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# Theory, Locality, and Methodology in Archaeology: Just Add Water?

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# THEORY, LOCALITY, AND METHODOLOGY IN ARCHAEOLOGY: JUST ADD WATER?

William H. Krieger

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Continuing the work of the 'Vienna Circle', philosopher Carl Hempel created explanatory models to ground scientific inquiry in logic and empirical truth. Beginning with the physical sciences, he explored the application of these models to the social sciences as well. Terrestrial archaeologists incorporated Hempelian concepts by calling for global changes in archaeological methodology. These changes, explicitly designed to maximize data collection (a necessary first step to develop archaeological general laws crucial to Hempelian explanation and confirmation), were developed using particular idiosyncratic geographical cues that would undermine archaeology if implemented in other contexts. In this article, I argue that similarly unconscious artifacts of particular archaeologists' goals and locations have also governed underwater archaeology's growth as a discipline, much to its detriment. It is my hope that understanding the philosophical and archaeological issues that have led archaeology to this point will help to move archaeology (both land and sea) forward.

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## Introduction

Of the proteges of the Vienna Circle, the one who had the greatest impact (in archaeological circles) was Carl Hempel. Although Hempel's place as the best representative of the circle can certainly be argued, his is virtually the only

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philosophical voice that was largely heard and discussed among theoretical archaeologists in the Americas.<sup>1</sup> Introduced to archaeological circles by Lewis Binford, Hempel's early ideas were central to the formation of processual archaeology.<sup>2</sup> Processual (or new) archaeology represented a foundational shift in the goals, theoretical orientation, and methods of archaeology. Its goal was to replace the culture-historical model's static picture of the past (represented by the cataloguing of artifacts and the separation of those materials into strict phases) with a more dynamic (focused on culture processes, which are by their nature more fluid), explicitly scientific model for understanding the past. Although Hempel did the majority of his work from the perspective of the physical sciences, he always had in mind the eventual application of logical empiricist principles in the social sciences, and he is clear that he is interested in a methodological unification between the social and empirical sciences and an eventual reduction to the physical sciences.<sup>3</sup> In "The Function of General Laws in History," Hempel begins with history, arguing not only that general laws, which are necessary for Hempelian explanations to work, can exist in history but that they are indispensable. While historians have been making pronouncements about the causal structure of history, until now these assertions have been without merit. "Only the establishment of specific laws can fill the general thesis with scientific content, make it amenable to empirical tests, and confer upon it an explanatory function. The elaboration of such laws with as much precision as possible seems clearly to be the direction in which progress in scientific explanation and understanding has to be sought" (Hempel 1942/1994, 51). Only after scientists reconfigure fields such as history to state and make use of explicit laws would the social sciences have the explanatory and predictive power that Hempel believed his model brought to the natural sciences. Once he could show that general laws were as effective

1. For a few examples, see Watson, LeBlanc, and Redman (1971), Binford (1962/1972), Schiffer (1975), and Salmon (1982).

2. For more information on the reasons that Hempel's is the primary representative of logical positivism to archaeological circles, see Bell (1994, 126).

3. In 1929, when the Vienna Circle published its manifesto, they hoped to create a new grounding for scientific inquiry (Der Weiner 1929/1996). This group (the logical positivists, as well as their proteges the logical empiricists) believed that they could provide a firm foundation (based in logic and empirical truths) for the sciences. To create this grounding, some in the circle (including Carnap 1928) believed that their goals could only be realized by means of a unification and reduction of science. Oppenheim and Putnam (1958, 409), referring directly to the goals of the Vienna Circle, argue that the sciences can be ordered in a series of levels, with the goal being to find entailment relationships allowing for the reduction of 'higher' levels to 'lower' level sciences, with the study of elementary particles (the realm of physics) at the lowest and therefore most foundational level. See also Nagel (1961, chap. 11).

and indispensable in the social science as they were in the physical science, he could begin to collapse the former into the latter (see Hempel 1966, chap. 8).

