Epilogue
Back to the Source

Water is a limited natural resource and a public good fundamental for life and health. The human right to water is indispensable for leading a healthy life in human dignity. It is a prerequisite for the realization of other human rights.

—United Nations Committee on Economic, Cultural, and Social Rights, 2002

Six BEVERAGES HAVE defined humankind’s past, but which will embody its future? One drink has already emerged as the most likely candidate. Like many of the defining drinks of history, it is highly fashionable, is the subject of conflicting medical claims, and has unseen but far-reaching geopolitical significance. Its availability will determine the path of humankind’s future, on Earth and potentially beyond. Ironically, it is also the drink that first steered the course of human development: water. The history of drinking has come right back to its source.

On the face of it, this might appear to be a welcome occurrence. Much of the appeal of other beverages, starting with beer in the Neolithic period, was that they were less likely than water to be contaminated. Only when the microbiological basis of water contamination began to be unraveled in the nineteenth century did it become feasible to tackle a problem that had bedeviled humans for centuries: maintaining an adequate supply of freshwater. Where previous generations turned to other drinks as substitutes, it is now possible to address the problem of contamination directly, through water purification and other improvements in sanitation. Water’s growing popularity, in other words, suggests that the danger of contamination is finally receding. But the reality is rather more complicated. Indeed, nowhere is the gulf between the developed and developing worlds more apparent than in their attitudes toward water.

Sales of bottled water are booming, with the highest levels of consumption in the developed world, where tap water is abundant and safe to drink. Italians are the world’s most enthusiastic consumers of bottled water, drinking an average of
180 liters per year each; they are closely followed by the French, Belgians, Germans, and Spanish. The global bottled-water industry had revenues of around forty-six billion dollars in 2003, and consumption of bottled water is growing by 11 percent a year, faster than for any other drink. Restaurants serve expensive water in designer bottles, and the habit of carrying a small plastic bottle of drinking water at all times, pioneered by supermodels, has become widespread. Stop at a filling station in the United States, and you will find that bottled water, ounce for ounce, costs more than gasoline. Mineral waters from specific sources, from France to Fiji, are shipped to consumers around the world.

The popularity of bottled water stems from the widespread belief that it is healthier and safer than tap water. But tap water, in developed nations at least, is just as safe. While there are occasional contamination scares, they affect bottled water too. In one study, published in the *Archives of Family Medicine*, researchers compared bottled water with tap water from Cleveland, Ohio, and found that a quarter of the samples of bottled water had significantly higher levels of bacteria. The scientists concluded that "use of bottled water on the assumption of purity can be misguided." Another study carried out at the University of Geneva came to the same conclusion, as did a report from the United Nations Food and Agriculture Organization, which found that bottled water was no better from a nutritional point of view than ordinary tap water.

That is hardly surprising, since as much as 40 percent of the bottled water sold in the United States is, in fact, derived from tap water, though it is usually filtered and may have extra minerals added. America's two leading bottled-water brands, Aquafina and Dasani, are derived from municipal water supplies. And although many bottled-water labels depict glaciers, crystal streams, and ice-covered mountains, these images do not always reflect the true origins of the water within. A study by the National Resources Defense Council, an American environmental lobby group, found that one brand of bottled water, labeled as "pure glacier water," came from a municipal water supply. Another brand, claiming to be "spring water," with a label showing a lake and mountains, actually came from a well in a factory parking lot, near a hazardous waste dump. The study also noted that in both Europe and the United States, the quality of tap water is far more stringently controlled than the quality of bottled water.

There is no evidence that bottled water is any safer or healthier than the tap water available in developed nations, and in blind tasting tests, most people
cannot tell the difference between the two. The differences in taste between bottled waters exceed the difference in taste between bottled water and tap water. Yet people continue to buy bottled water, even though it costs between 250 and 10,000 times as much per gallon as tap water. In short, safe water has become so abundant in the developed world that people can afford to shun the tap water under their noses and drink bottled water instead. Since both kinds are safe, the sort of water one drinks has become a lifestyle choice.

