

# The Science of Shallow Waters: Connecting and Classifying the Early Modern Atlantic

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**Abstract:** Histories of ocean science have emphasized the ways that state-sponsored deep-sea expeditions ushered in a new age of oceanic understanding during the late eighteenth and early nineteenth centuries. This essay, on the other hand, examines the ways that shallow waters played host to less formal but nevertheless important efforts to create oceanic natural knowledge, often centuries earlier. By documenting the legends and experiences of people who worked on and lived by the ocean—divers, sailors, and fishermen, among others—and corroborating their stories with firsthand observation, seventeenth- and early eighteenth-century natural historians built a nascent science of the sea. In its close focus on “sea beans” and “barnacle geese,” subjects of wide conjecture and earnest curiosity, the essay shows how shallow waters welcomed new actors onto the scientific stage and decentered the geographies of knowledge production, thereby advancing contemporary knowledge of oceanic circulation as well as the taxonomies and ecologies of coastal creatures.

For more than a generation now, Atlantic history has stirred up new and powerful eddies in the history of science. Comparative, transnational approaches to the study of natural history, weather, and climate, for example, have decentered the geographies of knowledge production and introduced new historical actors onto the scientific stage.<sup>1</sup> Yet comparatively little

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<sup>1</sup> Notable examples include N. Jardine, J. A. Secord, and E. C. Spary, eds., *Cultures of Natural History* (Cambridge: Cambridge Univ. Press, 1996); Susan Scott Parrish, *American Curiosity: Cultures of Natural History in the Colonial British Atlantic World* (Chapel Hill: Univ. North Carolina Press, 2006); Londa Schiebinger, *Plants and Empire: Colonial Bioprospecting in the Atlantic World* (Cambridge, Mass.: Harvard Univ. Press, 2007); James Delbourgo and Nicholas Dew, eds., *Science and Empire in the Atlantic World* (New York: Routledge, 2007); Delbourgo, *Collecting the World: Hans Sloane and the Origins of the British Museum* (Cambridge, Mass.: Harvard Univ. Press, 2017); and H. A. Curry, Jardine, Secord, and Spary, eds., *Worlds of Natural History* (Cambridge: Cambridge Univ. Press, 2018). On early modern climate see Vladimir Janković, *Reading the Skies: A Cultural History of English Weather, 1650–1820* (Chicago: Univ. Chicago Press, 2000); Jan V. Golinski, *British Weather and the Climate of Enlightenment* (Chicago: Univ. Chicago Press, 2007); Anya Zilberstein, *A Temperate Empire: Making Climate Change in Early America* (New York: Oxford Univ. Press, 2016); Sam White, *A Cold Welcome: The Little Ice Age and Europe’s Encounter*

attention has been paid to the science of the sea. As the historian of marine science Helen Rozwadowski observes, the history of the ocean has been largely overlooked, not least because of our tendency to “treat the seas as a backdrop for human activities rather than as a place susceptible to, and involved in, historical change.” As barriers between continents, cultures, and imperial spheres of influence, the oceans were imagined as simply “the spaces in between,” which, accordingly, garnered little scientific interest. As the marine environmental historian W. Jeffrey Bolster has shown, this insistence that the seas were somehow separate from human history and therefore unknowable led to long-term environmental decline.<sup>2</sup> It was not until the nineteenth century that the professionalization of science, the development of new technologies, and state-sponsored support of oceanic research opened the seas to more systematic investigation.<sup>3</sup>

Yet the grand scale of these blue-water campaigns—James Cook’s voyages, the U.S. Exploring Expedition, the *Adventure* and *Beagle* and, later, *Challenger* expeditions—overshadows the less heroic ways that scientific knowledge about the sea was produced closer to shore, informally, and, in many cases, centuries earlier. Tidal pools, shallow bays, and coral reefs, for example, appeared prominently in the accounts of seventeenth-century natural historians. Eighteenth-century beachcombers likewise catalogued new discoveries. The ease with which shallow waters could be explored, moreover, created more inclusive cultures of knowledge production. Native American and African divers, for instance, did much to shape European knowledge of the underwater world. And women played key roles in assembling some of the earliest collections of ocean mollusks and algae.<sup>4</sup>

Wading into the science of shallow waters adds to a recent transdisciplinary burst of oceanic scholarship historians have called the “new thalassology” and literary scholars have branded “blue cultural studies.”<sup>5</sup> But it also highlights the promise of a more specialized body of literature that Isaac Land has called the “new coastal history.” This research has situated coasts as important sites of human development and connection, revealing that even far-flung “littoral societies” had more in common with each other than with their inland neighbors.<sup>6</sup> In its close focus on the

with *North America* (Cambridge, Mass.: Harvard Univ. Press, 2017); Victoria C. Solonoski, *Climate in the Age of Empire: Weather Observations in Colonial Canada* (Chicago: Univ. Chicago Press, 2018); and Dagomar Degroot, *The Frigid Golden Age: Climate Change, the Little Ice Age, and the Dutch Republic, 1560–1720* (New York: Cambridge Univ. Press, 2018).

