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# Introduction

Of all the environments on our planet, the underwater realm is the most remote. Across history, societies that have lived in contact with the sea have gleaned information about the depths from surface observation, from what they could fish, and from what washes up on shore. Free divers, too, have brought back knowledge, although they have been severely limited by an atmosphere that is toxic to humans. In water, we cannot breathe, our eyes have trouble focusing, and as we descend, the pressure on the body becomes unbearable. Without technology, humans could not spend sustained time below. Since antiquity, people descended in diving bells for harvesting, salvage, and warfare. The premodern diving bell, however, was extremely dangerous and did not offer much of a window into the depths, as it was immobile and often-times used in murky waters.<sup>1</sup>

Western technologies made sustained underwater access possible in the middle decades of the nineteenth century, when the Industrial Revolution at sea created both the demand and the inventions for diving. The modern diving suit permitting prolonged submersion utilized steam and pistons, which had the power to force the lighter atmosphere of air into the denser atmosphere of water. Across the late eighteenth and early nineteenth centuries, engineers experimented with ways that industrial technologies might further human presence below. One among many experiments was the *machine hydrostatergatique*, designed by a man named Fréminet, as Jacques-Yves Cousteau explained in the film *The Silent World* (1956), standing before a 1784 print showing this invention in the cabin of his ship (fig. 0.1).<sup>2</sup> Cousteau chose to highlight Fréminet's machine among the experiments of this era because it included a separate chamber that held a reservoir of air and was thus the forerunner of scuba. A decisive innovation in the history of diving was the closed helmet bolted to the body of the suit, such as the design manufactured by German-English



FIG. 0.1. Jacques-Yves Cousteau and Louis Malle, *The Silent World* (1956), ca. 5:14. The match flame reflects off a 1784 print showing Fréminet's *machine hydrostatergatique*, a forerunner of scuba, and thus a creative spark intimating Cousteau's invention.

Augustus Siebe in 1839, which kept the diver's head encased in air, even amidst underwater turbulence (fig. 0.2). With the assistance of designs such as Siebe's, humans could reliably breathe underwater, and they also could see through the helmet's glass windows. Finally, they were able to spend extended periods in a realm that had for millennia been hidden from view.

Closed-helmet diving suits revealed that this environment was dramatically different from land, starting with its physical conditions. As anyone today who puts on goggles to go for a swim can observe, the aquatic atmosphere is cloudy instead of transparent, and when we look into the distance, particularly when the light is not directly overhead, objects rapidly fade into a fog. Further, we perceive colors differently; even at a few feet below the surface, reds are muted. Water is eight hundred times denser than air, and it absorbs light waves so effectively that even in crystalline water the furthest the human eye can see is around 240 feet.

And yet, when industrial technologies first enabled access to the underwater world, there was startlingly little public or scientific interest in firsthand observation, although the depths of the seas span almost three-quarters of the



FIG. 0.2. Augustus Siebe, “First Closed Diving Helmet and Breastplate” (1839). Photograph © Science Museum/Science & Society Picture Library.

globe and sustain terrestrial life.<sup>3</sup> While readers in the early modern and Enlightenment eras avidly consumed accounts of overseas voyages, nineteenth-century interest in the diving suit and the windowed diving chamber initially remained confined to industry, to serve salvage and construction operations for the ever-growing boom in shipping and travel. Scientists seemed indifferent to diving, with the exception of a few naturalists such as Henri Milne-Edwards, who described an expedition to Sicily in the 1840s that included scientific diving. Scientific indifference is all the more remarkable because diving technologies initially were deployed in shallow coastal waters, important arenas of observation for marine biologists at the time.

In contrast, marine scientists took note of engineering discoveries about the deep sea, which, by the 1850s, began to attract public and professional attention as a new realm for observation and exploitation.<sup>4</sup> The challenging project to lay a submarine communications cable across the Atlantic, launched in 1854 by American entrepreneur Cyrus Field, was particularly influential, and

it eventually succeeded with the collaboration of British and American engineers and governments. People had long believed the seafloor to be an even surface, since mariners for centuries had no need to take its soundings (ships are safe in deep water). Underwater mountains and valleys, however, hitherto unknown, presented formidable obstacles for running a cable, and the project was not completed until 1866. As engineers worked on laying the cable, they fished up unknown creatures, showing biologists that depths previously thought sterile held unanticipated life. These developments confirmed the unprecedented, alien qualities of the undersea and promoted the expansion of what historian Rosalind Williams has called “human empire” into the depths.<sup>5</sup> Great Britain was one of several sea-oriented nations to launch pioneering scientific expeditions, such as the four-year global voyage of HMS *Challenger*, from 1872 to 1876. Nonetheless, scientists on this voyage made their observations from the ship’s deck, although it would have been conceivable to use diving suits near shore.

Nor was helmet diving of interest to amateurs, despite the growing appeal across the nineteenth century of the seacoast as a leisure destination. What historian Alain Corbin notes as “the lure of the sea” emerged among upper classes in the later eighteenth century, who began to view the sea as promoting health and soul-stimulating pleasures, in contrast to their previous aversion.<sup>6</sup> Across the nineteenth century, the lure of the sea grew more democratic, as railways facilitated coastal access, creating demands met by the construction of new resorts. Yet such trips did not include opportunities to view or experience submarine engineering. Diving was a labor-intensive activity that required considerable resources as well as heavy and cumbersome suits. Even so, it is not impossible that people might have been afforded the chance to try a dive helmet. If there had been interest, perhaps there might have developed an early version of today’s snuba, a less technical and more accessible form of leisure diving than scuba, where swimmers dive in shallow depths tethered to an air tank at the surface.

