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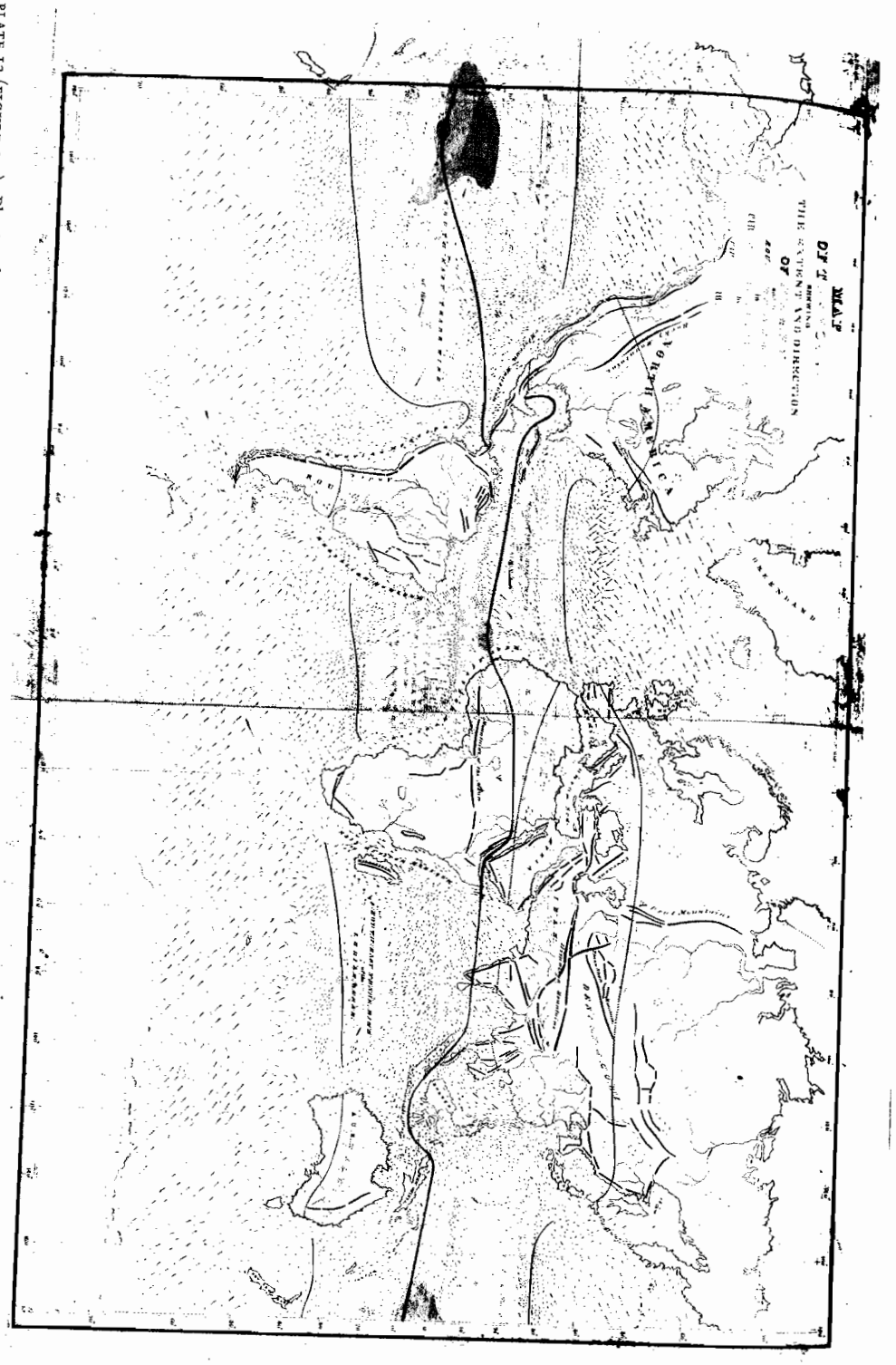


PLATE 12 (FIGURE 5.5). Plotting the Wind: Charles Wilkes's manuscript "Map of the World, Showing the Extent and Direction of the Wind." Courtesy of the Geography and Map Division, Library of Congress, Washington, DC.

CHAPTER FIVE

HYDROGRAPHIC DISCIPLINE AMONG THE NAVIGATORS

CHARTING AN "EMPIRE OF COMMERCE AND SCIENCE" IN THE NINETEENTH-CENTURY PACIFIC

D. Graham Burnett

> The map-readers in bureaus and *salons* needed to make the globe a real world and the real world a map for the strategies of empire.
>
> GREG DENING, *Islands and Beaches*

At eleven o'clock in the morning on Tuesday, August 9, 1842, a "wondering circle"[1] of officers of the U.S. Navy and assorted civilian dignitaries perspired while waiting patiently under a sailcloth awning tented over the deck of the massive ship of the line, the USS *North Carolina*, which rode at anchor in the summer sun off Castle Garden at the southern tip of Manhattan. These eager onlookers, who had gathered at the Battery Bridge hours earlier to catch a launch out to the gleaming vessel, were the lucky ones. They had front-row seats at the trial that was seizing headlines in New York City and galvanizing the American public: the court-martial of the officers of the United States Exploring Expedition, or "U.S. Ex. Ex."

After almost four years plying the world's oceans in the name of science, civilization, and national destiny, the ships under the command of the irascible Lieutenant Charles Wilkes had finally returned home. But with all eyes trained

on what was by far the largest single federal expenditure on scientific affairs in the nation's history, it had taken less than a month for accusations, recriminations, and countercharges to land the expedition's officers in the dock. Weeks of acrimonious testimony followed: first Wilkes against half a dozen of his subordinates, then, later, they against him. It was an irresistibly scandalous way to learn what had become of nearly 1 million dollars, 6 naval vessels, some 80 officers, and 350 men during a slow and devious circumnavigation that had meandered from the icy extremes of the Antarctic Circle to the sensual splendors of the tropical Pacific, and of which only rumors had been heard. As the editors of the *New York Herald* put it—having dispatched an opinionated stenographer to attend the proceedings aboard the *North Carolina* and record every word—"The evidence in the course of these trials is expected to bring to light many, if not all the proceedings of the celebrated exploring expedition, which have hitherto been like a sealed book to the citizens of these United States, who are deeply interested in all which occurred."[2]

On this particular day it would not be a sealed book opened to the scrutiny of the citizenry, but a sealed map. Taking the stand under the eye of the forbidding judge advocate, the young Lieutenant Oliver Hazard Perry (son of the eponymous hero of the 1812 war) positioned himself before a pair of hand-drawn nautical charts. Each of these depicted the island of Upolu, the choicest landfall in the archipelago now known as Samoa, but then often called the Navigators, the name bestowed by the French explorer Bougainville in 1768. Upolu—a lozenge-shaped volcanic ridge some 40 miles (64 km) in length, running east and west, positioned about 13 degrees south of the equator very near the center of the Pacific Ocean—had been the subject of Perry's surveying efforts not once but twice over the course of the U.S. Expedition. Now the island stood at the center of a cartographic controversy that threatened at least one man with the humiliation of navy punishment. Perusing the two charts, Perry submitted to the interrogatory from the investigating officer, Charles H. Winder:

> Q · State what is the difference in scale of the two Charts.
>
> A · This Chart is one inch to the mile, and the other is two miles to the inch.
>
> Q · Examine the two Charts & state to the Court what is the difference in distance from the eastern extremity of the Island to the point of Falalati where the survey of the *Flying Fish* ceased.
>
> A · By the large Chart the distance in 31¼ miles the small chart is 33¾ miles—a difference [of] 2½ miles.[3]

Did a troubled murmur rise from the audience? Were there whispers and sly glances cast upon the accused, Lieutenant Robert F. Pinkney, erstwhile captain of the surveying schooner *Flying Fish*?

There are, unfortunately, no stage notes in the official record of the trial, and the *Herald*'s dutiful reporter actually missed part of the exchange: he had already complained that some "testimony was given in such a low and indistinct tone" with the witness's "back turned to the reporter" that sometimes he could only "hear a sentence here and there."[4] But however the crowd responded to this strange testimony of cartographic comparison, there could be little doubt that the charts and their makers were now very much on trial.

I have begun *in medias res*, with a scene that brings cartography just about as close to melodrama as it can get—a chart and the men who made it hauled to the bar of juridical scrutiny. But what, it might well be asked, does this striking exchange in New York Harbor have to do with the theme of this volume? In what ways does the pageant of military justice aboard the *North Carolina* in 1842 shed light on "The Imperial Map" or "Cartography and the Mastery of Empire"?

Answering these questions is the task I set for myself in this chapter. In the pages that follow I intend to pull back from this shipboard inquisition and, by widening the frame, filling in the backstory, and sketching the setting, create the conditions for making sense of the scene and for examining its larger significance in the study of cartography and imperialism. The potential payoffs are large, since I will argue that at stake in the court-martial of Lieutenant Pinkney was nothing less than the guarantee of the reciprocity between maps and the world, that essential correspondence upon which any claims about "cartography and mastery" must depend. Ultimately at issue on the deck of the *North Carolina* was the whole interlocking array of naval and scientific practices—instruments, discipline, ships, orders; the metrical, scribal, and military procedures—that together were responsible for a powerful form of modern alchemy: that distinctive synthesis of geometry, astronomy, and imagination that, in the words of Greg Dening, made "the globe a real world and the real world a map for the strategies of empire."[5]

In an effort to make good on these claims, I will proceed in three sections: First, I will review the history of the United States Exploring Expedition, focusing on its origin and mission and situating its activities against the larger story of expanding U.S. commercial interests in the Pacific in the first half of the nineteenth century. Second, I will make an argument

for the importance of hydrography—maritime charting, nautical surveying, and the proto-oceanographic collation of data on the dynamics of the marine environment—both in the work of the U.S. Ex. Ex. and in the larger processes of diplomatic, economic, and cultural confrontation in this region in this period. Hydrographic practices have been, I will suggest, largely overlooked by scholars studying the links between cartography and empire in the nineteenth century. Finally, and with these arguments in mind, I will return to the deck of the *North Carolina* and the trial of Lieutenant Pinkney and his chart of Samoa, making use of the trial transcripts to show how, in the nineteenth-century Pacific, control over maps was control over men—in more ways than one.

THE U.S. EX. EX. AND "A THEATRE . . . PECULIARLY OUR OWN"

The United States Exploring Expedition, which spent the better part of three years charting the landforms in and around the Pacific, emerged from decades of wrangling, lobbying, administrative sabotage, and backroom dealing. Along the way the original notion of a naval expedition for "discovery" in the Southern Ocean—first mooted as early as 1815—gave rise to a paper trail so vast that even shrunk onto microfilm and buried in the recesses of the National Archives, it is less a trail than a subterranean superhighway through the commercial and political landscape of the first third of the nineteenth century.[6] Countless compromises and countercompromises gave the voyage its ultimate shape, and its final mission—in the words of the secretary of the navy, "to extend the empire of commerce and science; to diminish the hazards of the ocean, and point out to future navigators a course by which they may avoid dangers and find safety"—still left plenty of room for conflicting interpretation.[7] No sooner had the ships left Hampton Roads, Virginia, on the eighteenth of August, 1838, flags flying and guns booming salutes, than this interpretive space became a veritable agon where competing ideas about science, protocol, savagery, and American commercial destiny brawled with such force that the whole undertaking largely sank into ignominy; the collective energies of the participants sapped by endless controversies—old navy versus new, natural history versus natural philosophy, officer versus gentleman, scientist versus amateur. It is a good indication of the friction that the Ex. Ex. soon came to be known among its detractors as "the deplorable expedition." For a meticulous litany of these woes, we have a number of historians to thank, each of whom has made some effort to recover what can be salvaged from the mission as a whole, which remains (for better or worse) a certain kind of landmark in nineteenth-century American science. For instance, it is frequently noted that the expedition collections formed the

foundation of the Smithsonian Institution (over the objections, it should be added, of Joseph Henry); and it has been suggested that the Ex. Ex. served as a springboard for professionalizing American scientists at midcentury, in some respects setting a pattern for future federal support of learned activities.[8]

For our purposes, it will suffice to recall two things about the Expedition: first, that it both emerged from and contributed to rapidly expanding U.S. interests (economic, strategic, popular) in the Pacific in the first half of the nineteenth century; and second, that cartography lay at the heart of the enterprise—maps were used to argue for the expeditions, maps were what it was above all charged to produce, and finally, maps were, in the end, its greatest success in the eyes of its defenders. I focus on these issues in the pages that follow.

American fascination with the Pacific and its commercial potential was born with the republic itself. It was the adventures of the Connecticut-born seaman-interloper, John Ledyard, who accompanied Captain James Cook on his third and final voyage, which—published in serial and then in book form in New Haven in 1783—gave Americans a much sought-after glimpse of the Southern Ocean through the eyes of a countryman. Moreover, Ledyard narrated for them the archetypal (and, of course, ultimately fatal) encounter between enlightened exploration and "noble savages" in the paradisiacal archipelagos of the Pacific—to wit, Cook's resplendently romanticized death on the strand in the Sandwich Islands. It was a tableau depicting the apotheosis of science, courage, and sentiment, a tableau already venerated in Europe and Britain; and Ledyard helped infect the young Republic with a similar enthusiasm.[9] (Eventually the Ex. Ex. would be drawn inexorably, as if by historical compulsion, to replay the consummation of death and knowledge on Pacific beaches when, Cook-like, several of its young explorers fell to hardwood clubs on the sands of Fiji in 1840.)

Behind the raked standard of Enlightenment progress rallied the legionnaires of God, of Mammon, and of both. Ledyard's allusions to a Northwest trade in furs with China had, perhaps, still greater urgency in Salem than Georgian martyrology, and Massachusetts merchants already accustomed to outfitting long sea voyages in pursuit of fur and fat—seals and whales—in the northern and southern Atlantic quickly turned their attentions to the Pacific. On the cusp of the nineteenth century, the thin trickle of New England sea hunters, traders, and island scavengers rounding Cape Horn grew into a steady stream, as sea-otter pelts, seals, sandalwood, bêche-de-mer, and, increasingly, sperm whales made the Pacific a profitable (if risky) destination for merchant capital seeking new spawning grounds. In all these voyages of fortune, Americans jostled with competitors flying other flags, saliently Russian and British; but

the unprecedented naval exploits of Commodore David Porter during the hostilities of the War of 1812 (he captured more than a dozen British vessels and, as he put it, "completely [broke] up the British navigation in the Pacific"[10]) initiated—at least symbolically—a period of U.S. commercial prominence through much of Polynesia. This position would be maintained until shortly before the Civil War, as successive exploitative enterprises—from guano mining to slaving—kept ships and men coming, with a few zealous Christian proselytes stowed away for the passage. By 1820 American merchant vessels had called in every major port in every island group, and over the decades that followed New England whaling saw very rapid Pacific growth—in the number of ships, in the value of their hauls, in the geographic scope of the voyages.[11] In 1826 an American official estimated that more than 2,000 American seamen had visited Honolulu within the previous twelve months, and by 1835 almost 400 American whaling ships were plying the Pacific, a number that would continue to grow over the next decade, reaching a maximum of nearly 700 by midcentury.[12]

This period, roughly 1812 to 1860, has been called the golden age of American maritime history. A variety of commentators have worked to fit the patterns of seagoing commercial enterprise into the dominant narratives of American "continentalism" that organize the same period, pointing out that the traditional story of westward expansion must be set against broadening oceanic horizons to the south and far east that (depending on your view) either competed with, or merely extended, American visions of a nation that would stretch from coast to coast.[13] Regardless of what one makes of these debates, it cannot be denied that in the first third of the nineteenth century a considerable number of voices called for the United States to show the flag (and indeed perhaps to plant it) in the "brood of islands" that some tens of thousands of American seamen considered a home away from home and that, increasingly in the 1830s, scattered New England missionaries were working to make look very much like home itself.[14]

Where both showing and planting the flag were concerned, Commodore Porter was again in the vanguard. Shortly after his depredations on British shipping in 1813, he repaired to Nukuhiva, the largest island in the Marquesas group, declared it "Madison Island," and on the shores of what he called Massachusetts Bay set about erecting (with the forced labor of his British prisoners) "Fort Madison" and "Madison Ville." Enmeshing himself in local conflicts among indigenous potentates, Porter forged alliances, drew up formal-looking documents, raised the Stars and Stripes, and buried a cairn of American doodads (including pocket change) as a "solemn" token of U.S. possession, declaring, "Our rights to this island, being founded on priority of discovery, conquest,

and possession, cannot be disputed."[15] The Teii people, by his account, expressed enthusiasm for their new status as members of the American Republic (he in fact thought them natural republicans), and they promised to prosecute his war against bearers of the Union Jack.[16] Then Porter offered a paean to liberty and sailed away, leaving twenty-three navy men and officers to guard his manacled British captives.

The outpost failed in all respects. Driven from their redoubt by shifting alliances, a handful of surviving American seamen clawed their way off the beach about six months later. Administratively speaking, the ceremonious conquest passed into the limbo of unanswered executive correspondence. Though Porter wrote to James Monroe in 1815, urging him (and the nation) to offer some "acknowledgement" of his efforts to secure an "indisputable title" to this fertile and convenient island—a land which might be, Porter suggested, "at some future day of great importance to the vessels of the United States navigating the Pacific"—his letter was unceremoniously filed, apparently without comment.[17] Rebuffed, Porter turned his implacable naval energies to the idea of a peacetime Pacific exploring expedition. Later that same year, he wrote to Madison once again, asserting that an American undertaking in the spirit of Anson, Cook, Vancouver, and "La Peyrouse" would be the perfect vehicle "for enlarging the bounds of science, adding to the knowledge of men, and to the fame of the Nation." Leaving no doubt about the scope of his vision, Porter declared, "My views are general and they embrace the whole world." Not only did "many interesting points in Geography and Science still remain undetermined," as he put it, and not only were there "great extents of ocean that have never been traversed by ships and innumerable islands of which we have only traditionary accounts," there was the looming and vaster question of national destiny. He conjured the vision of nothing less than a Pacific America:

> We, Sir, are a great and rising nation. . . . We possess a country whose shores are washed by the Atlantic and the Pacific—a country on which the Sun shines the greater part of his round—a country on which all the world has turned its eyes—and a country in which even monarchs have sought a refuge. Of its extent, its resources, and inhabitants, we ourselves are ignorant. We border on Russia, on Japan, on China; and our trade is now of sufficient importance there to attract the attention and excite the cupidity of an enemy. We border on islands which bear the same relation to the N.W. Coast as those of the West Indies bear to the Atlantic States: Islands, the Chiefs of which are friendly in the utmost degree to our traders, without any knowledge of the Nation to which they belong.

It was therefore necessary, in Porter's view, to show the flag in these regions by means of an expedition, one that would advance merchant commerce even as it transcended the expectations of those conceited enemies of American grandeur "who know us now only as merchants." Science would thus conveniently serve, in his view, both light and lucre: "Let men of science be employed by the different Societies of America to Accompany the expedition," he explained, "and suffer no means to be left untried by which we may proffit [*sic*]." As for cartography, Porter envisioned nothing less than a thorough reorientation of the map of the Pacific, suggesting that "Washington might be made a first Meredian [*sic*] for the United States, and the longitude of the discoveries made, calculated therefrom." Interestingly, he undergirded this cartographic symbolism with a savvy strategy for laying precedent in international law for the claim that the Pacific world was properly within the sphere of American sovereignty. How else to understand the cryptic closing of his letter, where he intimated that the legal instruments of the proposed voyage ought to reflect presumptive American rights?

> Nations undertaking similar expeditions have thought it necessary to ask passports invariably from others for the ships. It would be well perhaps to consider whether the United States are not in a state to undertake this voyage without the aid of such passports.[18]

No direct connection has ever been established between Porter's expansive vision and Madison's subsequent calls for naval exploration of the Pacific Coast, but the possibility has always been alluring. By 1825, Madison was himself invoking Cook and La Pérouse in his address to the nation, praising "the spirit of improvement . . . abroad upon the earth," and suggesting that the expanding domain of "geographical and astronomical science" particularly merited the attentions of any great people: "Of the cost of these undertakings . . . it would be unworthy of a great and generous nation to take a second thought," Madison declared, before acknowledging that he was asking Congress to consider the notion of "internal improvement" (the constitutional category under which such expenditures could be federally authorized) "upon a view thus enlarged."[19] At the same time, he hesitated to suggest that this notion of "internal improvement" could be so stretched as to embrace the entire globe, and thus he ultimately disavowed the idea of "an expedition for circumnavigating the globe for the purposes of scientific research and inquiry," calling instead for a naval voyage to survey the long Pacific Coast.[20] This did not happen.

By 1825, however, American naval vessels were already afloat in the Pacific. In the early 1820s, following on the creation of the Mediterranean squadron in 1815 and conflicts with pirates from the Mahgreb, the U.S. Navy had moved toward a "distant-station" policy, and an expanded role in diplomacy and the protection of commerce. As Spain's colonial rule unraveled in revolution, and political conditions changed rapidly throughout the global Spanish insular and continental possessions, a West India and a Pacific squadron were the first to be added to a growing list of resident U.S. naval forces.[21] As Madison himself put it in the same speech, concerning the new Pacific squadron: "an unsettled coast of many degrees of latitude, forming a part of our own territory, and a flourishing commerce and fishery, extending to the islands of the Pacific and to China, still require that the protecting power of the union should be displayed under its flag, as well upon the ocean as upon the land."[22]

It was in this context—a new focus on American sea power, the explosive growth of trading and whaling in the Pacific—that the idea of a grand American exploring expedition began to gain momentum, and it was at this time (the mid-1820s) that the notion attracted the attentions of the man who would become its most visible and vocal advocate, Jeremiah N. Reynolds. Reynolds remains a somewhat mysterious figure. The available manuscript material appears to have been exhausted, and the picture that emerges is that of a shape-changer: a tireless promoter and messianic confidence man out of backwoods Ohio, a rhetorician of American destiny who teetered on the knife edge separating the visionary from the crank, before being escorted into the shadows by forces he himself set in motion.[23] In the process he won the undying admiration of that dark horse of American letters, Edgar Allan Poe, who quite literally died with Reynolds's name on his lips (affording Reynolds gothic immortality in American English departments). Poignantly (if unknowingly), Poe himself summed up Reynolds's role in the U.S. Ex. Ex. in a review penned in 1843, discussing the accomplishments (and failings) of the recently returned voyage: calling Reynolds the "prime mover" of the whole undertaking, Poe declared that, whatever the failings of the mission, "one thing is certain—when men, hereafter, shall come to speak of this Expedition, they will speak of it not as the American Expedition . . . nor, alas! as the Wilkes expedition—they will speak of it—if they speak at all—as 'the expedition of Mr. Reynolds.'"[24] It became, of course, the "Wilkes Expedition."

Reynolds was thus squeezed out of the Ex. Ex. And, as Poe's "alas!" suggests, the wound was still fresh in 1843. Reynolds and his supporters had been certain he would get to go along at least, and possibly even have a leadership role—but shifting political fortunes in the protracted preparations ultimately marginalized his backers in Congress. Nevertheless, his activities in the 1820s and 1830s shed considerable light on the forces that gave rise to the expedition, and show particularly the significance of whaling and cartography in the enterprise.

It was via petitions for congressional support of polar exploration that Reynolds first came to national attention, and though he possessed only very limited schooling, his lecture-circuit advocacy of American maritime enterprise eventually brought him within earshot of the secretary of the navy, Samuel Southard. During the 1820s the idea that private American whalers and sealers possessed geographic secrets that rivaled the discoveries of the great powers gained considerable currency, buttressed by the highly popular story of the encounter in January 1821 between the Russian explorer Fabian Gottlieb von Bellingshausen and the Stonington, Connecticut, sealer Nathaniel Palmer in the deep Antarctic: at what the Russian considered the ultima Thule of intrepid icebound seamanship, Bellingshausen had the disconcerting experience of having the fog lift to reveal a little flotilla of New England sealers, who suggested to him that if he just kept going, there was serious land to the south.[25] Encouraged by this tale of unpretentious Yankee initiative, and seeking intelligence that might guide a congressionally funded southern expedition, Southard commissioned Reynolds on an overland mission in 1828: to make his way to the seaport towns of Connecticut and Massachusetts, and there to collect what was known of the Southern Ocean (Antarctic and Pacific) through parleys with sea captains and the perusal of their logbooks. The resulting thirty-page report (with later supplements) is a remarkable historical document: a gazetteer surveying the scope of American maritime enterprise in the Pacific (fig. 5.1). In it, Reynolds listed the names and coordinates of more than two hundred islands, reefs, and shoals in the Pacific, all of which, he claimed, were the special domain of the whalemen of New England. In the accompanying letter to Southard he depicted the reconnaissance as a sojourn among the true masters of navigation in the vastest ocean on earth:

> Sir: In obedience to your orders of June 30, I repaired without delay to New London, Stonington, Newport, New Bedford, Edgartown, Nantucket, and other places where information might be found of the Pacific Ocean and South Seas. The whaling captains were ready to communicate such knowledge as they had treasured up or recorded in their numerous voyages. The owners of the whale ships were equally anxious to do all in their power to assist me in the object of my visit to them. In these places the navigators are certainly better acquainted with those seas than any other people in this or any other country can be.