<sup>2</sup> Helen M. Rozwadowski, “Ocean’s Depths,” *Environmental History*, 2010, 15:520–525, <https://doi.org/10.1093/envhis/emq055>; Michael S. Reidy and Rozwadowski, “The Spaces In Between: Science, Ocean, Empire,” *Isis*, 2014, 105:338–351, <https://doi.org/10.1086/676571>; W. Jeffrey Bolster, *The Mortal Sea: Fishing the Atlantic in the Age of Sail* (Cambridge, Mass.: Harvard Univ. Press, 2012); and Bolster, “Putting the Ocean in Atlantic History: Maritime Communities and Marine Ecology in the Northwest Atlantic, 1500–1800,” *American Historical Review*, 2008, 113:19–47, <https://doi.org/10.1086/ahr.113.1.19>.

<sup>3</sup> Antony Adler, *Neptune’s Laboratory: Fantasy, Fear, and Science at Sea* (Cambridge, Mass.: Harvard Univ. Press, 2019); Katharine Anderson, “Natural History and the Scientific Voyage,” in *Worlds of Natural History*, ed. Curry *et al.* (cit. n. 1), pp. 304–318; Helen M. Rozwadowski, *Fathoming the Ocean: The Discovery and Exploration of the Deep Sea* (Cambridge, Mass.: Harvard Univ. Press, 2005), esp. Chs. 5 and 6; Michael S. Reidy, *Tides of History: Ocean Science and Her Majesty’s Navy* (Chicago: Univ. Chicago Press, 2008); and Jason W. Smith, *To Master the Boundless Sea: The U.S. Navy, the Marine Environment, and the Cartography of Empire* (Chapel Hill: Univ. North Carolina Press, 2018).

<sup>4</sup> Regarding discoveries closer to shore see Rozwadowski, *Fathoming the Ocean*, pp. 103–109. On knowledge gleaned from divers see Molly A. Warsh, *American Baroque: Pearls and the Nature of Empire, 1492–1700* (Chapel Hill: Univ. North Carolina Press, 2018); Kevin Dawson, *Undercurrents of Power: Aquatic Culture in the African Diaspora* (Philadelphia: Univ. Pennsylvania Press, 2018); and Dawson, “Enslaved Swimmers and Divers in the Atlantic World,” *Journal of American History*, 2006, 92:1327–1355, <https://doi.org/10.2307/4485894>. On women as collectors see Beth Fowkes Tobin, *The Duchess’s Shells: Natural History Collecting in the Age of Cook’s Voyages* (New Haven, Conn.: Yale Univ. Press, 2014).

<sup>5</sup> Peregrine Horden and Nicholas Purcell, “The Mediterranean and ‘the New Thalassology,’” *Amer. Hist. Rev.*, 2006, 111:722–740, <https://doi.org/10.1086/ahr.111.3.722>; and Steve Mentz, “Toward a Blue Cultural Studies: The Sea, Maritime Culture, and Early Modern English Literature,” *Literature Compass*, 2009, 6:997–1013, <https://doi.org/10.1111/j.1741-4113.2009.00655.x>.

<sup>6</sup> Isaac Land, “Tidal Waves: The New Coastal History,” *Journal of Social History*, 2007, 40:731–743, <https://doi.org/10.1353/jsh.2007.0051>; David Worthington, ed., *The New Coastal History: Cultural and Environmental Perspectives from Scotland and*

interaction between coastal cultures and the environment, this work has historicized the European “discovery of the seaside” in art, literature, and leisure pursuits.<sup>7</sup> It has also shown how littoral people shaped the shore in more material ways and how those changes affected human institutions in return. A combination of dry and wet, permanence and variability, littorals tended to blur legality and subvert sovereignty.<sup>8</sup> Evoking both the permanence of “place” and the freedom of “space,” coastal regions provided interstices of economic opportunity and perhaps even personal liberty. As a result, trade (both licit and illicit) flowed freely among them. Alongshore, the conventions of conduct eroded: saltiness sharpened tongues, loosened restraints on dress, and created, among sailors and port people alike, a persistent, nearly unquenchable thirst.<sup>9</sup>