While scientists and members of the general public did not take observation down into the sea, they were eager to have the sea come to them. Aquariums were first developed to enable biologists to observe living marine creatures. Victorian naturalist Philip Henry Gosse oversaw the design and installation of the first public aquarium, the London Zoo’s “Fish House,” which opened its doors to the public in May 1853. Through its large glass-sided tanks, audiences enjoyed vistas of marine creatures in their environment,

revealing the vibrant beauty, strange forms, and fascinating movement of even such humble invertebrates as sea anemones and jellyfish. Public installations proliferated in zoos and in pop-up locations, from world's fairs to fisheries exhibitions. Further, people were keen to keep aquariums in their homes. A year after the London Zoo's "Fish House" opened, Gosse published *The Aquarium: An Unveiling of the Wonders of the Deep Sea* (1854), combining information on how to stock and maintain a home aquarium with details about how to collect specimens on trips to the coast. Gosse's book helped launch a type of popular guide promoting amateur marine naturalism, encouraging children and adults to collect coastal specimens and to keep aquariums for domestic enjoyment.<sup>7</sup>

Now, finally, people were able to access the "bejewelled palaces which old Neptune has so long kept reluctantly under lock and key," a reviewer of Gosse's *The Aquarium* declared.<sup>8</sup> Yet, public enthusiasm notwithstanding, aquariums were artfully curated gardens, underwater installations created to share scientific knowledge and also to delight. Their tanks were not facsimiles of the depths, and, moreover, their curators did not replicate real submarine conditions. Such knowledge would not have been hard to obtain; it was just a little under two and a half miles from the London Zoo in Regent's Park to 5 Denmark Street, London, the headquarters of Augustus Siebe's firm, recognized as a leader in industry diving.

Aquariums are commonly acknowledged as the first media form to give general audiences access to the underwater realm. So associated was the aquarium with the undersea that Jules Verne used it as a model in *Twenty Thousand Leagues under the Seas* (1870), the first book to imagine the planet as spanned by a holistic yet diverse undersea environment. A popularizer of science and technology, Verne wrote the novel soon after the completion of the transatlantic cable project. He consulted contemporary oceanographers and biologists, also basing his fantasies on nineteenth-century diving inventions. Yet he did not go to working divers for his submarine descriptions, which transposed terrestrial optics beneath the surface. For example, on the captivating hunting expedition in the forest of Crespo, thirty feet beneath the surface of the ocean, Verne's professor narrator Aronnax observes, "The sun's rays struck the surface of the waves at an oblique angle, and the light was decomposed by the refraction as if passing through a prism. It fell on the flowers, rocks, plantlets, shells and polyps, and shaded their edges with all the colours of the solar spectrum. It was a marvel, a feast for the eyes."<sup>9</sup> In fact, the aquatic atmosphere is hazy;

nor does it decompose light frequencies as a prism does. Further, the spectrum of color humans perceive in the depths diminishes, starting with the disappearance of red at about fifteen to twenty feet.<sup>10</sup>

Why were general audiences, to say nothing of scientists, indifferent to penetrating this vast new environment when immersive technologies appeared? We can imagine governments and entrepreneurs expending resources for exploration, had there been sufficient public interest. The Arctic Circle still stubbornly retained the lucrative promise that navigators could chart a Northwest Passage to the East, despite centuries of failure, and the doomed John Franklin expedition departed from England in May 1845. Historian of science, technology, and media Natascha Adamowsky suggests a primal emotional reason: the abiding fear of the depths.<sup>11</sup> Perhaps social stratification was an issue as well. The dangerous activity of helmet diving was carried out by working-class divers, while managers typically remained on the surface, in contrast to overseas expeditions, where the literate officer class participated firsthand in the rigors of maritime travel and penned eloquent accounts.

While I can only speculate about absence, it is possible to pinpoint when general publics, amateurs, and scientists alike became excited to learn about the depths: the moment when film was able to capture the submarine environment for audiences on land. In 1912, American J. E. Williamson invented the “photosphere,” a submersible that enabled underwater filming, with the operator and camera enclosed in a chamber of air.<sup>12</sup> In 1914, Williamson assembled footage taken from the photosphere and released the first underwater documentary, shared initially with scientist audiences and then distributed more widely, under different titles (*The Terrors of the Deep*, *Thirty Leagues under the Sea*). Although most of the film is now lost, records of its impact remain, and other photosphere films survive. In the words of Charles J. Hite, president of the Thanhouser film corporation, cited in a 1914 article from the *Moving Picture World*, “No man, until the Williamson invention was made practicable, could tell of the life below. The new invention brings to science the sea’s actualities of life, the long lost ships, the Imperators of other days, the hidden reefs, the variegated corals, the moving things.”<sup>13</sup>

The Williamson photosphere inaugurated a new era in curiosity and consciousness about the undersea. Submarine film had been preceded by a reliable process for submarine photography developed in the 1890s by French marine biologist Louis Boutan. Yet only with Williamson’s invention did people grasp that this technology brought new areas of the planet into view.

Such was the prevailing credit given to film that when the *Photographic Journal of America*, the oldest photography review in the United States, surveyed the brief history of underwater photography in 1921, it opined: “The most satisfactory results have been obtained by the Williamson camera, the results of which are familiar over the world by their incorporation into movie shows.”<sup>14</sup> Another example of the authority accorded submarine film was the source of the underwater photographs featured in the first full-length popular naturalist book about diving, William Beebe’s *Beneath Tropic Seas* (1928), which were movie frames taken from the photosphere.

Film’s role in stoking submarine curiosity was in part due to historical coincidence. Film became the visual medium with the greatest documentary authority in the twentieth century when the human ability to experience the underwater realm firsthand was expanding, thanks to dynamic innovations in diving and submersible technologies. At the same time, it is almost as if a muse of history was at work in such coincidence, because with film, the medium fits the message. Moving imagery has the unique capacity to disseminate particularly distinctive, alluring properties of submarine creatures and conditions, such as the glide of movement and the disorienting perception in underwater space.