Although terrestrial archaeologists incorporated Hempelian concepts in a variety of ways, the major effect of the processualist call was in forcing global changes in archaeological methodology. These changes, explicitly designed to maximize data collection, would lead to the discovery of general laws of archaeology. Unfortunately, these methodological practices were developed using particular, idiosyncratic geographical cues that I argue here and elsewhere undermine archaeology when implemented in other contexts. In this article, I argue that similar (unconscious) artifacts of the growth of underwater archaeology have had a similar effect on this field's current state. For this reason, and because the field has trouble distinguishing itself from other groups interested in artifacts that represent underwater cultural heritage, underwater archaeology has had a real image problem, both from the perspective of outside observers and from the perspective of other archaeologists. This article provides the historical and philosophical background for the decisions that underwater archaeologists have made to date, providing some philosophical and archaeological rationale for the reintegration of underwater archaeology with its terrestrial counterpart, at least in coastal contexts.

## One If by Land

By the early 1960s, a group of terrestrial archaeologists in North America, discontented with a field that saw itself primarily as a repository for descriptive knowledge of the past, decided to change the basic theoretical goals of archaeology. These 'new archaeologists' saw the work of Hempel and the goals of the Vienna Circle as the means to move archaeology from the humanities to the sciences. As an offshoot of history, art history, or classics, archaeology could document the past. As a science, archaeology would explain the past, revealing the causes of change and providing a real picture of what was happening, whether at a single site or over a large region or cultural group.

Reconfiguring archaeology into a science would be no easy task. There were a number of major theoretical hurdles that archaeologists would have to overcome to implement Hempel's (or, more properly, Binford's) vision of philosophical archaeology. In a series of classic case studies and theoretical articles, archaeologists and philosophers of science were simultaneously questioning the concept of general laws, asking whether there was a way to identify general laws (separating them from matters of happenstance or from laws too specific to be of use in creating nomothetic explanations) and whether there could specifically be archaeological general laws (as opposed to laws

imported from other fields). Additionally, archaeologists were asking about connecting past uses of artifacts to modern explanations, for example, exploring the role of ethnographic data in the creation of bridge principles for explanations. Archaeologists also hoped to use Hempel's model to move from older, ill-defined models explaining societal change (such as diffusion) to a systems approach.<sup>4</sup> Archaeologists (as well as the philosophers of science who helped set the new archaeology on this path) continually struggled with the implementation of this program.<sup>5</sup> The field, renamed "processual archaeology" once it was no longer new, fractured as different groups answered these questions in different ways; some new groups rejected processualism altogether, moving toward a poststructural analysis of archaeology (and of science in general).

Although processualists failed to redefine archaeology in a way that they could call it a science, processualism's greatest success was in changing the methodology (or 'doing') of archaeology. These methodological changes have become the norm in all of the current varieties of archaeology being practiced. Regardless of theoretical approach, contemporary archaeology demands that people in the field generate more (and more diverse) data, a call that has radically changed the practice of archaeology. Originally, this call was made for strictly processualist reasons: there were no pure general laws of archaeology. Archaeologists believed that the best way to generate archaeological general laws was by collecting as much data as possible. In this way, archaeologists analyzing the data would begin to see trends popping out of the material. From there, rigorous testing would confirm or disconfirm lawlike statements, and a real science of archaeology would be born. Interestingly, nonprocessual archaeologies also demand these types of data. For these groups, the goal is to undermine the idea that there is one explanation for any given event. Here, conflicting stories, told by archaeologists, local inhabitants, and other concerned groups, would be used to show the inadequacy of nomothetic, universal laws of human behavior.

On the ground (or under it), archaeologists met these demands in a number of ways. One change that has unquestionably transformed the field for the better was the expansion of archaeological projects to incorporate a wide variety of experts in fields never before associated with archaeology. Added to

4. These concerns, the focus of Krieger (2006), are outside the scope of this article.

5. Anyone reading academic journals devoted to archaeology during this period, from sources such as *American Antiquity*, *Bulletin of the American Schools of Oriental Research*, etc., would come across multiple articles attempting to understand the implications of this new theoretical approach, and field manuals developed in the 1960s-1970s sought to apply this model to new and ongoing projects.