In contrast to this homegrown geographic expertise, the official maps made by the European powers were revealed, in Reynolds's view, as a tissue of appropriation and misrepresentation:

ISLANDS AND REEFS—Continued.

	South latitude.	West longitude.	
Sarah Ann -	4°	154° 18′	Probably the same as Maldone's island, placed on charts in 155.°
Fenua Laosa Oroa, Gardner's island	W. N. W. 4 30	from 174 22	Mopelia about 60 miles. Not on charts; discovered by Capt. Coffin, of ship Ganges.
Coffin's island	31 13	178 54	Not on charts; discovered by Capt. Coffin, as above.
Ganges island -	10 25	160 45	On charts; seen by Capt. Coffin.
Do. -	10	161	Do. See Captain Coffin's printed account.
	South latitude.	**East longitude.**	
Nederlandich island.	7° 10′	177° 33′	Not on charts. See printed account.
Tracy's island	7 30	178 45	Not on charts.
Mitchell's group	9 06	179 48	
Plasket's island	9 18	179 50	Probably one of Mitchell's group.
Independence island.	10 25	179	Not on charts.
Island -	10 45	179 35	Not on charts.
Hunter's islands	15 31	176 11	
Reef (& 160° 14′)	23 48	164 14	
Do. - -	26 06	160	
Island - -	31 19	160 42	
Reef - -	26 06	160	Repetition of reef given above.
Do. - -	21 15	160	
Island - -	30 33	139 36	Inland, on New Holland.
Moore's island	30	166 35	See page 10, with Spartan island and reef.
An island, with plenty of wood and water.	from 1° N. to 2° S.	125 6	
Island - -	30 06	144 24	
Do. - -	29 31	143	
Do. - -	31	155	
Lydne's shoal -	3 20	146 50	
Ocean island -	41	170 48	
Do. -	2 30	152 40	
Reef - -	1 40	159 30	
Do. - -	8 30	144 45	

FIGURE 5.1. The Enterprising Whalemen: an excerpt from Jeremiah N. Reynolds's gazetteer of Pacific islands, 1835. Courtesy of the Firestone Library, Princeton University.

> The English charts, and those of other countries, are as yet very imperfect. Much of their information has been obtained from loose accounts from whalers, who were careless in some instances, and forgetful in others, and which were seized with greediness by the makers of maps and charts, in order to be the first to make these discoveries known. But perhaps it does not become us to be hypercritical upon other nations, as we have as yet no maps or charts of our own to compare with them.[26]

In this last aside, Reynolds invoked a rising spirit of what might be called "hydrographic nationalism" in the United States during this period, a sentiment often voiced in the cry that it was unseemly for the navigators of a liberated nation to plot their way into their own harbors using the charts of their one-time masters. It was partly arguments along these lines that goaded the government into creating the ill-starred Coast Survey in 1816, which conducted sporadic surveying in the teens and twenties under the brilliant but impossible Swiss geodesist, Ferdinand Hassler; similar rhetoric was also deployed by private firms like Edmund March Blunt and his sons, as they supplemented their print-shop piracy of foreign sailing guides with some original surveying endeavors, all in the name of a properly American set of ocean charts.[27] In sounding the call for an American Exploring Expedition during a congressional presentation in February of 1828, Reynolds gave powerful voice to this patriotic hydrographic imperative:

> When our naval commanders and hardy tars have achieved a victory on the deep, they have to seek our harbours, and conduct their prizes into port, by tables and charts furnished, perhaps, by the very people they have vanquished.[28]

A Pacific surveying expedition would thus afford the opportunity for an American hydrography of these regions, an opportunity to recover and to ratify the labors of American navigators. As Reynolds put it, for too many years each discovery of domestic merchant vessels had "sunk into oblivion" at home, even as "often . . . it was seized upon by some European constructer of maps, and placed in the charts as an important acquisition to geography, but without mentioning the names, or alluding to the nation of the discoverers from whose individual exertions such information had been derived."[29] All that was now needed, he argued, was an expedition that would recover and cartographically inscribe this "picture of more daring and successful enterprise than is to be found in the annals of any other nation."[30] Moreover, supporters of the plan argued that this web of anonymous and democratic exploratory work already

accomplished by ordinary merchant vessels would permit an official expedition to cover more ground faster than ever before. The naval commodore John Downes, an early partisan of the undertaking, expressed it this way:

> It is probable that not less than five hundred of these islands and reefs have been marked with sufficient accuracy by our whalers, sealers, and traffickers, of one kind or another, to enable an expedition to examine the most important of them, without much loss of time in seeking their positions. This will enable the discovery vessels to do more, in less time, than has probably ever been effected by a similar enterprise from any other country.[31]

The Yankee whalemen had, by these lights, sketched the first draft of the Pacific.[32]

As far as the whaling industry was concerned, archival materials support the idea that American seamen were largely dependent on foreign mapmakers. A number of surviving track charts from nineteenth-century whaling voyages, preserved in American maritime collections, are manuscript annotations on British Admiralty base maps. At the same time, Reynolds was not merely indulging his exceptional rhetorical gifts when, on returning from his New England mission, he praised those Yankee navigators who took him into their homes and laid open to him "their logbooks, and journals and charts."[33] If anything, he was exaggerating the amount of original work he had to do to amass their information. After all, the Salem East India Marine Society had been founded back in 1799, in part to serve as a clearinghouse for geographic information collected and redistributed by the maritime industries of Massachusetts; and while the greasier whalemen of Nantucket, Rhode Island, and New Bedford, Massachusetts, had no comparably splendid temple wherein to deposit their offerings, broadsheets like the Nantucket *Inquirer* served as the de-facto repositories of their geographic discoveries, regularly printing notices about newly encountered shoals, passages, and depots in the Pacific.[34] In fact, the editor of the *Inquirer*, Samuel Haynes Jenks, had already compiled, as early as 1825, an extensive list of uncharted or questionable Pacific islands sighted by Nantucket whalemen; their discovery routes had even been mapped, and the resulting chart of American Pacific enterprise waved about on the floor of Congress.[35] There can be little doubt that much of the impetus for Reynolds's commission from the secretary of the navy derived from this dramatic gesture by John Reed, Whig congressman from Massachusetts. During debates in May of 1828 concerning appropriations for an exploring expedition, Reed pointed out that the United States had some 150 whaling ships working the Pacific, risking lives and capital in dangerous waters. Then he rose to defend the need for an official surveying expedition:

> I hold in my hand (continued Mr. R.) a chart, on which is traced the routes of the whaling ships. They extend from Cape Horn, in the Pacific, six thousand miles to the Japan Isles, Asia and New Holland. I also hold in my hand a newspaper, printed some time since at Nantucket, giving an account of two hundred islands, reefs, and shoals, never surveyed or laid down on any chart. These islands and shoals, &c. have been discovered from time to time by the whale ships, but they did not possess either the means or time to survey them with accuracy.[36]

And it was more than just not having the time or equipment. While the whalers held pride of place for geographic ambition (traders merely followed established routes from port to port, whereas the whalers were pelagic wanderers, seeking out new grounds and spending years meandering over the oceans, and were thus uniquely suited to the task of geographic discovery in a vast ocean of small islands), they were nevertheless explicitly enjoined from the formal activity of surveying and exploration: the developing institutions of maritime underwriting in South Street and Boston were placing new restrictions on captains, including, increasingly, a rider stipulating that a private vessel lost "in the process of examining a group of islands or a reef" would forfeit its insurance policy.[37]

The specter of wrecks was linked to the specter of captivity on savage islands, so the supporters of the Pacific surveying expedition called on Congress to protect American shipping both by means of better maps and by a show of military force aimed at overawing the islanders, whose fearsome activities—both real and imagined—had entered popular consciousness in the period through the narratives of sailors and missionaries.[38] Pushing for the expedition in the 1830s, Reynolds pointed out that there were some 6 million dollars' worth of American shipping in the whaling industry alone, which continuously traversed the waters of "Oceania," where "we find the mariner in constant danger of striking his keel against some point of coral rock." He then went on to recall to his listeners that the resulting wrecks meant castaways and beachcombers who lived as prisoners in paradise, in thrall to savage kings.[39] The Exploring Expedition, he promised, would not only map the perils of the sea, but punish and liberate as necessary:

> It will be a matter of national pride that our country would be the first to set the example of an enterprise destined to *retrieve the character of civilized man*, and in some measure atone for the accumulated injuries which centuries have seen of daily increasing enormity.[40]

Thus those who joined Reynolds in his calls for the expedition—and there were many: he collected testimonials from congressmen, ship owners, and citizens' groups in the maritime regions—echoed his demand for a charting

expedition that would be, at the same time, "a demonstration of our power in those seas, which would make an impression upon the savages favorable to the future security of our mariners."[41]

This truculence reflected increasingly ambitious geopolitical posturing on the part of the United States, particularly in the Pacific, by the mid-1830s. From the earliest discussions about an exploring expedition, the reach of American national power had been explicitly at issue. Samuel Southard, after all, greeted Reynolds's report on the exploits of New England mariners with a report to Congress declaring the Pacific "a theatre . . . peculiarly our own, from position and the course of human events."[42] And while shifting administrations and priorities kept the expedition in limbo for almost a decade after Reynolds filed his initial report, the rhetoric of an *American* Pacific as the natural domain of an expanding American commercial empire grew only more strident as the nation tested the hemispheric boundaries of the Monroe Doctrine, and considered just how far "Westward the star of empire takes its way."[43]

Might that empire reach so far west that it returned to the East? For those who praised the civilizing function of commerce, and who insisted, with Daniel Webster, that the country was not a "great land animal,"[44] it was quite possible to answer in the affirmative.[45] In 1838 the cosmopolitan Whig representative from New York, Daniel H. Barnard, wove his praise of the Ex. Ex. into a speech on the civilizing effects of the great commercial empires, tracing the benevolent effects of commerce from Egypt to Greece, Rome, Spain, and Britain, calling for the natural divisions of labor afforded by colonial expansion, and citing the command of Heaven to man, "that he should *subdue the earth*." In his view this meant that naval enterprise should not cease until enterprising nations "shall have conquered, and all but annihilated the spaces that intervene between the seas and the centers of territories and continents, and between the various extremities of the land and points of departure and approach, for the population and the business that must swarm and swell upon its surface."[46] And similarly invoking the nascent Ex. Ex in 1837, a comparably sanguine Levi Woodbury (a former secretary of the navy, as well as of the treasury), speaking in the Hall of Representatives in the Capitol, declared the United States a "laboratory of the world, to try every doubtful substance in the crucible," and praised American commercial expansion, which had penetrated into "every habitable quarter of the globe" and made "the whole world, in some degree, tributary to our progress."[47]

The Ex. Ex. was, therefore, for many of its supporters, an opportunity for the nation to "acquire a footing" in an oceanic domain, to open a "noble theatre whereon to contend for mastery with the nations of the earth," and to demonstrate "our commanding position and rank among the commercial na-

tions of the earth."[48] One advocate, involved in the whaling industry, wrote a call for a new kind of frontier for the country—what he termed, alluding to commercial and missionary outposts in the Pacific and elsewhere, the nation's "*marine* colonies":

> Why should we have governors, judges, and all the paraphernalia of courts, in territories where there is a bare possibility that an Indian may be murdered, or become a murderer; steal a horse, or have his horse stolen; and not have a superintending influence abroad, where our ships are daily traversing from island to island and from sea to sea with the celerity and precision of the invisible dwellers of the deep, that the savage may be awed into respect, and the mutineer's hand be bound down in submission?[49]

Similarly situating the plan for the expedition with respect to continental expansion, Representative Harmer, in his speaking to the U.S. Congress, noted the precedent of the Lewis and Clark and Long expeditions, as well as Hassler's Coast Survey, before going on to deny that such "internal improvements" could be distinguished from the proposed Pacific voyage, if properly understood:

> At this moment, whilst we were discussing the question, Mr. Hassler was executing charts from the materials he had collected along our coast during the past summer, and it would be a most singular position to assume, that, although we could require him to survey and note all the reefs and islands within sight, or within one hundred miles of our coast, because the commerce of the country was carried on through this space, yet we could not send him, for the same purpose, to another part of the ocean, equally occupied by the public armed and private merchant vessels of the United States. . . . Every part of the ocean was within our jurisdiction.[50]

And to this expansive—indeed global—view of federal action, and the liberal reading of constitutional mandates it implied, Reynolds added his own, still more sweeping gloss. Citing "that great *apostle of liberty, father of democracy and strict constructionist*," Thomas Jefferson, Reynolds asserted that under the banner of science, the U.S. government could properly claim a veritably cosmic domain for its activities: "We claim no wider *range* than he has sanctioned; including as he does, *animate* and *inanimate nature*, the heavens above, and all on earth beneath."[51]

With such talk in Congress, and increasingly extensive and complex "facts on the ground" in the trading outposts and missionary settlements of the Pacific islands, it is little wonder that rivals France and Britain took note, and diplomatic correspondence reflected growing concerns about American influence and colonial intentions in the region.[52] After all, policies of territorial aggrandizement and commercial subsidy enacted under the cover of enlightened scientific universalism had been pioneered by the European powers, and practiced with subtle avidity for half a century. No one was confused about the significance of the project taking shape in Washington and on the naval docks from New York to the mid-Atlantic states.

By the time the U.S. Ex. Ex. left Virginia, it had been freighted with the ambition to put an American Pacific on the map.

SEA CHARTING MILITANT: HYDROGRAPHIC IMPERIALISM IN THE PACIFIC

In the previous section I endeavored to situate the U.S. Ex. Ex. within the larger context of American commercial expansion and other Pacific interests of the early nineteenth century. What emerged from that account was the central role played by cartography in the expedition's mission: in the planning, promotion, and, ultimately, goals of the voyage. As Wilkes's official instructions stated, the object of the expedition was "to diminish the hazards of the ocean, and point out to future navigators a course by which they may avoid dangers and find safety." This meant that, above all, it was the purpose of the expedition, "having in view the important interests of our commerce embarked in the whale-fisheries, and other adventures in the great Southern Ocean," to undertake the "exploring and surveying of that sea, as well to determine the existence of all doubtful islands and shoals, as to discover and accurately fix the position of all those which lie in or near the track of our vessels in that quarter, and may have escaped the observation of scientific navigators."[53]

Wilkes himself was thus commissioned to serve as just such a "scientific navigator," and it was on the basis of his scientific qualifications—he had studied surveying with Hassler, worked in the Coast Survey, and received tuition on navigational astronomy from Nathaniel Bowditch himself—that Wilkes, despite his relatively low naval rank, received (over the objections of many) the commission to lead the expedition. Indeed, so contentious were the issues of rank that the only way a number of other officers would agree to serve under Lieutenant Wilkes on the Ex. Ex. was to have the mission "divested of all military character." One of the other leaders of the expedition, William Hudson, was in fact narrowly senior to Wilkes, and lockstep Navy etiquette considered reporting to a junior officer anathema to naval order; Hudson faced withering criticism from many for accepting a post rejected by a number of his seniors. The mantle of science would insulate the whole affair and, it was hoped, cordon it off, lest the precedent breach the sealed bulkheads of rank. Under the enchantments of science, then, everyone would, in theory, get along. Hence

the care in Wilkes's instructions to emphasize that "the Expedition is not for conquest, but for discovery. Its objects are peaceful; they are to extend the empire of commerce and science."[54] And in addition to its elaborate cartographic responsibilities (which would fall to the naval officers under Wilkes), the vessels of the U.S. Ex. Ex. carried a wholly civilian scientific staff of nine, who were to focus on natural history: collecting specimens, sounding the natives, and putting everything on paper in words and pictures.[55]

At the same time, however, I also suggested in the previous section that, *pace* this banner of enlightened cosmopolitan pacifism, the Ex. Ex. sailed into the Pacific with considerably more martial aims as well. It had been conceived as an operation to extend the sway of American influence, and to overawe recalcitrant natives—missions that lay tacit in Wilkes's instructions to "diminish the hazards of the ocean." There can be little doubt that Wilkes understood the euphemistic aspects of this charge: in the official narrative of the expedition he wrote candidly, "Among other duties, we were called upon to administer chastisement for the murder of portions of the crews of whale-ships, as well as of persons belonging to the squadron, which was done not as a vindictive retaliation, but to convince the natives that their attacks on vessels bearing our flag cannot pass with impunity."[56]

And indeed such punitive assaults on Polynesian villages were undertaken a number of times during the course of the expedition, which served, wherever it landed in the Pacific, as an itinerant police force and an impromptu judicial system. Where Wilkes and Hudson believed justice demanded arrest, deportation, and even kidnapping, they did not hesitate to use their ships and men for these purposes. Prices were put on the heads of wanted natives, and secret missions were undertaken—in Fiji, in Samoa—to capture islanders believed to have been involved in violent resistance against American whalemen (who were ever on the prowl for provisions and often for women as well). One of these suspects, Vendovi, was made a prisoner aboard the *Vincennes* for more than two years, after Wilkes decided to bring him to trial in the United States. He died shortly after the Ex. Ex. returned to New York. In the wake of the fateful misunderstandings on the beach at Malolo Island that led to the deaths of half a dozen Fijians and two of the expedition's junior officers (one of them Wilkes's nephew), Wilkes methodically arranged for a vengeful massacre that destroyed two villages and left nearly one hundred islanders dead. Later in the voyage Captain Hudson similarly fired several native villages in punitive raids.

Here, I think we can say, is a surveying mission that offers quite a dramatic illustration of the theme of cartography and mastery. Even a brief review of the activities and effects of the voyages gives considerable support to the comment made by a recent historian of the expedition, who wrote, "Wilkes unabashedly

put his scientific expedition to the service of white, Anglo-Saxon Protestant imperialism."[57] So, for instance, Wilkes not only dealt rough justice in displays of American power when he saw fit, he also took responsibility for negotiating several treaties of commercial regulation with Polynesian communities—contractual arrangements that usurped local authority (for instance by extending U.S. jurisdiction over locals accused of crimes against Americans), extended civilizing social legislation over native practices (for instance forbidding work on the Sabbath and the drinking of spirits), and entailed local inhabitants in preventing sailors' desertion from ships calling in Polynesian harbors (in essence an effort to use the islanders to enforce the extortionate labor arrangements essential to maritime merchant capital).[58] In addition, he appointed U.S. consuls as local agents representing American interests, set fixed pilotage rates for visiting vessels, and (in keeping with his instructions from the secretary of the navy) made, wherever possible, "such arrangements as will insure a supply of fruits, vegetables, and fresh provisions to vessels visiting" the insular settlements, arrangements that included "teaching the natives the modes of cultivation, and encouraging them to raise hogs in greater abundance."[59]

In these and other ways the U.S. Ex. Ex. was an undertaking that sought to effect what may properly be called imperial transformations—legal, ecological, cultural—at every anchorage. And between those anchorages, the expedition was continuously at the task of surveying, making maps meant to service the different dimensions of American interest in the region. It will be worth taking a moment to review the cartographic productions of the Ex. Ex. in more detail with these interests in mind.[60]

The most significant cartographic legacy of the expedition is the two-volume folio *Atlas* published in 1858, elephantine books thick with a total of 109 engraved sheets (many featuring several individual maps). Most of these were large, highly detailed charts for the purpose of Pacific navigation, including more than one hundred representations of harbors, anchorages, and beachside village settlements; the work as a whole covering a total of nearly three hundred islands (figs. 5.2 and 5.3). Dozens of comparably detailed coastal charts depicted the shores of the Pacific Northwest, from San Francisco to the bottom of Vancouver Island. Though bound atlases were issued more than fifteen years after the Ex. Ex. returned, Wilkes's charts had been sold as single sheets as early as April of 1843, less than a year after the *Vincennes* dropped anchor in New York harbor. And as many as fifty thousand of his navigational charts were distributed loose to commanders in the U.S. Navy and captains in the merchant marine.[61]

A closer look at some of these charts reveals how thoroughly they met the demands of commerce in the Pacific in this period: for instance, minute anno-

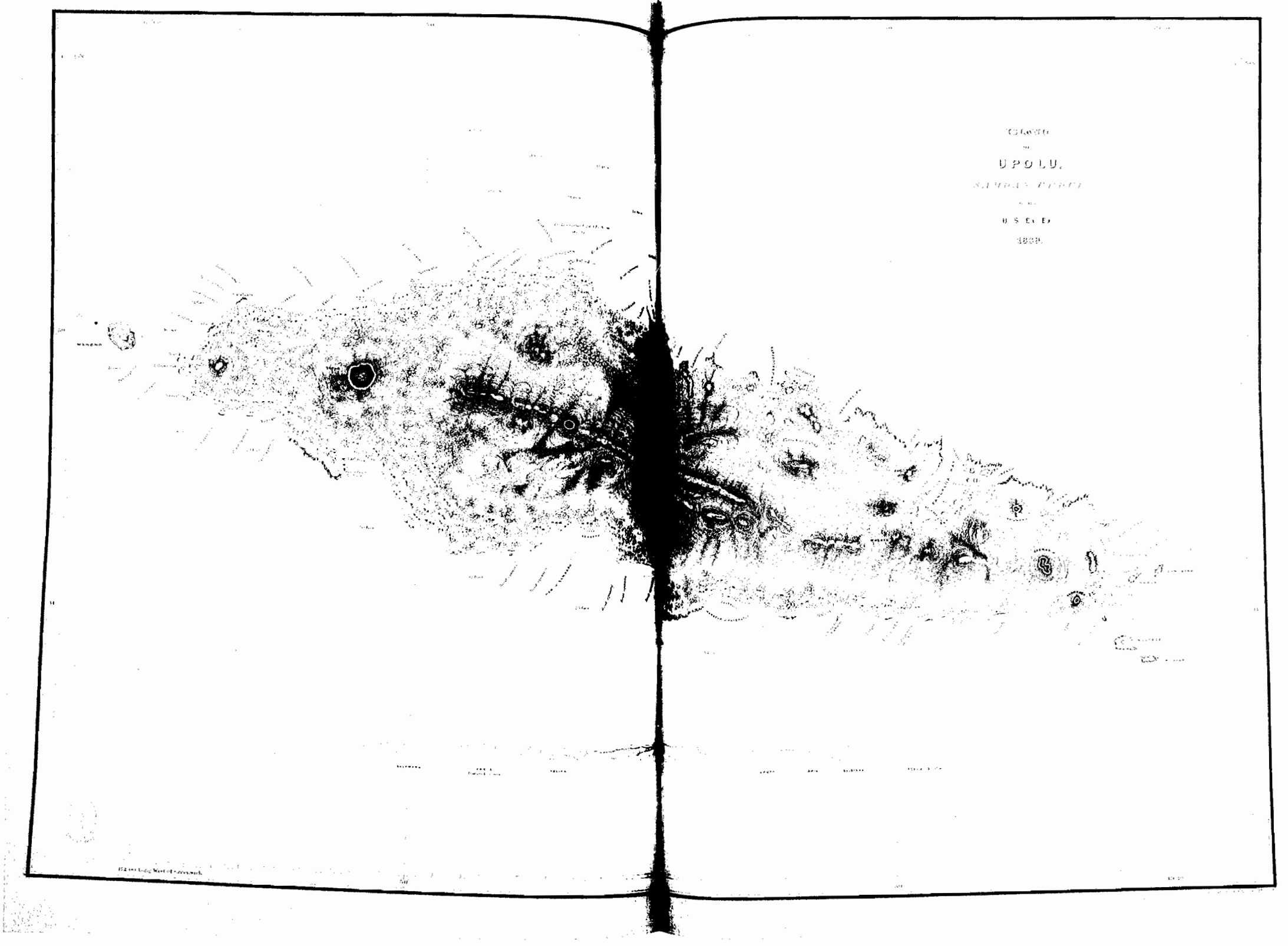


FIGURE 5.2. The Atlas That Emerged from the U.S. Ex. Ex.: Upolu, as printed in 1850. Courtesy of the Geography and Map Division, Library of Congress, Washington, DC (Q 115. W6 folio).