Print accounts had been the principal medium for describing overseas exploration, and several print narratives would become best sellers for their portrayals of the undersea, once the environment piqued general interest. American William Beebe’s 1928 *Beneath Tropic Seas* was widely disseminated, and Jacques-Yves Cousteau’s book *The Silent World* (1953), published simultaneously in English and in French, was its equivalent during the postwar launch of scuba. Yet throughout published observations of the undersea, we find the phrase “words cannot express.” This rhetorical term, the *je ne sais quoi*, dates to the early modern era to underline the writer’s failure to convey an intense experience—that, in twentieth-century dive narratives, was the perception of extraordinary submarine reality.<sup>15</sup> Thus, Beebe wrote at the beginning of *Beneath Tropic Seas*, “you had planned to tell the others all about it, but you suddenly find yourself wordless,” describing surfacing from a dive (and referring to himself in the second person).<sup>16</sup>

Human perception undersea posed difficulties for visual as well as verbal expression, and few images of this realm based on firsthand observation exist before photography. One noteworthy example is *Davy Jones’s Locker* (1890), the sole undersea scene by the premier British marine painter William Lionel



FIG. 0.3. William Lionel Wyllie, *Davy Jones's Locker* (1890), oil on canvas. Photograph © National Maritime Museum, Greenwich, London. Wyllie has captured the submarine palette and haze, yet the clearly defined detail in the foreground of the scene, such as the octopus entwined with human remains, characterizes seeing through air rather than water.

Wyllie, which Wyllie drafted after improvising a dive helmet out of a biscuit tin and studying marine life in an aquarium (fig. 0.3). Wyllie's remarkable painting of a ship's wreckage shows us the pervasive haze underwater and its muted palette. Fish flit like silver ghosts in this gloom, and an octopus intertwines with a blanched human bone, perhaps a pelvis, lying next to a skull. True to octopus camouflage, the creature's head has taken on the ghastly pallor of the bone, with brown tentacles protruding from holes in the bone that help viewers identify its presence. Yet the octopus in Wyllie's painting remains a sinister emblem of death, lacking the sense of life imbued by its glide and remarkable undulations.<sup>17</sup> Nor could Wyllie—or early black-and-white film, for that matter—depict the octopus's continuously changing hues, which would fascinate viewers later in the century when filmmakers could capture underwater color.

The primacy of moving picture media in fostering our curiosity about the submarine realm continues to this day. The history of underwater film is one of dynamic technical inventions, both belonging to the history of moving image technology (such as the development of color processes suitable for all types of cameras around 1950), and specific to the challenges of working in one of the most inhospitable environments on earth. Across this history, innovations in both diving and filming continue to reveal new aspects and areas of the underwater environment, feeding and stimulating public interest. The twenty-first-century equivalents of Williamson's *The Terrors of the Deep* are the BBC miniseries *The Blue Planet* (2001) and *Blue Planet II* (2017). Further, as I discuss in my epilogue on *Blue Planet II*, film today is able to show, beyond submarine geology and biology, the impact of the Anthropocene on a realm so long thought to be beyond human reach.

The ability of film to let general audiences dive without compressed air or mask has led us to associate underwater film with documentary. From Williamson's first moving pictures, however, audiences also enjoyed these views for their expressive power, even if they had more trouble articulating such appreciation compared with their marvel at submarine reality. The contribution of the underwater environment to the aesthetics of cinema is the subject of *The Underwater Eye*. By the word "eye" in my title, I mean human vision, in the sense of both knowing and seeing, conceptually as well as sensuously disoriented owing to the physical qualities of the aquatic atmosphere. I also use "eye" in the sense of the movie camera that works as a prosthesis, with the capacity to extend the sense of sight in water, as in other environments on our planet.

With vision immersed, filmmakers have been able to exercise their craft on what I call the underwater film set—including both submarine conditions and technologies for their capture. There, they have created novel, charismatic imagery that expands the visual and narrative imagination. Filmmakers' raw materials for such imagery are aquatic life, place, and even the atmosphere. Immersed in water, the camera exhibits strange, beautiful, and sometimes dangerous submarine flora and fauna, such as sharks, octopuses, or coral. It can also make use of the environment's distinctive optics and its effect on movement, including its attenuation of gravity, permitting exploration of three dimensions, like a liquid sky. The underwater film set has further stimulated new types of adventure beneath the surface, inspired by industry and leisure as well as by the dangers of an atmosphere toxic to human physiology.



FIG. 0.4. Jacques-Yves Cousteau and Louis Malle, *The Silent World*, ca. 1:55. “A motion picture studio 165 feet under the sea” (ca. 2:10).

Jacques-Yves Cousteau and Louis Malle set up shop on the underwater film set in the first minutes of *The Silent World* (1956), their award-winning film vaunting the possibilities of the underwater realm for cinema and human curiosity. “This is a motion picture studio 165 feet under the sea,” declares the narrator in the English version of the film, designating a group of divers clustering around a reef, flippers fluttering, wielding torpedo-shaped cameras (fig. 0.4). The glare of their strobe lighting dramatically intensifies the brief spark of a match illuminating Cousteau’s cigarette in the scene where he names Fréminet’s *machine hydrostatergatique* as a precursor to scuba.

Across my history, readers will see filmmakers create underwater imagery that hearkens back to preexisting fantasies. Pre-Romantic and Romantic aesthetics for celebrating nature figure prominently in underwater scenes, as filmmakers shape areas of the planet that defy viewing habits. Filmmakers submerge stories of thrilling adventures in extreme environments familiar from centuries of European traveling. They devise other figures by reworking famous undersea images from tradition. Romantic aesthetics and a famous

undersea image meet in Cousteau's portrayal of underwater shipwrecks in his first film shot with scuba, *Sunken Ships (Epaves)* (1943).<sup>18</sup> Shakespeare famously called the effect of the sea on the physical body and human ambition a "sea-change" in *The Tempest*, when the spirit Ariel conjures for Fernando the strange treasure of his drowned father's decomposing corpse: "Full fathom five thy father lies. / Of his bones are coral made. / Those are pearls that were his eyes. / Nothing of him that doth fade / But doth suffer a sea-change / Into something rich and strange."<sup>19</sup> Cousteau took up this transmutation in *Sunken Ships* but transferred sea-change to the detritus of ships, respecting the taboo against exhibiting human remains. Overgrown with marine creatures, sunken ships become eerie living architecture, recalling the Romantic cult of ruins. Furthermore, Cousteau picked out aspects of a ship's hull that resemble a Gothic arch, sketching the first draft of the wreck as a gothic ruin that he would elaborate with Louis Malle in *The Silent World*.