It was that spirit of possibility that also made littorals important spaces of ocean science. As Rachel Carson observed, the edge of the sea was a “world that keeps alive the sense of continuing creation and of the relentless drive of life.”<sup>10</sup> That animating element spurred early modern natural philosophers to poke through distant tide pools and slog across remote mudflats, thereby challenging those sure-footed narratives of metropolitan scientific authority. Focusing narrowly on two case studies—about the sea bean and the barnacle goose—this essay shows how shallow-water reflections illuminated the principal pathways of oceanic connectivity and initiated investigation into the nature of coastal creatures. This, in turn, helped lay the foundations for a more expansive eighteenth- and early nineteenth-century science of the sea.

#### UNDERSTANDING OCEANIC CONNECTIVITY: THE SEA BEAN

As Europeans ventured into the Atlantic during the late medieval period, they added coherence to what had long been imagined as an indeterminate void. Island hopping along the coast of Africa and into the Atlantic, they extended their reach by the end of the fifteenth century to the Caribbean and beyond. Farther north, thousands of fishing vessels pushed west from Ireland to Iceland to the coast of North America. Exploring the shore, they extended their “early modern seaboard civilization,” thereby creating an archipelagic understanding of oceanic space.<sup>11</sup> In thousands of ship logs, letters, and maps they built new frameworks of oceanic understanding that reflected their growing familiarity with the edges of an expanding Atlantic world.

Yet the ocean’s long history as a place of mystery colored early modern efforts to understand it. As scholars of the Enlightenment have shown, the distinction between otherworldly “wonders”

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*Beyond* (Cham: Palgrave Macmillan, 2017); John R. Gillis, *The Human Shore: Seacoasts in History* (Chicago: Univ. Chicago Press, 2012); and Michael N. Pearson, “Littoral Society: The Concept and the Problems,” *Journal of World History*, 2006, 17:353–373, <https://doi.org/10.1353/jwh.2006.0059>.

<sup>7</sup> Alain Corbin, *The Lure of the Sea: The Discovery of the Seaside in the Western World, 1750–1840* (Berkeley: Univ. California Press, 1994); and John K. Walton, *The English Seaside Resort: A Social History, 1750–1914* (Leicester: Leicester Univ. Press, 1983). See also Bernhard Klein and Gesa Mackenthun, eds., *Sea Changes: Historicizing the Ocean* (New York: Routledge, 2012).

<sup>8</sup> Christopher L. Pastore, *Between Land and Sea: The Atlantic Coast and the Transformation of New England* (Cambridge, Mass.: Harvard Univ. Press, 2014); and Lauren Benton, *A Search for Sovereignty: Law and Geography in European Empires, 1400–1900* (New York: Cambridge Univ. Press, 2010).

<sup>9</sup> Yi Fu Tuan, *Space and Place: The Perspective of Experience* (Minneapolis: Univ. Minnesota Press, 1977); Paul A. Gilje, *Liberty on the Waterfront: American Maritime Culture in the Age of Revolution* (Philadelphia: Univ. Pennsylvania Press, 2007); Jesse Cromwell, *The Smugglers’ World: Illicit Trade and Atlantic Communities in Eighteenth-Century Venezuela* (Chapel Hill: Univ. North Carolina Press, 2018); and Gilje, *To Swear Like a Sailor: Maritime Culture in America, 1750–1850* (New York: Cambridge Univ. Press, 2016).

<sup>10</sup> Rachel Carson, *The Edge of the Sea* (Cambridge, Mass.: Houghton Mifflin, 1955), p. 2.

<sup>11</sup> Gillis, *Human Shore* (cit. n. 6), p. 67; and John R. Gillis, *Islands of the Mind: How the Human Imagination Created the Atlantic World* (New York: Palgrave Macmillan, 2004), p. 46. For European expansion across the equatorial Atlantic see Philip D. Curtin, *The Rise and Fall of the Plantation Complex: Essays in Atlantic History* (New York: Cambridge Univ. Press, 1998); on European expansion across the boreal Atlantic see Bolster, *Mortal Sea* (cit. n. 2), Ch. 1.

and subjects of “curiosity,” a term used to convey more systematic modes of philosophical investigation, was uncertain at best. Religious faith and empirical inquiry were inextricably connected.<sup>12</sup> Mirroring the churning coastal ocean, the miraculous mixed with the material, the theological with the natural, animating a process of epistemological agitation that saw old ideas and new whipped up by the waves and blown into foam. That spume gathered unevenly along beaches, marshes, and tiny coves and over time coalesced into a nascent science of the sea.

