

2021-2024

PLASTIC SEA ISLANDS

There is a new twist to the ocean's giant regions of plastic waste, such as the Great Pacific Garbage Patch, that has apparently surprised marine biologists. Coastal marine organisms such as anemones and rock-dwelling polyps that inhabit nearshore or even intertidal environments are now being found attached to plastic trash in the middle of oceans. Although scientists surmise that nearshore species may have hitched temporary rides on degradable oceanic "vehicles" (e.g., logs or flotsam) in the past, their permanent residence in the open ocean is novel. This observation raises questions about whether the immigrants are competing with resident pelagic species for food, space and other resources and whether they may eventually evolve adaptations for better exploiting their plastic environment. In any case, it appears their new anthropogenic habitat is continuing to expand.

LITHIUM FROM WATER

A growing concern about global climate change has accelerated the replacement of gasoline-powered vehicles with electric ones that require large quantities of lithium for the batteries. Large-scale terrestrial mining of lithium is damaging to the environment; hence, researchers are looking to water as a more benign source. Highly concentrated salt solutions, known as brines, are available from geothermal and lacustrine sources that can be further concentrated in evaporation ponds or supplied with an energy-efficient heat source (e.g., solar) that expedites evaporation. Because lithium represents such a small percentage of seawater's ions, its use as a source is generally not practical. However, an electrochemical method that enhances lithium's separation from the more abundant ions is now available. Perhaps the brines produced by desalination can one day serve as a lithium source.

OPTIMAL DRINKING WATER? (part 1)

Whereas the emphasis on water quality has traditionally been removing contaminants to reduce health related issues, the topic of beneficial attributes for water (either naturally-occurring or additions following treatment) has received considerably less scientific attention. Potentially healthful benefits of drinking water have focused on minerals such as calcium, magnesium and potassium; however, their bioavailability from water is variable and dependent on an ion's valence state, a person's gut flora and their concurrent intake of food. Water provides less than 5% of our requirement for most essential minerals, although calcium and magnesium can reach 20%. As such, communities characterized by harder waters have been associated with lower rates of cardiovascular disease, hypertension and other diseases, perhaps because magnesium is a common mineral deficiency. Still, food remains our major source of minerals.

OPTIMAL DRINKING WATER? (part 2)

Besides the dissolved minerals in drinking water, there are several other physical/chemical attributes (e.g., molecular structure, pH, ORP, deuterium content) that have been postulated to affect human health. Molecular structure is the most controversial of these attributes because it is difficult to measure and the persistence of clusters following ingestion has not been demonstrated, particularly in light of the processes by which water enters living cells. So-called alkaline (high pH/low ORP) water has been portrayed as an anti-oxidant and acid neutralizer; however, its ability to retain these physical properties long after ingestion is also frequently disputed. Similar to alkaline water, the benefits of deuterium-depleted water are based mainly on treating health problems, rather than maintaining health; however, the mechanisms by which normal biological processes favor hydrogen over deuterium are recognized.

SAVING A GLACIER

The recent discovery of massive cracks in the ice shelf of Antarctica's Thwaites Glacier has concerned scientists because if the tongue of the glacier breaks off, it could precede its entire loss and subsequently raise sea levels by as much as 10 feet worldwide. Hence, there are a number of proposals to buttress the glacier using artificial braces, berms or islands that would buy time (probably a few hundred years) to cut greenhouse gas emissions and maybe stabilize the climate. Another proposal is to install anchored curtains around the ice that would redirect the warm dense waters that are melting the ice from below. Logistical, legal, and engineering challenges (not to mention the costs) associated with these alternatives are huge and their probability of success is unknown—as are their unanticipated effects on the local environment. It comes down to a question of what's the riskiest path.