Many influential fantasies conceived on the underwater film set occur in works whose subject is the sea. Filmmakers have imprinted majestic dolphins, killer sharks, and melancholy shipwrecks on the popular imagination as a result of techniques for organizing images studied here. These fantasies have, moreover, become part of how audiences conceive of this realm that most of us are not able to witness firsthand. Nonetheless, despite the importance of sea subjects in the aesthetics of underwater film, I qualify the environments at issue as *underwater* rather than *undersea*. The underwater film set's contribution to cinema extends to life on land and to the creation of mood. The beauty of underwater movement and the underwater haze can be used to create mystery and glamour, as in the swimming sequence of erotic longing in Jean Vigo's *L'Atalante* (1934) (fig. 0.5) or, on a more sensational note, kinky seduction in a number of James Bond films, starting with *Thunderball* (1965), directed by Terence Young. The swimming pool can turn from banal to dystopically surreal, epitomized by the view of suburban reality that Ben, the hero in Mike Nichols's *The Graduate* (1967), reveals from the bottom of his parents' pool (fig. 0.6). Narrative filmmakers have incorporated the drowned into their use of the underwater atmosphere to evoke social dystopia, in contrast to documentary filmmakers, who eschew showing the dead. Famous dystopic shots include the underwater view looking up at the floating corpse that starts Billy Wilder's *Sunset Boulevard* (1950) and the undulating submerged seaweed and hair of the murdered widow discovered intermingled at the midpoint of Charles Laughton's *The Night of the Hunter* (1955).



FIG. 0.5. Jean Vigo, *L'Atalante*, ca. 1:08:20. Longing in the liquid atmosphere: the captain's runaway wife floats toward him as an alluring vision.



FIG. 0.6. Mike Nichols, *The Graduate*, ca. 23:59. The atmosphere of water and the edges of the face mask distort Ben's view of his parents from the bottom of their pool, expressing twisted suburban values.

## The Shapes of Submarine Fantasy

*The Underwater Eye* is organized into three parts that demarcate eras, according to the state of dive and film technologies, which often work in tandem, affording new possibilities for imagery, whose contours are defined as well by their limitations. I start part 1 with firsthand representations of the underwater environment that circulated in print between the invention of modern helmet diving and the inception of underwater film. These representations include verbal descriptions as well as engravings by the Austrian Baron Eugen von Ransonnet-Villez from a diving bell off the coast of Sri Lanka in the 1860s and paintings conceived and sketched underwater by Walter Howlison “Zarh” Pritchard, who first dove with a helmet off Tahiti in 1904. Through analysis of their works, I introduce readers to the qualities of human perception in the depths that would fascinate, frustrate, and inspire filmmakers.

Part 1 then describes distinctive underwater imagery created in the first era of underwater film. From 1914 until the scuba revolution of the 1940s, both camera and operator were predominantly protected behind glass, whether in a pool or from within submersibles. In narrative cinema, underwater imagery accordingly frames its subjects using the format that film scholar Jonathan Crylen has identified as “the cinematic aquarium,” designating rectilinear views, like aquarium scenes.<sup>20</sup> Within this format filmmakers portray adventure, such as the combat with real sharks and a mechanical octopus in Stuart Paton’s *Twenty Thousand Leagues under the Sea*. I also discuss the fascination of underwater movement, from the aquatic dance of Annette Kellerman to the glide of sharks. Both movement and adventure take an avant-garde turn in Man Ray’s surrealist invitation to look with a marine eye. Part 1 concludes with two Hollywood entertainment films that introduce a shift to the portable camera, which, when coupled with scuba, would transform the stories that could be told underwater and the ability to exhibit drama and suspense. Lloyd Bacon’s *The Frogmen* (1951) used the portable Aquaflex camera to portray the underappreciated action of World War II underwater demolition teams. On the cusp of the scuba revolution, Robert Webb’s *Beneath the 12-Mile Reef* (1953) captured a sponge diver’s view of a tropical coral reef with exquisite underwater footage shot by cameraman Till Gabbani.

In the 1940s and early 1950s, views of the cinematic aquarium were replaced with a vastly expanded range of shots and imagery, as the camera, its operators, and actors were free to roam around beneath the surface. The book’s second

part considers this transformative era, inaugurated by technologies invented either for or coincidental with World War II. Diving aids included swim fins, masks, and scuba, along with film innovations such as the portable camera and strobe lighting.<sup>21</sup> Such innovations created a range of new ways to exhibit the underwater environment, which dive and film pioneers such as Jacques-Yves Cousteau, Louis Malle, and Hans Hass first explored in documentaries.

Part 2 discusses the shots and imagery created by Cousteau, Malle, and Hass that would help shape the aesthetics of cinema underwater, in narrative film as well as documentary. The directorial choices of these image makers had an impact around the world. As Louis Malle commented about making *The Silent World*, “[w]e had to invent the rules—there were no references; it was too new.”<sup>22</sup> Part 2 also discusses influential imagery created during an extraordinary decade of innovation in narrative filming. Works featured include the Walt Disney studio’s first live-action film, *20,000 Leagues under the Sea* (1954), directed by Richard Fleischer, where, as in documentary, the film’s creators were grappling with how to shape this never-before exhibited environment for audience entertainment. “Everything they were doing down there was experimental,” said Roy E. Disney, senior Disney executive and Walt Disney’s nephew, about making the underwater sequences of this film, which, notably, implemented techniques from proscenium theater to unify diffuse underwater space.<sup>23</sup>

In addition, I discuss the four-season television series *Sea Hunt* (1958–61), produced by Ivan Tors and shot with a portable camera designed by leading underwater cinematographer Lamar Boren, who did most of the camerawork. A major cultural influence in the United States and abroad, *Sea Hunt* imagined new stories of suspense and adventure based on underwater dangers and the range of postwar military, leisure, and commercial activities practiced undersea. Its innovations in environmentally generated plotting would go on to shape subsequent adventure narratives set underwater, as well as science fiction adventures in the toxic atmosphere of outer space.