“Sea beans,” drift seeds, or Fava de Colom (Columbus beans), as they were known in the Azores, were some of the more mysterious things that washed up on shore. Probably the earliest account of sea beans came from 1570 in Mathias de Lobel’s *Adversaria Nova*, an Anglo-Irish “herbal” (or natural history) that made reference to drift seeds. Lobel noted that he had received a number of sea beans from ship captains who had sailed to both Africa and America. But he had also received specimens from Dame Catherine Killigrew of Cornwall, who explained that over the years she had found numerous drift seeds washed up on the beach near her home. “Some [were] floating,” wrote Lobel, “others of them [were] digged up from where they lay buried in the sands by the shore, as if they had been drifted from the New World by favouring southerly or westerly winds, as is the faith of the Cornish folks that dwell by the English sea.”<sup>13</sup> Lobel’s willingness to accept the Dame’s observations and to entertain the “faith of the Cornish folks” suggests that the oceans still held many mysteries and that philosophical authority was widely dispersed.

Although Renaissance humanists had been perfecting the art of description, cataloguing the things they saw, and, importantly, traveling to collect specimens and stories since early in the fifteenth century, the ocean’s inaccessibility often checked the efforts of Europe’s leading naturalists to examine its secrets.<sup>14</sup> Those who worked at sea—fishermen, merchant seamen, and naval personnel—tended to know the most about it. It wasn’t until the establishment of the Royal Society in 1660 that the sea garnered systematic scientific attention. When in June 1661 the new society advanced a set of instructions to Edward Montagu, the Earl of Sandwich, proposing six topics to investigate during his upcoming naval voyage to the Mediterranean, they urged him to observe the ocean depth, salinity, water pressure, bioluminescence, and, most notably, the tides and currents.<sup>15</sup>

This concern with ocean circulation placed the sea bean front and center. In 1675 Sir George Makenzie noted in the Royal Society’s *Philosophical Transactions* that “*Molucco Beans*” had been washing ashore on Scotland’s “Western Isles,” where, he noted, “they are found fast to the stalks, which the Common-People supposed to be Sea-tangles, and laughed at me, when I said they were Land-beans.” To confirm his suspicions, Makenzie wrote to the Earl of Seaforth, who explained that he had frequently found sea beans along the shore on the Isle of Lewis in the northern Hebrides. So common were they that locals used the bean husks for snuffboxes. The Earl also explained that he had found a “*Cabbage-tree*” on the shore. Between the sea beans and the palms, he surmised that ocean currents were carrying the seeds from great distances, although he believed that

<sup>12</sup> On Enlightenment investigations see, e.g., James Delbourgo, *A Most Amazing Scene of Wonders: Electricity and Enlightenment in Early America* (Cambridge, Mass.: Harvard Univ. Press, 2006); and Parrish, *American Curiosity* (cit. n. 1). Regarding the connection of faith and empirical inquiry see David Sorkin, *The Religious Enlightenment: Protestants, Jews, and Catholics from London to Vienna* (Princeton, N.J.: Princeton Univ. Press, 2008); and Sarah Rivett, *The Science of the Soul in Colonial New England* (Chapel Hill: Univ. North Carolina Press, 2011).

<sup>13</sup> Mathias de Lobel, quoted in Nathaniel Colgan, “On the Occurrence of Tropical Drift Seeds on the Irish Atlantic Coasts,” *Proceedings of the Royal Irish Academy, Section B: Biological, Geological, and Chemical Science*, 1919, 35:29–54, on pp. 30–31, 53.

<sup>14</sup> Brian W. Ogilvie, *The Science of Describing: Natural History in Renaissance Europe* (Chicago: Univ. Chicago Press, 2006), p. 238.