people who had been a part of archaeological teams—such as ceramicists, architecture specialists, art historians, linguists, and the like—microfloral and faunal specialists, chemists and geologists, and scatologists became regulars (or regular consultants) on American (and American-led) terrestrial projects.<sup>6</sup> Even as the new archaeology became processual, when it was attacked by other groups and replaced by more nuanced views of the role of science and the humanities in understanding archaeological change, these advances have proven crucial to everyone working in the field to date.<sup>7</sup>

Other changes, which also remain in place in spite of the theoretical changes that have occurred in the past 30 years, have not been as universally applauded. Many of the changes American archaeologists imposed on archaeological practice, driven by a desire to maximize data, came bundled with a special bias that undermined the goals of the new archaeology (regardless of the program's theoretical issues). In short, American archaeologists changed the field's focus from one primarily on excavation to one based on survey, moving from depth to breadth, and from cities to landscape. Although there can be many ways to rationalize this change (and although this is not to say that people stopped excavating), the theoretical basis for this change was that in the American Southwest, moving from excavation to survey would highlight the goals of processual archaeology: maximizing data, focusing on regions as opposed to small areas, eliminating possible parallels between archaeology and treasure hunting, and minimizing biases relating to political and socioeconomic status—all laudable goals. Unfortunately, those methods were (perhaps unwittingly) exported to American projects in other contexts, places where the methods proposed would have done none of these things, and would have resulted in a severely skewed understanding of the past (running exactly counter to the theoretical goals driving these changes). By noting problems with the philosophical underpinnings of the new archaeology, archaeologists have come to understand that it is unreasonable to expect explanatory models to map directly onto particular examples of scientific practice. In many cases, seemingly trivial factors (e.g., regional geography) can have a profound impact on theoretical success. This means that archaeologists have been looking for more flexible approaches, understanding that they may lose strict claims to objectivity in their quest for knowledge.

6. European archaeology benefited from many of the methodological and technological advances that came with American processualism, without falling into the processual/postprocessual feud that continues in American circles to date. See Bell (1994) for a treatment of these issues.

7. Kosso (2001) is one of the best exemplars of this more nuanced approach, one who shows that archaeological (and scientific) objectivity need not be sacrificed in the face of modern challenges to the scientific status quo.

Given a proper understanding of the relationship between regional geography and archaeological methodology, an alternative model (focusing on disunity) is the best way to secure theoretical success, as it leads archaeologists to ask scientific questions about regional changes while simultaneously allowing for more humanities-based specific questions. The product, a set of multi-vocal approaches, would give investigators—whether archaeologists, oppressed peoples, or indigenous groups—a realistic set of tools. Instead of coming away from our work with radically oversimplified stories that conform to a particular set of expectations, we would be left with a messier but more realistic picture of the past.

## Two If by Sea

Underwater archaeology shares much with its terrestrial counterpart. Although interest in the recovery of underwater artifacts is as old as seafaring, and people have been bringing antiquities to the surface for hundreds of years, underwater archaeology as a scientific discipline is relatively new. Although experts disagree on the exact dates and project that could be titled the first underwater archaeological excavation, probably the first clear example of this new field would be the excavation of the 1200 BCE shipwreck at Cape Gelidonya by Bass (1961), Throckmorton, Taylor, and Dumas in the 1960s. Although earlier projects (such as the recovery of the Antikythera mechanism in 1900) were headed by archaeologists, or by other people concerned with the protection and study of antiquities, the actual diving was generally performed by sponge divers or other people whose sole interests were in bringing materials of value up to the surface.<sup>8</sup> As scuba diving (invented in the 1940s by Lambertsen for the US Navy and made commercially viable by Cousteau and Gagnon) made underwater work safe, archaeologists, including George Bass, learned to dive in order to fully control their projects and in doing so changed the archaeological landscape (or seascape).<sup>9</sup> “George Bass most

8. To be fair, work on terrestrial sites was not much different during this period. The great archaeologists of the late nineteenth to early twentieth century routinely ‘supervised’ large excavations, employing hundreds of local laborers. These groups (both land and sea) decimated archaeological sites, destroying materials that (now) would be considered of high archaeological value, in order to find jewelry or other materials then considered valuable. In both cases, bribes were routinely a part of the wages for these laborers so that materials would find their way to the archaeologists, as opposed to the black market. In his field manual, Petrie (1904, 33–34) goes as far as discussing proper ways and amounts to pay his laborers in order to recover his artifacts without overpaying their value.