In Part 3, I take up the aesthetic contribution of underwater settings to narrative cinema in subsequent decades. Starting in the 1960s, the underwater film set became a dramatic, if not everyday, resource of both films and TV shows, as moving image creators developed aesthetic effects from the possibilities that emerged during the revolution in underwater filming of the 1950s. To describe all the imagery created there is a project exceeding my scope, given the quantity and variety of works, which traverse fiction and documentary, as

well as film and TV. I have chosen to describe films that create what I call liquid fantasies: imagery whose aesthetic qualities derive from aquatic environments and that takes on a life in the cultural imagination beyond realistic depiction to inspire cultural myths.

Many liquid fantasies in films, from James B. Clark's *Flipper* (1963) to James Cameron's *Titanic* (1997), amplified storylines and new shots first used in the 1950s, sometimes devising new technologies in quest of more extensive access and yet more dramatic effects. Thus, Cousteau and Malle portrayed a sunken ship as a melancholy gothic ruin when they took audiences to survey the wreckage of the SS *Thistlegorm* in *The Silent World*. Filmmaker James Cameron would echo this gothic mood by incorporating the wreckage of the RMS *Titanic* into his eponymous film. Since it lies at twelve thousand feet, in black depths inaccessible to divers, Cameron commissioned a range of technologies to capture footage, including an ROV (remotely operated vehicle) equipped with a video camera, capable of maneuvering into the wreck's narrow passages and withstanding the extreme pressure in such depths.<sup>24</sup> He otherwise never could have captured views of actual wreckage such as "silt streaming through intricate bronze-grill doors" and "a woodwork fireplace with a crab crawling over the hearth," to cite Rebecca Kegan, clarifying documentary footage artfully incorporated into the film's melancholy montage.<sup>25</sup>

A comparison of Cousteau and Malle's portrayal of a wreck site in *The Silent World* and Cameron's exhibition of interiors of the *Titanic* illustrates the importance of technological access in what filmmakers can and cannot portray. At the same time, while the history of technology is an important thread in my account, dive and film technologies "enable" rather than determine representations, to take up a productive word emphasized by Crylen.<sup>26</sup> The views afforded by technologies are starting points that filmmakers then fuse with aesthetics that further their creative aims. Given how few people have visited these environments, it is worth emphasizing that an underwater setting has no necessary aesthetic frame. Filmmakers can create very different emotional effects with the same type of material. While both *The Silent World* and *Titanic* stage a wreck site in the gothic tradition, Steven Spielberg, in contrast, realized a wreck's possibility as a horror house in an isolated but suggestive moment in *Jaws* (when a diving shark biologist discovers a dead fisherman in his cap-sized boat).

The aquatic atmosphere imbues movement and optics with unique aesthetic properties, which are difficult to simulate on land. For this reason,

I focus on works created in water, although the qualities of the underwater environment do shape simulated imagery in both live action and animation. Pixar's *Finding Nemo* (2003) and *Finding Dory* (2016), for example, evoke the spectrum of undersea colors and the impact of depth on human perception. With the exception of innovative underwater sequences in *20,000 Leagues*, I do not discuss narratives about submersibles, although a number of influential films about submarines have been set undersea, such as Wolfgang Petersen's *Das Boot* (1981) and John McTiernan's *The Hunt for Red October* (1990). I leave these films to the side because their settings primarily show the inside of vessels, with scant aquatic shots that reveal the hazy outlines of hulls in the murk. Indeed, the menace created by underwater obscurity is an important element of submarine fiction's suspense. The combatants cannot see enemy crafts or torpedoes in the obscure marine environment. Listening and sonar hence become essential to survival.

American works feature prominently across my study, owing both to the importance of Hollywood in the film industry and to the long-standing American coordination of innovations in dive technologies with moviemaking, from the invention of the photosphere by Williamson to James Cameron's ROVs. At the same time, my focus is not on the ways in which such films belong to American cultural history. Rather, I am interested in identifying innovative underwater moving imagery celebrated in both the general press and scholarship, as well as by other filmmakers. Some of the films I discuss are European; some depend on international collaboration. Cousteau worked with Massachusetts Institute of Technology engineer Harold Edgerton to design the strobe lighting that enabled the rich color visuals of *The Silent World*. Cameron, a Canadian based in Hollywood, used Russian submersibles to create the lighting system enabling his deep-sea footage for *Titanic*. In 1956, the Austrian Hans Hass became a household name in the English and German-speaking worlds with the BBC's series *Diving to Adventure*.

For reactions in the general press, I draw on American periodicals because of the practical constraints of archival research, but this American point of departure has led me to essential European works in submarine filmography. In the early 1950s, for example, articles in both the *New York Times* and the niche periodical *Skin Diver*, the first American magazine devoted to diving, featured films by Hass, as well as by Cousteau and Malle. My study is not exhaustive, but I hope it nonetheless conveys a sense of the impact of the underwater environment on the history of moving-image artistry.

