Seedhead n+8

blabber

THAR SHE BLOWS

Oil is a renewable resource. Whale oil, that is. Nantucket Island harvested her first whales around 1672, probably Right whales migrating by just offshore, harpooned from rowboats launched off the beach. Groping around at a new industry for the teenage colony whose agricultural base was already in decline, the island's aldermen had brought in some Basque whaling consultants to teach Nantucketers the trade. The whales were towed back to the beach to be "cut in" and the blubber "tried", or rendered into oil by cooking in a large cauldron. The oil, stored in wooden barrels, was sold as a lamp fuel, for candle making, and as a lubricant. The meat and bones were left to rot on the beach or wash out to sea. Having exhausted her topsoil in just thirteen years, Nantucket got busy exhausting the ocean of whales.

The rowboats launched through the surf into the lumpy North Atlantic soon led to multi ton schooners, with voyages of a few months, and the schooners in time led to multi hundred ton ships, with voyages of a few years. As with most human endeavors, the art and science of whaling was refined and improved with zeal. In 1712 a schooner blown off course happened to kill a sperm whale, and its superior quality blubber, high-grade spermaceti, and occasional load of ambergris helped to really make oceanic whaling profitable. A whole culture developed around whaling. Words specific to the industry, songs, an elaborate art form (scrimshaw), and a hierarchy of specialized skills. For the rest of the 18th century whaling boomed. In New England, spreading from Nantucket to mainland ports like New Bedford, ships and barks and brigantines plied the North and South Atlantic, using wind to get whales to get oil. At first there were herds of whales, hundreds of thousands of each species in the Atlantic alone. As the 18th century wore on, the whalers went farther for longer to fill their holds.

In 1793 "Rebecca" rounded Cape Horn and initiated Yankee whaling in the Pacific. As the 19th century got underway, New England scoured the Pacific for its remaining leviathans. By 1840, when 21-year-old Herman Melville signed on for an 18 month whaling voyage on board the Acushnet, Nantucket was the third largest city in Massachusetts, and New Bedford was approaching its zenith of over 300 vessels and 10,000 men employed in the whale oil industry. The springy baleen of the plankton eating whales was buttressing the female figure in a myriad of corsets, bustles, and hoops. Captains returning to Nantucket from distant lands brought back pineapples and shrunken human heads as gifts for their little ones who had grown up while they were gone. A few generations of people grew up and died in the folds of the thriving cities, proud civic and industrial infrastructure, and global economic undertaking that marked the communities that dispatched the ships. After 150 years of vigorous whaling the whale populations in the easy to harvest latitudes were waning. The whales were in decline. The New England whaling industry would be dead in twenty years.

Tooling around recently in a half ton sloop between Nantucket and New Bedford caused me to think about the days of whale and sail.

Pleasure sailing for the idle rich has replaced the gruesome working conditions aboard the Yankee whalers. The idea of goring a beautiful sea mammal to death in a blood fest, let alone allowing such a mess on the deck, is now utterly repugnant to the remaining sailors here in Buzzards Bay. Nevertheless we preserve the history with pride, we preserve a bit of the argot, referring to the toilet as "head" and across as "athwart", and we preserve an iota of the skills, tying the proper knot for the situation, and sailing around sans engine with one eye on the sea and the other on the weather. The Seal Rocks and the Sow and Piglets Reef we avoid are the same. The tidal rips and capricious winds are the same. After a day of squalls thrashes and drenches us around Saconet Point we are becalmed the following day in the shipping lanes near the Cape Cod canal, as a heavy fog sets in. I reverse the roles of the boat and the dinghy and start rowing, towing the little sailboat and Dawn behind. Believe it or not, they used to move the big square-riggers in and out of harbors this way, using several rowboats each with four oarsmen. Because there are still occasionally collisions between ships in the fog, we don't sing a rousing shanty, but listen carefully to the traffic in the beautiful, eerie, blanketing stillness.

Despite rowing for three hours I still can't fall asleep that night at anchor in Cuttyhunk. I am plagued by thoughts of our anchor dragging in the mud and those Yankee whalers. In the 1840s did anyone talk about the whales running out? Was there a math teacher who opined in the New Bedford Gazette that something should be done to preserve the stock of whales for future generations? Were there philosophers in the bars along the wharf who predicted the year when the last whale would be harpooned? Were there captains who after a few drinks in those same bars angrily dismissed the philosophers by exclaiming "the ocean's infinite and the whales will last forever!"? At the annual meetings of the board members of the whaling companies did the old men who financed the building of the big ships and outfitted them with ten thousand square feet of canvas, ten miles of rope, and tons of iron and bronze hardware—did they nervously question the captains about the availability of whales in the South Pacific? Did they quietly talk among themselves about the dwindling whale reserves and the possibility of exploring for whales in the Arctic?