9. Another example of an early attempt at archaeological excavation underwater was at Grand Congloué, where Fernand Benoit directed Cousteau in the study of two Roman vessels (one from



significant contribution to maritime archaeology was his accomplishment at Cape Gelidonya. This site, off the coast of Turkey, was the first widely publicized demonstration that maritime archaeological excavation required no compromises from the professional standards set by terrestrial archaeologists” (Fontenoy 1998, 49). “Before he had first gone to Turkey he had consulted many land archaeologists and found that the majority felt that underwater archaeology was impossible and could never become an exact science. They stated such reasons as: ‘Nothing could be preserved underwater,’ or ‘It is impossible to make proper plans underwater.’ Some said it was too dangerous and far too expensive for the amount of information that could be gained” (Marx 1975, 35). At Cape Gelidonya and at other sites, including Yassa Ada, Bass showed detractors that it was possible to do good archaeology underwater, clearly distinguishing what he was doing from what had gone on before and setting a high initial set of expectations for the field.

Although both terrestrial and underwater archaeologists have spent decades trying to adapt their archaeologies to scientific explanatory models, members of these groups were not reading each other’s work and benefiting from a larger intrafield discussion of these issues. For instance, Muckelroy (1978) wrote extensively about problems surrounding a variety of what he termed ‘scrambling devices’ that disturb a shipwreck over time, making its analysis difficult. However, he does not mention the work of terrestrial archaeologist Michael Schiffer (1975), who made a huge impact on archaeological theory by focusing extensively on ways to properly understand and to deal with disturbances to land sites, be they natural (n-transforms) or cultural (c-transforms.)

Underwater archaeologists also speak regularly of the ‘scourges’ of their field, groups like treasure hunters, who strip artifacts of their context, and deep sea trawlers, who destroy sites without any regard to their archaeological value. Archaeologists speak of territorial disputes and issues of artifact ownership as unique problems, rarely citing analogous problems for terrestrial archaeologists, such as the archaeological black market and modern farming, problems that are easily found in any journal.<sup>10</sup>

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the first and the other from the second century CE) lying on top of each other. Despite the fact that this was one of the first examples of scuba-aided exploration of archaeological remains, there was a serious lack of documentation because this excavation was not performed by an underwater archaeologist at the site, and what was recovered was not done using proper excavation methods. As such, I have not chosen to focus on this (or on any other similar) attempt as my exemplar.

10. On a peripherally related note, these scourges are usually referenced in this order, despite the fact that deep sea trawling is unquestionably responsible for orders of magnitude of more destruction than treasure hunters could possibly do (even if one accepted uncritically the idea that this is always the result of treasure hunting and other ‘exploratory’ endeavors). For more on this, see Foley (2007).

Despite the differences between these two archaeologies (whether real or merely apparent), the roots of both terrestrial and underwater scientific archaeology stem from the same theoretical issues mentioned above. Although Hempel is mentioned less by name in journals devoted to underwater archaeology, the pioneers of the field brought Hempel's ideals with them when they moved from shore to sea. Underwater archaeologists spoke of denying terrestrialist claims that underwater archaeology could not be a science. They wanted to establish covering laws, to be able to generalize from their particular finds, and to explain the past.