## Environmentally Specific Imagery: Fact and Fiction

Submarine filming, even for narrative films, offers the opportunity to create aesthetic effects from physical qualities specific to the environment. Murky visibility below, for example, confers a sense of mystery that can be ineffable or menacing, depending on context. The atmosphere of water is denser than air, and thus harder for humans to move through, yet it also offers opportunities for grace and glide. Water-dwelling creatures that extract oxygen by swimming cannot be filmed alive in air. The need to shoot underwater for such depictions, even in fantasy films, blurs the documentary/fantasy divide. True, the atmosphere of air is a real element in narrative films made on land, but we take this atmosphere for granted, except when it is enhanced or disturbed—as, for example, in the lurid colors of sunset amidst smoke, or the palpable quality of light filtering through dust. “The last thing a fish would ever notice would be water,” anthropologist Ralph Linton is reputed to have observed. While it may sound obvious, the physical qualities of an environment, even those so familiar they become invisible, play a formative, although not determinate, role in shaping its cinematic expression.

So, too, does an environment’s familiarity to its audience. The underwater realm is remote. Even today, comparatively few people dive, and the depths beyond about 130 feet are accessible only to professional divers and submersibles. Further, human perception underwater differs drastically from perception in air. As a result, spectators, particularly of novel scenes, have more difficulty filling out unfamiliar aspects using their imagination—as audiences around the world could, say, if shown the Eiffel Tower from below, or with a close-up of its girders. In introducing viewers to an underwater setting, filmmakers hence take care to introduce orienting elements—for example, through organizing scenes according to well-established aesthetics. Thus, as I have discussed, Cousteau, Malle, and Cameron alike use gothic conventions to present an underwater wreck site.<sup>27</sup> In this way, too, the underwater film set complicates the documentary/fantasy divide.

Another factor that leads filmmakers’ work across the boundary between fantasy and documentary relates to challenges in underwater capture. One problem filmmakers face in the marine environment, for example, is the opacity of the water’s surface. This opacity makes it difficult to create a visual connection between actions in the depths and corresponding actions that are occurring in the atmosphere of air. Cousteau and Malle addressed this challenge creatively when they filmed sharks feeding on a carcass in *The Silent*

*World*, by drawing on conventions from horror film scenes of killing. These scenes disconnect the perspectives of killer and victim in such a way as to shock and disturb spectators. Cousteau and Malle did not translate precisely: in *The Silent World*, the victim's limited perspective on the action becomes the crew's topside view from the *Calypso* of a feeding frenzy, while the gaze of the killer becomes submarine viewpoints of the sharks, first as they inspect the carcass, and then, as they feed, their savagery evoked with handheld, jerky close-ups. Cutting back and forth between chaos above the surface and revealing glimpses of action below, the directors sensationalized the shark's predation. In *Jaws* (1975), Steven Spielberg took Cousteau and Malle's horror-film solution for crossing the waterline and returned it to its fantasy inspiration. Now, the victim is associated with the surface view, oblivious to the unseen, prowling shark.

As is the case with the gothic wreck, such a horror portrayal of sharks is an aesthetic choice, and not the only way to organize shark imagery. Cousteau and Malle's contemporary Hass exhibited sharks lyrically in his black-and-white *Humans among Sharks* (*Menschen unter Haien*) (1947/48). Remaining below, Hass's camera invites us to admire these apex predators—warily, to be sure—whom he shows swimming majestically, and to leave them in peace. The Spielberg representation of sharks is so powerful that it has terrified swimmers over nearly the past half century, although in fact the number of attacks by great whites on beachgoers every year is minuscule. In recent decades, marine conservation initiatives are increasingly revealing that overfishing threatens many shark species and that these creatures play a key role in the ocean food chain, which would dramatically alter were they extinct.<sup>28</sup> One means pursued to attract public interest in shark conservation has been to erase the *Jaws* icon and replace it with imagery based on better information. The lyrical *Island of the Sharks* (1999), for example, directed by Howard and Michele Hall, places these animals in an abundant, visually mesmerizing ocean ecosystem.<sup>29</sup> In this framing, the Halls take advantage of the vastly expanded resources of IMAX and color film to continue what I will explain as Hass's fundamentally Romantic aesthetic.

There is one more environmentally specific reason why underwater filming complicates the documentary/fiction divide. Work in the depths is exceptionally difficult, leading productions to rely on a small group of specialists: the same camera people, divers, and engineers overlap in factual and narrative film, and in both, they apply their knowledge of the underwater environment and their eye for how to film it. This overlap starts with Paton's use of

Williamson's documentary footage for *Twenty Thousand Leagues* and goes forward to Cameron's fusion of documentary and studio imagery in transporting spectators to the wreck site of the *Titanic*. In the second half of the twentieth century, Hass, already famous for his documentaries, was the camera person for an early Italian narrative film including scuba footage, *Rommel's Treasure* (*Il tesoro di Rommel*) (1955). Lamar Boren, who filmed *Sea Hunt* (1958–61) and the first James Bond films with underwater action, starting with *Thunderball* (1965), also captured documentary footage for *The Magical World of Disney's* two-part documentary telefilm *The Treasure of San Bosco Reef* (1968). Cameraman Al Giddings would take up Boren's mantle from the 1970s through the 1990s, filming the underwater sequences in some of the later Bond films and directing underwater photography for Cameron's *The Abyss* and *Titanic*. Giddings also did documentary work across his career, from his cinematography for the Canadian short *The Sea* (1972), directed by Bané Jovanovic, to the IMAX short *Galapagos* (1999), which Giddings codirected with David Clark.

