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## Rethinking the Inedible

By JESSE H. AUSUBEL

I learned to fish in the 1950s from the Oak Bluffs Steamship Authority pier. About 100 yards from shore, we used to catch black sea bass, blowfish and the occasional tautog while watching the SS Nobska and other ferries dock and cast away.

Seafood is astonishingly delicious, and tastier and more varied in markets than ever, owing to improved storage and transport. Before the advent of refrigeration, fresh sushi was a delicacy for the emperor of Japan. Allowing a part to stand for the whole, we may say that the democratization of sushi has changed everything. Survival is hard, even if you can leap at 60 mph like a swordfish.

For the past decade I have participated in the largest study of marine life in history, the first worldwide Census of Marine Life. The census covers microbes to mammals, near shore to mid oceans, and abyssal mud to foaming waves. The results on about 250,000 forms of marine life will be reported in October 2010. The motto of the census is making ocean life count. Most scientists involved in the Census believe there will be less to count in 2020 and a lot less in 2050.

Humans do hunt plants and animals to extinction. Consider a terrestrial example. Many types of contraceptives have always existed in the form of vegetables and seeds that contained hormone mimics. The Greeks and Romans extensively used a plant similar to fennel for contraception. The plant grew wild in Libya. To stress its commercial value, the Romans minted its image on coins, so the plant can be exactly identified. It was harvested to extinction.

Complete extinctions are harder to achieve in the ocean than on land, but locally many species are disappearing. Who would have guessed in 1960 that buck-toothed blowfish would become rare in Vineyard waters?

We can understand that in a world of seven billion human tongues aquaculture must largely replace hunting of the wild animals for many, maybe all forms of marine life. We are accustomed to the reality that even vast America does not produce enough wild ducks or wild blueberries to satisfy our appetite. Fortunately, farming of oysters, tilapia, and other herbivorous species spare other marine animals from doom.

But perhaps humanity must range further during this century to provide food that spares land and sea for nature. I am a backyard farmer and love my cherry trees, but obviously feeding an ever larger crowd only by means of agriculture or aquaculture is a complicated business. In fact, it is already being circumvented. Look at what shoppers actually pick up in the food aisles and outlets. For sure, the cows are incidental.

Back to basics, we depend on the hydrogen produced by the chlorophyll of plants. Once you have hydrogen, for example, produced by means of nuclear energy, a plethora of microorganisms are capable of cooking it into the variety of substances in our kitchens. Researchers for decades have been producing food conceived for astronauts on the way to Mars by cultivating hydrogenomonas on a diet of hydrogen, carbon dioxide and a little oxygen. They make proteins that taste like hazelnut.

A person consumes around 100 watts. A current nuclear power plant has a power of a couple of gigawatts: enough to supply food for a few million people from, say, 2,500 acres for the power park. A spherical fermenter of 100 yards diameter could produce the primary food for the 30 million inhabitants of Mexico City. The foods would, of course, be formatted before arriving at the consumer. Grimacing gourmets should observe that our most sophisticated foods, such as cheese and wine, are the product of sophisticated elaboration by microorganisms of simple feedstocks such as milk and grape juice.

Globally, such a food system would allow humanity to release 90 per cent of the land and sea now exploited for food. As in West Tisbury and Chilmark, humanity might maintain artisanal farming and fishing to provide supreme flavorings for bulk tofu.

If values permit. Recent video of a veined octopus building a shelter from coconut shells shows intelligence in my eyes comparable to a dog. Human rights entered the vernacular in the 1970s and animal rights in the 1990s. Not only the octopus, but microbes may have a case, too. Consciousness and intelligence exist in bacteria. A slime mold presented with two food sources systematically connects to the food sources through the shortest route. We may define intelligence as the capacity to solve problems in a changing context, which requires memory and computing power. Both are essential, and single cell organisms seem to have them.

Eating will get tougher during the 21st century.

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