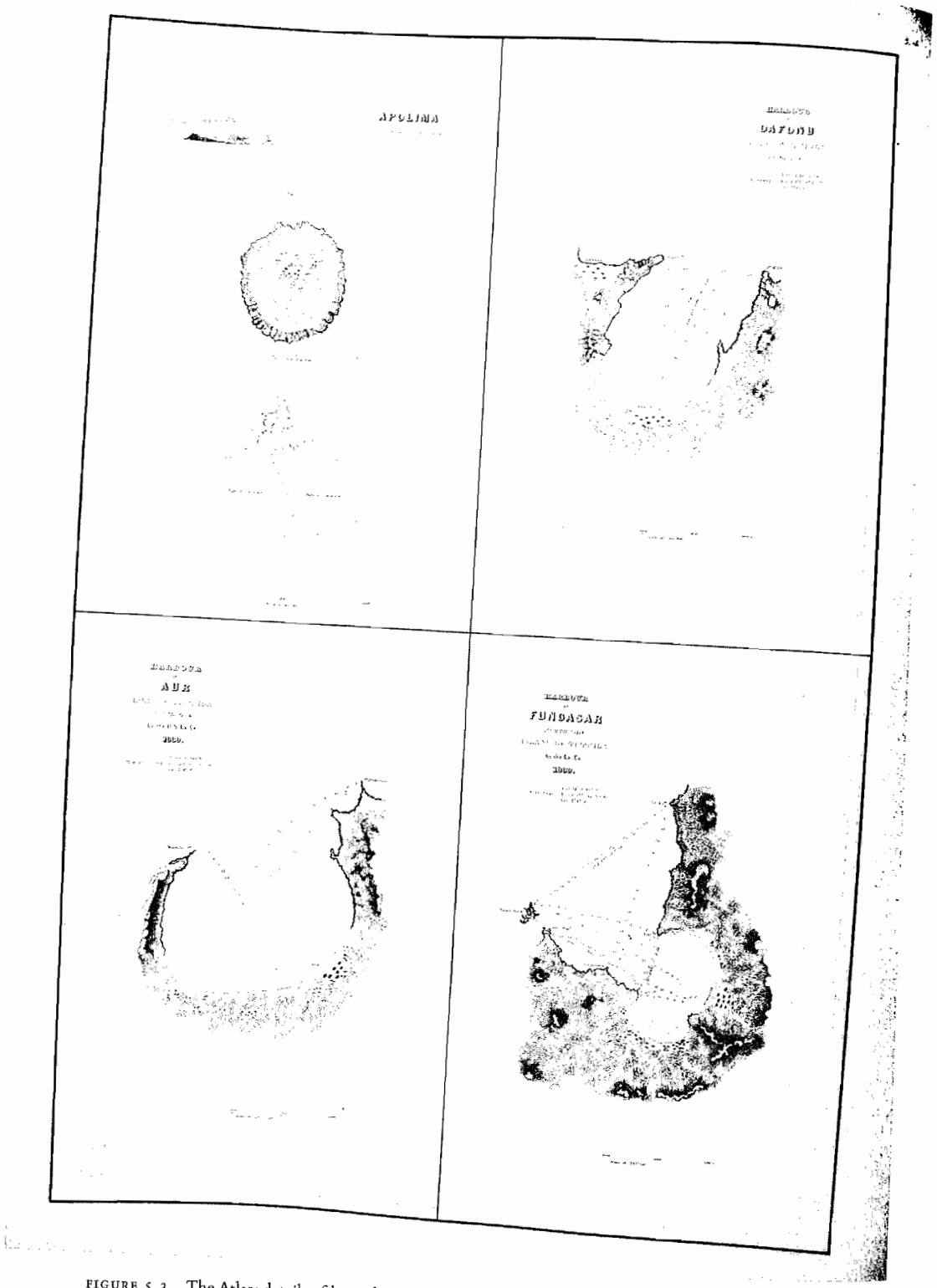


FIGURE 5.3. The Atlas: details of hazards and harbors, as printed in 1850. Courtesy of the Geography and Map Division, Library of Congress, Washington, DC.

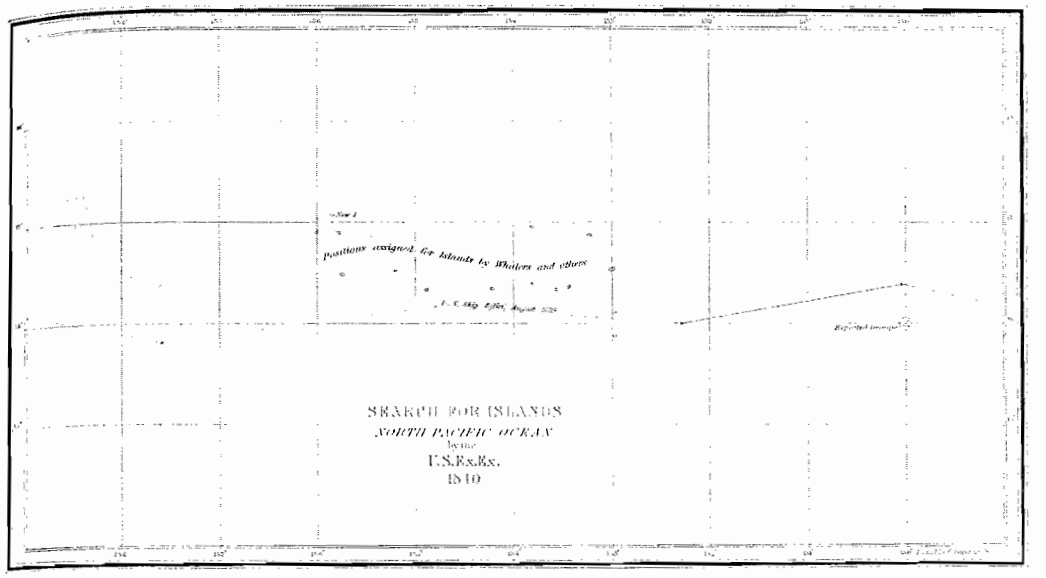


FIGURE 5.4 Cruising for Phantom Islands: Charles Wilkes's chart of the effort to fix the location of reported land, from Wilkes, *Theory of the Winds* (London: Trübner and Co., 1856). Courtesy of the Sterling Memorial Library, Yale University.

tations signal the location of springs, and inform navigators where wood and water could be had in the most remote locales. Other, more idiosyncratic charts (published separately) depict the Ex. Ex. doing its vaunted task of sweeping the sea for *vigias*, those nebulous hazards reported by whalemen and others, the locations of which had not been specified with adequate certainty (fig. 5.4). Wilkes's narrative volume *Hydrography* featured detailed sailing instructions for each of the significant ports of call in the major island groups, and amounted to an American version of Alexander Findlay's British *Directory for the Navigation of the South Pacific Ocean*, first published in 1851. In addition, Wilkes and the midshipmen who helped him work up his results explored the interactions between winds and currents in an effort to plot the most efficient routes for sailing vessels negotiating passages around the world (fig. 5.5). In fact, Wilkes even went so far as to examine the data he had collected for evidence that his maps of Pacific currents might be used by whalemen to scout promising new whaling grounds. He hypothesized that the whales' food was transported by the temperate gyres in both hemispheres, and that the best whaling zones fell in the areas where such currents terminated, in what he called "neutral spaces." In this sense a chart like this one (fig. 5.6) is nothing less than a remarkably early thematic map of marine resources. Moreover, it did more than merely show "at one view" the "chief resort of whales" in the Pacific; by sketching currents

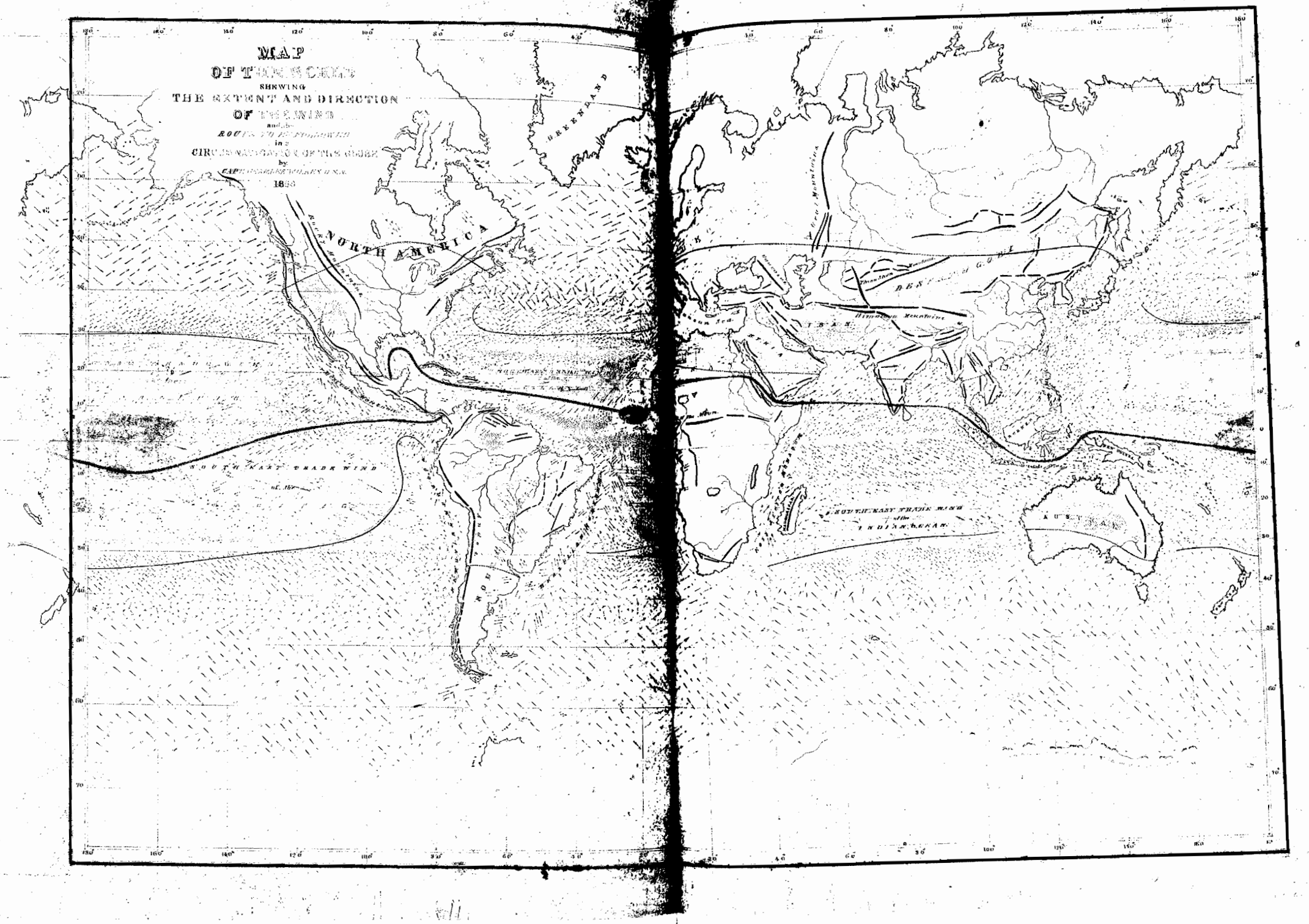


FIGURE 5.5. Plotting the Wind: Charles Wilkes's manuscript "Map of the World, Showing the Extent and Direction of the Wind." Courtesy of the Geography and Map Division, Library of Congress, Washington, DC.

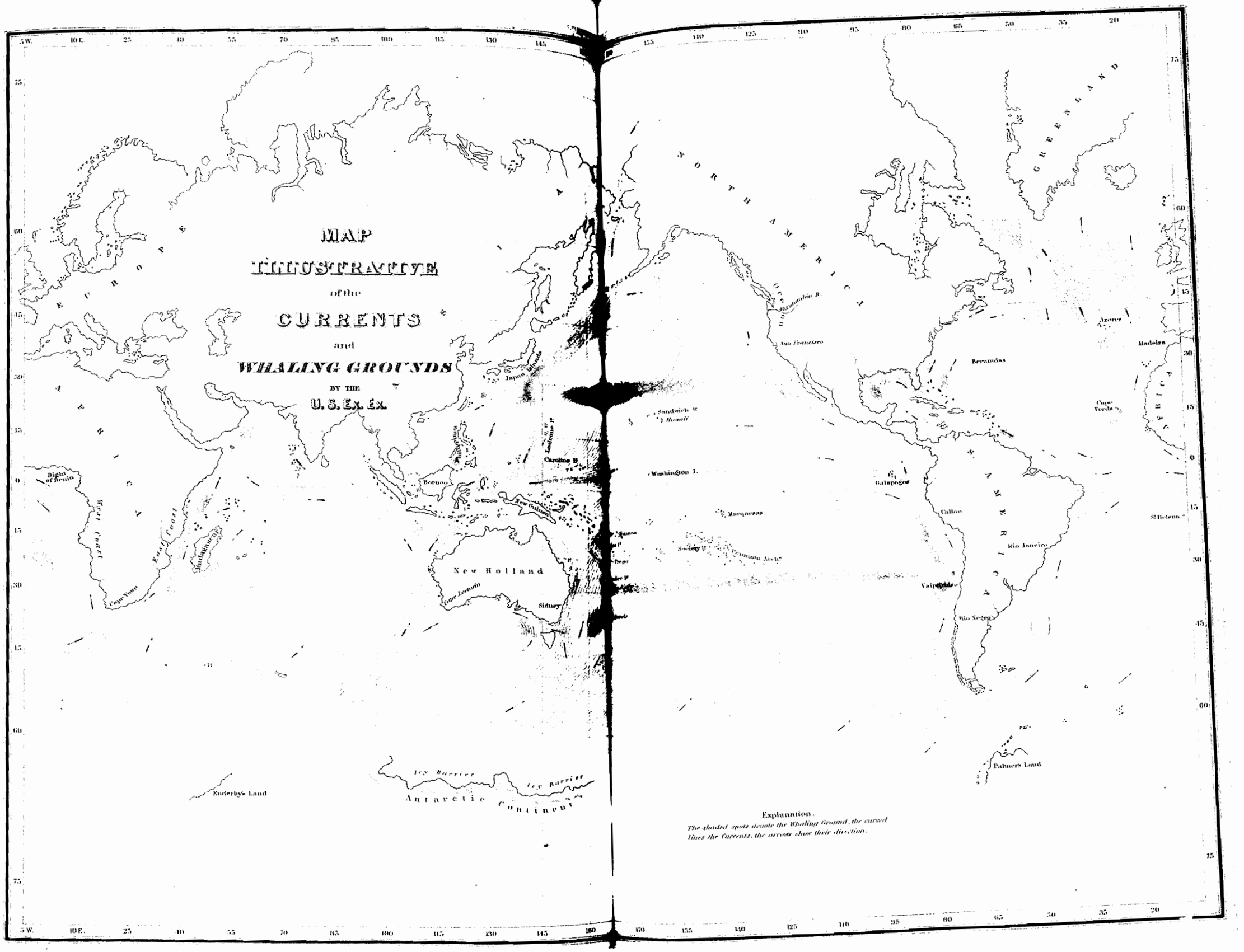


FIGURE 5.6. Plotting the Whales: Charles Wilkes's printed chart of oceanic currents and whaling grounds, from the *Narrative of the United States Exploring Expedition*, vol. 5, chap. 12, "Currents and Whaling." Courtesy of the Firestone Library, Princeton University.

and their terminal zones, this chart made an ambitious bid to offer a predictive instrument for those seeking newly productive grounds for the industry.[62]

If such documents give us a very clear sense of the ways that the maps of the Ex. Ex. served American ambitions in the region in practical ways, it is worth taking a moment to consider how this cartography served more nebulous symbolic functions as well. Given the immense popularity of Wilkes's five-volume narrative of the expedition, with its inset maps and small but detailed atlas volume, it is not difficult to see the cartography of the Ex. Ex. as functioning like the foolscap setting of a vast stage on which American readers could watch the drama of national enterprise unfold. Paul Carter has written powerfully about the theatrical conventions of colonial spatial representation,[63] and given what we know about the writers and readers who paged through Wilkes's volumes as they conjured up images of U.S. action in the South Seas (Melville, notably, kept the volumes close at hand as he summoned *Moby-Dick*), there is certainly a case to be made that these maps—which largely erased the vast sea, presenting indifferently accessible tropical islands for collective consideration—offered Americans a world eminently accessible to national ambition. After all, these maps came into the public domain in the company of a lengthy tale of the intrepid world-encompassing exploits of some four hundred Americans, a tale that could be plotted on those very charts like a play blocked upon a paper proscenium.

In these and other respects the cartographic work of the Ex. Ex. played a highly significant role in expanding the ambit and security of U.S. commercial enterprise in the Pacific in the nineteenth century. While the stories of Wilkes's map of the Oregon Territory (which came to be entangled in broader negotiations with Britain) and the endlessly controversial coastal chart he drew to depict the disputed sightings of the Antarctic Continent—which has been the subject of cartometric analysis well into the twentieth century—have perhaps received more attention from scholars of map history, the charting of the central Pacific (for instance his celebrated chart of the Fiji group, of which he was very proud) certainly merits comparable consideration.[64] Given the number of Ex. Ex.–surveyed islands that would later fall under formal U.S. possession during the Guano Rush of the 1850s, it seems to me fair to argue that Wilkes's hydrographic enterprise played a major role in bringing into being, by the late 1850s, maps that depicted "American Polynesia" as a bounded domain in the middle of the world's largest ocean. If, as I suggested above, the Ex. Ex. set sail with the intention of putting an American Pacific on the map, then later nineteenth-century images like the one by the German geographer Ernst Behm (fig. 5.7), or those in the popular atlases by the Scottish geographer Alexander Keith Johnston (fig. 5.8), point to the very real success of the undertaking.[65]

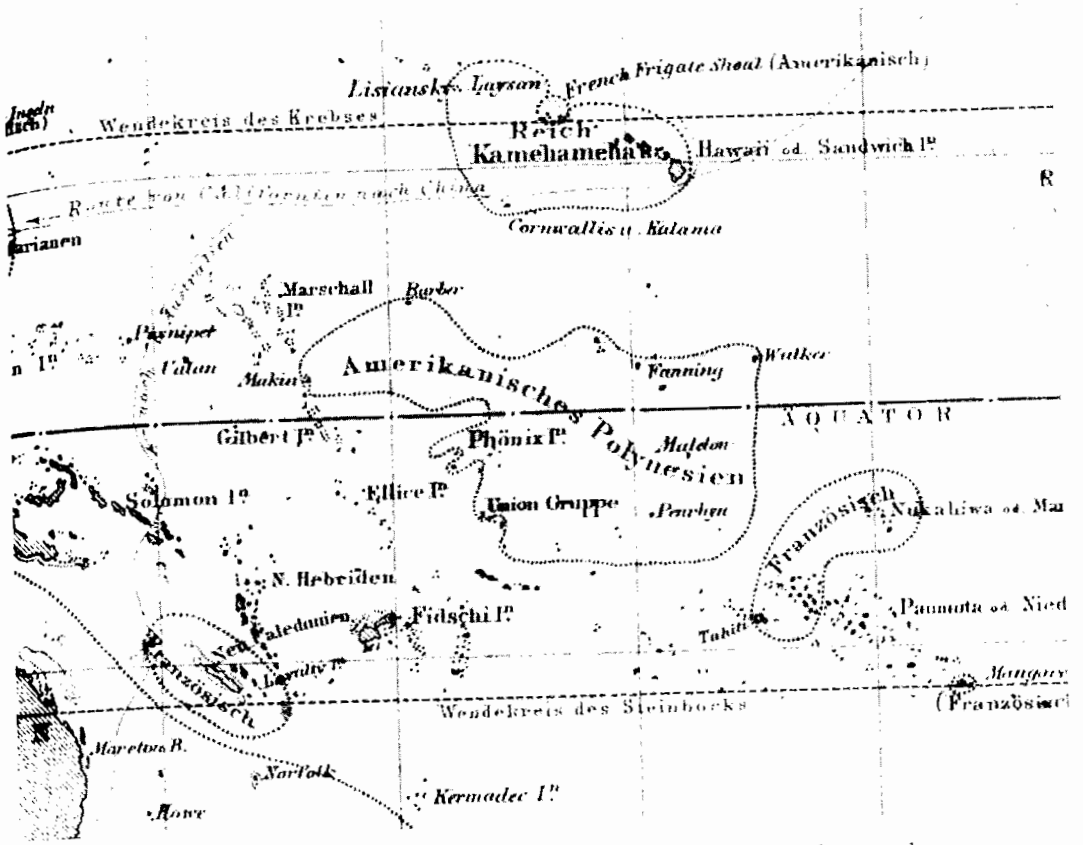


FIGURE 5.7. An American Polynesia, ca. 1859: Ernst Behm's depiction of the United States in the Pacific. Courtesy of the Firestone Library, Princeton University.

In short, then, looking at the course of the expedition, its activities, and the legacy of its cartography, we might summarize the role of the Ex. Ex. in a tidy, if charged, shorthand: the U.S. Exploring Expedition pursued power and knowledge in the Pacific in the mid-nineteenth century—power over natives, and with respect to the rival intentions of the French and British in the region, knowledge of the winds, currents, terrain, inhabitants, and products of this vast and valuable part of the globe.

While to modern students of science and imperialism these two aims—"power-knowledge"—may seem to be a conjoined twin, it is interesting to

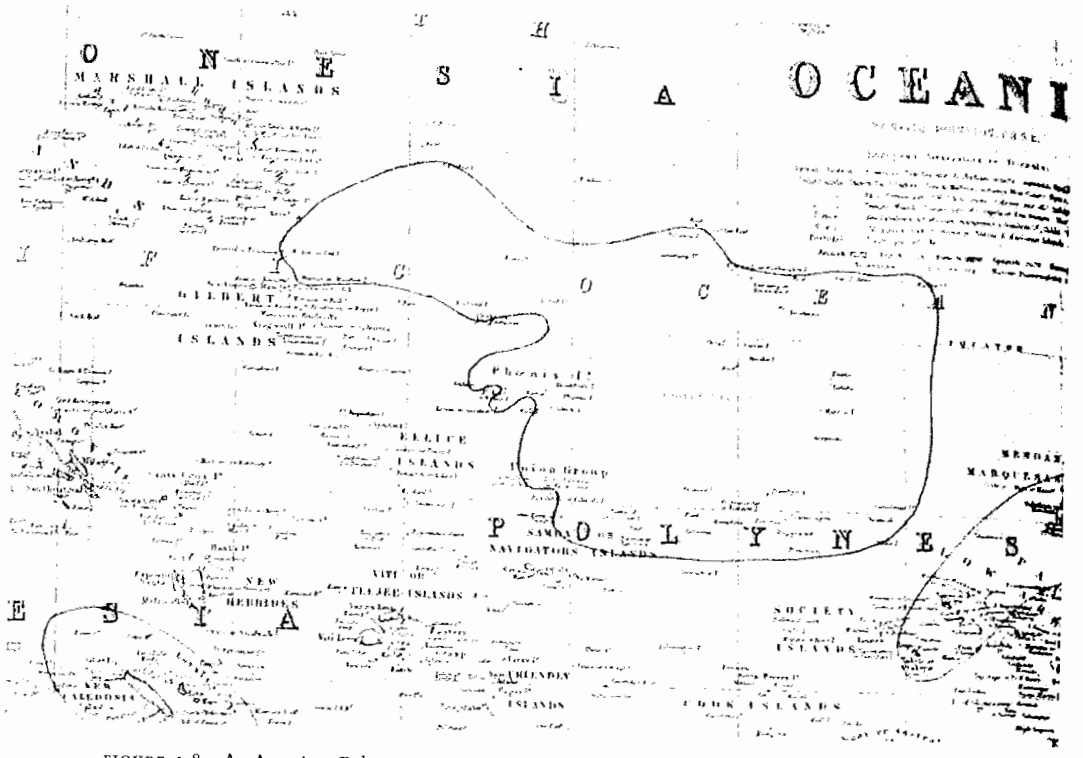


FIGURE 5.8. An American Polynesia, ca. 1882: Alexander Keith Johnston's depiction of the United States in the Pacific. Courtesy of the Geography and Map Division, Library of Congress, Washington, DC.

note that this was by no means so clear to contemporaries. For instance, some of the most vicious disputes during the preparation of the voyage came over the kind and number of vessels to be utilized: a massive frigate like the *Macedonian* would make a suitably martial flagship, but its deep draft would fetter the surveying duties.[66] Those who backed sending a smaller vessel asked facetiously just how big a ship it took to scare a bunch of naked Pacific Islanders. Wrote the much-harassed secretary of the navy, Mahlon Dickerson (to whom the final preparations fell), in an acid letter penned for the papers in 1837:

> Will not the large ship Relief, of four hundred and sixty tons, the two brigs Pioneer and Consort of two hundred and thirty tons each, and the schooner Pilot, of one hundred and fourteen tons, sufficiently *awe* the *natives*? Must the frigate be added to intimidate the savages?[67]

And indeed he went on to mock the very idea that science and military force could be usefully combined on the same expedition. If the expedition was to

be "warlike," what were the scientific corps for? And if scientific, why the cannons? Here he enjoyed a veritable guffaw at the prospect of power and knowledge sharing the same oak bottom:

> Suppose, in clearing the decks of one of the vessels, the frigate, for instance, for action, what a scene of confusion—skeletons and bones of animals of all kinds, testaceous, crustaceous, vertebrated, and invertebrated; heaps of molluscous treasures; alligators stuffed, "and other skins of ill-shaped fishes," must all be tumbled into the ocean without reserve.[68]

When, in the endgame, Wilkes slashed the roster of civilian scientists (several dozen had been slated to sail) and took the physical sciences such as astronomy and meteorology into his own hands (arguing famously that the U.S. Navy would not serve as "hewers of wood and drawers of water" for a gaggle of pompous philosophers), an infuriated (if sidelined) Jeremiah Reynolds, ever the watchdog, struck back, mocking the scientific pretensions of the navy in general and Wilkes in particular. Reynolds went so far as to publish a scurrilous little play, which purported to depict the backroom dealings of the naval higher-ups who were, in his view, scuttling the expedition in a mortifying orgy of back-slapping philistinism. In this scene the secretary of the navy supposedly asks Wilkes, behind closed doors, if there was really a need for a so-called entomologist on the voyage:

> WILKES · No; I never saw a *bug* at sea in my life, except some cockroaches, when I made that short cruise in the sloop-of-war some eight or ten years ago. As to *land-bugs*, the sailors can *pick* them up and stick pins through them just as well as one of the scientifickers. I think that was the way D'Urville had it done; and, when he reached home, somebody worked up the bugs for him, took their likenesses, and gave him all the credit. And as for crabs and lobsters (crustacae I believe they call them), although I have often seen crawfish and the like in foreign markets, and along our seacoast while making important surveys . . . I never heard of their being dissected by other instruments than knives and forks, and then, when properly cut up (with salad), and well mixed with oil, vinegar, salt, pepper, and mustard, they are, as you know, extremely delicious.
> DICKERSON · Yes, my dear commodore.[69]

Even this last line was a subtle dig, since Wilkes was emphatically *not* a commodore (that was the whole problem with his appointment), and his decision to wear the accoutrements of that rank once at sea was one of the greatest scandals of the whole voyage.