The blurred boundary between documentary and fiction in underwater film notwithstanding, some important differences remain. Documentaries notably respect plausibility, showing events that human observers have witnessed, even if filmmakers sometimes must go to some lengths to reproduce them. Further, documentaries respect location—no such obligation constrains fiction. Ivan Tors, an influential producer of underwater film and TV in the era of the scuba revolution, told *TV Guide* in 1959 that “people never notice ‘scientific’ errors.”<sup>30</sup> Tors was speaking about the most successful production of his career, the TV series *Sea Hunt*, whose underwater scenes stitched together imagery from such diverse locations as the Los Angeles oceanarium Marineland of the Pacific; the warm freshwater of Silver Springs, Florida; and the Pacific Ocean off southern California. When a portion of an episode set in the Hudson River was shot off Catalina Island, “a barracuda, strictly a warm-water fish, swam between [star Lloyd] Bridges and cameraman Lamar Boren in the big scene.” On the question of what to do with this implausible detail, Tors told *TV Guide* that “fifteen thousand dollars to take out one fish . . . is nonsense.”<sup>31</sup>

In an epilogue, I discuss the way documentary filmmakers integrate their commitment to show reality with technical and aesthetic considerations, introducing yet another formative factor shaping the imagery they create on the underwater film set. This epilogue focuses on the documentary as genre, in contrast to my treatment of documentaries in parts 1 and 2, where I discuss

their imagery for its expressive power alone. Thus, I do not inquire whether Captain Wallace Caswell Jr., star of *Killers of the Sea* (1937), in fact slaughtered bottlenose dolphins, nor do I analyze how Cousteau and Malle's exhibition of the SS *Thistlegorm* relates to the actual wreck. In the epilogue, I do examine how documentary persuades audiences to accept its exhibition of submarine reality through the example of the immensely popular TV series *Blue Planet II*, first shown on TV in 2017, which mobilized innovative film and dive technologies to capture never-before-recorded, and in some cases never-before-seen, views of marine life. *Blue Planet II* creators organized such views to entertain but also to prompt action to mitigate climate change, and the series famously succeeded on both counts. As I break down favorite scenes, I show how *Blue Planet II* incited audiences to care about remote oceans and submarine reality by hearkening back to familiar fantasy, even when portraying novel subject matter and, notably, to the liquid fantasies discussed in part 3.

### The Blue Humanities in the Depths

In showing filmmakers' creative use of the underwater film set, *The Underwater Eye* contributes to a conversation at the intersection of media studies and marine and maritime studies, a thriving interdisciplinary area that Steve Mentz has named the "blue humanities." Until recently, underwater film was not much discussed in either field. For media studies, the submarine setting is a niche environment, appearing infrequently, and techniques on the underwater film set do not obviously seem to contribute to cinema history. For the blue humanities, the surface of the seas has been the predominant arena for social action, and hence the focus of efforts to reintegrate the seas into history. During the past fifteen years, however, the blue humanities has started to realize that the depths belong to history as well.

Below, I provide details on scholars who have taken the lead in drawing attention both to the cultural significance of the undersea and to submarine film, with the goals of acknowledging work that has shaped my thinking, giving readers reference points in an emerging field, and explaining the contribution of my study. (Those readers who are not part of such conversations may want to skip this and go to part 1.)

The turn to the ocean depths in interdisciplinary ocean scholarship occurred around 2005, the year Helen M. Rozwadowski published *Fathoming the Ocean: The Discovery and Exploration of the Deep Sea*. In this study, Rozwadowski drew together science, history, and cultural studies to reveal how during

the mid-nineteenth century the deep sea emerged in the West as a new planetary frontier. Rozwadowski has subsequently pursued her inquiry into the twentieth century, noting the emergence of the undersea as a frontier for strategic, scientific, and technological reasons during the World War II and post-war eras.<sup>32</sup> Stacy Alaimo has played an important role not only in drawing attention to the aesthetic interest of the undersea environment but also in showing the different expressive effects created in its different depths. Thus, she reveals the poetics of the abyssal zone, starting with the writings of William Beebe, whose famous exploits included diving half a mile down in the bathysphere, which he designed with Otis Barton.<sup>33</sup> Alaimo has traced this impact forward to both James Cameron's narrative spectacles and to documentary imagery of the depths in an era of environmental awareness, such as photos of undersea pollution revealing the scale and duration of the 2010 British Petroleum oil spill in the Gulf of Mexico.

The blue humanities' undersea research over the past decade has extended to earlier eras as well. Early modern specialists have focused on the imaginative significance of what was then an almost completely unknown area of the planet, beginning with Steve Mentz's influential *At the Bottom of Shakespeare's Ocean* (2009). The depths have further appeared in crossover studies focused on marine animals, such as Philip Hoare's *The Whale: In Search of the Giants of the Sea* (2010) (first published as *Leviathan, or The Whale* [2008]), Sy Montgomery's *The Soul of an Octopus* (2015), and Richard King's *Lobster* (2011).

Nicole Starosielski is an influential media critic and cultural historian whose *The Undersea Network* (2015) traces the networks of submarine fiber-optic cables around the planet that we take for granted and that enable modern communications technology. Along with her book revealing communication in the hidden depths, Starosielski has written about the role of film in their exhibition, and indeed was one of the first to organize films made undersea into a corpus. She categorizes submarine films according to their ideology of ocean depiction: "exposing the seafloor" (1914–32), "ocean exploitation" (1945–58), and "domesticating inner space" (1960–72).<sup>34</sup> Starosielski points out that although "[a] number of works . . . have begun to address the cultural representations of marine mammals," such as those by Gregg Mitman and Derek Bousé, among others, "these lines of inquiry have yet to develop into a sustained conversation on the cinematic construction of underwater environments."<sup>35</sup> The investigations of Franziska Torma also are in the forefront of expanding understanding of the social and cultural forces shaping undersea film. Torma focuses on the way films are shaped by the conjunction of science,

technology, and ideology across the twentieth century and into our present. Thus, for example, she notes the importance of scuba in freeing the diver as pioneering “merman” in the 1950s, while IMAX enhanced the grandeur of blue planet exhibition by the century’s end.<sup>36</sup> Building on such studies and also diverging from their primary focus on cultural history, *The Underwater Eye* highlights the contributions of underwater film to the poetics of the moving image.