In contrast, for many people in the developing world, access to water remains a matter of life or death. A fifth of the world's population, or around 1.2 billion people, currently lack reliable access to safe drinking water. The World Health Organization estimates that 80 percent of all illness in the world is due to waterborne diseases, and that at any given time, around half of the people in the developing world are suffering from diseases associated with inadequate water or sanitation, such as diarrhea, hookworm, or trachoma. There are about four billion cases of diarrhea a year, resulting in 1.8 million deaths, 90 percent of them among children under five. Illness and death are not the only consequences of the lack of access to water; it also hinders education and economic development. Widespread illness makes countries less productive, more dependent on outside aid, and less able to lift themselves out of poverty. According to the United Nations, one of the main reasons girls do not go to school in sub-Saharan Africa is that they have to spend so much time fetching water from distant wells and carrying it home.

The United Nations has set a goal of reducing by half the proportion of people without access to freshwater and adequate sanitation by 2015. But although good progress was made during the 1980s and 1990s, the rate at which people are being connected to safe water supplies has since declined. One problem is that while access to water is still improving in rural areas, its availability in cities has declined in many parts of the developing world. This decline is worrisome, given the unstoppable trend toward urbanization. By around 2007, demographers estimate, more than half of the world’s population will for the first time be living in cities; humankind will have completed the six-thousand-year transition from being a predominantly rural to a predominantly urban species. According to figures from the International Water Management Institute, it would cost an extra $1.7 billion a year beyond what is already being spent to achieve the United Nations' desired improvement in access to water, while improving sanitation would cost a further $9 billion or so a year—a small fraction of the
amount spent on bottled water in rich nations. But there is more to solving the problem of access to water than money. In many cases there are political obstacles too. In recent years disputes over water rights, particularly in the Middle East and Africa, have caused political tension and even military conflict.

Water was, for example, an important unseen factor behind the Six Day War of 1967, when Israel occupied Sinai, the Golan Heights, the West Bank, and Gaza. Ariel Sharon, who was a general at the time and later became Israel's prime minister, noted in his autobiography that although people usually regard June 5, 1967, as the start of the Six Day War, "in reality, it started two and a half years earlier, on the day Israel decided to act against the diversion of the Jordan." In 1964 Syria had started building a canal to divert two of the main tributaries of the Jordan River away from Israel. Using a combination of artillery and air strikes, Israel brought work on the canal to a halt. "While the border disputes between Syria and ourselves were of great significance, the matter of water diversion was a stark issue of life and death," wrote Sharon. Israel values the territories it occupied in 1967, which granted it control of the Jordan's headwaters, as much for their water supply as for any military advantage. The Palestinians who live in the West Bank are allotted just 18 percent of the territory's water; the rest goes to Israel.

Ever since, politicians in the Middle East have cited water as a possible cause of future conflict in the region. In 1978 Egypt threatened military action against Ethiopia if it interfered with the flow of the Nile, Egypt's chief water supply. When Egypt signed a peace treaty with Israel in 1979, its president, Anwar Sadat, declared that "the only matter that could take Egypt to war again is water." And in 1985 Boutros Boutros-Ghali, then the Egyptian foreign minister and later the secretary-general of the United Nations, predicted that "the next war in the Middle East will be fought over water, not politics."

It is hardly surprising that water should be such a contentious topic; rivers and lakes mark international boundaries, and at least ten rivers flow across half a dozen or more borders, so that one country's actions affect other countries downstream. Ethiopia controls 85 percent of the waters of the Nile, upstream of Egypt; Turkey's dam on the Euphrates lets it control the flow into Syria. Flooding has prompted Bangladesh to demand that India and Nepal build dams upstream to control the flow of the Ganges and Brahmaputra rivers.

In the arid region of central Asia, there are fears that growing water scarcity might spark conflict between the former Soviet republics of Kazakhstan,
Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. Another concern is that: climate change will alter the distribution of water, leading to flooding in some areas and droughts in others, affecting agricultural production, and causing political instability. Many observers have, therefore, suggested that water might replace oil as the scarce commodity most likely to trigger international conflict.

Yet water can also promote international cooperation. Access to water is so fundamental that its management has often forced otherwise hostile states to work together. The Indus Basin Treaty of 1960, which dictates how India and Pakistan should share the water of the Indus and its tributaries, has remained in force despite repeated military clashes between the two nations. Similarly, Cambodia, Laos, Thailand, and Vietnam have cooperated over the management of the Mekong, even though the region through which it flows has been racked by war. And in the late 1990s the ten squabbling countries of the Nile Basin signed a cooperative water-management agreement backed by the United Nations and the World Bank. Water, it seems, has the potential to be both a cause of war and a catalyst for peace.