<sup>15</sup> Margaret Deacon, *Scientists and the Sea, 1650–1900: A Study of Marine Science* (London: Academic, 1971), pp. 23 (regarding the knowledge of those who worked at sea), 73–74 (Royal Society interest in the sea), 74 (instructions to Montagu). See also Helen Rozwadowski, “History of Ocean Sciences,” in *Encyclopedia of Ocean Sciences*, Vol. 2, ed. John H. Steele, S. A. Thorpe, and Karl K. Turekian (San Diego, Calif.: Academic, 2001), pp. 1206–1210.

the “freshness in the Kernel” made it “seem more probable, that they came by the Northern passage” and were “kept in the Cold conservatory, than in the Warm Baths of the other progress.”<sup>16</sup>

If Makenzie and the Earl of Seaforth agreed that the beans were terrestrial plants drifting among ocean currents, the local islanders, unlike those in Cornwall, scoffed, imagining them to be fruits of the sea. In some cases, even more learned observers agreed. In 1684 Sir Robert Sibbald included sea beans in a catalogue of marine plants. Sibbald’s ideas seemed to confirm the growing number of reports of strange submarine gardens. From wreck divers, who were often African, Robert Boyle received descriptions of “Trees and Fruit growing at the bottom of the sea.” Boyle learned that upon descending “to recover thence some shipwrack’d Goods,” one diver discovered a “certain sort of Fruit” that was “of a slimy and soft consistence, about the bigness of Apples.” Upon reaching the surface, however, that fruit summarily withered. Other divers reported that under the sea there grew a “pretty store of a certain sort of Trees, bearing Leaves almost like those of Laurel . . . but of what virtue, or other use, he had not the Curiosity to enquire.” Yet another diver explained that off the coast of Mozambique there was a “store of Trees, that bear a certain Fruit, which he describes to be very like that, which in *America* they are wont to call *Acayu*,” or cashew. Boyle’s reports could have described any number of marine animals, algae, or even flights of fancy, but they nevertheless suggest that although the distinctions between oceanic and terrestrial life were anything but clear, local knowledge had begun to solve some of the sea’s riddles. In its willingness to take seriously far-flung accounts from African divers, the growing science of the sea was both literally and figuratively an exercise in oceanic inquiry from the “bottom up.”<sup>17</sup>

Perhaps because of their great mobility or their taxonomic ambiguity, sea beans were often attributed supernatural qualities. Sir John Morison, “an indweller” upon the Isle of Lewis, explained, likely sometime between 1678 and 1688, that sea beans “had the virtue to make [women] fortunate in cattle.” One smaller white-colored bean, known as “*Sant Marie’s nutt*,” could “preserve woman in child-bearing.” Similar mythologies washed ashore in Iceland, where the broth of boiled sea beans was said to ease the pains of childbirth, and in Norway, where drinking beer from a sea bean shell was said to aid the delivery of afterbirth. In County Donegal in Ireland, tradition holds that drinking the liquid from a sea bean would help a barren couple conceive. Connemara folktales explained that sea beans kept the fairies at bay. But mostly, drift seeds were simply sources of good fortune. In Dingle, for example, girls wore them around their necks for luck.<sup>18</sup> In almost all cases, the sea bean was imbued with something otherworldly. It defied the boundaries of land and sea, of tropical and temperate climates, and even of materiality—Was it a vegetable or a mineral? (A nut from a tree or stone from the sea?) And it held the preternatural powers of spontaneous generation, of breathing life into barrenness and facilitating passage into the world.

It was the Irish-born naturalist Sir Hans Sloane who finally began to unravel the mysteries of the sea bean. Sir George Garden of Aberdeen had sent Sloane a selection of beans, and Sloane,

<sup>16</sup> George Makenzie, “Some Observations made in Scotland by that Ingenious Knight, Sir George Makenzie, sent in a letter to Mr. James Gregory, and by him communicated to the Publisher,” *Philosophical Transactions of the Royal Society of London*, 1675, 10(117):396–398, <https://doi.org/10.1098/rstl.1675.0038>.

<sup>17</sup> E. Charles Nelson, *Sea Beans and Nickar Nuts: A Handbook of Exotic Seeds and Fruits Stranded on Beaches in North-Western Europe* (London: Botanical Society of the British Isles, 2000), p. 29 (Sibbald’s inclusion of the sea bean in his catalogue of marine plants); and Robert Boyle, “Relations about the Bottom of the Sea,” in *Tracts Consisting of Observations about the Saltness of the Sea: An Account of a Stastical Hygroscope and Its Uses: Together with an Appendix about the Force of the Air’s Moisture: A Fragment about the Natural and Preternatural State of Bodies* (London: E. Flesher for R. Davis, 1674), pp. 2–4. On enslaved African divers see Dawson, *Undercurrents of Power* (cit. n. 4); and Dawson, “Enslaved Swimmers and Divers in the Atlantic World” (cit. n. 4). See also Delbourgo, *Collecting the World* (cit. n. 1), p. 118.