Inquiries by Starosielski, Torma, and Rozwadowski, notably, are at the inception of a robust conversation around underwater film that has started to develop over the past six years, led by the blue humanities. Crylen is writing a book from his dissertation, “The Cinematic Aquarium: A History of Undersea Film” (2015), which brings technology into dialogue with environmental issues as well as with aesthetics. Natascha Adamowsky notes the continuation of a tradition mixing objective knowledge and wonder, connecting Enlightenment and nineteenth-century science and entertainment to pre-scuba undersea documentary films. The endpoint of her 2015 *The Mysterious Science of the Sea, 1775–1943* is the year of Cousteau’s first underwater film shot with scuba, *Sunken Ships*. Shin Yamashiro includes undersea film in a long American tradition of sea writing in *American Sea Literature: Seascapes, Beach Narratives and Underwater Exploration* (2014). Writing about contemporary narrative films with underwater sequences, Adriano D’Aloia speaks of “enwaterment,” as an aesthetic in films that “both physically and psychically engage . . . the spectator in a ‘water-based relationship,’” whether or not their story concerns oceans or lakes.<sup>37</sup>

Ann Elias was the first to recover the fascination of the undersea for surrealism, which recognized the visual power of D’Aloia’s “enwaterment,” even in imagery made far from the sea. In *Coral Empire: Underwater Oceans, Colonial Tropics, Visual Modernity* (2019), Elias offers a compelling model for how to address the impact of submarine aesthetics on art and film by using the case of a single type of environment: mesmerizing coral reefs. *Coral Empire* opens paths as well in its attention to the first-world colonialism and racism that shape both the image capture and portrayal of underwater scenes. In a history inaugurated by the films of Williamson in the Bahamas, Elias contrasts the labor of people of color who participated in filmmaking, notably in diving and other water work, and their erasure in the finished products, which exhibit reefs as virgin territories for spectatorial delight and first-world tourism.

Since the late 2010s, scholars have started to recover the untold stories of the role played by both African diaspora and Indigenous divers of color across the history of maritime globalization, beginning in the early modern era, notably in salvage and pearl diving, as Rebekka von Mallinckrodt describes.<sup>38</sup> The

great poet Derek Walcott evokes the work of Black divers in the Caribbean salvage industry in the haunting section “Rapture of the Deep” in “The Schooner *Flight*” (1979). There, the protagonist, Shabine, adds to his credentials as emblematic sea worker of color a stint diving with “a crazy Mick, name O’Shaughnessy, and a limey named Head.”<sup>39</sup> As I have researched production on underwater film sets, I have found details showing colonial racial hierarchies abound, notably in warm-water locations preferred for submarine filmmaking, from Williamson’s Bahamas studied by Elias, going forward into the scuba era. Thus, for example, to shift from the Caribbean to the Red Sea, while in Sudan filming *Under the Red Sea*, Hans Hass was attacked by a shark, although he did not include the episode in the film. Hass recounted that the attack took place while the Sudanese skipper, Mahmud, stereotypically portrayed in the film as jovial and carefree, was napping while Hans and Lotte Hass dived. When Mahmud awakened and realized that Hass has been bitten, he rowed over, and Hass “handed over the shark [that Hass was “pulling . . . after” him] to Mahmud. He hauled it up and battered its head in with a cudgel.”<sup>40</sup> Such evidence affirms the importance of recovering the racialized distribution of labor in underwater filmmaking, as in tropical tourism industries more generally, although I do not open up this essential, challenging subject, attending exclusively to the technological capture of submarine materiality and its contribution to the realm of fantasy. Furthermore, underwater fantasies considered in this study have shaped the imagination of audiences beyond first-world contexts. Tellingly, Walcott repurposed nitrogen narcosis and Cousteau’s term “rapture of the deep,” along with cinematic vistas of coral, when he conceived of the strange emotions and seascape accompanying Shabine’s delirious encounter with the bones of men and women who drowned during the Middle Passage.<sup>41</sup>

The propensity of the underwater environment to displace categories and concepts from land has been a recurring theme in the work of blue humanities scholars such as Mentz and Alaimo. Elizabeth DeLoughrey has recently used the concept “sea ontologies” to conceptualize this submarine defamiliarization of our land-based paradigms of aesthetics, philosophy, and history in her contribution to a recent influential section on “Oceanic Routes” in the journal *Comparative Literature* (2017). DeLoughrey illustrates “sea ontologies,” analyzing the underwater art installations of Jason deCaires Taylor. Thus, she cites Taylor, noting how the art object’s stability erodes underwater owing to the harsh environment: “underwater you are dealing with a completely different notion of time and it’s confusing but fascinating; even for me when I return

after a month . . . the work looks completely different.”<sup>42</sup> In 2019, the journal *English Language Notes* published a special issue edited by Laura Winkiel, exploring both undersea and topside the “new perspectives, ontologies, and transmaterial subjectivities” offered by oceanic frameworks.<sup>43</sup> Articles in this issue, like the most recent work in the blue humanities, disrupt terrestrially oriented concepts of scale and substance, as well as a human-centered notion of the cosmos.

As Mentz and more recently Alaimo have emphasized, scholars need to locate sea ontologies in the qualities of specific marine environments, if such notions are more than metaphorical, anthropomorphic projections.<sup>44</sup> The importance of situating both marine fantasy and marine reality in relation to specific locations is a current trend in oceanic studies, as it is in environmental documentary. Along with what might be called *placing* sea ontologies, another challenge is to situate them in time. Thus, humans’ destructive impact on oceans in the age of the Anthropocene is at the forefront of critical, documentary, and creative interest in marine environments today. Such current awareness intersects with a long-standing history in Western aesthetics of imagining the alluring, beguiling impact of the depths on the human senses, which Killian Quigley and I have formulated as the senses of the submarine in the introduction to our recent edited collection *The Aesthetics of the Undersea* (2019).<sup>45</sup>

The human senses are very much at sea on the underwater film set as they contend with altered perception and orientation, among the many formidable aspects of submarine materiality. Throughout this book, the underwater environment is at once a remote, toxic realm and an opportunity for innovative, enduring contributions to the repertoire of cinematic imagery and to fantasy.

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