In the longer term, and assuming that humanity manages to avoid nuclear self-immolation, the establishment of colonies on other worlds, starting with Mars, will also depend on the availability of adequate water. The inhabitants of a Mars colony will need water to drink and wash, to grow crops, and to convert into rocket fuel, which can be made by splitting water into its component elements, hydrogen and oxygen. This, together with the search for extraterrestrial life (which is also assumed to depend on water), explains why so much effort is being put into locating and understanding the distribution of water on other bodies in the solar system. Some scientists even believe that colonizing Mars is necessary to ensure the continued survival of humanity. Only by becoming a "multiplanetary species," they argue, can we truly guard against the possibility of being wiped out by war, disease, or a mass extinction caused by an asteroid or comet crashing into the Earth. But that will depend on finding supplies of water on other worlds.

Water was the first drink to steer the course of human history; now, after ten thousand years, it seems to be back in the driving seat. To talk of colonizing other planets seems outlandish, but the idea is surely easier for us to understand than the modern world would be for a person transported through time from a Neolithic village from 5000 BCE. He would not recognize any modern language and would no doubt have difficulty comprehending aspects of modern life such
as writing, plastics, airliners, and computers. But while much has changed in the intervening millennia, some things have remained the same. He would surely appreciate a glass of beer and would recognize the communal toast for good luck and the ensuing companionable atmosphere.

For our Neolithic time traveler, a drink of beer might provide a connection with the future; for us, beer is one of the beverages that can provide a window on the past. When you next raise some beer, wine, spirits, coffee, tea, or Coca-Cola to your lips, think about how it reached you across space and time, and remember that it contains more than mere alcohol or caffeine. There is history, too, amid its swirling depths.
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Appendix
In Search of Ancient Drinks

Are you interested in tasting one of these ancient drinks? Many of them survive, in one form or another. But be warned that you may not find some of them very palatable.

Near Eastern Beer

The most important difference between ancient and modern beers is the use of hops, which is a relatively modern innovation. Hops add a refreshing bitterness to the taste of beer to balance the sweetness of the malt, and also act a preservative, making beer less liable to spoil. But from the perspective of ancient brewers, they are inauthentic. Hops became a standard ingredient of beer between the twelfth and fifteenth centuries, and initially different words were used to distinguish between hopped and unhopped drinks: in English, beer referred to a drink that contained hops, while ale was unhopped. Subsequently, ale came to refer to top-fermented beers, as opposed to bottom-fermented lagers, where the yeast sinks to the bottom of the barrel. I have simply used the generic term beer throughout this book to refer to beverages made from fermented cereal grains.

Traditional folk beers, which survive in many parts of sub-Saharan Africa, are probably the nearest thing to Neolithic beer. They are thick, opaque drinks usually made from a mixture of sorghum and either millet or maize. A typical recipe involves soaking the sorghum in water until it starts to sprout, and then spreading it out to dry in the sun, with frequent turning to ensure it dries thoroughly and does not start to rot. Meanwhile the other, unmalted grain is put into hot water to make a thin gruel. The gruel is left overnight or until it turns sour. The malted sorghum, which has been roughly ground with a stone, is then added to the gruel, which is left to stand in a large pot until it becomes sparkling and alcoholic. Finally, the drink is filtered through a sack or sieve before drinking. (In South Africa I drank some umqomboti, a traditional Xhosa beverage made from a mixture of malted and unmalted sorghum. Thick, creamy,
and off-white, it had a sour tang, reminiscent of yogurt. It was rather like drinking liquid bread.)

The Egyptians and Mesopotamians drank beer that was more like modern beer: It was clear or cloudy rather than opaque, since the wort—the sugary mixture created by cooking the grains in water—was strained before fermentation. During the late 1980s and early 1990s Fritz Maytag, at the Anchor Brewery in San Francisco, painstakingly recreated Mesopotamian beer using an ancient recipe dating from around 1800 BCE, the Hymn to Ninkasi. (Ninkasi was the Mesopotamian goddess of brewing.) Maytag and his team even prepared *bappir*, the traditional "beer bread" made from malted barley to enable it to be stored for long periods. When I sampled a fifteen-year-old piece of *bappir*, it tasted quite good, though it contained a lot of chaff. Those who drank the resulting beer said it tasted sweet by modern standards, due to the lack of hops.