In light of these hostile exchanges between, if you like, the partisans of knowledge-seeking, on the one hand, and power-seeking on the other, and considering the very real showdowns that did occur between the scientific staff and the naval officers during the voyage, it is surely tempting to accept the judgment of Ian Jackson, who, writing on the Ex. Ex., asserts that science and naval culture simply do not mix, and never have.[70] As he puts it, "There is a traditional conflict, extending at least until the British North Greenland Expedition of the 1950's between naval discipline and the informal character of scientific zeal."[71] He is not the only commentator to assert that the Ex. Ex. was finally undone by the tensions between the naval and the scientific cultures.[72]

What I want to do in what follows, however, is argue that, on the contrary, in at least one critical domain of the expedition's scientific work—its hydrographic surveying (its most important knowledge-seeking endeavor)—naval discipline, and indeed naval violence, were by no means an impediment to scientific zeal. Rather, I want to go so far as to suggest that they were in some sense constitutive of hydrography as a scientific activity. By examining the surveying practices of the Ex. Ex. in some detail, and by looking more broadly at the operations of hydrographic surveying in this period, I will put forward the claim that this was a form of cartography essentially shaped by naval imperatives, structures, and technologies. Hydrography was at its core a military undertaking, and surveying activities were impossible without the exercise of the same sort of synchronized nautical maneuvers that were the choreography of naval warfare. Naval discipline and military orders authenticated cartographic accuracy, and the whole charting enterprise turned the tools of naval dominance—cannons and landing craft—into the instruments of cartographic precision. From observatory-fortresses erected on distant shores, to sweeping encirclements under sail accompanied by the martial pageantry of meticulous signal flagging, hydrography in the first half of the nineteenth century is, I contend, best thought of as sea charting militant on the colonial peripheries.[73]

I want to emphasize here that I am now talking about something more than the general point that sea charts were a dimension of those processes of displacement, usurpation, and hegemony that transformed much of the world—including most of the Pacific islands—into the nominal territory of a small number of nations in Europe and the Americas by the end of the nineteenth century. This is clearly the case, and I have shown as much where the Ex. Ex. is concerned by reviewing the maps that came out of the expedition and the uses to which they were put. But in keeping with the trend in scholarship on cartography and colonial space over the last decade or so, I want to go beyond looking at maps as artifacts capable of doing certain kinds of work (juridical, symbolic, propagandistic, practical) for imperial powers, and instead try to excavate the *practices* from which these artifacts emerged, with an eye on demonstrating how such practices themselves were inextricably entwined in colonial situations, and how these practices embodied (if in subtle ways) elaborate and significant conceptions of colonial space. I am thinking here, for instance, of Matthew Edney's work on the trigonometric survey of India, where the ideal of a systematic, administratively centralized trigonometric survey is shown to reflect the British authorities' deep commitment to a rational, orderly, and fixed colonial domain, coordinated by hierarchical bureaucracies.[74] I contributed to this type of research in my *Masters of All They Surveyed*, where, focusing on the traverse surveys of itinerant geographic explorers, I demonstrate the extent to which their practices embodied the expansive character of colonial space, and were bound up with the instability of colonial borderlands (an instability those very practices helped generate).

To these two examples of cartographic techniques that are at the same time rightly understood as instantiations of different spatial conceptions of colonial order (and disorder), I would like now to hazard adding a third: the hydrographic survey. If trigonometric surveys embodied the ideal of rationally coordinated surveillance over a fixed and bounded colonial territory, and if traverse surveys reflected the overreaching territorial appetites of metropolitan colonial authorities, I want to argue that hydrographic surveys—which boxed the compass around insular possessions, shooting tangential sight lines from warships under sail—must be understood as a peculiar hybrid of naval truculence and precision metrology, a form of mobile, glancing survey particularly suited to the circulatory, glancing character of seaborne commercial imperialism in the early nineteenth-century Pacific.

When I say that hydrography was sea charting militant on the colonial peripheries, I mean this quite literally, in that this was a form of geographic inquiry wholly devoted to peripheries: to coasts and their contours. There has been a tendency among historians of imperial cartography to treat the beginning of the nineteenth century as the end of the era of coasts and the beginning of the age of interiors.[75] It is often suggested, for instance, that the coastal outlines of the continental landmasses were, in some sense, finished by the end of the eighteenth century, and that therefore the navigational preoccupations of the old maritime empires had to give way to new topographic imperatives driven by the territorial demands of the new imperialism. But this periodization is misleading in several ways. In the first place, the half century following the celebrated voyages of Captain Cook saw dramatic European (and eventually, as we have seen, American) focus on the Pacific, the region Greg Dening has so elegantly described as a world of "islands and beaches." His phrase expresses

the fact that in the Pacific, coasts were in a sense all there was—an impression doubtless heightened for navigators encountering the countless strange, "empty" islands that dotted those waters and that became one of the leading geological mysteries of the age. Coral atolls were literally empty in an unprecedented way; they were calligraphic doodles of coastline unencumbered by any central landmass. Here was a domain in which coastal surveying exhausted the cartographic possibilities.

Moreover, the Pacific afforded a space that seemed to come as close as nature could provide to a blank sheet for the inscription of cartographic forms. This vast oceanic void was, in navigational terms, itself the precise geophysical analogue of an empty geometrical field for spatial ordering; and on this field locational coordinates were more than just fixed points around which to frame a larger map (as in topographic surveys)—in the Pacific those coordinates amounted to the places themselves. Indeed, a directory of the Pacific could be reduced to a list of longitudes and latitudes, each pair of which corresponded to an island. Even the priority of discovery had everything to do with locational rectitude, since mariners regularly named "new" landfalls in their logbooks; but only if others could find land at the same location was it possible to establish who had found what.[76] In this way claims to possession in this distinctive environment came to be contingent on surveying details, and narrowing envelopes for positional accuracy continuously revised both the expectations incumbent upon explorers and the history of exploration itself, since geographers perpetually reappraised who had been where, and when, based on newly precise information about the location of islands.

In these respects the coasts were by no means "finished" in the Pacific at the end of the eighteenth century: they were the central preoccupation of cartography in the region. But there is another, more general reason why coastal charting remained an immensely significant dimension of state-sponsored cartography at home and abroad in the first half of the nineteenth century, and this has everything to do with those improved levels of positional accuracy I just mentioned. As Olivier Chapuis has shown in overwhelming detail, the work of the French naval cartographer Charles-François Beautemps-Beaupré (1766–1854) effectively reinvented the standards and practices of marine surveying in the opening decades of the nineteenth century. His 1808 treatise, *Méthodes pour la levée et la construction des cartes et plans hydrographiques*—itself, notably, the product of Beautemps-Beaupré's experience in Pacific exploration, and originally published as an "appendix" to the published narrative of the celebrated Pacific voyage of Antoine Raymond Joseph Bruni d'Entrecasteaux in search of La Pérouse—became the widely translated standard protocol for naval hydrography. By these newly exacting standards, hardly any coasts in the

entire world had been properly surveyed. No longer would the mere passage of ships' captains, maintaining their track charts and taking periodical offset observations to promontories on an alien coast, constitute a "survey" and provide adequate data for cartographers.[77] In place of such ad-hoc arrangements, Beautemps-Beaupré and his counterparts in other countries—men like Beaufort and Belcher in Britain, Krusenstern in Russia, and, indeed, Wilkes in the United States—demanded a wholly different commitment to a systematic, orchestrated, and instrumentally intricate form of survey under sail, one that involved running triangulations performed by multiple vessels (or one main ship and several boats) and controlled by primary points fixed through sustained astronomical observations.

While the celebrated work of Cook and his late eighteenth-century acolytes gestured toward these arrangements, it was not until vessels could carry dozens of chronometers, and teams of able hands could be equipped with azimuth instruments as precise as the Vernier-ruled sextants and repeating circles of the early nineteenth century, that such undertakings became feasible at any appreciable scale. Of course, on home ground it had long been possible to survey coasts by means of the techniques of land-based triangulation that were defining the possible in geodesy in the eighteenth century. And it is for this reason that the techniques of hydrographic surveying as codified and refined by Beautemps-Beaupré (and those who followed him) must be understood as essentially developed for use at the *outre-mer* margins of expanding global ambitions: this new hydrography was born at the colonial periphery in the early nineteenth century, as a science fundamentally in the service of Anglo-European overseas ambitions.

Just how tight were the acceptable margins of error under the exacting standards of the new hydrography? We have valuable evidence here in the form of memos solicited by the U.S. government in preparation for the mission of the Exploring Expedition. Vice Adm. A. J. von Krusenstern, veteran of a three-year Pacific exploring cruise aboard the *Nadeshda* and the *Neva*, and the leading Russian exponent of precision hydrography (he had extensively counseled Captain Robert Fitzroy before the departure of the *Beagle* in 1831), offered a detailed review of the state of geographic knowledge in the Pacific in January of 1837. In that document he expressed his concern about a number of irreconcilable survey results. For instance, he noted a difference of 27 arc minutes in the longitude of the western point of the large atoll he called Prince of Wales Island (also known as Vlighen, Dean's Island, and Nairsa—now Rangiroa), a discrepancy between the recent surveys of Bellingshausen (circa 1820) and Otto

von Kotzebue (circa 1825). This, he pointed out, was unacceptable, the more so "since the two navigators do not differ, either before or after, more than three minutes"—or a distance on the ground in this region of less than 3 miles (4.8 km). He encouraged Wilkes to sort out who was in error.

From the general analysis in the Krusenstern report it becomes clear that good hydrographic surveying results in this period were expected to agree, for the most part, to within 1 minute of arc, or less than a mile, and that control points fixed astronomically ought to be good to within 100 yards.[78] In Pacific waters, disagreements of more than 15 or 20 minutes of arc in the location of a small atoll suggested that different islands might well have been spotted, given that such differences fell outside the horizon-line vista of a masthead lookout. Interestingly, from this demanding perspective Krusenstern had little patience with the whalemen's cartography. In the early 1830s he got his hands on a copy of Reynolds's compilation of Pacific positions gleaned from the logbooks of Yankee navigators, and promptly composed a withering critique in his *Supplé-ments au Recueil de Memoires Hydrographiques*, published in St. Petersburg. In it he asserted not only that the list included the same island at multiple locations (which Reynolds, of course, acknowledged), but also that in many cases it listed several different islands that could all fall, given the imprecision of the coor-dinates presented, at the same locale. Adding that at least a few of the landfalls did not exist at all, as he could vouch from experience, Krusenstern concluded that extracting geographic expertise from blubber hunters in the rising age of true hydrographic science "could not inspire great confidence."[79]

It was a dismissive attitude wholly shared by Wilkes, who went out of his way to denigrate the hydrographic importance of merchant shipping logbooks (he had no affection for Reynolds, who was nothing but a very public thorn in his side).[80] By doing so, he was defending the elite and distinctive status of the properly scientific hydrography that was his domain, and the source of his illustrious commission. He was also reflecting a more general shift in what we would now call the field sciences in this period: a movement of the locus of control and authority from the cabinet to the field itself. In contrast to the col-lational and critical project of desk-chair geographers, for whom cartographic truth emerged through judgment and comparison, through weighing differ-ent results and reconciling disputes (for whom, in sum, mapmaking authority remained very much sedentary, scholarly, and metropolitan), for Beautemps-Beaupré, Wilkes, and the scientific hydrographers—all to a greater or lesser extent devotees of the patron saint of instrumental precision *en plein air*, Alex-ander von Humboldt—cartographic truth was a product of work done on site, by men equipped to establish and maintain their positions under the most test-

ing conditions, men outfitted to create the privileged space of an astronomical observatory wherever they landed; and by doing so to generate the data for the commensuration of earth and sky. For them, mapmaking authority stood on the deck of ships, and surveyed remote lands from volcanic promontories.[81] It is tempting, in Wilkes's case, to extend this distinction into the domain of con-trasting conceptions of political authority and intellectual progress: in the teeth of a number of what might be called populist-democratic efforts at bottom-up sea charting—Reynolds and his Yankee salts, later Matthew Fontaine Maury and his fleet of floating observers—Wilkes threw an unapologetically top-down hydrography. As I will show below, he annealed the new hydrography with Old Navy discipline to create a charting enterprise that was not just au-thoritative, but something quite close to authoritarian.[82]

Having established that a new kind of surveying was afloat in the Pacific in the early nineteenth century, I want to turn now to a closer investiga-tion of this practice to show what it looked like both on the waves and in the notebooks and blank charts of its practitioners. In the process I will try to substantiate my central claim: that naval hydrography in this period was deeply shaped throughout by military imperatives.

The Ex. Ex. affords a particularly rich opportunity for such analysis, since a considerable number of unique manuscript sources survive, along with many of Wilkes's printed orders and instructions, opening a particularly large and bright window onto just how the new hydrography looked. We know, for instance, a great deal about Wilkes's own studies in this area, both from his detailed manuscript autobiography and from the exhaustive research done by Doris Esch Borthwick on Wilkes's trip to England and the Continent in 1836 to secure the precision instruments for the expedition.[83] We have detailed records of all of those instruments (fig. 5.9), and we know the circles within which the somewhat self-important young American officer moved when in Britain.[84] His acquaintances and guides were a who's who of the Admiralty hydrographic establishment, and the astronomers and instrument makers who advised and serviced this community. On the navy side, Wilkes was in personal contact with James Clark Ross, Henry Forster, Basil Hall, Edward Sabine, and Robert Fitz-roy, and even Francis Beaufort himself. Among the elite men of science, he was received by William Whewell, and took instruction in pendulum observations from Francis Baily, vice president of the Royal Astronomical Society (where Wilkes was feted as a guest of honor, and where he made the acquaintance of Charles Babbage and William De Morgan). In Paris and Munich he hunted up instrument makers to compare with the British masters who had agreed to fill

ASTRONOMICAL AND SURVEYING INSTRUMENTS.

1 Three and a half feet transit, iron stand, &c., Dolland.
1 Altitude and azimuth circle (eighteen inch) two feet telescope, with microscope readings, by Dolland.
1 Repeating circle, twelve inch, by Ertel.
1 Five feet refracting telescope, six inch aperture, with micrometers, &c., by Meyer and Fraunhofer.
1 Three and a half feet refractor. Three inch ap., by Troughton.
2 Six inch repeating reflecting circles. Ertel.
1 Twelve inch repeating reflecting circle, by Gambey, with depression mirror.
1 Variation transit. Dolland.
6 Sextants. Troughton and Simms.
2 Levels, staffs, &c. Troughton and Simms.
2 Plane tables.
6 Box sextants.
6 Schmalcalder's prismatic compasses.
2 Dip sectors.
6 Mercurial horizons.
1 Glass horizon.
2 Massey's patent logs.

6 Surveying chains.
6 Barlow's compensating plates.
1 Amici collamator.

MAGNETIC INSTRUMENTS.

1 Variation apparatus, by Gambey.
1 Variation apparatus, by Dolland.
1 Gauss's diurnal variation. Troughton and Simms.
1 Diurnal variation. Gambey.
1 Diurnal variation. Dolland.
2 Dipping needles, six inches, by Robinson.
2 Dipping needles, twelve inches, by Gambey.
2 Dipping needles, six inches. Dolland.
3 Intensity needles. Gambey.
2 Intensity needles. Dolland.

METEOROLOGICAL AND PHYSICAL INSTRUMENTS.

2 Standard barometers. Troughton and Simms.
6 Mountain barometers, with extra tubes.
1 Iron cistern. Jones.
2 Sympiesometers. Adie.
6 Daniell's hygrometers.
2 Pouillet's hygrometers, à capsule.
9 Standard thermometers, by Simms, Jones, and Dolland.
16 Six's self-registering thermometers, with copper cylinders for deep sea soundings.
2 Scopeloscopes.
3 Pluviometers.
1 Brass convertible axis experimental pendulum, by Jones.
1 Iron convertible axis experimental pendulum, by Jones.
1 Eight day astronomical clock, mercurial pendulum. Molyneux.
1 Eight day clock, steel bar pendulum, for pendulum experiments. Molyneux.
1 Journeyman clock. Molyneux.
Iron frame to support the agate planes and its fixtures; also clock frames and stands. Molyneux.

Telescopes for observing coincidences, &c., &c. Jones.
Two weekly chronometers, Nos. 1567 and 1503. Charles Frodsham.
One Siderial chronometer, No. 1615. Charles Frodsham.
Twenty-five 56hrs. Chronometers, viz.:—Nos. 2075, 2085, 2203, 1839, 2204, 2066, 2093, 2095, 1964, 2105, 2052, 2083, 2096, 2037, by Parkinson and Frodsham; Nos. 2088, 3001, 1826, 2067, 2042, 2057, by Molyneux; Nos. 972, 766, by Arnold and Dent; Nos. 169, 170, by Chas. Young; No. 850, by James Murray; and four Pocket chronometers, viz.: Nos. 2124, 733, by Parkinson and Frodsham; No. 22, by Molyneux, and No. 786, by Cotterel and Co.

FIGURE 5.9. The Instrumentation for the Voyage: Charles Wilkes's list of surveying equipment. Courtesy of the Firestone Library, Princeton University.

his orders: William Simms, Charles Frodsham, Charles Young, Arnold and Dent. These months conferring with the mathematical practitioners of London and reviewing charts with hydrographers who had made major contributions to the cartography of the Pacific ensured that Wilkes was fully apprised of the best practices of his day.[85]

Moreover, we have a unique way to see how Wilkes synthesized this knowledge into a practical surveying plan: a single surviving manuscript of the pamphlet Wilkes composed for the survey officers of the expedition, entitled "Notes on Surveying for Officers of the U.S. Exploring Exped.," is preserved in the Library of Congress.[86] It appears that holographs of this instruction booklet were deposited on each of the larger vessels in the expedition, and that it was studied by the survey participants. From the first page of this "short manual" (as he called it), Wilkes positioned the expedition's collective undertaking with respect to the dominant authorities in modern hydrography, explaining that his pamphlet was to be used in connection with "Dalyrample, Beautemps-Beaupres, Belcher, Robson and other authors in your possession." Wilkes then began his own primer in surveying methods, outlining in great detail the proper outfit for the survey boats, instructing his subordinates on exactly how they were to hold their sextants for each of the possible kinds of angles they would be expected to shoot, and reviewing the way in which each observation was to be recorded in the all-important "Note or Angle Book." Only then did he move on to a summary of the geometry of surveying, describing resection and triangulation and offering the pithy declaration that "The Problem in Marine Surveying (I had almost said the universal one) is that denominated the 3 point problem." At that point—and most significantly for our purposes—he sketched in a series of remarkable diagrams the actual naval maneuvers that would need to unfold around a newly discovered island (figs. 5.10–5.14). We can see here the array of the main vessels at anchor, shooting their primary network of interlocking triangles to promontories on shore, and fixing their positions by azimuth bearings to the sun (figs. 5.10 and 5.11). Wilkes then went on to depict the secondary deployment of the boats inside the reef, and described the work of the junior officers, who would need to sight the secondary triangles and take lines of soundings while also sketching the coast (fig. 5.12). Only then are the sails to be unfurled (fig. 5.13) and the running survey begun, with the sequence of primary and secondary triangles continuing in a clockwork revolution around the island (fig. 5.14).[87]

If exercised correctly, Wilkes explained, such an attack provides "the means of surveying a harbor or island without even the necessity of touching the shore" (no mean feat around the hostile sands of the untraveled Pacific in this period). But success in these delicate operations demanded skilled seamanship,

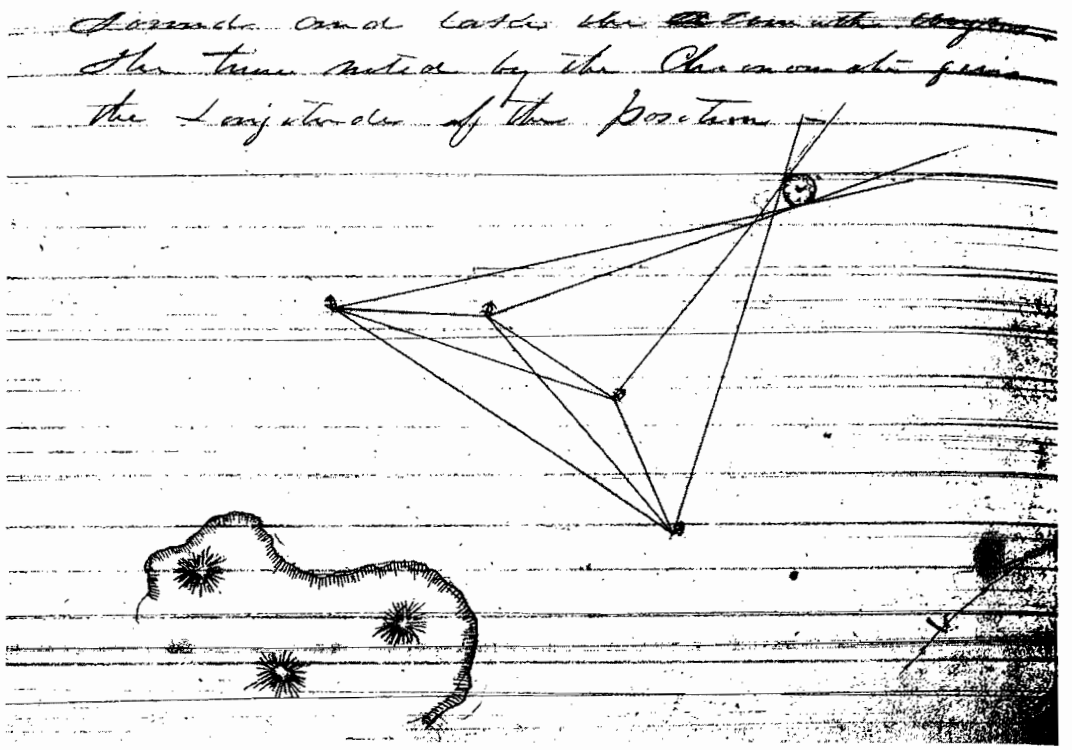


FIGURE 5.10. Instructions on the Encircling Survey: the first of a sequence of diagrams depicting the hydrographic "attack" on an island, from "Notes on Surveying for Officers of the U.S. Exploring Exped.," Charles Wilkes's manuscript instruction pamphlet. Courtesy of the Manuscript Division, Library of Congress, Washington, DC.

as he emphasized: "To advance rapidly with surveying operations, it is all important that the surveyor should take the full advantage of winds and currents, not only to facilitate the work but to save the labor of the boats' crews." And this was not just any kind of seamanship, either. Given the need for precise coordination, this was emphatically *naval* seamanship, the command of vessels inextricable from the command of men. Throughout Wilkes's manual there are numerous references to the importance of obedience and attention to orders, and to the relationship between rank and hydrographic responsibility. For instance, it would fall to the "commanders" to "fix any points of land astronomically," and coxswains were not to be trusted to outfit the surveying kit. Reviewing how the junior officers commanding the small boats (they were actually whaleboats, those light and sturdy craft best handled by American seamen) were to organize their activities, Wilkes paused to underline the issue of obedience again: "I would further impress upon all the necessity of conforming

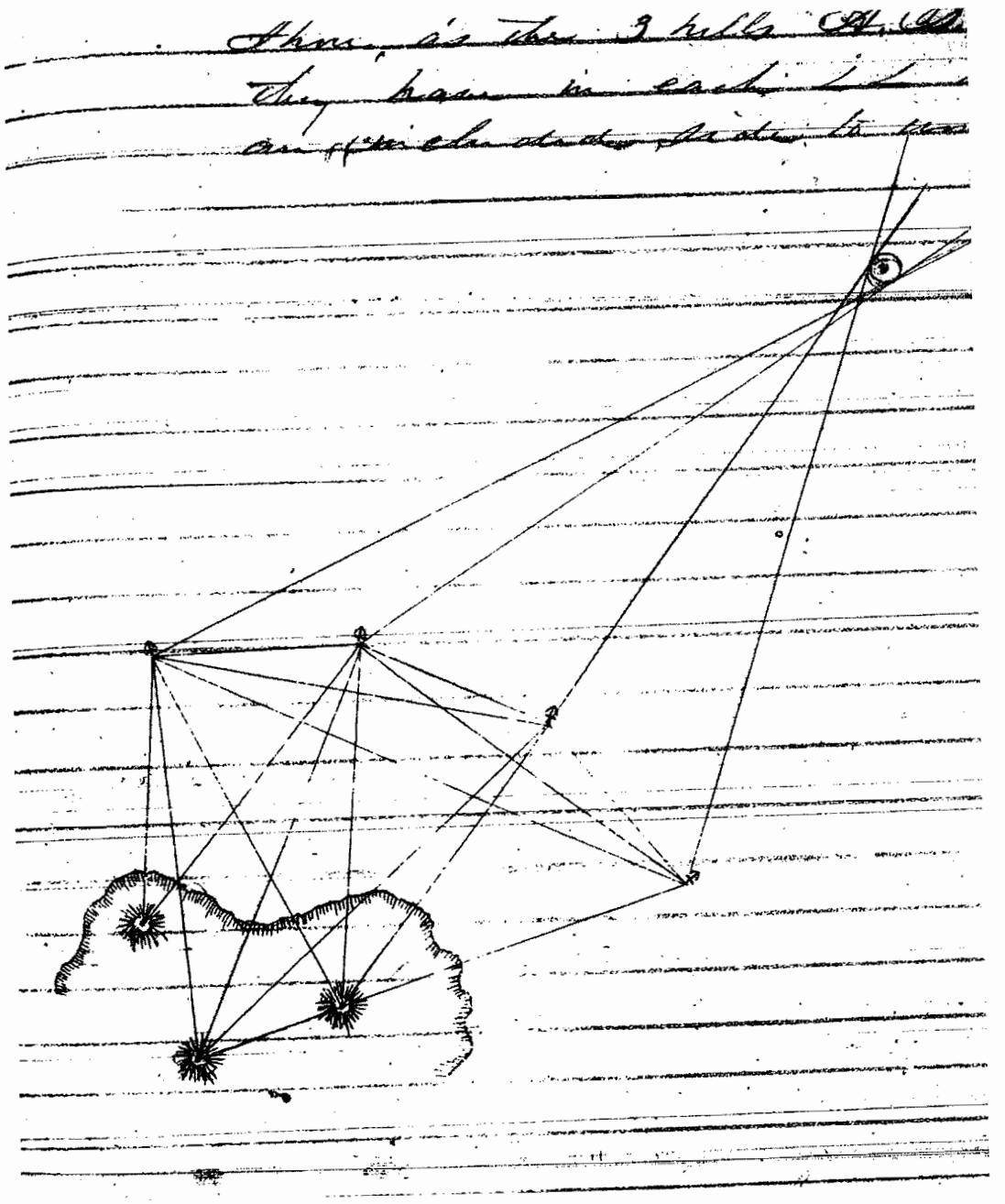


FIGURE 5.11. The Encircling Survey: bearings to promontories on land, from Charles Wilkes's manuscript instruction pamphlet. Courtesy of the Manuscript Division, Library of Congress, Washington, DC.

