s spaces as working with him in the fore cabin, almost as if he had been included on the ship’s equipment list. And if we think closely about the crew photographs, such as Image 1, we can actually see another of our missing technicians, because someone was on the other side of the lens. One of *Challenger*’s innovations was the inclusion of an on-board darkroom to allow documentation of the voyage. Though a popular and widely spread practice by the 1870s, photography remained very technical and hands-on, and, as Eileen Brunton, who compiled a volume of known photographs from the expedition, has pointed out, “The preparation of the wet plates on board a rolling ship must have taken great skill as must their developing.”¹² Thus the expedition shipped a designated photographer, corporal of Royal Engineers Caleb Newbold. Tellingly, we have no photographs of Newbold himself; he too appears in the official account only as an accessory, tied to the description of his workspace.

Newbold did not finish the voyage aboard. He deserted when the ship pulled into Cape Town, South Africa, and was replaced by a civilian named Frederick Hodgeson – again, we have no photo. Matkin, our informant among the crew, never identified Hodgeson by name, but he did note that the new photographer was horribly seasick. Perhaps this discomfort continued, for Hodgeson deserted in Hong Kong and was in turn replaced by Jesse Lay. These successors also make no appearance in Thomson’s account, the desertions and hirings are buried in the pay records and in a brief mention by Matkin,

¹⁰ Matkin to Sarah Craxford Matkin, 29 December 1872.

¹¹ Matkin to Fred Matkin (brother), Hong Kong, 31 December 1874–January 1875, M46, Archives, Scripps Institution of Oceanography, University of California, San Diego (hereafter SIO, UCSD), in Matkin, *At Sea with the Scientifics*, 217.

¹² Brunton, *Visual Index*, 16.

and it is not even completely clear which of them were civilians versus naval personnel.¹³ What role these photographers' invisibility played in their decisions to desert is impossible to say. The scientific validity of the expedition results, their communication to and acceptance by other professionals, and both public and government conviction that the expedition had been worthwhile relied on the illustrative capabilities of Wild's pen as well as Newbold's, Hodgeson's, and Lay's lenses. Yet the technicians responsible remained largely invisible. Indeed, after their return, despite publishing an account of their results before anyone else, Wild was not included in the publication of the official results. Unable to turn his work aboard *Challenger* into a longer-term career, he eventually emigrated to Australia, where he found better job prospects.¹⁴

Our most fleeting, and in some ways most intriguing, whisper also comes from Matkin, who wrote to his mother as the ship left Cape Town, "Professor Thompson [*sic*] has engaged a young Caffre [a derogatory term for an African] for a servant in the Analyzing room ... The Professor also has a Bermuda Negro for his private servant, & I have heard that he will get a Maori at New Zealand, also a couple of New Guinea men, & a Chinaman, a Japanese, & an Esquimaux bye & bye."¹⁵ The African's name was W. Pembre; we know it only because Matkin later recorded the man's death in Hong Kong from "decline."¹⁶ Of the Bermudan, we know nothing. Matkin's speculation about the professor's future staff no doubt references the long practice of kidnapping locals as potential guides and translators – and as scientific specimens; both British and American ships were guilty of this, even within the few decades prior to this voyage. But Matkin was likely making fun of the rapacious collecting practices of the naturalists more broadly. Note that both the historical practice and the joke equate these men with specimens of fauna collected along the way.

The *Challenger's* scientific laboratories are well-documented; their layout and equipment received detailed, multipage descriptions in the official account, usually of the empty space, simultaneously carefully stowed for sea and ready for work, though one depiction shows a naturalist at work while in port, his

¹³ Brunton details the available evidence about each of the photographers; *Visual Index*, 16–17.

¹⁴ Wild's account identifies him as a "member of the civilian scientific staff" and is illustrated "with Charts and Diagrams by the Author," J.J. Wild, *Thalassa: An Essay on the Depth, Temperature, and Currents of the Ocean* (London, 1877).

¹⁵ Matkin to Sarah Craxford Matkin, Table Bay, 10 December and Simon's Bay, 15 December 1873, M25, Archives, SIO, UCSD, in Matkin, *At Sea with the Scientifics*, 128.

¹⁶ "Abstract of Voyage of H.M.S. 'Challenger,'" Appendix F in Matkin, *At Sea with the Scientifics*, 371.

desk piled with books, a pile of dead birds behind him, as two sailors talk and smile outside the door. As anyone who has been on board a ship will know, the laboratories would not have been huge spaces – just enough room for the scientists to do their work. And yet, buried in the lab notebook of expedition naturalist John Murray are a couple of references to someone missing from this picture as well.