These goals were directly related to the timing of the birth of underwater archaeology as a discipline. Bass and his colleagues moved from land to water at precisely the same time that the new archaeology was becoming a major concern in archaeological circles. As such, the underwater archaeologists brought the theoretical materials that they were familiar with to the sea, leaving the terrestrial field's theoretical discussion just as it was heating up. In the next decades, while underwater archaeology was busy refining its practices, attempting to bring their methods and technology to a point that it would pass muster with the exacting standards of their terrestrial counterparts, those terrestrialists were recognizing the artificiality of those standards and were reacting by moving in very different theoretical and methodological directions. This apparently slow start, by the way, should not be seen as a critique that only applies to underwater archaeologists. Terrestrial archaeologists, the original practitioners of the new archaeology (as practiced in the United States) spent a decade attempting to incorporate Hempel's covering-law models to archaeological practice.<sup>11</sup> However, while archaeologists were arguing the merits of Hempel's deductive-nomological model in the 1970s and 1980s, philosophers of science were moving past these models either for others that better captured the nature of scientific laws or for those questioning the idea of laws altogether.<sup>12</sup>

Regardless of the timing, land and water archaeology went through a period of parallel development. Both groups questioned the methodological

11. This model can be found in much of Hempel's work. A clear version (one cited by a number of archaeologists) is the subject of Hempel (1966). For more on the incorporation of Hempelian methods into archaeology, see Plog (1974) and Raab and Goodyear (1984). Watson (1983) shows how these issues affect underwater archaeology, using case studies already discussed in this article. For an examination of Hempelian models, both in isolation and applied to archaeology, see Krieger (2006, 2011).

12. For examples of more nuanced law-based approaches, see Salmon (1998). For questions surrounding the need for or utility of laws, see Cartwright (1983). For a consilience approach, see Giere (2006).

implications of the theoretical goals underpinning the new archaeology, and both groups would call for changes in archaeological practice. The groups hoped to move from questions about specific chronologies at single sites toward a focus on big-picture questions, whether in terrestrial contexts in the 1960s (Binford 1962/1972) or in underwater contexts in the 1980s (Watson 1983).

These two groups shared more than a common history. They also made parallel mistakes in seeking to redefine their disciplines. Like their dry counterparts, underwater archaeologists unintentionally allowed specifics of their particular approach to interfere with the development of their methodological goals. These decisions, made with the best of intentions, damaged this field's credibility and have crippled its ability to move beyond forward theoretically.

### Preconceptions and Sea Conceptions

To be sure, archaeologists working underwater have a very different and very serious set of issues that frame their entries into the archaeological record. Scuba, although safe (especially when compared with the death-defying measures undertaken by the pioneers of the field), is itself a challenge. Focusing on archaeological fieldwork is itself difficult, tiring, and at times tedious. Adding to this are the extra burdens of breathing through a regulator while wrapped in layers of neoprene, worrying about nitrogen loading and nitrogen narcosis, and the possibility of hypothermia from long exposure to water at any temperature. In addition, the underwater environment means that divers have technical issues to deal with: difficulties in communicating with one another, in being able to see and record their finds, in taking measurements, in survey and excavation techniques, and in conserving finds.

In addition to dive-related concerns, archaeology in general suffers from an image problem. Until relatively recently, collectors' goals were generally to find valuable pieces. These artifacts were used as ways to connect current regimes to past empires, as curios or sources of personal prestige, or more directly to monetary profit. Archaeologists of all stripes have a difficult time differentiating themselves (in the public collective consciousness) from treasure hunters. Many Americans associate archaeology with such luminaries as Dr. Jones and Lady Croft (as is witnessed by the large numbers of people who want to major in archaeology, as compared to the few that finish their degree after one season of fieldwork). The idea that there is a theory (or a number of theoretical positions) behind archaeological fieldwork—that statues, gold pieces, or other artifacts could be seen as valueless absent their context—makes little sense to the majority of the populace and, in fact, to the large

“avocational archaeology” community. Underwater archaeology suffers from this comparison even more than terrestrial archaeology because of a few differences between the two fields, differences that make good methodological sense (given the theoretical landscape that these fields were starting from) but that (to the untrained eye) further blur the line between underwater archaeology and treasure hunting.