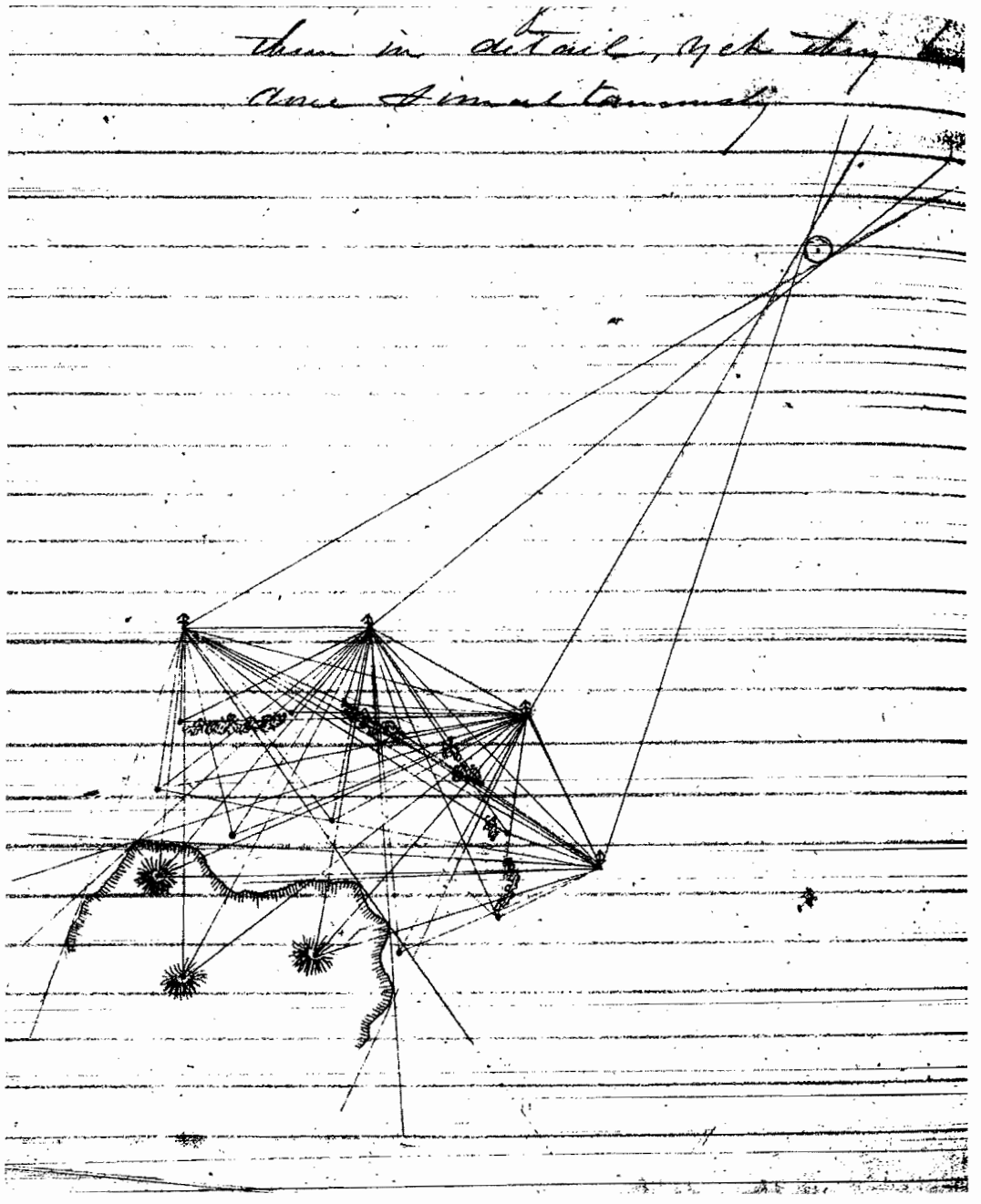


FIGURE 5.12. The Encircling Survey: boats work inside the reef; the ships raise anchor and begin to move. From Charles Wilkes's manuscript instruction pamphlet. Courtesy of the Manuscript Division, Library of Congress, Washington, DC.

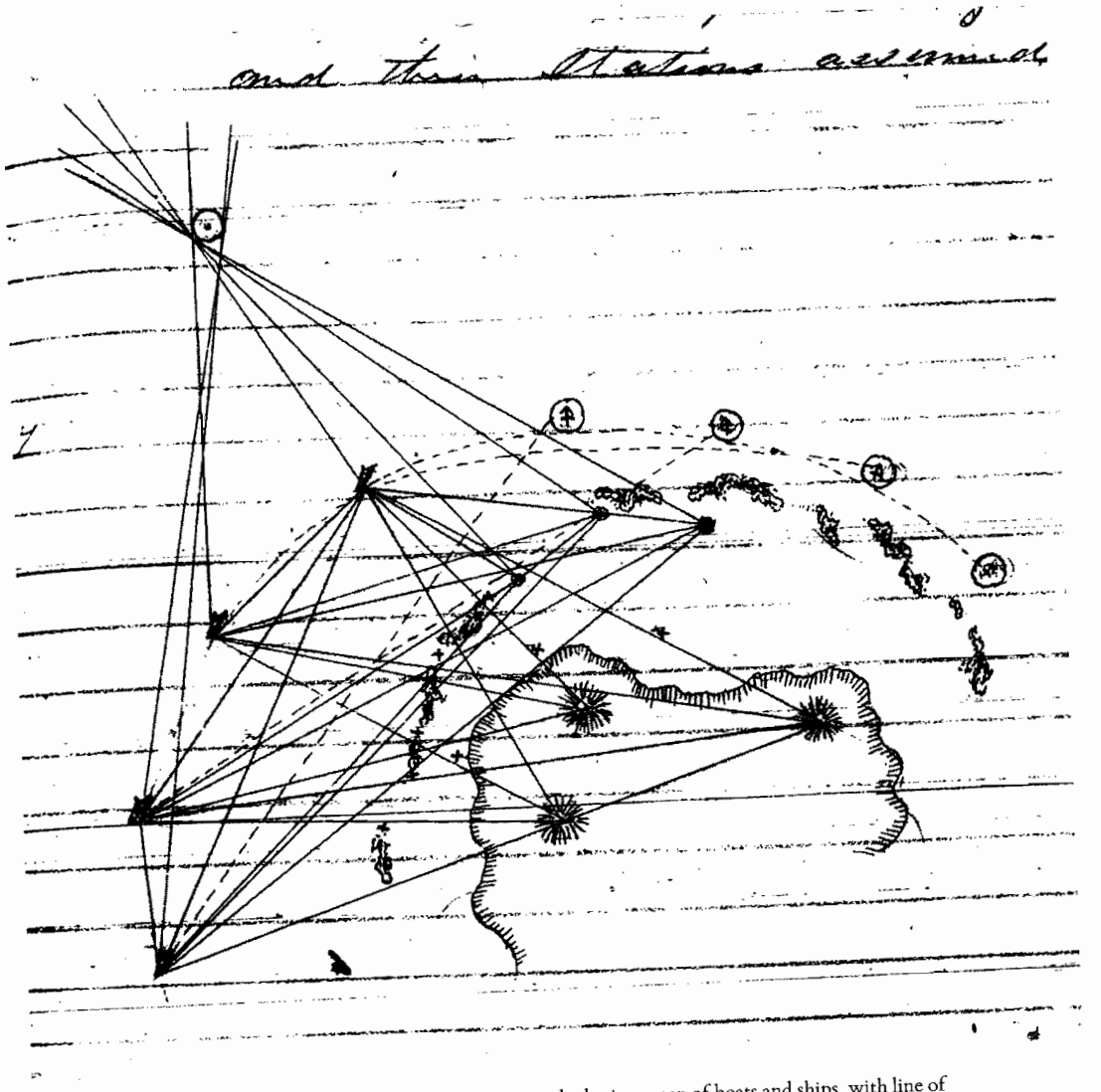


FIGURE 5.13. The Encircling Survey: the counterclockwise sweep of boats and ships, with line of sight bearings between them. From Charles Wilkes's manuscript instruction pamphlet. Courtesy of the Manuscript Division, Library of Congress, Washington, DC.

to their written orders in every respect, altho it may appear against the interest of the duty."[88]

Wilkes's centralized command over the surveying was complete, and it extended into every stage of the cartographic process: "Written orders," he informed the members of the expedition, "will always be furnished to the officer in command of a division of boats or to those acting singly." Additionally, Wilkes's authority extended to actual control over the vast paper chase of

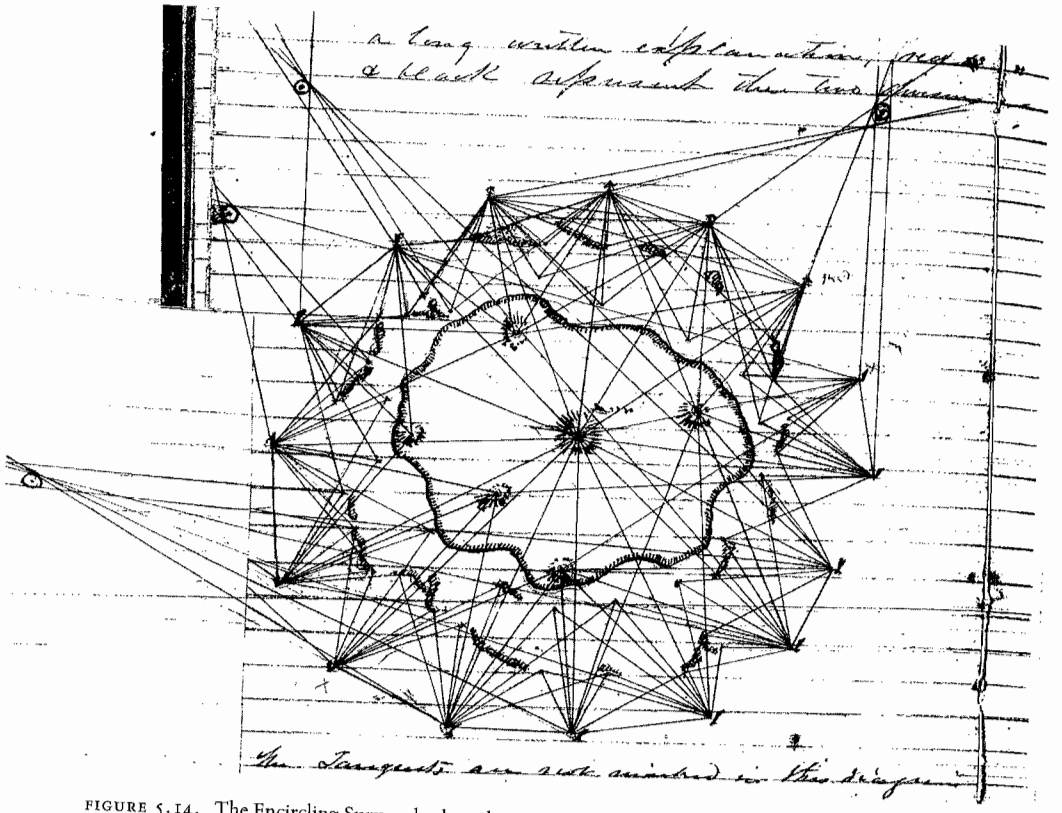


FIGURE 5.14. The Encircling Survey: back to the original anchorage, having completed all the stations. From Charles Wilkes's manuscript instruction pamphlet. Courtesy of the Manuscript Division, Library of Congress, Washington, DC.

the exploring work as a whole, since his own instructions authorized him to "require from every person under your command the surrender of all journals, memorandums, remarks, writings, drawings, sketches, and paintings, as well as all specimens of every kind, collected or prepared during your absence from the United States."[89] Where the actual maps were concerned, he manifested his strict adherence to the subordinations of hierarchy when he recounted an incident that took place during the drafting of the Tahiti charts. The story appears in his autobiography:

> Surveys of the Harbours had been set on foot by me and officers were assigned from the *Vincennes* and *Peacock* to be employed. Of these Lt. Walker of the *Peacock* happened to be the oldest & of course took the direction, as was the established custom. In the duties w[h]ere many were engaged, the surveys had been finished and the charts made and Sent to me with all the work notes, &c, &c, for my inspection. The sheet was well executed by Mr. Stuart, the clerk of Captn Hudson, and made a handsome appearance, but the title of the Chart at once drew my attention which Lt. W.M. Walker had directed to be printed on it in most conspicuous letters, "Surveyed by Lt Walker, U.S.N." thereby appropriating all the credit to himself. I felt Really ashamed to think that any officer should so far forget himself.[90]

Firmly striking out the attribution to a junior officer, Wilkes returned it for redrafting, provoking, he acknowledges, some grumbling.

A concern for teaching proper deference to the exigencies of collective action—and for maintaining due respect for his own command—permeated Wilkes's orders and activities both during and after the expedition. Where the surveying itself was concerned, this meticulous attention to rank and control reflected the demands of a complex operation that had to unfold with sufficiently mechanical precision. To aid in the necessary coordination of activities, Wilkes spelled out an elaborate system of flag signals so that, as he put it in a description of his surveying practices published after the expedition's return, "I could direct the vessels to assume any position I might select for our purpose." So, for instance, bearings were to be communicated using the following syntax of ensign flags:

> With the distinguishing pennant of the vessel whose bearing is to be shown: hoist the "number" indicating the degrees with the cornet above, if the bearing be from the north, but under, if from the south; then the corresponding numbers for the minutes and seconds; with the preparatory pennant, if to the east, or without it, if to the west, thus: cornet under 56, would signify S. 56 degrees; then 04–26, would correspond, 04' and 26" W.[91]

Such signaling became particularly important when the survey undertook to establish baselines by means of sound, a key control under Wilkes's system. Much of the ranging of the survey, as he explained, "rested upon the measure of distances by sound. For this we had ready means by firing guns alternately from the different vessels."[92] In the surveying manual Wilkes gave instructions on the practice, and a rule of thumb for backup calculations without a watch:

> The distance may be obtained by counting from the time a person perceives the flash if he will count as fast as he can until he hears the report, and then compare his counting with the seconds hand of his watch, he will get a very good note of it. I have generally found that in counting as fast as I can I make 2.9 to each second of time—there are times when one is not prepared with a watch, or when that watch

happens to be left behind, that one can make an effectual observation with the means he has with him.

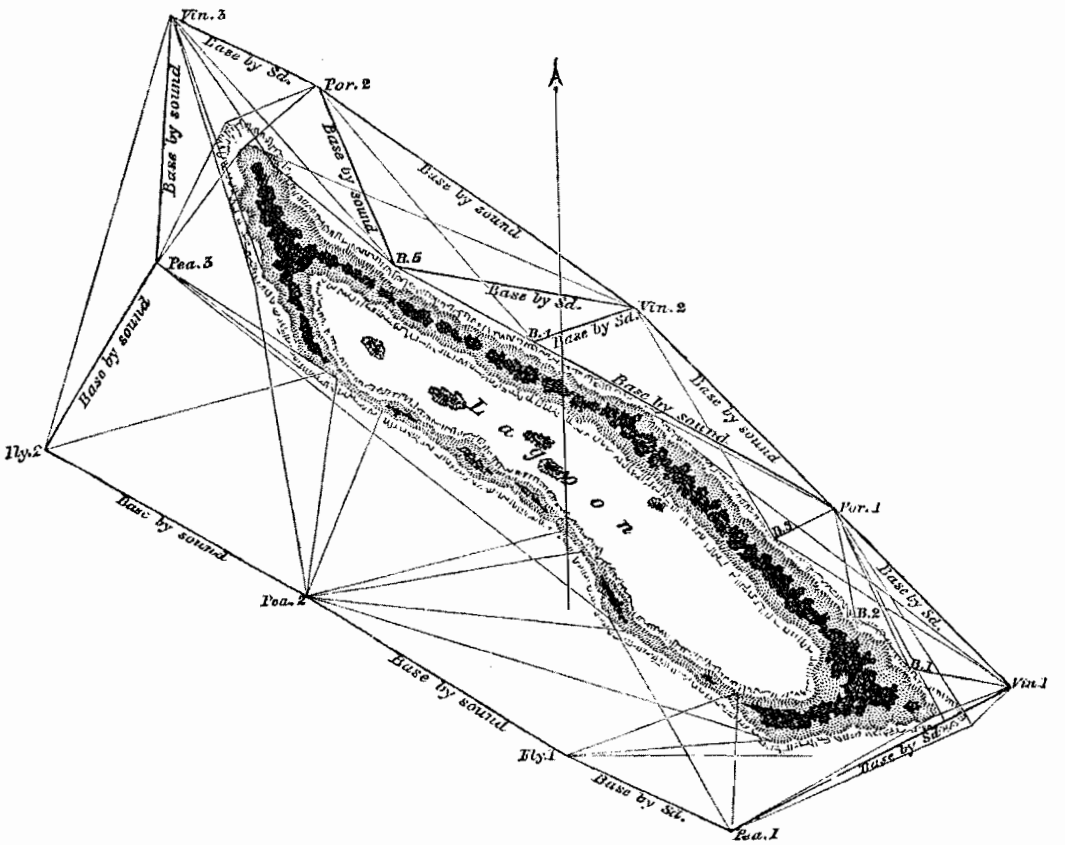
The precise conversion factor for deriving distance from these elapsed times (between flash and boom) was a preoccupation of Wilkes's from the start of the voyage to well after its completion: outside Rio de Janeiro at the outset of the expedition, he had the vessels run the same baseline twice, using sound and trigonometry to derive a working conversion factor; he would later collaborate with the Bonds at the Harvard observatory and with several telegraph companies, in another effort to establish a more precise constant for the equation (using electromechanical devices originally designed as part of a Boston fire alarm system).[93]

Since this aspect of the running survey demanded the most careful coordination between distant vessels, Wilkes expanded on the relevant signal system at some length, writing to his subordinates that "when you are ready to change your position, haul down your distinguishing pennant, and when ready to measure the base or distance by sound, which is the first thing to be done after you are in position, hoist your ensign at the fore; as soon as all the vessels have answered, you will dip it and fire in a few seconds, run up the ensign again, and repeat firing three times." The system for relaying the elapsed time by means of signal flags was still more complex (involving different combinations of the "repeater" flags to signify fractions), and it yielded, in principle, an elaborate scheme for firing around the flotilla during the encirclement of a given island (fig. 5.15).[94]

As Wilkes acknowledged toward the end of the pamphlet, "I am aware that the operation may appear confused at first to some, but with a little explanation they [*sic*] need not be so long." Finally, he roused his troops with words that might apply equally well to a naval engagement: "to act with advantage all must do their part—for it is as it were a chain in which all would become actors, and all must give great attention to the 'modus operandi'—but I feel that we have the will and the old adage is a good one 'when there is a will there is a way.'"

We can in fact see quite directly how such a survey actually looked, because a handful of the manuscript working charts from the expedition have survived, and are housed in the National Archives.[95] For instance, figure 5.16 shows the working manuscript chart of "Nanouki or Henderville Island," now known as Aranuka Atoll, in what was then called the Gilbert Islands, now in the Republic of Kiribati. On it we can see a version (somewhat dilapidated, to be sure) of the process outlined by Wilkes in his instructions. Note for instance

time changed theirs also. the same operations are then repeated.
Of such an operation, the annexed wood-cut is an example.



By these alternate changes in the stations of the several vessels, and boats continued until a circuit of the island has been made, the work is

FIGURE 5.15. The Cannonade: "base by sound" indicates a distance established by timing the interval between the flash and the report of the ship's guns. Courtesy of the Firestone Library, Princeton University.

the use of the two vessels, the sloop of war *Peacock* and the schooner *Flying Fish*, to run multiple baselines by sound, and the use of the whaleboat inside the reef, to triangulate positions (fig. 5.17). The radiating network of pencil lines, many of them tangential to the features of the island itself, are the traces of the actual bearings, as observed by sextant by the surveyors. Of the labors of this kind of work inside the reef, one of the young officers wrote to his family in 1839:

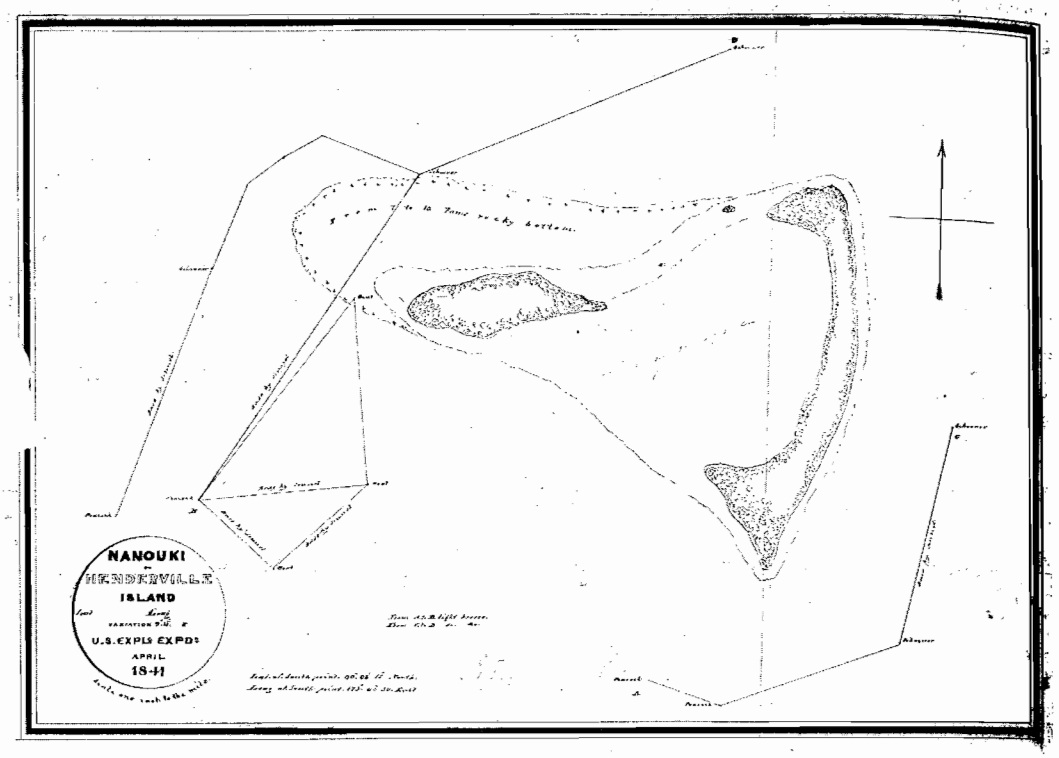


FIGURE 5.16. Manuscript Chart from the U.S. Ex. Ex.: Nanouki Island, showing details of the survey techniques. Courtesy of the National Archives and Records Administration, Cartographic and Architectural Section, College Park, MD.