On 1 February 1875, Murray reported joining a shore collecting party consisting of several of the officers and naturalists, two blue jackets, and “Percy.”¹⁷ On 5 March 1875, Percy accompanied Murray and a lieutenant to the island of New Guinea.¹⁸ On 1 April, Percy was away in the boat picking up an albatross that an officer had shot on the wing. When he returned, Murray recorded their differing identifications of a smaller bird.¹⁹ On the afternoon of 5 April, Percy caught a new species of shark, and on 7 April a black albatross with hook and line.²⁰ The next day he reported “very grand” phosphorescence the previous night, which Murray had not seen.²¹ We have lists of all the officers and scientists aboard. There is no Percy among them. Murray never referred by name to any enlisted men or even the photographer; he named them by their positions. And Murray referred to the mysterious Percy more familiarly than one would expect with a “blue jacket.”

The *Challenger* report’s narrative mentions, only once, a “Mr. F. Pearcey, birdskinner and naturalists’ assistant.”²² This must be our Percy. And indeed, in the preface to his summary of the scientific results, Murray includes a list of specimens of foraminifera (single-celled, planktonic animals) prepared from his own work and “from collections selected from the deposits by Mr. Frederick Pearcey, assistant to the naturalists on board the Challenger.”²³ Pearcey receives no mention in the scientific results volume on foraminifera.

¹⁷ H.M.S. Challenger: Diary of Sir J. Murray (hereafter Murray Diary), 1 February 1875, vol. 3, 345228-3001, Murray Collection, Sect. 1, 3, NHM.

¹⁸ Murray Diary, 5 March 1875.

¹⁹ Murray Diary, 1 April 1875.

²⁰ Murray Diary, 5 and 7 April 1875.

²¹ Murray Diary, 8 April 1875.

²² T.H. Tizard, H.N. Moseley, J.Y. Buchanan, and John Murray, *Narrative of the Cruise of H.M.S. Challenger with a General Account of the Scientific Results of the Expedition*, in *Report on the Scientific Results*, part 1, vol. 2 of *Report of the Scientific Results of the Voyage of H.M.S. Challenger During the Years 1873–76 Under the Command of Captain George S. Nares, R.N., F.R.S., and the Late Captain Frank Tourle Thomson, R.N.* (London, 1885), 783.

²³ John Murray, *Report of the Scientific Results of the Voyage of H.M.S. Challenger During the Years 1873–76 Under the Command of Captain George S. Nares, R.N., F.R.S., and the Late Captain Frank Tourle Thomson, R.N.: A Summary of the Scientific Results*, part 1 (London, 1895), xxxviii.

Thanks to digital databases of nineteenth-century newspapers and other periodicals, we can piece together at least a snapshot of Pearcey's career. Frederick Gordon Pearcey was born about 1857, and does not enter the record until, at the age of 15, he embarked aboard *Challenger* as a taxidermist and general assistant to the biological laboratory. A modern effort to identify the recipients of an 1895 commemorative medal of the expedition lists Pearcey as a Domestic Third Class in the Royal Navy – an enlisted rank, though perhaps assigned for the purposes of pay alone, as he seems to have spent no other time in service.²⁴ Still, social class likely played a role in his invisibility, as it did for the servants who served as invisible technicians in Shapin's study.²⁵ Pearcey's portrait is included in an 1897 replica of a commemorative volume presented to John Murray to celebrate the publication



F. G. Pearcey.

Image 3. Portrait of Frederick Gordon Pearcey, from Walter Crane, *Challenger Expedition Reports: Portraits of the Contributors* (London, 1897), 19.

of the final volume of the *Challenger* reports, but he is on the last page, coming after not only all the expedition scientists and naval officers but also the shore-based naturalists who wrote results based on the expedition's retrieved specimens (many of which Pearcey likely had a hand in preserving for their study). He is identified as "Assistant to the Naturalists on the Expedition," and his portrait shares the page with those of Murray's Edinburgh secretary, a translator of zoological reports, and a "member of editorial staff."²⁶

In his capacity as lab assistant, Pearcey appears to have worked with Murray most regularly of the naturalists, though that is a guess made in the absence of other evidence, as Murray is the only one who seems to have mentioned him, and his association with Murray continued after the voyage. Upon the expedition's return – Pearcey would have been 18 or nearly 19 – he was assigned to the *Challenger* office, which was set up in Edinburgh and

²⁴ Glenn M. Stein, "The *Challenger* medal roll (1895)," updated 2 December 2015, www.19thcenturyscience.org/HMSC/Chall-Medal/ChallengerMedal.html.