There have also been several attempts to recreate Egyptian beer, notably the Tutankhamen Ale produced by the Scottish and Newcastle Breweries based on research by Delwen Samuel of Cambridge University. Her electron-microscope analysis of brewing residues led her to conclude that Egyptian beer was made from a mixture of malted barley and unmalted emmer (a kind of wheat), which makes sense since malting is a labor-intensive process. The barley was malted and ground and then mixed with cold water to liberate enzymes, and the emmer was ground and mixed with hot water to liberate starches. When the two were mixed, the enzymes broke down the starches into sugar. The wort was then sieved to remove the chaff before fermentation; depictions of this step have been wrongly interpreted, says Samuel, as loaves of bread being crumbled into the vat. Following this recipe produced a fruity, sweet beer that was golden in color and slightly cloudy. The one thousand bottles produced were sold at Harrods.

It is hard to find anything similar to Egyptian or Mesopotamian beer today since very few unhopped beers are made commercially. A rare exception is the King Cnut Ale made by St. Peter's, a British brewery, based on a recipe from the first millennium CE and named for King Canute, the eleventh-century ruler of Denmark, Norway, and England. It is made with barley, juniper, orange and lemon peel, spices, and nettles. It resembles beer, but without the bitterness of the hops it tastes sweet and fruity—and, in fact, rather like wine. Drink this beer, and you will understand why Nabonidus, the last king of the NeoBabylonian Empire, referred to wine as "the excellent 'beer' of the mountains." Another example of an unhopped beer that is still made today is Sahti, a Finnish folk
beer. Michael Jackson, a beer expert, calls it "the last primitive beer to survive in Europe." Traditionally a seasonal beer, it is available all year round at Zetor, a pub in the center of Helsinki, where it is kept in plastic kegs in a fridge. It has a bouquet of stewed chicory and the tang of a wheat beer but, of course, no hops. Instead, as with King Cnut Ale, juniper berries are used to balance the taste of the grain.

Greek and Roman Wine
The finest ancient wines, as people of the time noted, were those that did not require adulteration or additives to conceal their faults. So they would probably have tasted similar to modern wines (though, of course, the Greeks and Romans almost always drank their wine diluted with water). Overall, though, the practice of adding things to wine, at every stage from fermentation to serving, was far more widespread. Most wine was probably of far lower quality than even the cheapest modern wine, due to the far lower standards of hygiene and the difficulty of storing wine for long periods. As a result, wines were usually blended and flavored to produce a more palatable or consistent product. Very few of these practices remain in modern wine making; a notable exception is the use of pine resin in the Greek wine, retsina. The use of resin as a flavoring and preservative has ancient origins and was not restricted to Greece in ancient times. It may have arisen from the use of resin to coat the insides of amphorae, to prevent wine from seeping out. Retsina mixed with water, then, gives a fair approximation of one style of ancient wine.

Other styles, however, involved the addition of herbs, honey, or even seawater at various stages of production. Several Roman wines have been recreated, using recipes, techniques, and equipment from the period, by Herve Durand and his family at the Mas des Tourelles winery in the south of France, on the site of a Roman vineyard. One wine, called Mulsum, is a red wine that contains herbs and honey; it is sweet, but not overly so, with spicy notes. Diluted with water, it tastes rather like Ribena. Another wine, Turriculae, is based on a recipe recorded by the Roman writer Columella. It is a white wine made with a small quantity of seawater and herbs, chiefly fenugreek. It is straw-colored and tastes remarkably like a dry, nutty sherry; the saltiness of the seawater is well integrated and not too conspicuous, so that it tastes like a natural part of the wine, rather than an additive. The third of Durand's Roman wines, Carenum, is a
dessert wine made from red wine mixed with *defrutum* (a boiled-down, spiced wine used as a cooking ingredient by the Romans) and herbs. The addition of *defrutum* raises the alcohol content and the sweetness; the result tastes quite similar to a late-harvest Zinfandel. All of these wines can be purchased at the winery.