In 1859 petroleum oil was refined in Pennsylvania for use as an illuminant. In 1879 the electric lamp was invented, cleaner burning than the finest sperm whale oil. In 1906 carbon steel alloys were widely introduced, and spring steel wire immediately found service in the mysterious inner supporting garments of the female fashion industry. Even though the whales never totally ran out, the whaling industry collapsed. The population of Nantucket plummeted. As early as the Civil War, just a few years after New Bedford's peak of whaling infrastructure, the old whaling ships were sold as junk to the Union Army to be scuttled outside southern ports in a blockade.

Even as it was dying, people of great vision recognized how pretty in many ways the era was (conveniently ignoring the harm caused to people and whales). They began archiving the memorabilia: the ships' logs, the paintings, the scrimshaw, the rope work, the harpoon points. Museums now preserve these keepsakes of our heritage, and the history of the beauty and hardship of the product that defined 150 years of Massachusetts' history: whale oil.

When a technology is replaced it is difficult to predict what will come along and how much disruption the change will cause. When Edison invented the light bulb, he was not working on a way to save the sperm whales, and he was not trying to destroy the city of New Bedford. One thing about the conquest of new technologies is always true, however. The new technology is at first always inferior to the old. When the original steam locomotive broke down on its first day of service, the teamsters trying to run the damn thing fetched some good old mules to finish the run. When the first iron-hulled ship was introduced, the shipwrights along the Falmouth quay howled with laughter and sailors were terrified to put to sea in it. The first

steamship required so much coal to fuel her that there was no room for cargo or passengers. The first computer was barely more powerful than an abacus yet required an entire building of cacophonic equipment just to keep it cool. In order for these technologies to dominate their antecedents they required investment, visionary support, aggressive bolstering, and often treachery and deceit to aid in their development. The light bulb was useless without the power plants and distribution grid to supply it with current. It took a fantastic amount of vision and money and cajoling to get society to build this infrastructure. The job made building a whaling ship look like a yachting vacation.

As I write this the world supplies civilization with 90 million odd barrels of petroleum oil per day. Petroleum supplies 40% of human's metered energy, and more crucially, 90% of human's metered transportation fuel. The rate of petroleum production is expected to peak around 2010. Petroleum exploration yields fewer and smaller fruits. Meanwhile, our society's transportation habits are as profligate as ever. Instead of cheerfully adopting new technology and collecting memorabilia for the petrol-era museums, our society manifests the illness of the bereaved mother chimpanzee who clings bitterly to her dead infant and lashes out furiously at the zoo attendants who try to pry it gently from her arms. I do not claim to know when or how the petroleum era will end. I doubt we will return to whaling for oil. The lesson of the whale oil era is only that, as infrastructure lags behind production the way current lags behind voltage in a circuit, we may feel most comfortable only moments before the crunch.~

Contact Seedhead Zine: e-mail Luseedhead@yahoo.com ~

D'ABORD LES OISEAUX

As children we are commonly taught that authority is associated with being right. As adults we learn the murky reality, authority rests with who creates the truth. Some people are shocked to see deception uncovered; I am shocked to see assent and compliance.

There is a funny story about authority that I found in Daniel Boorstin's The Discoverers. Boorstin, reviewing the great contributions to science and technology, credits the ancient Chinese with discovering time and the calendar. Brilliant Chinese astronomers measured the length of the year with astonishing accuracy and applied their results to the development of a superior calendar. Subsequent emperors arbitrarily altered the calendar simply to demonstrate their absolute and divine power. These "whimsy calendars" were forced on the populace by fiat. So a peasant could follow the law, plant by the emperor's calendar, and watch their family starve, or break the law, plant by common sense (or the astronomer's calendar) in the correct season, and risk punishment. Nowadays information is still the staple grain, and what we are force-fed has no nutrition.

In addition to the Emperor (and governments of other sorts), religions were the other early manufacturers of truth. Take Galileo. Galileo was not slapped down because his idea threatened Christian doctrine. Recall that Galileo, a very pious guy, thought that the best model for understanding the observed behavior of celestial bodies (planets) was to adopt the view that the planets all went around the sun. It is very important to understand that Galileo's "proof" of this (what we now call a fact) was very weak (and he knew it), and would not have stood up to any peer review. Galileo was convinced that by understanding tides he would eventually really prove his hypothesis, and wasted a lot of time trying to understand tides, which is near impossible. Basically Galileo saw how the model of the sun being in the center simplified the geometry and was therefore a beautiful theory, and being more beautiful it was how God wanted it, and thus "true". Now it is easy to understand why Galileo was slapped down (tried and found guilty) by the Pope. By interpreting God's

will, Galileo usurped the Pope's authority. After all, it was the Pope who slapped down Galileo, not God.

Galileo is remembered as the father of the Renaissance. It is believed that his defense of Copernicus against the Church represented the initiation of the Scientific Age, where through senses and intellect an individual could describe the world better than the Bible and the Church could. But Galileo did not even claim to prove Copernicus, he merely noted the elegance of Copernicus and inelegance of the others from a strictly kinematics (things moving around) viewpoint. And he was obstinately wrong about a bunch of other things (tides, comets). It is easy to imagine, had the church "won" the battle and Fox News wrote the history, how Copernicus and Galileo would be portrayed in hindsight as confused, meddling, troublemakers. They were followers of the Greeks (the Greeks, somehow, invented Copernican theory long before Copernicus), who, everyone knows, fucked little boys.