Although others argue that maritime archaeology’s relative youth as a discipline has meant that not enough attention has been paid to the field’s theoretical underpinnings (see, e.g., Fontenouy 1998, 49–50), a good argument can be made that a particular theoretical model has driven methodology for underwater specialists, just as it has for land archaeologists. As mentioned above, the new archaeology’s focus on the creation of archaeological covering laws resulted in a significant change in the way that archaeology was done. Archaeologists, like all scientists, struggled with questions surrounding the idea of covering laws. Some, like Binford (1967) and Rathje (1972), gave early examples of laws and resultant explanations that could be applied within certain regions. Others, like Fritz and Plog (1970), appealed to potential universal laws in their work.<sup>13</sup> Still others asked whether archaeological laws were even possible, pointing out that most examples being offered were either very specific and therefore worthless to archaeologists hoping to create general laws (or to observe true universal regularities) or so general as to be trivial.<sup>14</sup>

Binford and others, believing the failure to be with archaeology (and not endemic to Hempel’s models), sought to break through this wall by force. They decided that the only way that archaeologists would be able to discover laws would be to gather immense amounts of data from every source possible, hoping that laws (or at least trends) would start to appear in the process.<sup>15</sup> Binford, for example, devoted a significant portion of his career studying ethnographic data in order to create a system that he believed would eventually

13. Universal hypotheses, or lawlike statements, are meant to be placeholders for general laws. See Hempel (1942/1994) for an explanation of how this happens in both the social and the empirical sciences.

14. Flannery (1973) speaks of two processual approaches: one he calls law and order, based on a strict importation of Hempel’s deductive-nomological model to archaeology, and the other is called Serutan archaeology, which is more relaxed and does not rely as heavily on statistical analyses of data to produce complete archaeological explanations.

15. Interestingly, this idea (gathering data until regularities become apparent) is making a comeback. A movement, termed ‘data-driven science’, suggests that a similar program should use large data sets to uncover laws, or that, given our growing computing power, laws may no longer be necessary for the advancement of knowledge.

mediate between ancient artifact and modern function, a system called archaeological middle-range theory.<sup>16</sup>

For terrestrial archaeologists, this theoretical demand for data revolutionized the methods and the scope of archaeology. Ceramics, building materials and techniques, bones, plant materials, soil samples, scat, and the like were elevated to a position equal to already recognized sources of archaeological data, such as tombs, coins, and inscriptions. Another fundamental change would be directed toward the goals of archaeology. Given the new data-driven needs of scientific archaeology, a good argument could be made that excavations, which focused a lot of energy on a small piece of geography, needed to be deemphasized in favor of large regional surveys. A survey will, by its nature, focus on breadth over depth. This may sacrifice information about specific areas in the survey area, but it will make up for this deficit by providing information about a large area. These archaeologists argued that studying regions over sites would allow archaeologists to better generalize their results, avoiding errors that come with focusing on those specific groups that tend to live in cities (e.g., elites). Additionally, archaeologists could ‘save’ parts of sites for future generations (arguing for better technique over short-term discovery), they could avoid intrusive excavation in sensitive areas (including grave sites of indigenous peoples), and they could save a lot of money (excavations are very expensive). Regardless of the fact that terrestrial archaeology has moved beyond the theoretical goals of processual archaeology, the changes sparked by this theoretical revolution continue to play out in the world’s many current archaeologies.<sup>17</sup>

Underwater archaeologists, having read the same literature as their terrestrial counterparts as they made their way to the water, had the same plan and the same goal: they would collect more data in order to establish covering laws for their nascent discipline. However, features of the underwater ‘landscape’ moved divers in a very different direction than their land-based counterparts. Terrestrialists were not digging as much as they used to, and they were unable (due to the immense amounts of data that could come out of every square meter of soil) and unwilling (due to fears of destroying the archaeological record) to fully excavate sites. Underwater archaeologists, on the other hand, were engaging in as much artifact recovery as possible, bringing up everything from amphorae to ship timbers.

This makes good theoretical sense as, in this context, maximizing data means excavating ships. Although surveys, using a variety of manned and

16. Binford has published numerous articles and books on this subject. Binford (2001) brings his decades of research together and is the best example of what he was trying to achieve.