²⁵ Shapin, "Invisible Technician," 554, 560.

²⁶ Walter Crane, *Challenger Expedition Reports: Portraits of the Contributors* (London, 1897), 19.

supervised first by Thomson and then by Murray to oversee the preparation of the official volumes. Clearly they must have considered him a valuable assistant to have kept him on the project, and reportedly “his alert intelligence and obliging disposition made him a favourite” on the staff.²⁷

Once the last of the reports was published, Pearcey went on to work at marine biological stations in Scotland, then at the Owens College Museum in Manchester, on the staff of the Scottish Fishery Board – during which time he apparently assisted Murray again, this time with scientific surveys of Scottish lochs – and eventually as assistant curator of zoology at the Bristol Museum.²⁸ In the course of this work, in addition to his presumed skill at taxidermy, he developed an encyclopedic knowledge of foraminifera and, in fact, published papers on them in the 1880s and 1890s. He also published on laboratory techniques, including his development of new methods of cutting microscopic sections of marine deposits, and on museum practice.²⁹ Twenty-four models of foraminifera species he created out of glass and plaster are now part of the collection of the Natural History Museum in London.³⁰

Clearly all of this is scientific work. Pearcey worked in places that did science, he developed new scientific techniques, he wrote on original scientific research for scientific publications, and his obituary appeared in the journal *Nature* when he died in 1927. Yet he was never elected to the Royal Society, and Murray, though he apparently valued Pearcey’s talents enough to continually include him in projects, seems never to have mentioned him in his own scientific writings. In the scientific results, Pearcey remained an invisible technician.

This may be because the work he did – as that of the artist and photographers and sailors aboard – was in fact recognized as skillful but not knowledgeable.³¹ The knowledge Pearcey and other technical specialists

²⁷ “Obituary[: Frederick Gordon Pearcey],” *Nature* 119, no. 2989 (12 February 1927): 245.

²⁸ Pearcey is one of nine surveyors listed on a survey of Loch Ness; John Murray and Laurence Pullar, “Bathymetrical Survey of the Fresh-Water Lochs of Scotland, Part XIII, Lochs of the Ness Basin, First Part,” *The Geographical Journal* 30, no. 1 (July 1907): 62–71.

²⁹ Fred[erick] G. Pearcey, “Method of consolidating and preparing thin sections of friable and decomposed rocks, sands, clays, ooze, and other granulated substances,” *Edinb. Phys. Soc. Proc.*, 8 (1885): 295–300; *Brux., Soc. Belge Micr. Ann.*, 9 (1885): 221–27. Pearcey, “On preparing artificial ground-work for mounting individual specimens, economic sets, etc., in spirit,” *Museums Journal*, October 1907. Pearcey, “A method of utilizing small wall-areas in museums for spirit preparations,” *Museums Journal*, October 1907.

³⁰ A.J. Bowden, F.J. Gregory, and A.S. Henderson, eds., *Landmarks in Foraminiferal Micropalaeontology: History and Development* (The Geological Society, 2013), 339.

³¹ Skill versus knowledge is a distinction Shapin points to in the shore-based seventeenth-century laboratory he examined; Shapin, “Invisible Technician,” 555.

possessed was craft knowledge, tacit, hands-on, and experiential. By contrast, Thomson, Buchanan, Murray, and the other naturalists who directed the ship's scientific operations possessed scientific knowledge. While certainly honed through their work at sea, it had been acquired through patient and bookish study ashore. Their scientific authority thus came from their education, even though a naturalist's education at the time remained largely informal and sometimes self-directed, often an adjunct to formal university education in a traditional field like medicine. It was this form of knowledge that granted them access to and patronage from the Royal Society, and the associated authority to direct the conduct of scientific operations aboard.

Additionally, the modern, Western image of science prizes a model of individual, thoughtful effort rather than extended, collective work.³² Given this predisposition of interpretation, the work of the hundreds of men on board *Challenger*, each playing his part in the collective work of the expedition, was perhaps doomed to invisibility.

Prince Albert of Monaco and Intersectional Invisibilities³³

From the 1880s to the 1920s, Prince Albert I of Monaco constructed a series of yachts designed for the purpose of pursuing oceanography, though certainly also for comfort. He undertook nearly annual cruises of a few months' duration in the Mediterranean, the Atlantic, and the Arctic Ocean, inviting leading European scientists to join him. Albert's yachts, too, were operated by a crew of seamen responsible for the ship's movement and repair, and who operated the oceanographic equipment through muscle power on the original yacht and increasingly through the operation of steam or electrical-powered equipment as each new yacht surpassed the old in capability and sophistication. These men appear in Albert's autobiography but almost always as generic seamen, strong but child-like, whose romanticized lives swung between hard work at sea and debauchery ashore.³⁴ Albert displayed a certain affection for them, which was tempered by the vast social distance between a prince and a deckhand. Unfortunately, they did not leave their own accounts.