<sup>18</sup> John Morison, “An Account of the Lewis,” in *The Spottiswoode Miscellany: A Collection of Original Papers and Tracts Illustrative Chiefly of the Civil and Ecclesiastical History of Scotland*, Vol. 2 (Edinburgh: Spottiswoode Society, 1845), p. 341; and Nelson, *Sea Beans and Nickar Nuts*, p. 44 (for a broader discussion of sea beans as lucky see pp. 42–53).

who had spent a year and a half in Jamaica penning a detailed natural history of the island, identified three of them. He believed the seeds had fallen from Jamaican trees into the rivers, whereupon they washed into the ocean and “may be carried from thence by the Wind and Current, . . . through the Gulph of *Florida* . . . and into the *N. American Sea*.” “How they should come the rest of their Voyage I cannot tell,” he conceded, but he thought that since ships typically returned to Europe by sailing north into the Westerlies perhaps the beans had followed a similar route. To support his hypothesis, Sloane cited Ferdinand Columbus’s accounts of canoes and human bodies drifting onto European shores.<sup>19</sup> The sea, he believed, created dramatic—even improbable—connections. But his firsthand observations corroborated by written records seemed to confirm a deeply connected Atlantic World—one in which the motion of the ocean minimized the distances *and differences* between the West Indies and Ireland and Britain.<sup>20</sup>

### CLASSIFYING THE BARNACLE GOOSE

If by balancing long-held beliefs with systematic observation shallow-water savants and their informants parsed the patterns of oceanic circulation, their methods also helped unravel the complex taxonomies and ecologies of coastal creatures. The barnacle goose (or goose barnacle) had for centuries elicited considerable debate. When the Welsh clergyman and historian Giraldus Cambrensis penned his *Topographia Hibernica* in the early twelfth century, he told a story of birds born “in a wonderful way” from barnacles, possibly repurposing a tale from India from about the same time. First, Giraldus explained, the barnacles formed “as excrescences on fir-logs carried down upon the waters.” Clinging by their beaks “like sea-weed” to the log, the developing birds, “enclosed in shells,” underwent a “mysterious and remarkable generation” until they either let go and took flight or swam away. To prove that this was possible, Giraldus explained that the “first generation of man” had arisen “from the slime of the earth without the co-operation of either man or woman.” “Blush! Wretch. Blush!” he ordered his reader. “At least consider the evidence of nature. She daily produces and brings forth new creatures . . . for our instruction and in confirmation of the Faith.”<sup>21</sup> Cradling the power of the divine, the shore and its creatures, he explained, could generate new life spontaneously. For Giraldus, whose work was an attempt to alienate Ireland in service of England’s empire, the barnacle goose story was just one of many fantastical tales crafted to emphasize Irish otherness.

Yet his story had surprising staying power. In 1597 the English botanist John Gerarde published a widely read herbal that explicitly rejected old superstitions and championed recent botanical developments. But Gerarde nevertheless included the story of the barnacle goose. He described a small island in Lancashire where along the shore, among shipwreck timbers and driftwood, there “is found a certaine spume or froth” that develops into shells. In time, he continued, birds emerge from those shells and “falleth into the sea,” whereupon they grow to a size “bigger than a Mallard, and lesser than a Goose.” Along the coast, between Dover and Romney, Gerarde explained that “with the helpe . . . by Fishermens wiues” he hauled a rotten tree from the

<sup>19</sup> Sir Hans Sloane, “An account of four sorts of strange beans, frequently cast on shoar on the Orkney Isles, with some conjectures about the way of their being brought thither from Jamaica, where three sorts of them grow,” *Phil. Trans. Roy. Soc. London*, 1695, 19(222):398[298]–300, <https://doi.org/10.1098/rstl.1695.0045>; and Ferdinand Columbus, *The Life of the Admiral Christopher Columbus by His Son Ferdinand*, trans. Benjamin Keen (London: Printed by Butler & Tanner, Ltd., for Rutgers, the State Univ. [of New Jersey], 1959), p. 49.

<sup>20</sup> Delbourgo, *Collecting the World* (cit. n. 1), p. 68.