Several winemakers produce wine using grape varieties that supposedly date back to Greek and Roman times. Particularly noteworthy is the Mastroberardino winery near Naples, which makes wines from the Greco di Tufo, Fiano di Avellino, and Aglianico grapes. The first is a white grape thought to have been introduced to Italy by the Greeks, the second is another white grape favored by the Romans, who called it Vitis Apiana, or "the vine beloved by bees," and the third is a red grape that is used in Mastroberardino's flagship wine, Taurasi. Such is the Mastroberardino family's devotion to ancient grapes that they were recently asked to replant the vineyards of Pompeii. Yet they are equally devoted to modern wine-making technologies, such as refrigerated stainless-steel tanks and rotary fermenters. This ensures that Mastroberardino wines are clean, vivid, and powerful, but also completely inauthentic; they include no herbs or seawater, for example.

To serve a modern wine in the Greek or Roman manner, the main thing to remember is to dilute it with water. Do so, and you will notice something surprising, namely, how well a wine's bouquet and taste survive dilution. Andre Tchernia, an expert on ancient wine, tells the story of meeting at a conference in Saint Emilion an eminent winemaker whose mother had always drunk her wine mixed with water—but who could still distinguish between different vintages. Even though the Greeks and Romans diluted their wines, in short, this did not impair their ability to recognize and appreciate various styles and vintages.

**Spirits from the Colonial Era**

The process of making distilled drinks has not changed significantly since colonial times, and some distilleries dating back to that period are still operating today, making brandy, rum, and whiskey. Spirits appealed less for their taste than for their power to intoxicate, which is why they were often consumed in cocktail-like mixtures such as punch or grog, the forerunners of modern cocktails. It is a simple matter to recreate grog by mixing dark rum, water, and brown sugar with some lemon or lime juice, though modern drinkers may then wish to move swiftly
Coffee from the Seventeenth Century

The traditional Arab method for preparing coffee involves bringing a mixture of ground coffee beans and water to the boil three times in quick succession. This agitates the coffee grounds and extracts a lot of flavor, resulting in a strong, black drink. When coffee was brought to Europe, however, its preparation was rather more haphazard. In England, coffee was initially taxed like a form of beer, namely by the gallon, which meant that London coffeehouses had to prepare their coffee in advance in order to pay duty on it. The cold coffee was then reheated for consumption. To ensure a ready supply, a pot was kept near the boil, which would have resulted in a strong, bitter drink best taken with sugar. Perhaps the nearest modern equivalent, suggests Jeremy Torz, a London-based coffee expert, is the coffee in an office percolator that has been left switched on for a day or two. He notes that seventeenth-century coffee would have been quite lightly roasted in a pan or tray; deeper, darker roasts had to await the development of elaborate roasting machines. Being transported in a damp ship, possibly alongside powerful spices, might also have affected the coffee's taste. All of this suggests that there would have been wide variations in the taste of coffee between one coffeehouse and another, and from one week to the next. The presence of caffeine, and the surroundings in which the coffee was served, would appear to have been more important than its taste. (The coffee filter was a twentieth-century invention.)

Old English Tea

The first tea to be brought to Europe in the seventeenth century was green tea made from unoxidized leaves, which was consumed without milk or sugar. Green tea from China can be readily purchased today and probably tastes very similar. Black tea became popular in the eighteenth century, partly because it was less likely to contain toxic adulterants, but its greater bitterness promoted the addition of sugar. This tea was made from semioxidized leaves and was known at the time as bohea; this style of tea became known as oolong in the 1850s, by which time even stronger teas, made from fully oxidized leaves, were also becoming
popular (and which may also, confusingly, be called oolongs). So a light, semioxidized oolong gives an impression of eighteenth-century tea, but one that is inaccurate in two respects: It is not adulterated with other ingredients or blended with other teas. The nearest equivalent to the dubious blends of the eighteenth century is probably low-cost teabags. Many tea blends and styles survive unchanged from the nineteenth century, such as Earl Grey (flavored with bergamot) and English Breakfast Tea.

**Cola from the Nineteenth Century**

Today's Coca-Cola is still made using the original secret recipe, but that recipe has been tweaked a few times, notably to reduce the level of caffeine and replace the original trace of cocaine with flavorings extracted from coca leaves. For a cola with an entirely legal extra kick, try Jolt Cola, which contains more caffeine than Coca-Cola and was favored by programmers during the dot-com boom. Several firms also make speciality colas using old-fashioned recipes. I am partial to Fentiman's Curiosity Cola, an old-style cola that contains extracts of guarana berries and catuaba bark, both natural stimulants, as well as caffeine.