Each of Albert's expeditions also included an artist. Artists were common

³² Shapin, "Invisible Technician," 561.

³³ "Intersectionality" is a sociological term referring to the "interconnected nature of social categorizations such as race, class, and gender, regarded as creating overlapping and interdependent systems of discrimination or disadvantage," *Oxford English Dictionary*, accessed 7 August 2025, <https://www.oed.com>. The term was coined by Kimberlé Crenshaw, "Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics," *University of Chicago Legal Forum* 1989: 139–68.

³⁴ For instance, Albert I, *La carrière d'un navigateur*, 2 ed. (Monaco, 1905), 52–53.

expedition team members even after the advent of photography, as a trained scientific illustrator could capture not only the form but also the vibrant colors of captured creatures, which fade quickly in marine fauna even before they are subjected to preserving fluids.³⁵ In his 1896 expedition to the Azores, Albert took advantage of his yacht’s facilities for guests – in other words, it could comfortably and privately accommodate women – and invited Mademoiselle Jeanne Le Roux, “artiste peintre,” to accompany the expedition and paint watercolors of their specimens.³⁶ He later noted that she was the only newcomer to the scientific party who did not succumb to seasickness during the voyage.³⁷

The Azores expedition was one of many Albert undertook which involved a land as well as sea component, often with separate teams of researchers assigned complementary tasks. He followed a similar pattern on his expedition to Spitsbergen, an island above the Arctic Circle, in 1907, where he was joined by a team of shore-based researchers led by a Norwegian army officer. Among them, distinguishable in Albert’s French-language account by the feminine noun, was the “botaniste” Hanna Resvoll-Holmsen.

Resvoll-Holmsen participated in the expedition apparently at the behest of another member of the Norwegian team, geologist Adolf Hoel. One usual excuse for preventing the participation of women, worries over how they would live amongst men in a rough environment, was apparently avoided by giving Resvoll-Holmsen both her own tent and an independent mission. She would be dropped off alone with tent and supplies in a remote location, where she spent the next several days surveying the vegetation. The ship periodically returned to ferry her to a new base, where she again worked independently. In this way she assembled a foundational picture of the island’s ecosystems, discovering several new species along the way and setting the stage for future

³⁵ For a history of marine illustration in the longer context of scientific illustration, see Samantha Muka, “Imagining the Ocean: Marine Artists and Our Visions of the Marine World,” in *Soundings and Crossings: Doing Science at Sea 1800–1971*, ed. Katharine Anderson and Helen Rozwadowski (Science History Publications, 2016).

³⁶ Albert I, “Sur la troisième campagne scientifique de la *Princesse Alice*,” *Comptes rendus de l’Académie des Sciences*, 14 décembre 1896. Reprinted in *Résultats des campagnes scientifiques*, f. 84, 18. See also, Jacqueline Carpine-Lancre, *La campagne de la Princesse-Alice en 1896* (Monaco, 1996), *passim*, but especially the photographs on 37 and 67, and examples of Le Roux’s work reproduced on 61 and 63.

Women were in fact already on board, serving as cleaners for the family’s and scientist’s cabins. Class is important here, too, complicated by Albert’s status as not only the captain but also a member of royalty and eventually as the crowned head of Monaco, which colored his relationship with embarked scientists, as well as his staff and crew.

³⁷ Carpine-Lancre, *La campagne de la Princesse-Alice*, 36.

work.³⁸

Resvoll-Holmsen was not, in the strictest sense, either invisible or a technician; she was a trained botanist, doing her own work examining and collecting specimens for the Musée Océanographique in Monaco and the University of Christiania (later Oslo). Albert included her name in his report to the Académie des Sciences in Paris. She also published her results in her own full name; in French, this revealed her gender in the process.³⁹ Yet neither was her role fully visible; Albert reported her involvement as “Madame Dieset” – her former married name, though she had divorced several years earlier.⁴⁰ She remains little known outside of Norway. Certainly the involvement of a woman scientist on an expedition above the Arctic Circle in 1907 is not widely known – and indeed, she returned for additional independent field work the following year, this time having secured her own funding. She went on a further solo botanical expedition to Finnmark, also above the Arctic Circle and the most northerly part of Norway, in 1909.⁴¹

Conclusion

The cases of Jeanne Le Roux and Hanna Resvoll-Holmsen, of W. Pembre and his anonymous Bermudan colleague, speak to an aspect of the invisible technician trope which Shapin did not fully explore: the way it so often overlaps and intersects with other invisibilities. Frederick Pearcey was invisible because he was a technician, a role in the laboratory that grew from the social and occupational status of a household servant. Servants were supposed to be invisible.⁴² At sea, this same master and servant relationship determined the legal status of seamen long after it faded ashore. But the invisibility assigned by the servant’s role was amplified when it encompassed other people considered unusual to the scientific effort, such as people of color like the ill-fated Pembre on the *Challenger* or women.