> I was constantly employed from daylight in the morning until dark and night, and one half of the time up to my waist in water wading over coral reefs in the hot burning sun, until I was very near the colour of the natives themselves, + was burnt + skinned like an eel.[96]

The mosquitoes, he added, were murder. In figure 5.18, showing Apia Island, it is possible to make out the traces of this dangerous work on the coral reefs themselves (fig. 5.19). This chart and several others also reveal the records of the positional fixes (by meridian altitudes, sometimes also by chronometer) that controlled these surveys and pegged them to the graticule of longitude and latitude (fig. 5.20).

It is important to note that these are quite clean manuscript charts. Indeed, it appears that several of them are inked final copies intended for the engravers, since on the original chart of Swain's Island, for instance, it is possible to make out a faint pencil annotation ("Reduced & drawn") that suggests communica-

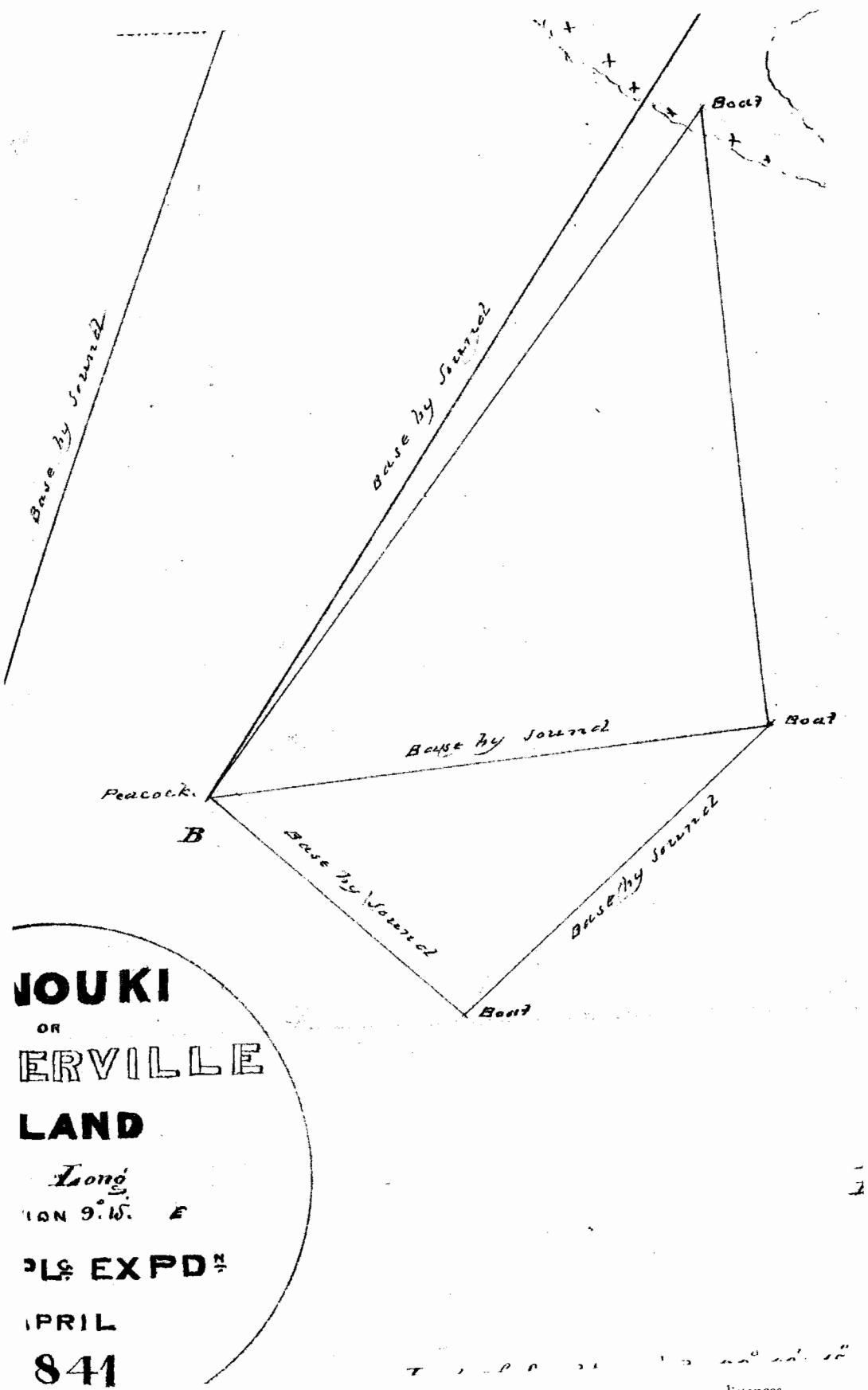


FIGURE 5.17. Nanouki Island: detail of figure 5.16, showing the use of the guns to measure distances. Courtesy of the National Archives and Records Administration, Cartographic and Architectural Section, College Park, MD.

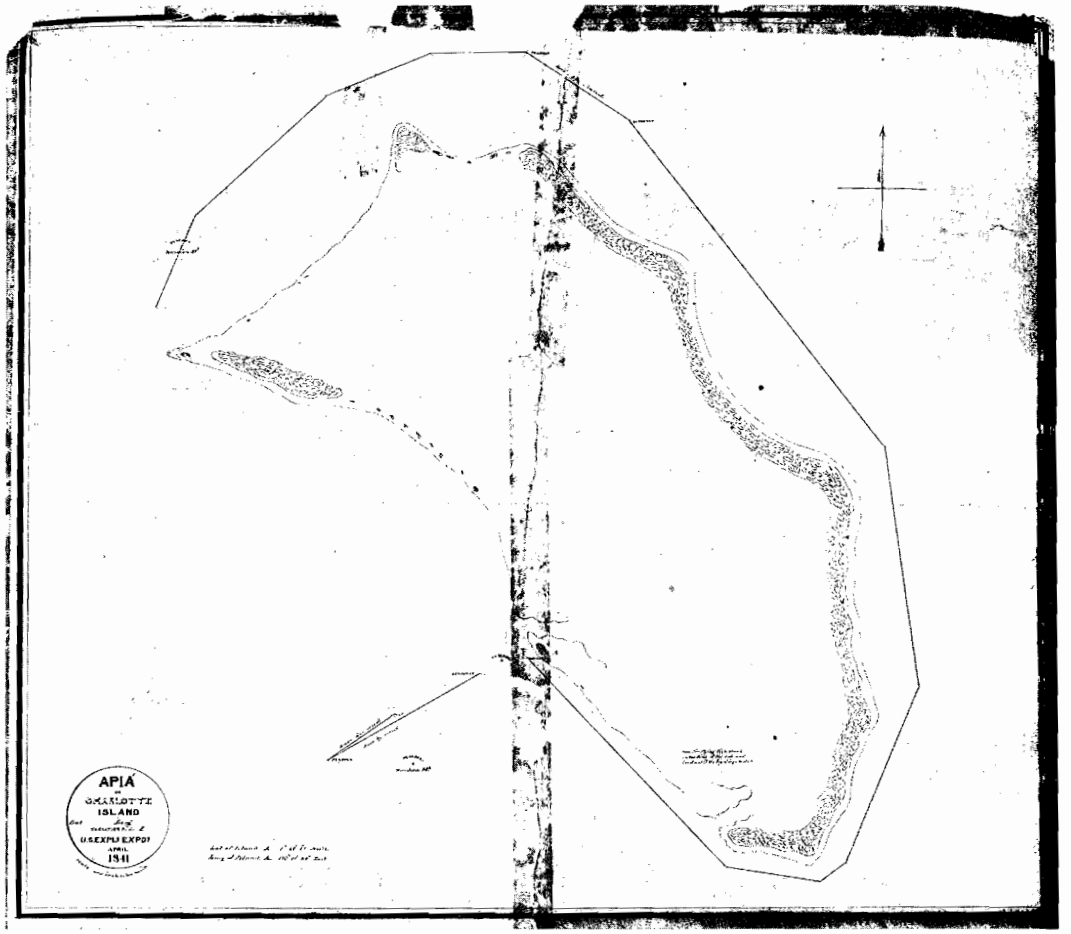


FIGURE 5.18. Manuscript Chart from the U.S. Ex. Ex.: Apia Island, showing details of the survey techniques. Courtesy of the National Archives and Records Administration, Cartographic and Architectural Section, College Park, MD.

tion between the house of C. Sherman, the printers, and the artist-mapmaker Joseph Drayton, who oversaw the production of the printed charts.[97] There are similar notations on a lovely surviving elevation drawn by Drayton himself, and marked out for transposition onto copper (fig. 5.21). And in fact, interestingly, it appears that at least one set of the atlas volumes in the Geography and Map Division of the Library of Congress belonged to Wilkes or to the members of his mapmaking staff, since a number of these *printed* sheets are also marked up with critical annotations—in some cases a back-and-forth penned in different hands—concerning, apparently, the fidelity of the printed charts to the manuscript exemplars: for instance, "Lagoon on original" answered by a brusque "*None*" (fig. 5.22).[98]

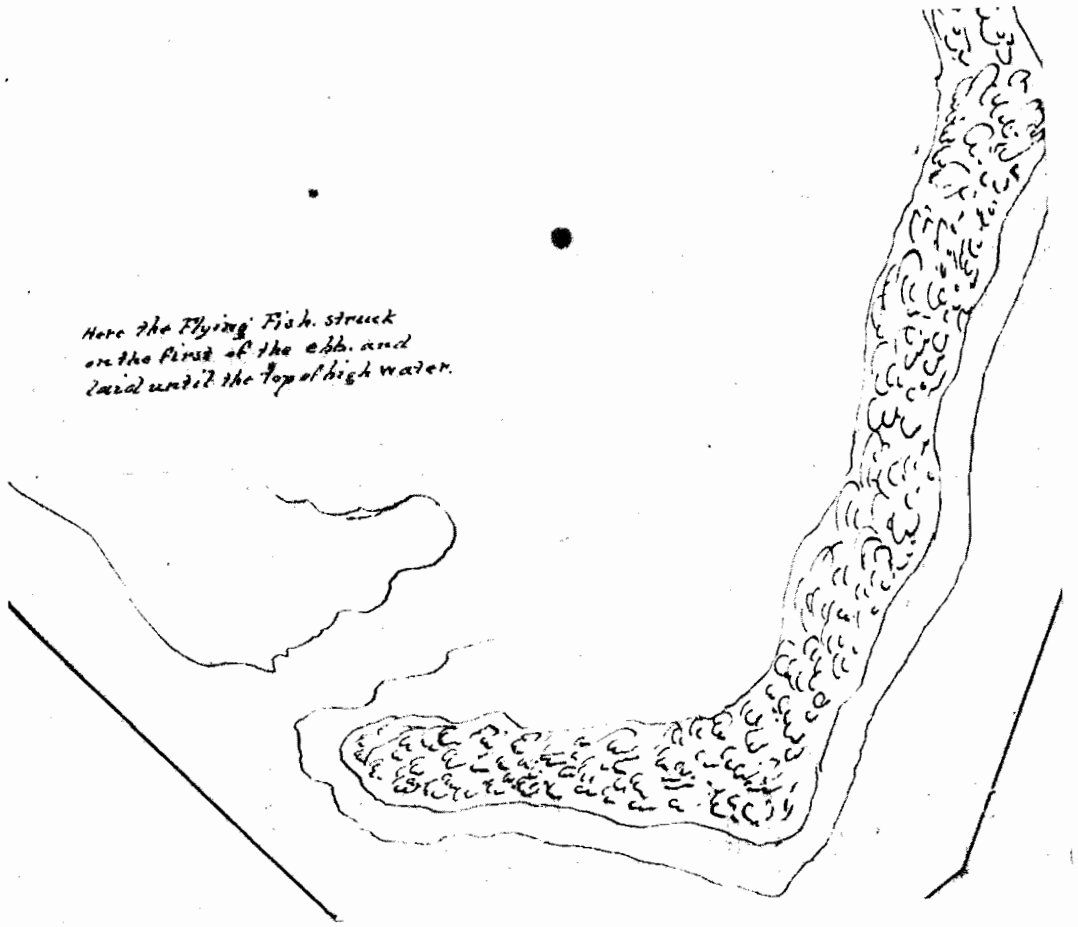


FIGURE 5.19. Apia Island: detail of figure 5.18, an annotation that spells out the hazards of surveying inside the reef. Courtesy of the National Archives and Records Administration, Cartographic and Architectural Section, College Park, MD.

While these clean manuscript charts do—despite their advanced state—offer glimpses of the surveying practices (in pencil, in lines that would vanish when the maps went onto the plates for printing), it is important to bear in mind that they represent, as it were, the tip of the iceberg—or perhaps more appropriately, the mere coral lip of a submarine mountain—of data collection, sketch maps, observation sheets, angle tables, and rough drafts.[99] Such ephemera—the scribblings of calculations and the compilation of overlapping work by the different vessels—are by and large lost to us.

In the course of researching this chapter, however, I stumbled on a dramatic exception: the unique angle book that survives from the whole expedition, which turned up in box 16 of Entry 58, Record Group 37 in the Old Records

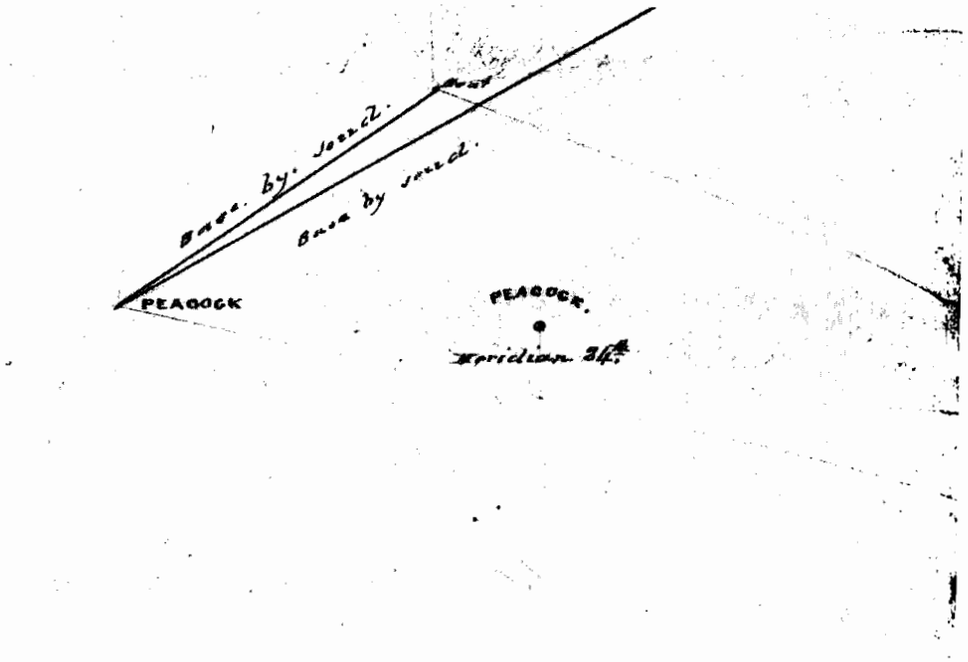


FIGURE 5.20. Getting an Astronomical Fix: detail of figure 5.18, specifying one of the fixed positions around which the rest of this island survey would be oriented. Courtesy of the National Archives and Records Administration, Cartographic and Architectural Section, College Park, MD.

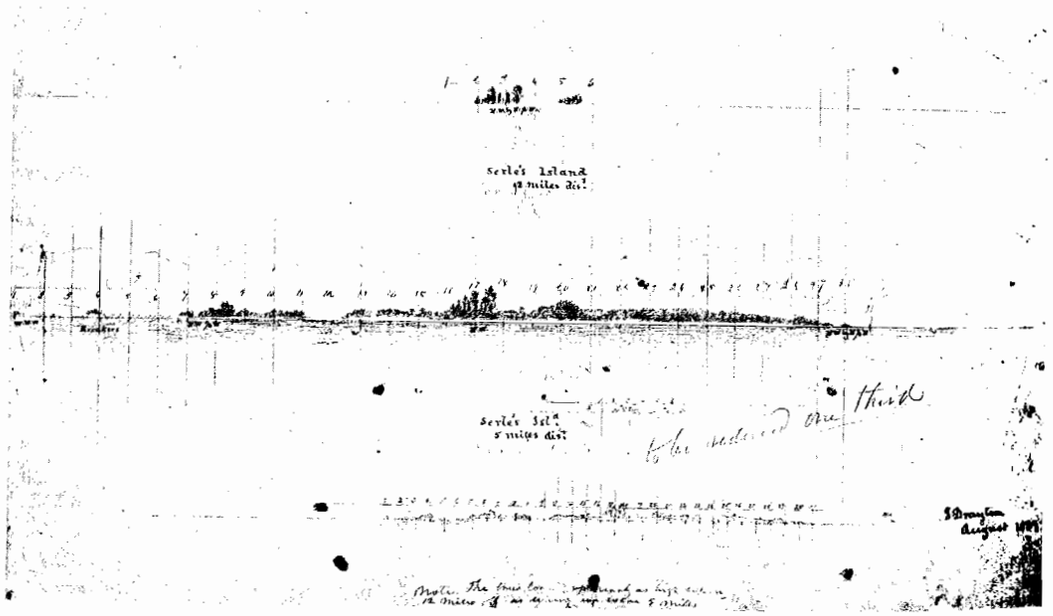


FIGURE 5.21. Sketch of an Elevation: Joseph Drayton's manuscript drawing of Serle's Island, prepared for transfer to copper. Courtesy of the National Archives and Records Administration, Cartographic and Architectural Section, College Park, MD.

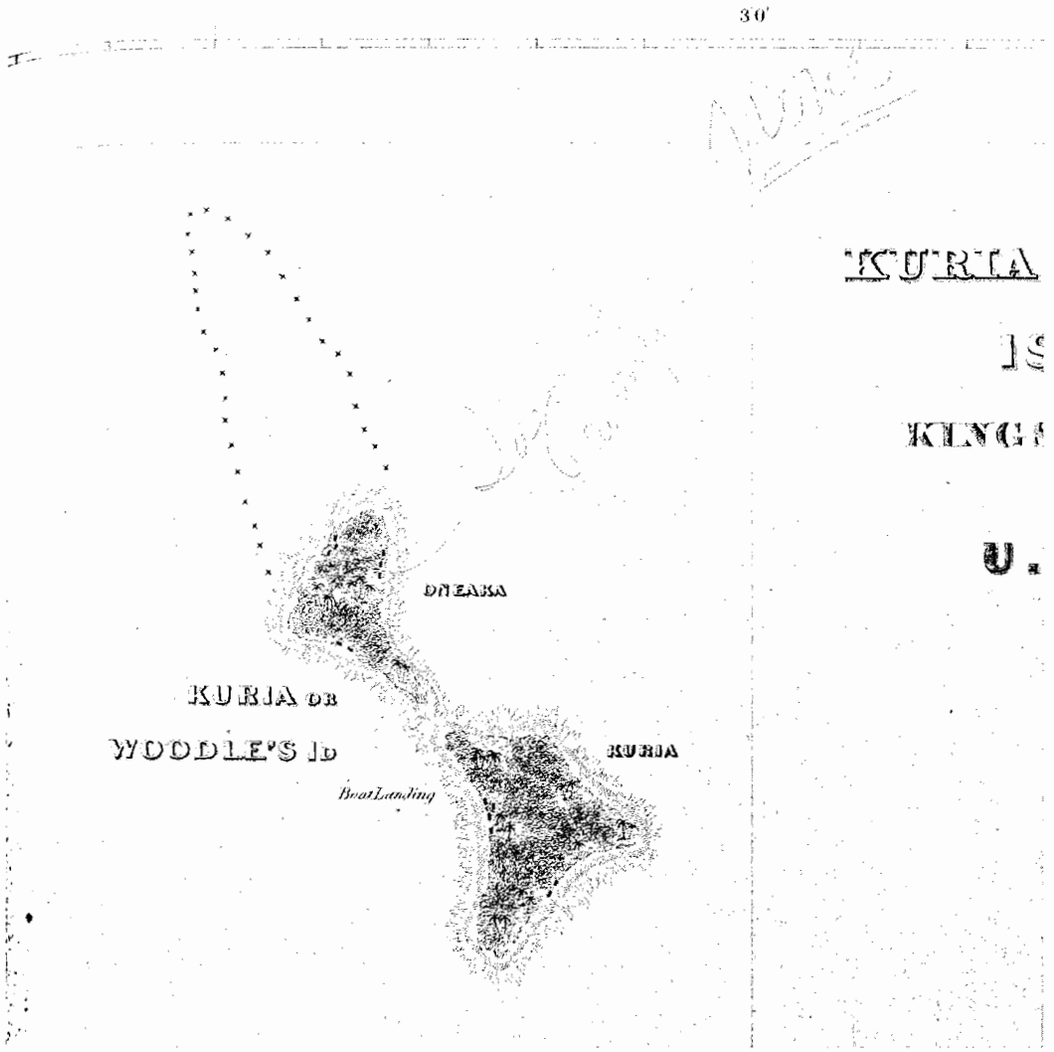


FIGURE 5.22. Let's Get This Right: the back-and-forth between draftsman and print shop over details in the chart. Courtesy of the Geography and Map Division, Library of Congress, Washington, DC.

Division of the National Archives. It is an extraordinary glimpse into the actual hands-on, wading-the-reefs level of surveying work done on the expedition, and as far as I know this is the first time it has come to light. I have been able to identify the book as having belonged to George M. Totten, passed midshipman aboard the brig *Porpoise*, and it appears to have been primarily used by him during the survey of the large western island of Savaii, in the Samoa group, in October of 1839. Here we can see his doodle map of the archipelago between "Oupolu" and Savaii (fig. 5.23), and it is possible to coordinate his large-scale

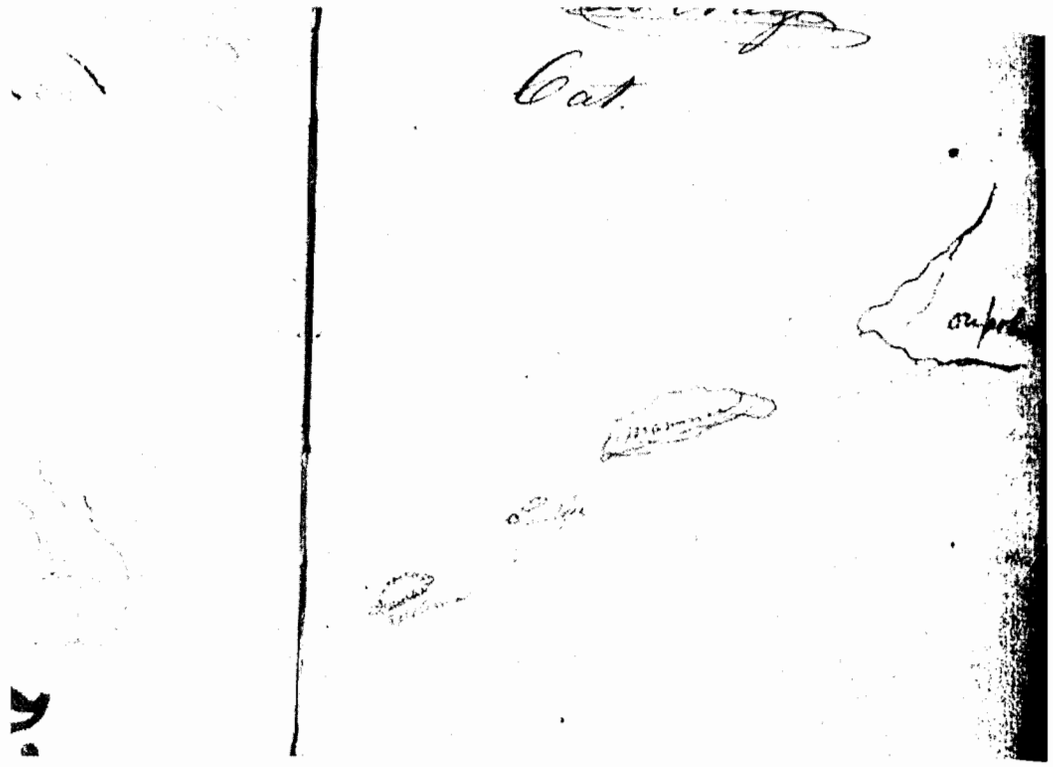


FIGURE 5.23. A Surveyor's Notebook: George M. Totten's sketch map of the archipelago between Upolu and Savaii. Courtesy of the National Archives and Records Administration, Old Records Division, Washington, DC.

sketches with parts of the final survey chart of Savaii published in Wilkes's atlas (figs. 5.24 and 5.25). In the pages of the notebook, we can see Totten's lists of angles (fig. 5.26), his triangulations (fig. 5.27), and his sounding lines (fig. 5.28), all the product of long days of boat work.