<sup>21</sup> Giraldus Cambrensis, *The History and Topography of Ireland*, trans. John J. O’Meara (Atlantic Highlands, N.J.: Humanities, 1982), pp. 41–42. On Giraldus’s storytelling see John G. T. Anderson, *Deep Things out of Darkness: A History of Natural History* (Berkeley: Univ. California Press, 2013), p. 46; and Sir Ray Lankester, *Diversions of a Naturalist* (New York: Macmillan, 1915), p. 118.



sea and found it covered with “thousands of long crimson bladders” at the end of which “did grow a shell fish.” Upon dissecting some, Gerarde found little birds in various stages of development. These were, he avowed, “no doubt . . . the Fowles called Barnakles.”<sup>22</sup> Leaving aside the apocryphal conclusions at which he arrived, Gerarde’s observation that the creatures were attached to driftwood tangles and shipwreck timbers suggests that he believed his embryonic geese had come from afar. For both beans and barnacles, the sea was capable of cultivating long-distance connections. That Gerarde sought the help of fishermen’s wives suggests, moreover, that common folk played essential roles in bringing these connections to light. But ultimately, his decision to include the story in his herbal suggests that at the dawn of the seventeenth century tradition informed experience in substantive ways. Along the edge of the sea, wonders, especially those corroborated by locals, conferred authority.

As a result, the goose barnacle drifted into view yet again. Sir Robert Moray, who had helped procure the Royal Society’s charter, noted in 1677 that on the islands of western Scotland, among the driftwood timbers from which “the Common people build their Houses,” he saw “multitudes of little Shells; having within them little Birds perfectly shaped, supposed to be *Barnacles*.” Although he admitted that neither he nor the islanders had ever seen a live bird emerge from the shells, he nevertheless explained that the birds therein were “curiously and completely formed,” comprising “a perfect Sea-Fowl.”<sup>23</sup> By the second half of the seventeenth century convention held that spontaneous generation was possible only in microorganisms and perhaps among parasitic worms.<sup>24</sup> In consequence, Moray’s story did not escape criticism. In his 1684 *Scotia Illustrata*, a detailed dissertation on Scottish shorebirds, the same Robert Sibbald who had labored to classify sea beans roundly rejected the barnacle goose myth. Similarly, in 1685 Royal Society Fellow Tancred Robinson dismissed the tale, which, he explained, could have been perpetuated to circumvent religious dietary restrictions. The miraculous generation of goose barnacles, whether falling from trees or dangling from driftwood, was, he believed, preposterous.<sup>25</sup>

But the most scathing criticism of the barnacle goose myth came many years later, in 1751, from the naturalist John Hill. Angered that he had been denied membership in the Royal Society, Hill criticized its members’ credulity, explaining in no uncertain terms that “Ignorance is the Great Parent of Miracles.” Barnacles and geese, he bristled, may share the same shore and even a slight resemblance, but that did not mean that one emerged from the other. If his predecessors had looked to fishermen and their wives as sources of natural knowledge, he rejected those locals as “ignorant.” Bereft of philosophical training, the fishermen, Hill explained, conflated “the

<sup>22</sup> John Gerarde, *The herball or Generall historie of plantes: Gathered by Iohn Gerarde of London Master in Chirurgie very much enlarged and amended by Thomas Iohnson citizen and apothecarye of London* (London: Printed by Adam Islip Ioice Norton and Richard Whitakers, 1633), pp. 1587–1588. On Gerarde see Anderson, *Deep Things out of Darkness*, pp. 45–46.

<sup>23</sup> Sir Robert Moray, “A Relation Concerning Barnacles, by Sir Robert Moray, Lately of His Majesties Council for the Kingdom of Scotland,” *Phil. Trans. Roy. Soc. London*, 1677, 12(137):925–927, <https://doi.org/10.1098/rstl.1677.0032>.

<sup>24</sup> James E. Strick, *Sparks of Life: Darwinism and the Victorian Debates over Spontaneous Generation* (Cambridge, Mass.: Harvard Univ. Press, 2000), p. 4.