These are hardly the only missing voices in shipboard ocean science; ships have obviously always needed crews, whose specific contributions have

³⁸ Eva Fuglei and Helle V. Goldman, “Hanna Marie Resvoll-Holmsen: a pioneer in Svalbard,” *Polar Research* 25, no. 1 (2006): 3–4.

³⁹ Hanna Resvoll-Holmsen, *Exploration du nord-ouest du Spitzberg entreprise sous les auspices de S.A.S. le prince de Monaco par la Mission Isachsen*, partie 5, *Résultats des campagnes scientifiques accomplies sur son yacht*, f. 44 (1932): 44.

⁴⁰ Albert I, “Sur la neuvième campagne de la *Princesse Alice IIe*,” *Comptes rendus de l’Académie des Sciences*, 15 juin 1908. Reprinted in *Résultats des campagnes scientifiques accomplies sur son yacht*, f. 84 (1932): 44.

⁴¹ Fuglei and Goldman, “Hanna Marie Resvoll-Holmsen,” 6, 10.

⁴² Shapin, “Invisible Technician,” 554, 560.

almost always been elided under the efforts of their captains. The same is true of laboratories and assistants. But frequently – perhaps more frequently than historians have thus far noticed – those missing people complicate our expectations of the shipboard scientific space because these expectations are formulated around a homogenous racial and gender picture. Once we know to look for them, perhaps diligent archival work in South Africa might turn up more information on Pembre or the *Challenger* photographers. While there, we could identify the Africans who were hired to work on the German research vessel *Meteor* during the German Atlantic Expedition in the mid-1920s; these men appear in sailors’ uniforms alongside the crew in at least two photographs, but their names are unknown, and the captain did not mention them in his official account.⁴³ Australian archives might tell us who showed American marine biologists the “aboriginal hunting methods” used to capture dugong for physiological experiments during the 1966 Australian (Billabong) Expedition.⁴⁴ In each of these cases, as is generally true in the cases explored more deeply above, the missing voices receive, at most, only passing reference in the official accounts, but their labor and skills were fundamental to the success of the science they enabled.

Careful reading of the sources to find these actors serves several purposes, even when we cannot find many details of their experience. It restores missing voices to the chorus, certainly, and any time we can add more voices we enrich our understanding of the past. It diversifies our understanding of science – and of the maritime – by including not just new voices but different ones. (And we must be careful to remember that it is our understanding alone that is being diversified; these people were always already members of the scientific and maritime communities, even if we left them out of our accounts.)

The stories that scientists told, and still tell, about their own activities are carefully, if often subconsciously, curated. They follow tropes of their own genre, which focus on a supposedly dispassionate science conducted in a controlled environment by often heroic individuals. We already know better than to believe the shipboard environment can be controlled and dispassionate, but beyond our imagining of science conducted in heavy weather, Arctic cold or

⁴³ Reinhard Hoheisel-Huxmann, *Die Deutsche Atlantische Expedition 1925–1927: Planung und Verlauf* (Convent Verlag, 2007), 32; for photos, Abb. 64. “Messkarten und Fotos von der Arbeit des Vermessungsschiffes ‘Meteor,’” N167-2, Auftrag Nr. 729, Bundesarchiv-Militärarchiv, Freiburg im Breisgau, Germany.

⁴⁴ Robert Elsner, “Preliminary Report on Dugong Studies, August–September, 1966,” in Alpha Helix Australian (Billabong) Expedition, *R/V ALPHA HELIX Australian (Billabong) Expedition, April–October 1966: A Cooperative Scientific Program with Participants from Universities and Institutions of the United States of America and Australia* (s.n., 19–), 120.

tropical heat, we do not have a good picture of how the lack of control affected the conduct of science, the understanding of the oceans that grew out of it, or the consequent development of the discipline. Restoring the missing voices of those who helped with the work, who did the messy but necessary tasks that allowed scientists to claim authority over nature, enriches our understanding in important ways. It reminds us too to look for the invisible technicians still working around us. If we listen to their voices, we may learn important things about how our own world works.

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