Digging into such fine-grained details of the survey practices can point to significant, and otherwise overlooked, facts about how hydrographic surveying was actually done. Take for instance this exquisite and unique leaf, depicting the expedition's discovery of McKean Island (in the Phoenix group [fig. 5.29]), named for the ship's cook, who spotted it from the *Vincennes* on the nineteenth of August, 1840. We can see in this elegant composition of text and chart the work of the two boats dispatched to conduct a survey of an island that would later become one of the most productive of the U.S. guano islands.[100] But for our purposes what is most interesting in this document is the closing signature, "Respectfully, James Alden," since it helps us to recognize just what this document represents: what we have here is the written compilation of the prelimi-

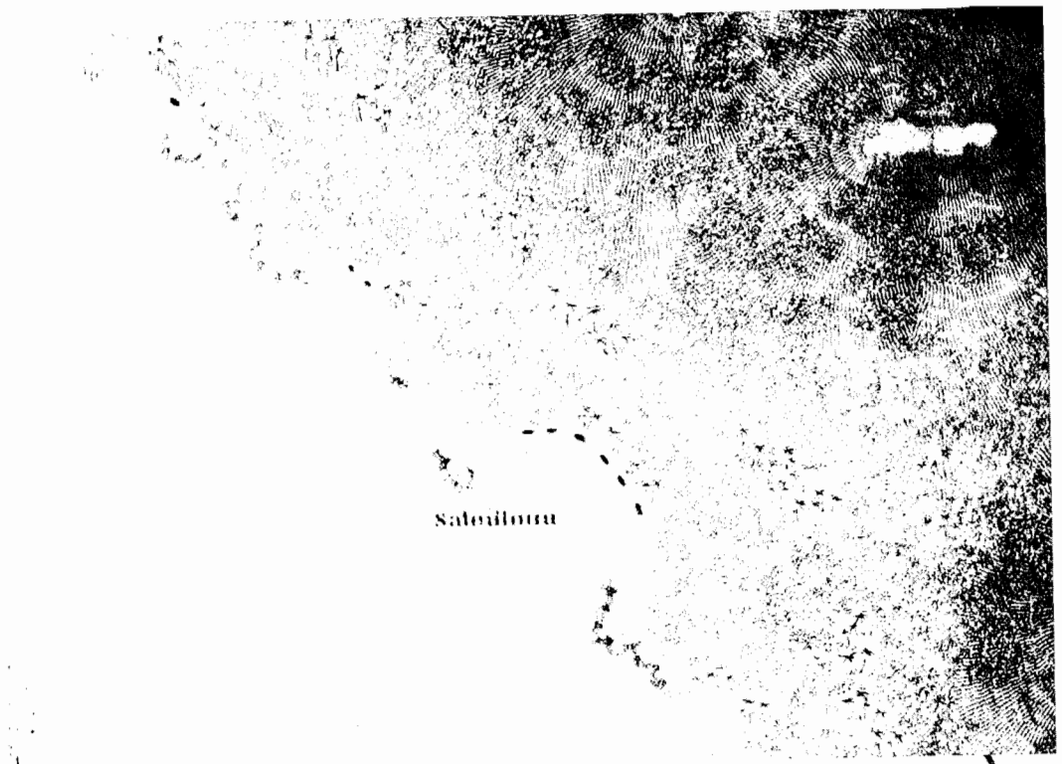


FIGURE 5.24. Initial Sketchbook and Final Chart: a juxtaposition of George M. Totten's manuscript survey notebook and the U.S. Ex. Ex. chart of the west coast of Savaii. Courtesy of the National Archives and Records Administration, Old Records Division, and the Geography and Map Division, Library of Congress, Washington, DC.

FIGURE 5.25. Initial Sketchbook and Final Chart: a juxtaposition of George M. Totten's manuscript survey notebook and the U.S. Ex. Ex. chart of the northwest tip of Savaii. Courtesy of the National Archives and Records Administration, Old Records Division, Washington, DC, and the Geography and Map Division, Library of Congress, Washington, DC.

nary survey information composed by one of the leading survey officers, Lieutenant Alden, for submission to his commanding officer, Captain Wilkes. Such a report was known as a "deck paper," and it was a document that Wilkes had ordered to be completed at the end of every surveying day by every surveying officer. This is the only one, of what must have been thousands, that has been preserved. The deck paper was required to include calculated azimuth results, elapsed times, and a diagram of the relative position of the different boats at anchorage.[101] Had the work on McKean Island been more extensive, and had Alden been in command of one of the secondary vessels in the expedition while doing the work, he also would have been responsible for seeing to it that the observations compiled in his boat officers' angle notebooks were synthesized

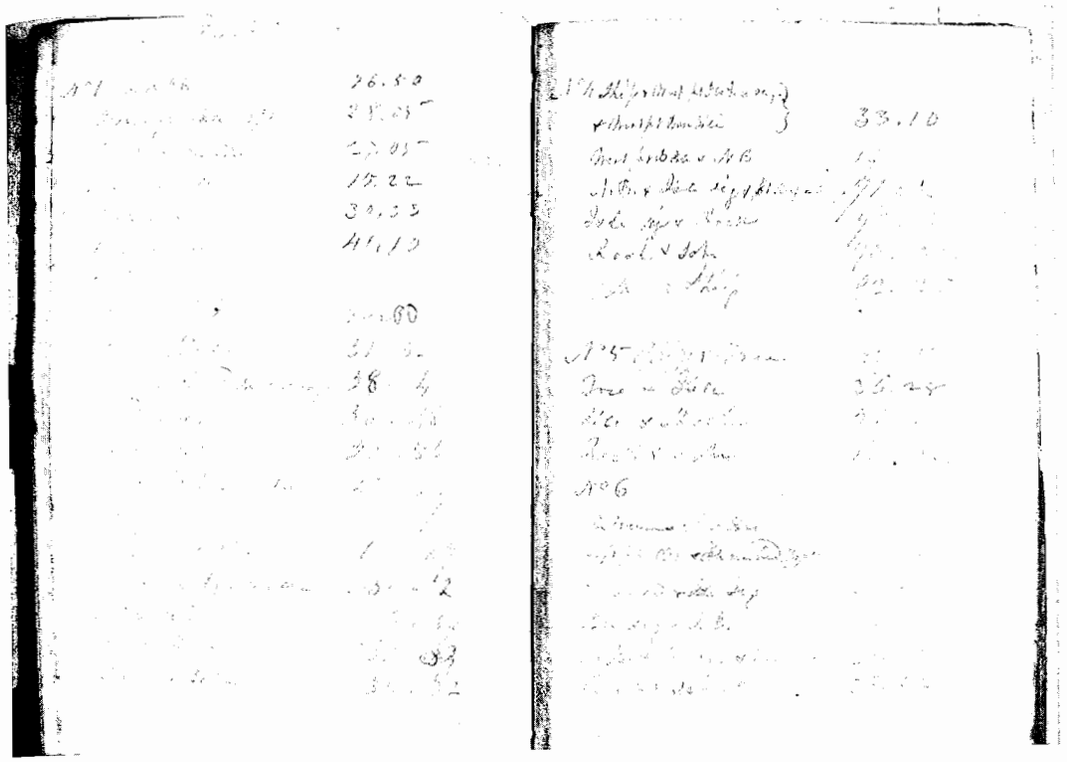


FIGURE 5.26. A Day's Work: George M. Totten's angle observations for a sequence of survey stations. Courtesy of the National Archives and Records Administration, Old Records Division, Washington, DC.

with the data from his vessel in what was known as a "deck board," which took a columnar form (fig. 5.30).[102]

What we begin to see by tracing the survey down into its raw materials in this way is the elaborate system of rules and regulations for recording and transmitting the data of the charting work. From the raw angle books, to the deck paper, to the deck board, to the master log and track charts aboard the flagship, the survey data moved up the chain of command, from the base of the pyramid (the sweat work of the men in the boats) through the preliminary synthesis and compilation aboard the secondary vessels of the surveying fleet (under the authority of each of the commanding officers), before finally arriving on the quarterdeck of the *Vincennes* for the use of the survey "commodore" and his cartographic assistants. Along the way, each transmission was governed by strict and formal orders, as evidenced by Wilkes's testy supplementary order promulgated in August of 1839, reminding his reporting officers that "the deck-board will be kept strictly according to the formula herewith sent"—or

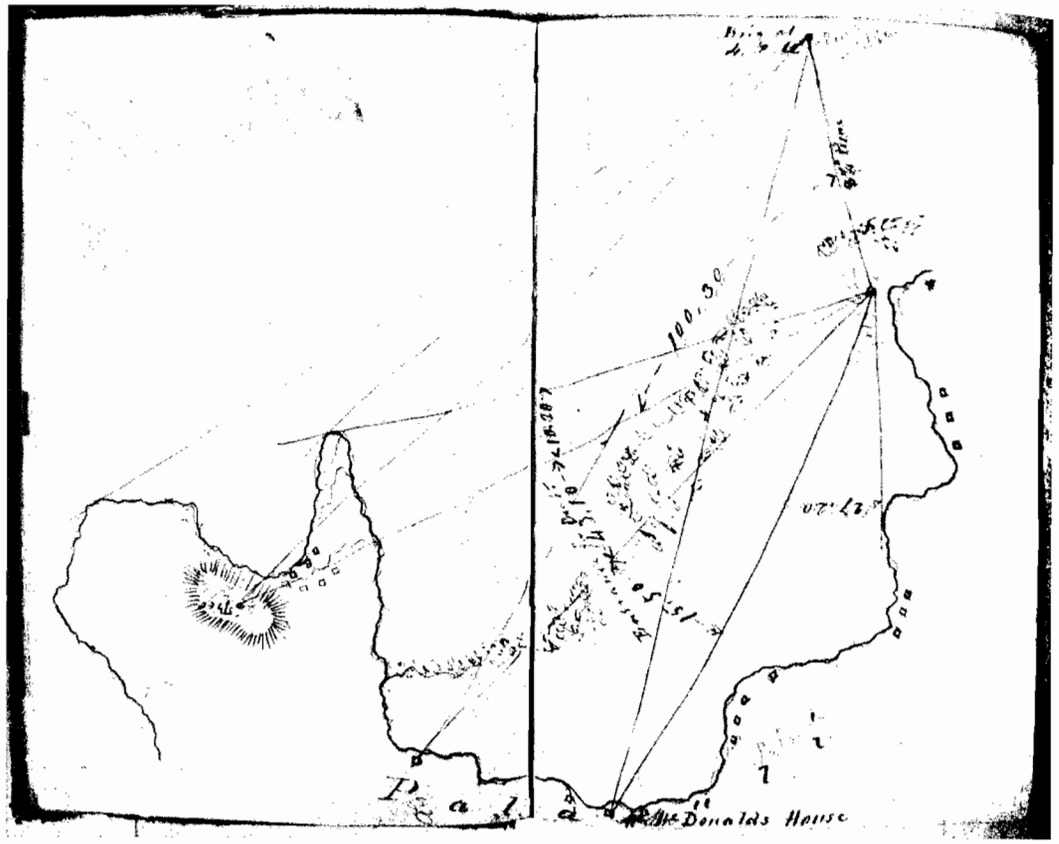


FIGURE 5.27. A Little Trigonometry: George M. Totten's angles plotted as triangles. Courtesy of the National Archives and Records Administration, Old Records Division, Washington, DC.

the further prodding sent several weeks later, reiterating that "the orders to the officers of the boats must be well understood before they leave the ship, and strictly obeyed."[103]

And this, I believe, brings us to what I take to be the most important characteristic of this work: the striking way that this form of hydrographic surveying traded on the resources of naval discipline. What is revealed by our excavation of the overlapping pyramids of survey data and naval command is the role played by military order in the construction of cartographic precision itself. In other words, what we have here is more than merely ordinary precision surveying in a naval *setting*; this is rather a form of surveying where naval discipline authenticates and ratifies the precision itself. The nested hierarchy of primary and secondary triangulations is built out of the nested hierarchy of men; a reliably unbroken chain of cartographic information is guaranteed by the reliably unbroken chain of command. Precision is the product of follow-

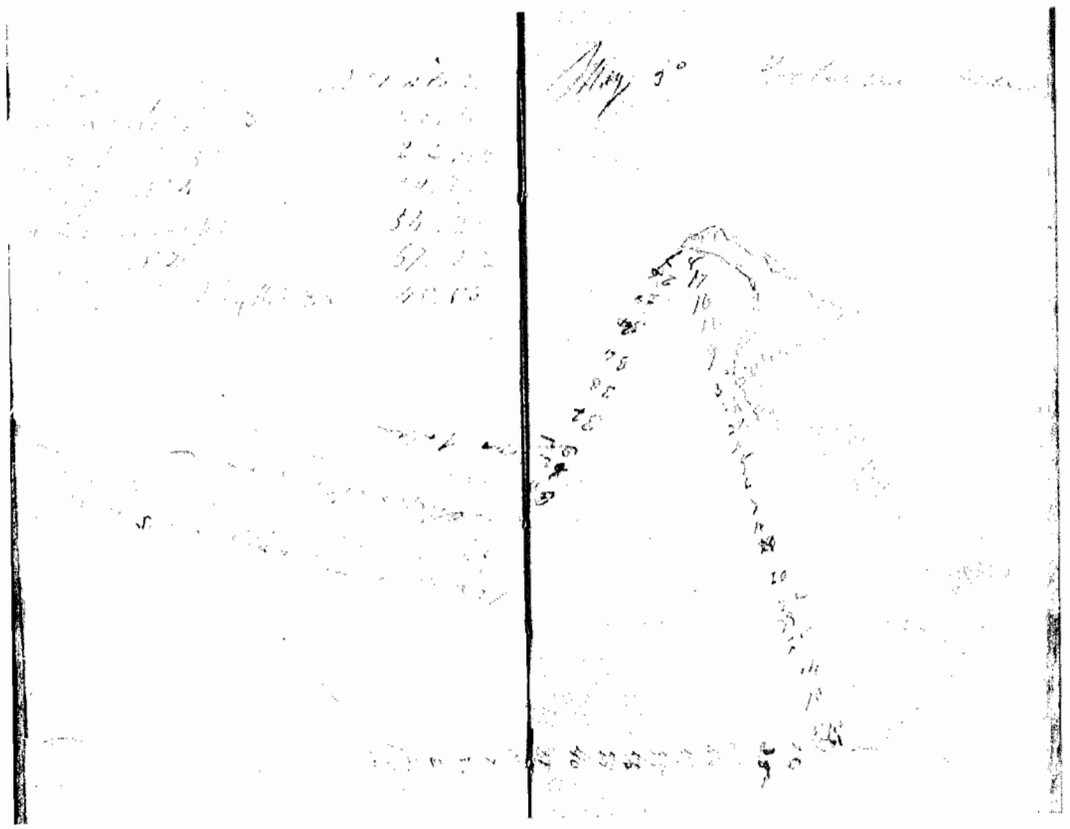


FIGURE 5.28. With Lead and Line: George M. Totten's series of sounding measurements along a triangle of transects at the mouth of a small harbor. Courtesy of the National Archives and Records Administration, Old Records Division Washington, DC.

ing orders, with the notable corollary that error amounts to nothing less than insubordination.

This, as we will see, was the real subject of the trial on the deck of the *North Carolina* in New York Harbor in the summer of 1842.

To sum up the argument of this section: hydrography in the first half of the nineteenth century was a scientific enterprise significantly constituted—in its practices, its norms, and perhaps even in what we might call its rituals—by naval discipline. Here knowledge gathering and overawing the natives were very much of a piece, since precision metrics were performed with the instruments of naval violence. If, as has been suggested, colonial maps were drawn in blood in the age of empire, hydrographic surveys were inscribed in the smoke and thunder of naval guns, as elaborate cannonades sounded and

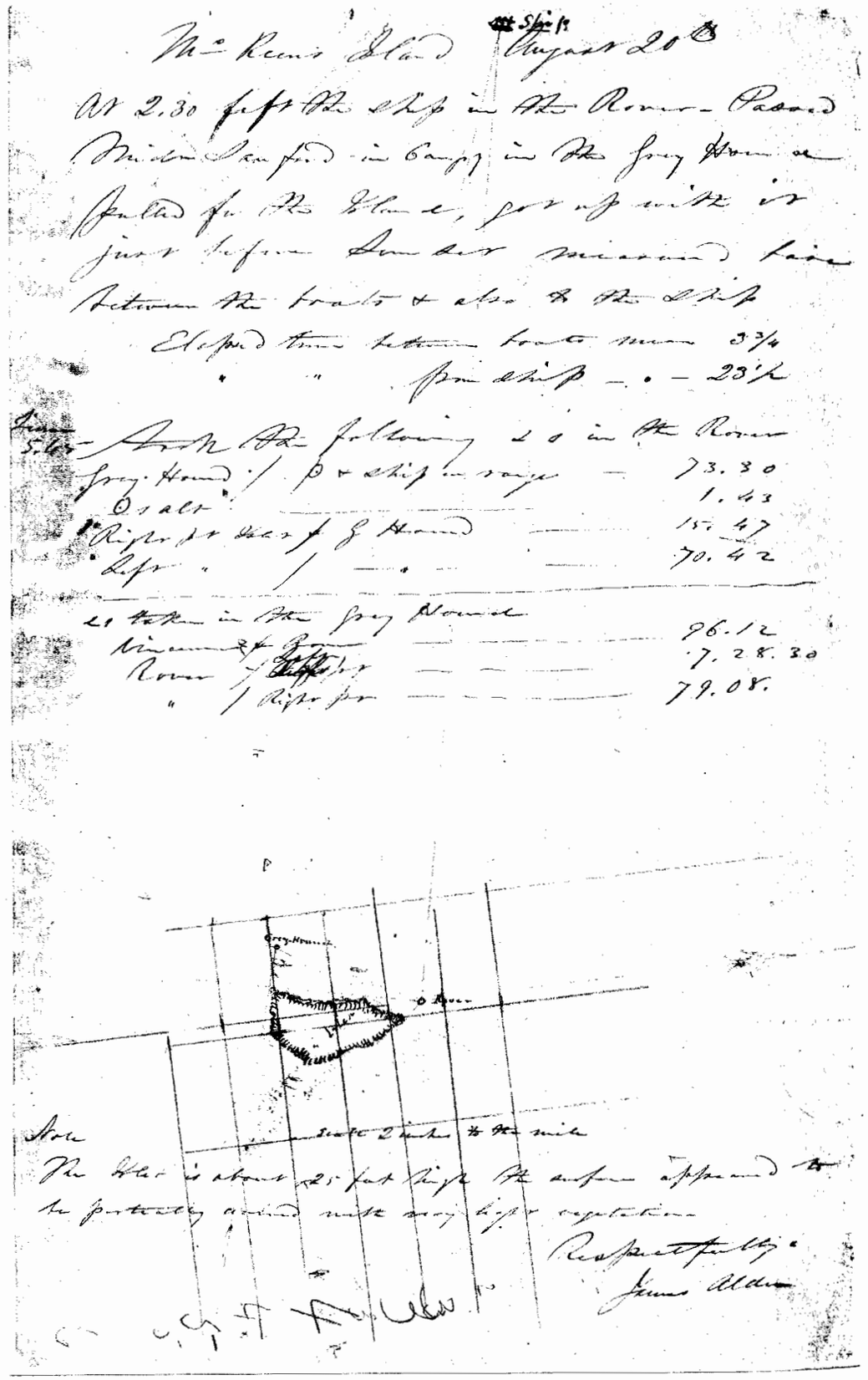


FIGURE 5.29. The "Deck Paper": summary of a hydrographic survey, formally submitted to a superior officer—in this case from Lieutenant James Alden to Captain Charles Wilkes. Note the small icon for the ship at the top of the page. Courtesy of the National Archives and Records Administration, Cartographic and Architectural Section, College Park, MD.

were entered upon a deck-board, for which the following form was prescribed:

FORM OF DECK-BOARD.

TIME.	POSITION.	TIME.	AZIMUTH OF ⊙.	LEFT-HAND OBJECT.	CENTRE OBJECT.	RIGHT-HAND OBJECT.	REMARKS.

To illustrate still further the mode in which the whole squadron was made to concur in obtaining unity of action, a detail of a survey and a plot of the work are subjoined.

FIGURE 5.30. The Source of All the Trouble: Charles Wilkes's instructions on the composition of the "deck board." Courtesy of the Firestone Library, Princeton University.

choreographed squadrons of disciplined men ran encircling maneuvers around distant islands.[104] Here was the surveying science of the man-of-war, developed at the colonial periphery for use on colonial peripheries, and ideally suited for service in the Pacific during decades of considerable international rivalry in this region. And it is only when we begin to consider this rivalry that the true scope and significance of what I have called "hydrographic imperialism" starts to become evident, since we are talking not about a few isolated episodes of surveying activity, but rather dozens of major expeditions, sponsored by all the major powers in the region—Britain, France, Russia, and the United States—amounting to probably the largest government investment in the region for more than half a century. The names of the leaders of these surveying expeditions amount to a roster of Pacific enterprise in the period: Vancouver, de Freycinet, D'Urville, King, Du Petit-Thouars, Fitzroy, Kotzebue. All of them were practitioners of the kind of cartographic work that has been our subject here; their surveying activities were, at the same time, pageants of naval prowess and precision drills—not at all unlike formal gunnery exercises—that used the instruments and culture of the navy to pin the earth to the stars. By doing so, these men made the world into a map, pausing only now and again to load their cannons with actual shot, and to reinforce the strategies of empire even more directly.

Hence, when Captain Wilkes and his squadron happened to fall in with the brutal British Captain Edward Belcher (author of one of the best-known treatises on navigation and hydrographic surveying) and his small surveying fleet at Rewa in the Fiji Islands in June of 1840, it is little wonder that the two hydrographers felt each other out in stiff exchanges of courtesy and closely guarded their charts. They were both skilled practitioners of the hydrographic science of cartographic mastery in the first half of the nineteenth century, and were thus very much rival draftsmen of the imperial map in the Pacific.

HYDROGRAPHIC DISCIPLINE AMONG THE NAVIGATORS

It is now time to return to the deck of the *North Carolina*, and to pick up the trial of the unfortunate Lieutenant Pinkney, and the Upolu map surveyed aboard the *Flying Fish* under his command. At the start of this chapter I asserted that this trial was worth our attention not merely because it brought a map and a man into the dock of judicial scrutiny. I suggested that its true significance for scholars of cartography and imperialism lay in the way that the proceedings brought the whole array of exploratory surveying practices—the instruments, discipline, ships, and orders; the metrical, scribal, and military minutiae of the new hydrography—into view, and in doing so opened to scrutiny the generally sealed *arcanum* where the chart and the shore were made adequate to each other. Throughout the era of European global projecting, much hinged—practically, ideologically—on the vaunted reciprocity of maps and the world; but seldom was it possible to witness, and indeed to interrogate, the actual production of that reciprocity. The historical recovery of such processes can tell us a great deal.

It is for this reason that I have argued above that scholarship on cartography and imperialism must pay close attention to cartographic practices, as opposed to merely the cartographic artifacts that were a product of those practices. A strength of such an approach, as I have pointed out elsewhere, is the opportunity it affords to "unsettle" these powerful representations of colonial space, and by doing so to reveal fissures, lacunae, oversights in what can otherwise be a compellingly polished and even impenetrable surface. I mean something more here than what J. B. Harley called cartographic "silences"—the leaving-things-out that can serve the functions of propaganda or collective manipulation.[105] I am more interested in those moments, those sites, where the imperial map can be made to speak the conditions of its own creation, and in doing so be made to disavow its peculiar pretensions: its sovereign view, its pervasive scope, its even and indifferent subsumption of place. For here we come to the cusp of the true "power of maps": by trading on an unholy alliance of mimetic conventions and metrical geometry, maps conjure omniscience out of what is, in the end, merely a handful of views from here to there, a glancing passage, and/or a few locales from which the stars and moons have been studiously regarded. We may not wish to call this a sleight of hand, and we may not wish to call its effects hegemonic; but it is difficult to avoid a disconcerting sense that something disingenuous is going on, and that the costs have been, at different times—and with particular reliability in the non-European world—high.