<sup>25</sup> Robert Sibbald, *SCOTIA ILLUSTRATA SIVE PRODRROMUS HISTORIAE NATURALIS IN QUO Regionis natura, Incolarum Ingenia & Mores, Morbi iisque medendi Methodus, & Medicina Indigena accurratè explicantur. ET Multiplices Naturae Partus in triplice ejus Regno, Vegetabili scilicet, Animali & Minerali per hancce Borealem Magnae BRITANIAE Partein, quae Antiquissimum SCOTIAE Regnum constituit, undiquaque diffusi nunc primum in Lucem eruuntur, & varii eorum Usus, Medici praesertim & Mechanici, quos ad Vitae cum necessitatem, tum commoditatem praestant, cunctis perspicuè exponuntur . . .* (Edinburgh: Printed by J.K. J.S. and J.C. and are to be sold by Dorman Newman, at the Kings Arms in the Poultry, London, 1684), pp. 36–37; Lee Raye, “Robert Sibbald’s *Scotia Illustrata* (1684): A Faunal Baseline for Britain,” *Notes and Records*, 2018, 72:383–405, <https://doi.org/10.1098/rsnr.2017.0042>, esp. p. 393; and Tancred Robinson, “Some observations on the French Macreuse, and the Scotch Bemaclie; together with a continuation of the account of boyling, and other fountains,” *Phil. Trans. Roy. Soc. London*, 1685, 15(172):1036–1040, <https://doi.org/10.1098/rstl.1685.0042>.

[barnacle's] filamentous Substances . . . with Feathers, and persuaded themselves, that the Geese, whose Origin they could before by no Means make out, were bred from them." Although the biology of birds and the patterns of their migration were far from settled at the time, Hill punctuated his criticism by stating what he believed was obvious: in some seasons birds "appear among us" and in others fly "to other Kingdoms." As further proof that the Royal Society was wrongheaded, he cited Dutch sailors who had seen the same geese, presumably at their northern nesting sites, sitting on eggs with hatchlings "running about them."<sup>26</sup> Hill's rebuke surely sought to settle an intellectual grudge, but his impatient tone also suggests that he believed the folkways of fishermen had duped the philosophical establishment and clouded oceanic understanding. If by placing his faith in Dutch sailors Hill conferred some scientific authority on peripheral people, he nevertheless insisted that they anchor their contributions in sober observation.

### CONCLUSION

As sites of systematic investigation and philosophical transformation, the shallow waters of the early modern Atlantic World mingled myth with inquiry, speculation with observation, and the head knowledge of elites with the "craft" of those from more humble origins.<sup>27</sup> Shallow-water creatures—from sea beans to barnacles—reveal important things about contemporary knowledge of the sea and of the natural world more broadly. Drift seeds, for instance, spurred some to contemplate Atlantic systems of oceanic circulation. Goose barnacles encouraged others to grapple with the taxonomic and ecological complexities of coastal creatures. And both played a part in ongoing efforts to understand the origins of life.<sup>28</sup> Over the course of the eighteenth century, attempts to classify other sea creatures sparked considerable debate. In response, natural philosophers and their patrons developed complex networks of correspondence; philosophical societies hosted lectures and coffeehouse debates; and printers in Paris, London, and Amsterdam raced to publish new findings.

The wider effort to understand these plants and animals was driven not only by philosophical curiosity but also by the contest for empire. Oceanic knowledge provided a means to national wealth, prestige, and, ultimately, global power. But shallow water, steeped in legend and conveying both the germ of life and the essence of death, perhaps tempers those narratives of imperial competition and conquest, forcing us to reframe the construction of oceanic knowledge as something that's produced pell-mell, along the periphery, and often collaboratively with the help of fishermen, women, and non-Europeans.

In time, the sediments of oceanic natural knowledge shifted. The pounding of the surf, punctuated by periodic storms, pushed the sands of superstition, conjecture, and empirical analysis into new shoals. Those banks and bars looked very different through the blurry eyes of a wreck diver than they did through the spectacles of a London philosopher. They may also have sounded very different in the language of littoral people, a lexicon that was lost as coasts changed over time.<sup>29</sup> A more careful consideration of shallow water may remind us that including these multiple perspectives is essential to both ocean science and our histories of it.

<sup>26</sup> John Hill, *A Review of the Works of the Royal Society of London; Containing Animadversions on Such of the Papers as Deserve Particular Observations* (London: Printed for R. Griffiths at the Dunciad in St. Paul's Church Yard, 1751), pp. 105, 106, 110, 108.

<sup>27</sup> Margaret Cohen, *The Novel and the Sea* (Princeton, N.J.: Princeton Univ. Press, 2010), pp. 15–58.

<sup>28</sup> Strick, *Sparks of Life* (cit. n. 24).

<sup>29</sup> John Stilgoe, *Shallow Water Dictionary: A Grounding in Estuary English* (New York: Princeton Architectural Press, 2004).