17. For a history of these changes, see Trigger (1989).

unmanned tools, could provide some data to maritime archaeologists, the fact is that a variety of processes (currents, trawling, etc.) make underwater stratigraphic archaeology difficult, if not impossible, on a regional scale. If the region cannot give the archaeologist much in the way of information, underwater archaeologists argue that the lion's share of data for big-picture issues (e.g., questions surrounding maritime trade or political alliances during a particular period, issues concerning changes in ship construction, hypotheses about contact between different groups separated by large distances) can only be obtained by understanding (excavating) the ships and cargoes found on the bottom.<sup>18</sup> Specialists here could look at the contents of the cargo, amphorae used to carry the cargo, ballast stones and anchors, a ship's configuration, and even the wood (e.g., determining where a ship had been by noting timbers used to make repairs) for their answers. Understood in context, this radically different approach makes sense (given the goals stated above); however, this focus on complete excavation looks very similar to treasure hunting, regardless of the goals of or intentions behind the respective practices.

Ironically, these differing, theoretically informed directions have resulted in much of the distance between terrestrial and underwater archaeologists. Some land archaeologists agree with the public view that underwater archaeology is just treasure hunting with a PhD. For reasons explained above, terrestrialists have been trained (rightly) that archaeology is interested in context. On the land, context is identified with stratigraphy, the key to understanding the complex relationships between artifacts and ecofacts, and the lynchpin of archaeological data. In underwater contexts, although the idea that human artifacts can be preserved for long periods of time is something that specialists have known for some time, and despite the fact that Bass argued that underwater sites should be excavated stratigraphically, most underwater archaeologists believe that the study of stratigraphy is difficult or impossible because of the impact of tidal and other postdepositional factors on artifacts, be they ships or shipyards.<sup>19</sup>

As such, the word 'stratigraphy' is rarely used in books or other teaching resources for underwater archaeologists. Occasionally, a team will find that one shipwreck has come to rest atop another, requiring that the site be excavated one ship (and layer) at a time; in some (rare) cases, such as the sunken

18. This position is not universally accepted. Authors such as Fontenoy (1998) have suggested that hypothesis-based archaeology, focusing on interdisciplinary teams and on survey (as opposed to excavation), is the theoretical future of all (including underwater) archaeology.

19. Lyell (1832, 258) uses lists of manifests of ships lost at sea and accounts of well-preserved materials recently recovered from the sea to argue that, in the future, maritime archaeology will produce more artifacts than can be found on land. For more on this, see Marx (1975, 41).

city of Port Royal, an underwater team has gone to great efforts to excavate and document entire seascapes using stratigraphic methods.<sup>20</sup> However, this is the exception. As little stratigraphy is called for underwater, many underwater archaeologists receive little to no training in it. As stratigraphy is the backbone of terrestrial archaeology, the fact that it is largely absent from the knowledge base (much less the site reports) of underwater archaeologists has led the former to largely dismiss the qualifications of the latter. Underwater archaeologists, however, focus on complete excavation of archaeological materials, both to exact as much information from the materials being studied and because disturbing underwater artifacts, thereby exposing protected materials to open water or oxygen, causes their rapid degradation.

Thus, terrestrialists, concerned with stratigraphy and loath to excavate whole cities, have had problems communicating with underwater archaeologists, unconcerned with stratigraphy and focused on complete excavation. For the most part, this total disconnect simply means that land and underwater archaeologists do not spend a lot of time at each other's conferences and in each other's publications. In contexts where archaeologists are working on coastal cities, however, the fact that land archaeologists do not think of underwater archaeologists as adding to the discipline means that coastal cities are being excavated as land cities, ignoring information from shipwrecks that could provide crucial information about these cities' trading partners, as well as any currently submerged materials that might exist (from materials swept to sea during storms to entire cities that have become inundated with water over the centuries), and thereby missing a huge amount of information about those cities.<sup>21</sup> The goal of this article was to provide a proper understanding of the historical and theoretical factors leading both land and underwater archaeologists to this point. Hopefully, this will result in both groups having a better grasp of the philosophical foundations of their own and each other's disciplines, a reevaluation of the strengths in approach of each discipline, and a renewed working relationship, both on the ground (and water) and in theoretical discussions of the future of their fields.

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20. For information on the Port Royal excavations, see Bass (1972), Marx (1972), and Hamilton (1991).

21. For information on just how important sea level change can be on archaeological sites, see Blackman (1973) and Coleman (2008).

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