It is important to underline that what I am describing here is by no means dismissable as an idiosyncratic view of the map dreamed up by poststructuralists and promulgated by two-bit Saidian acolytes. That maps derived their power from fibbing about their mimetic character, by smoothing over the nubbly texture of their surveyed warp and weft by means of secondhand representational conventions—and that this was a problem for mapmakers and map users—all this well understood by the very individuals who gave shape to the kind of hydrographic enterprise that has been the subject of this chapter. Take for instance the remarkable suggestion made by Alexander Dalyrample in 1771, in his "Essay on the Most Commodious Methods of Marine Surveying":

> I think it would be very useful in hydrography, besides the chart describing the coasts, soundings, &c. to have one, on the same scale, of lines and points only. For, as it is almost impossible in a chart to have every place or sounding fixed with equal precision, it is certainly expedient to show upon what authority every part is determined.
>
> - I would have the data for determining the several stations marked by strong black lines.
> - The bearings from these stations for determining the several points, or objects, in faint black lines.
> - The points, or objects, whose situations are determined with the utmost precision, I would mark thus ★.[106]

Dalyrample was here calling for nothing less than a shadow map, or, perhaps better, a skeleton map: one that eschewed the representational resources of depiction, of *pictura*, and instead austerely and explicitly declared itself the geometric record of a metrical encounter with a place. While a number of practitioners tried to supplement their standard charts with information of this kind—Beautemps-Beaupré liked to use dotted lines to fill in regions he had not surveyed according to his own exacting standards, and he recommended mark-

ing questionable points with the letters "P.D." for "*Position Douteuse*"—none was, in the end, willing to renounce the satisfactions (and indeed the utility) of pictorial conventions.[107]

Such considerations even reached directly into the activities of the U.S. Ex. Ex. itself. The wry acting sailing master aboard the *Flying Fish*, George Sinclair—who helped on the disputed survey of Upolu, and who rose to Pinkney's defense in the court-martial proceedings—confided the following in his private journal shortly after the completion of the Fiji survey:

> I hope and trust that Capt. Wilkes will not claim too much for the chart, which I have no doubt will be a very handsome one. If he publishes the chart as completed and as one of perfect accuracy, he will claim for it more than it is entitled to, and if the ground should ever be reëxamined by future navigators, with more time to devote to the work than we had, we will lose the credit to which we are most justly entitled, of having accomplished in the short period of three months, so vast a work with even an approach to accuracy; but I claim for this survey more than an approach to accuracy, although I cannot claim for it perfection. If we had had provisions for two months longer we could and would have made it perfect. . . . There are many parts of this group that could not be bettered if we had years to devote to the work, and there are again many parts that from want of time we have been compelled to hurry over and slight.[108]

The problem, Dalyrample would have been quick to point out, was that no sailor who looked at the fine final chart could ever tell the difference between those different parts of the survey—the good, the fair, the poor—until his vessel had run up onto the shore. But that, of course, was an unfortunate consequence of the very conventions, the pictorial enchantments, that transformed tables of survey data into an actual chart, and endowed them with cartographic authority. A ship lost as a result was, we might say, a small sacrifice to the minor divinity who guarded the power of maps.

For the most part, then, the spell remained unbroken: the messiness, the unevenness, the contingencies from which a given map arose were left behind as working drafts gave way to lines carved in copper, until, finally, there was on the page a picture (indeed, as Sinclair put it slyly, "a very handsome one") of a place—a persuasive picture girded with geometry and framed by a celestial mathesis.

For the most part this was the way it worked. But this chalcographic spell could not withstand the witness stand.

Facing countercharges, Wilkes made sure to throw the book at each of the men he brought to trial.[109] In Pinkney's case, this meant lodging a host of accusations against him: contempt of his superior, neglect of his duty, violation of Navy rules, scandalous conduct, illegal punishment of his subordinates, and so on, and so on. In this forest of charges and specifications, however, the map of Upolu loomed large, and Wilkes delayed the start of the trial proceedings until he had in hand the two charts that he believed would prove his case—to wit, that Pinkney had scandalously neglected his duty during the surveying of the Navigator Islands. Over the next five days, more than a dozen witnesses were called as the two sides struggled to establish what had happened during the surveying work in Samoa, and the charts—the first made under Pinkney's command during a circumnavigation of the island in the *Flying Fish* in October 1839, the second made from supplementary data collected during a second expedition along the southern shore in a pair of whaleboats led by Lieutenant Perry in February of 1840—were subjected to forensic scrutiny. Did the differences between them amount to a punishable crime? Perry, who had materially participated in both surveys, testified that they did not. Yes, there was a total difference of some 7 miles (11 km) in the length of the island on the two charts, and yes, the second one was almost surely better. But this had nothing to do, in his view, with failures in Pinkney's command over the earlier survey: in 1839 their pass at the southern shore of the island had been plagued by rough weather—rain and high winds. Once these conditions kicked up, it had been impossible to launch the whaleboats, and so nearly the whole run had been made without the benefit of surveyors working the inside of the reef. Moreover, the low sky had made azimuth observations impossible, and the promontories at the center of the island had been mostly invisible for the whole week. In the end, the track chart of the vessel had been maintained using the log line and ordinary dead reckoning, and offsets to the island had been taken as conditions permitted. To cap it off, Perry himself had fallen ill midway around the island and had been forced to take refuge in his berth.

Though Perry had been assigned to report to Pinkney, captain of the craft, Perry himself was the most experienced hydrographic surveyor on the *Flying Fish* in 1839, and he was therefore assigned the actual tasks of conducting the survey. Little wonder, then, that after sickness took him out of commission, the quality of the first survey had fallen off. The

southwestern corner of the island had received cursory attention. In working up the chart after the first circumnavigation, Perry had been forced to elide this zone by linking up the earlier parts of the schooner survey on the southern shore with a detailed boat survey of the northwest coast made by two other officers who had been working their way around the island in the opposite direction, and had been in the lee of the bad weather. How were the different bits of the survey joined up at this critical disjuncture? The judge advocate pressed this question on Perry, who replied, "If I remember rightly, we had an azimuth on that point [gesturing at the chart], and this line was sketched ahead of the time I was taken sick."

Q · How do you know the azimuth was taken; and by whom was it taken?
A · If I remember, the azimuth was taken by a position off Falealiti [*sic*], and a line thrown off by sextant.
Q · Do you consider this sufficient to plot a chart with?
A · If you have got nothing better . . .

Perry acknowledged that textbook practice would have called for two back sights to triangulate the connection, but if the observations did not exist, there was nothing to be done. He explained that to improve the joint he used a few sketches made by other officers while he himself had been on the sick list.[110]

According to Perry, no secrets were kept from Wilkes: "On my return, I was in conversation with Lieut. Wilkes, and I mentioned that we had not been able to use the boats, and the survey had been made from the schooner."[111] In other words, Perry informed Wilkes that the tracing of the southern coast of Upolu had been done using old-fashioned cruise-by-while-sketching techniques, rather than a proper hydrographic survey of the newest type. Why was the second survey completed faster and done better? demanded the judge advocate. And Perry answered that not only was the weather better on the later passage, but, working within the reef in the boats, he had been protected from the seas. In addition, he had able to work more efficiently because "my previous knowledge of the ground aided me in my work."

Moreover, Perry demurred on the question of just how significant the difference between the two charts really was. Clarifying several elements of his testimony the following day, he explained that he had never been concerned by the two versions of Upolu: "I never measured the charts," he explained, "and to the eye the only difference appeared to be in the sketching." Summing up his view of the whole affair in a sentence calculated to invite probing questions about the margins of error in the entire cartographic undertaking of the Ex.

Ex., Perry dismissed the discrepancies out of hand. Sitting before two charts, which differed by more than 10 percent in their linear dimensions, Perry announced, "I considered them as corresponding."

In light of this surprising assertion, the court wanted to understand if the discrepancies between the two Upolu charts were in any way extraordinary, and the judge advocate pressed Perry for more context: "Was this the only instance of the case of a survey being remade," demanded the judge advocate from the chair, "and if not state another." To which Perry replied, "I understood that King's Island was resurveyed by the Porpoise, and that differed from the surveys of the Peacock and the schooner."[112]

Here was a strong suggestion that something else was really at issue in the court-martial proceedings concerning the Samoa charts, something other than positional accuracy per se. After all, the trial presented the leading survey officer arguing that the discrepancies under scrutiny were not exceptional; rather, he seemed to be saying, they reflected the messy realities of surveying, not negligence of duty. Indeed, Perry said as much explicitly when asked the essential question: "During the time that you were under the orders of Lieut. Pinkney did he exhibit a becoming zeal to perform the duty in the survey?" Perry gave an unequivocal reply: "He did: he was exceedingly anxious to do everything right and proper."

The acting sailing master on the vessel, Sinclair, echoed this exoneration when he took the stand: "In regard to the charge of carelessness and neglect in performing that survey, Mr. Pinkney shewed every anxiety and disposition to do it to the best of his ability, and I believe it was done as well as he could do it. His anxiety on the subject was remarked; I thought he was over anxious."[113] Sinclair also confirmed Perry's recollection that the weather had plagued their progress: it had been so wet that they had been forced to leave off using the sand glass when heaving the log, since everything was soggy and the sand would not run properly. Moreover, in Sinclair's view, if there was anyone to blame for the poor survey on the first pass it ought to be Wilkes himself, since the *Flying Fish* was utterly ill-equipped for its task. Not only was there no chronometer on board, there was not even a piece of equipment as basic as a patent log—a torpedolike screw that, dragged behind a vessel, converted the flow of water into estimates of distance; a tool very useful if dead reckoning had to be employed. It was clear that there was no love lost between Sinclair and his former commander. A look back at Sinclair's private journal from this part of the voyage finds him complaining even then of the poor outfitting of the vessel ("she is enough to break down the constitution of a horse") and the lack of proper equipment for the assignment:

> Mon. 21 Oct. Commenced surveying the South East and South pts of Upalo with the detached Islets. The ground between these islets + Upalo is foul. Surveyed the South and SE sides and commenced surveying the western side. Everything seemed to operate against us in this work. In the first place we had not (nor could we obtain tho frequent application was made) an instrument so indispensable as a patent log. And in the next place the weather was so bad . . .[114]

When he took the stand as prosecuting witness, Wilkes insisted that what was at issue in the trial was not just a less-than-optimal survey performed under less-than-optimal conditions. In reply to the pointed question posed by the judge advocate—"Does the error in the chart made on the survey by the accused indicate positively that the survey was performed negligently?"—Wilkes answered in the affirmative: "In my opinion it does."

But in view of the testimony of half a dozen witnesses about weather and equipment, testimony about Pinkney's assiduous efforts to support Perry's work, and above all Perry's own assertion that the errors in question were not even particularly grave, how did Wilkes ever believe he could make the argument that Pinkney was punishable for the first chart of Upolu—a chart everyone agreed he had not even made, and the surveys for which he had commanded only in the nominal sense that he commanded the vessel from which they were performed? As the trial unfolded it grew increasingly clear that what was at issue was not merely the conformity of the charts, but rather a larger conformity to the system of hierarchical hydrographic discipline: the armature of rank and subordination that framed every chart as rigidly as the graticule of longitude and latitude. In the end what was central to the charge against Pinkney was not that he had made a bad map—it was acknowledged, in effect, that he had almost nothing to do with any of the charting activities in the Samoan group; and anyway the map was not that bad. The real charge against Pinkney was that he "did neglect to keep the required deck board and minutes of observations; and further, the said Lieutenant Robert F. Pinkney did fail to report his arrival at the harbour of Apia, from that duty [of surveying] to his commanding officer, the said Lieutenant Charles Wilkes." At issue, then, was obedience, not metrical accuracy. In the mind of Charles Wilkes, however—and indeed, as I have argued, in the practices of hydrographic surveying as a whole—the two were fundamentally inseparable.

We have already encountered the deck board, and noted its place in the pyramid of data collection and surveying responsibilities: it was the daily tabular collation of all the surveying work done by the actual surveying hands—their angle notebooks and azimuth observations—together with information about the position of the main vessel. It was the responsibility of the commanding officer, and it was to be conveyed to the flagship commander. In Wilkes's view, Pinkney's survey was culpably negligent above all because he had violated the order to keep and convey the deck board. Actual positional errors on the chart may have had theatrical value at the trial (and for this reason, perhaps, Wilkes led his prosecution with the demonstration of such discrepancies), but the fundamental issue was that the chain of command securing the chain of cartographic information had been broken. When asked how he could be certain that the chart performed under Pinkney was erroneous, Wilkes offered a reply that spoke directly to the twinning of naval discipline and hydrographic accuracy: there was, he explained, "no data furnished me with the chart to prove it."[115] The chart was in error because it was, literally, unauthorized: since Pinkney had not followed orders, the chart was wrong. Where the land itself actually lay did not, from this perspective, even really matter.

But had Pinkney disregarded his orders? As the missing deck board took shape as the dispositive issue in the trial, the judge advocate worked to get to the bottom of this question. What exactly were those orders? Where were they written? When? Was the maintenance of a deck board actually standard in the Ex. Ex. surveys—even if there were in fact no rowboats involved in a given survey, and hence no multiple sources of data to collate? The many witnesses had different and conflicting answers to these questions, and as the testimony dragged on it became increasingly clear that there was considerable confusion among the surveying officers: Just how different was the deck board from a detailed surveying notebook? Sinclair thought there were more columns in a deck board, but he asserted that he could not, with confidence, "identify its form." Moreover, he alleged that Wilkes himself, when surveying from the schooner, did not keep a deck board but maintained his notes in an ordinary notebook, and made his maps from those data. Even Perry, who acknowledged the difference between the two kinds of record, and who asserted that he had himself maintained both a survey notebook and at least some version of a deck board during the passage of the *Flying Fish* on the southern shore of the island (or at least had done so until he got sick), confessed that he never used the deck board in actually plotting the survey:

> Q · Was a deck board similar to the one shown you kept on board the schooner?
>
> A · It was, all except that one line [gesturing at one of the columns in the

example deck board], and I am not sure about that, though it may have been there.

. . .

Q · Did you plot the work from such a deck board, and was there a copy kept on board?

A · To the first part of the question I answer no. The notes were kept after the manner of the Coast Survey, and copied from them into a deck board of the proper form by me.

Interestingly, the Coast Survey—notoriously by this point, given the difficulties of Ferdinand Hassler, and the back-and-forth tussle with the U.S. Navy—was under civilian direction, and was thus fundamentally at odds with the military forms of naval hydrography that I have discussed here. According to Perry, then, the deck board was not in fact a link in the chain from which cartographic accuracy hung; rather, it was naval busywork, derivative and performed because rules were rules and they had to be obeyed.

Sinclair had an even clearer memory of Perry's attitude toward the reduplication of effort demanded by the maintenance of the deck board on a soggy running survey being conducted from a single vessel:

> I recollect particularly that Mr. Perry kept the notes of this expedition in the form of a deck board as required by the orders of the expedition. Mr. Pinkney did not know the form of a deck board, nor did I, and he required Mr. Perry to rule it and transfer the notes from his printed note book. I recollect that Mr. Perry considered this unnecessary.

And on this point he positively insisted.

> I recollect distinctly Mr. Perry sitting down in the cabin, and transferring his notes on to a ruled sheet of paper. . . . I recollect Mr. Perry did not consider this necessary, but Mr. Pinkney ordered him to do it, and he did it. It was on cartridge paper.

Why didn't Pinkney have a clearer grasp of what a deck board was supposed to be? Was he culpable for this ignorance? Here again different answers were offered by different witnesses. Sinclair, feisty, said he was not certain that the main surveying instructions even mentioned a deck board. It was hard to say: "I never read them but once, and the more I read, the less I understood them," he declared—a dig at Wilkes's digressive prose and looping syntax. Indignant, Wilkes denied that the document before the court was in fact the "instructions"

at issue: what was being waved around was, it turned out, the manuscript surveying "manual" (the document I discussed above), where indeed no mention was made of the deck board. But the proper *instructions* took the form of an actual order, lodged in the order volume of the flagship. A copy of them, dated 25 June 1839, had been entered into evidence in the court, and they very much did stipulate the maintenance of a deck board. From this point on, nearly two days were spent sounding a parade of witnesses about when the surveying instructions were promulgated, when they were received by the different vessels, and where Pinkney was when all this was going on. It was Wilkes's intention to prove that Pinkney had to have seen them, and it was Pinkney's contention that he had never had the opportunity to do so.

In reviewing the transcripts there appears to be an inordinate degree of confusion about the date that the surveying instructions went out to the vessels. According to Wilkes's second in command, Lieutenant Hudson, they were distributed in the Low Archipelago in September of 1839 when Pinkney was actually serving on Hudson's vessel, and thus he ought to have seen them before taking over the *Flying Fish* survey in October. But Pinkney was later able to establish that he had not been on Hudson's vessel at that time. Another witness, Lieutenant Cadwallader Ringgold, testified that the survey instructions had been issued all the way back in January of 1839 at Rio Negro (when Pinkney was away on service in the supply vessel); and yet another witness remembered the survey orders coming out in June or July of 1839, but thought it possible they had never gone to the two smaller schooners at all.

In the end, the issue was never quite resolved, and it is only with the clarity of hindsight that I have been able to sort out why there was such diversity of opinion on the question. As it turns out, everyone was, in a way, right. There were in fact multiple distributions of survey instructions—three to be exact, not including the "manual"—and they were all slightly different, reflecting Wilkes's increasing preoccupation with the control of the expedition and its workings. The first, issued shortly after the Rio Negro survey in February of 1839, made no mention of the deck board (like the original surveying manual lodged aboard the larger vessels). The second, a reissue, came in June of the same year, and added the deck board, almost certainly as an amendment to the surveying practices in the wake of the disputed sightings of the Antarctic coastline. Finally, in August, as the Pacific surveying began in earnest in the Tuamotu archipelago, Wilkes issued yet another clarification, a specific insistence on the necessity of officers keeping and surrendering the deck board. Interestingly, the first two of these new commands can be correlated quite closely with moments of leadership crisis on the expedition: they emerged from episodes of sharp conflict with senior officers, and merit consideration as part of Wilkes's

larger efforts to shore up his uneasy and contested command.[116] Surveying for Wilkes was thus a means of maintaining control over men, at well as a way to gain control over the land and the sea.

And, finally, it is in this context of authority and subordination that we must return to the last element of Wilkes's cartographic vendetta against Robert Pinkney. Recall the strange final sentence of the specification of charges, to wit: "the said Lieutenant Robert F. Pinkney did fail to report his arrival at the harbour of Apia, from that duty [of surveying] to his commanding officer, the said Lieutenant Charles Wilkes." Here, I want to argue, lies the key to understanding the whole drama of the Upolu charts and the court-martial proceedings on board the *North Carolina* in August of 1842. For, tacked on to the end of a charge of criminally negligent surveying—a charge leveled against a man who did not do the surveying, remember; and on the evidence of a chart not more erroneous than others made in the course of the expedition—we find an allegation that Pinkney failed to report to Wilkes when he was finished. Just what did this have to do with the chart?

For the answer we must return to the events around Upolu in October of 1839, since it is here that we can reconstruct the meticulous metrics of rank, what we might call the "precision insubordination," that lay beneath the cartographic controversy. When, on the nineteenth of October, Wilkes issued his written orders to Pinkney to undertake the Upolu survey, he stated that Pinkney was to "remain under the orders of Capt. Hudson until further instructions," and that the *Flying Fish* was to rejoin the *Peacock* (under Hudson's command) in the course of its circumnavigation of the island in the opposite direction. Midway through the voyage, Hudson in the *Peacock* did indeed flag down the *Flying Fish*, and commandeer a number of her officers and men for an expedition to a neighboring island to try to capture a Samoan man named Opotuno, who was wanted for the murder of an American sailor. Sinclair, who was tapped for this mission, thought it a fool's errand from the start, and wrote mockingly about its failure in his journal. His pen dripped sarcasm on the day before they departed, when the survey had been suspended for a top-secret police action:

> We will of course succeed, for the whole affair is so well managed that it would be impossible that it should fail, so well indeed has the secret been kept, that the officer in charge of the largest boat, has never received any further official information than that he was launched on a trading expedition.
>
> "We are a great nation"!!!

And the next entry is still more withering:

> Cloudy, rainy, disagreeable, squally weather. About noon the war party left for the shore. I accompanied it and heavens what a fight we had, with fried bread, pork and eggs; we either sat in the boats, arms concealed, chilled with the rain, or in some cases struggled about town in partys [*sic*] while capt. Hudson paid a visit to the missionaries. Thus ended my first grand effort in the defence of my country. At sunset we got aboard the schooner having killed 2 pigs and broken fifteen eggs. I am exact as regards numbers, because it is a matter of some importance that every circumstance in connection with this brilliant affair should be recorded.[117]

They ended up leaving a ransom to be paid to anyone who delivered up the elusive Opotuno, dead or alive.

So in the end, the hydrographic survey of Upolu had been interrupted for an exercise in imperialism of a more direct sort. As a result of these delays, by the time the *Flying Fish* made its way back around to the harbor on the northern shore of the island, Wilkes himself had found his way there in the squadron's flagship. And it is clear that at this point Pinkney elected not to report the results of the expedition to his commander, Wilkes, but chose instead to stick with the letter of his original orders and to report to Hudson, who had also by this time made his way back to the harbor. Formally, Pinkney's instructions did place him under Hudson "until further orders," so he could justify his action as nothing more than scrupulous attention to duty as spelled out in his orders.

But it was not that. To report to the second in command in full view of the commander represented a meticulous violation of protocol, an exquisitely measured breach of etiquette. Indeed, it is evident that Hudson and Wilkes understood the act as a dangerous display of disregard—indeed, perhaps, contempt—for the commander: in plain view of the (illicit) commodore's pennant flown by Lieutenant Wilkes, Pinkney ceremoniously reported to Hudson, who was, as everyone knew, Wilkes's senior officer by roll rank, if not by commission. While Pinkney could protest that he was only doing exactly what Wilkes's orders plainly stated, he was in fact playing a perilous game, throwing the original sin of the commander's rank-jumping commission into his face and that of his erstwhile superior while the whole squadron looked on. When Pinkney showed up to report to Hudson, Hudson himself recoiled: "I told him he had nothing to do with me . . . and he had not to report to me, the Vincennes was in the harbor." Shortly thereafter, Pinkney would lose his command, and a mere passed midshipman would be promoted over the heads of all the fractious lieutenants to captain the *Flying Fish*.

At the heart of the trial against Mr. Pinkney's maps was, in the end, this defiant if sly gesture of insubordination, this goading of the commander by means

of an act of disingenuous obedience, one that spoke volumes about the vitiation of rank, privilege, and hierarchy that underlay the whole expedition in the eyes of Wilkes's detractors. As Pinkney put it in his impassioned defense: "I never pretended to be a surveyor. . . . [And] Lieutenant Perry kept the deck board, of which no model was ever sent to me." But the issue in the trial was deeper than all that, and Pinkney expressed as much in a surprising turn of phrase: "But, alas! gentlemen, I forgot that he who had once violated the chastity of rank, must have made himself its enemy forever."

As the trial of Lieutenant Pinkney dramatizes, the practice of nineteenth-century hydrographic imperialism braided power and knowledge in more ways than one. In the lockstep protocols of the naval survey, insubordination amounted to cartographic error, and men were disciplined by the exigencies of mapmaking, just as the maps themselves were a product of that discipline.

When the verdict came down, Pinkney was acquitted of the charge of negligence in the making of the Upolu chart, though he was found guilty of another charge, "treating with contempt his superior in the execution of his office," and suspended from the U.S. Navy for six months. In this sense, then, the court affirmed the principle of hydrographic discipline among the navy's navigators. Back among the other Navigators—the islands of Samoa—hydrographic discipline had also been affirmed, and the punishment was still more severe. Charged to redo the survey of Upolu in December of 1840, Lieutenant Hudson used the return visit as the opportunity to make a second grab for Opotuno, and to seek out a second Samoan man, Taji, suspected of violence against a whaleman. Unsuccessful again, Hudson trained the guns of the *Peacock* on the village of Saluafata—the same guns that had just been doing service in the survey—and poured broadsides across the beach, before sending his men ashore under cover to burn the settlements. This third survey, again plagued by bad weather, proved useless, and it was never incorporated into the chart of the Samoan Islands.

I have used this chapter to argue that the Pacific surveys of the first half of the nineteenth century must be understood as exercises inextricable from the expanding ambit of European and American ambition in this period. Not only did the maps they produced serve those ambitions, so too did the passages of the surveying vessels; and indeed, as I have tried to show, so too did the very practices of the surveys themselves. And disciplining the natives was only part of the program. Those maps, and the surveys from which they were made, were the product of a cartographic enterprise thoroughly imbued with the rigid principles of naval discipline: in this activity the power of maps was inseparable from the power of men, rectitude was simultaneously social and geometric, and error was tantamount to insubordination.

Back in October of 1829, U.S. Navy Captain William C. B. Finch, commanding the *Vincennes* a decade before she would visit Samoa under Captain Wilkes, made a stop in Honolulu during a Pacific cruise. After trying to collect some sandalwood debts, Finch made a diplomatic representation to the powerful ruler Ka'ahumanu, presenting him, on behalf of President Adams, with "a pair of globes, celestial and terrestrial, and a map of the United States."[118] It is impossible to say what the savvy Hawaiian leader thought of the gifts, but it is safe to assume that Finch waxed eloquent about these remarkable objects, and the way they showed the world in miniature, just the way it was. Did he try to explain what was involved—the fine brass tools, the thick tables of star positions, the sines and cosines, the bearings and trampings—in making the real world into a globe, and the globe into a real world? There is no way to be sure. Did he mention the thunder and the blood? Probably not. Did Ka'ahumanu have his own ideas about what the process would look like? Almost certainly he did.

The *Vincennes*, he may have surmised, would be passing his way again.