Regardless of who is writing the history, it is easy to show that, even as early as Galileo, progress of scientific ideas wasn't a rigorous step-by-step logical process like the building of a brick wall. It was (and still is) an unruly heap of scraps of data, analysis, insight, intuition, recycled models and pirated ideas. Is science, then, just another machine for manufacturing truth? It may be, but it is a very special machine. Very unlike the others, Science at least purports to have an absolutely egalitarian doctrine of interpreting the truth. Anyone is empowered to contribute to the "truth" if they follow the rules of scientific method, reproducibility of results, and peer review. This doctrine of allowing a constant universal feedback loop to adjust the truth at any time is whacky. It would mean instant death for any religion—nothing can be sacred or holy, no one is directing the show, too many questions. As for emperors and other forms of government, these mediums through which people's wills are modulated have nothing to do with truth. Nobody's will, neither the emperor's nor the peon's, desires the inconvenient interference of truth.

So Science became another institution besides emperors and religions for making up truths. It didn't replace religion or emperors, both of which go right on inventing the truth, using science when it serves them, and making it illegal when it challenges them.

Of all the myriad examples of truth creation one can contemplate, one of the greatest of our time has to be the fable of "Christopher" (name sanitized for Anglo-American consumption) Columbus. It takes place in the context of a bizarre mindset that imagines the whole world outside of Europe to be "undiscovered" because European churches and emperor's wished to be ignorant of it. We are taught in grammar school that Columbus, the innovator, took a risk with some Spanish venture capital, and profited handsomely in the discovery market. Now there is a book, 1421, by Gavin Menzies, that claims that Columbus left Spain with accurate maps of what he was about to discover and that the Chinese who made these maps had already thoroughly explored the place (and the whole world!), and made friends with the original discoverers who got there 10,000 years earlier (native Americans). That the memory of Columbus is fraudulent doesn't bother me. The detail of this fable that always irked me is the idea that Europeans did not know there was land across the Atlantic, that they were superstitious that the earth was flat and voyagers to the west would encounter horrible monsters before they fell off the edge and straight into hell. With or without Chinese charts, the ignorance and superstition of European society is the premise that makes Columbus's voyage seem remarkable. I accept that the church was ignorant and superstitious, because it served their purpose. Perhaps this superstition wore off on many people. But I don't believe that the fishermen who lived along the French, Basque, and Portuguese coasts didn't know that the earth was round and land laid to the west a ways. First of all, the Basque fished cod on George's and the Grand banks for several centuries before Columbus. In good weather they saw

Newfoundland and other points, and the cloud formations and clouds of birds that say "land". Like freshmen at the dance, they were afraid to go ashore and introduce themselves, but they occasionally did. There is a hilarious mention of this from a much later (1602) voyage of "discovery". Gosnold is credited with "discovering" the Elizabethan Islands (the little islands off Cape Cod). When his Concorde drops anchor in the lee of Cuttyhunk the local Wampanoag sail over to greet them in a "Basque shallop" (small fishing sailboat) wearing "European clothing" (This was taken from Paul Schneider's The Enduring Shore). Although it is not clear whether the Basque shallop was acquired through trade, salvage, or plunder, the point is that illiterate fishermen probably preceded ship's chroniclers on the New England coast, though we can only guess by how many years or centuries. One other interesting tidbit from the Gosnold story is that the mercantile aspect of the voyage ended up being a ship full of sassafras bark, in great demand as a medicine in England at the time. The Basques, favoring cod over bark, may have lacked incentive to go ashore at first.

Then there are the birds. Every year millions of arctic terns migrated across the Atlantic from Labrador and rested on the shores of Southern Europe before catching the northeast trades to South America. A dumb tourist or wandering preacher might have mistakenly thought "these exhausted birds come from England" or " these exhausted birds come from the sea" or even "these exhausted birds are from hell", but not a seafaring fisherman. People who live on the coast and use the ocean for subsistence understand birds, and this great annual migration of birds across the Atlantic telegraphed the certainty of land on "the other side". I wonder if the sharp eyed Galician mariners ever bothered to share their observations with the rep from Rome (or wherever) who came less regularly than the terns to babble over them in Latin and cop a bit of tribute.

As for the shape of the earth, for peoples who have navigated at sea the assumption of a spheroid shape has always served them well. The ancient Chinese, the ancient Greeks, and, I am convinced, most seafaring boat pilots (although not necessarily sailors on board large ships, who weren't themselves responsible for navigating, and were more connected to the ship than to the sea), supposed the earth is a sphere. Navigation is the thread that connects Truth, Science, calendars, Galileo, astronomy, fishing, and birds. It is the original non-violent endeavor with dire consequences, where the natural world is both the bible and the adversary. It is an applied science with an unambiguous test for success: Did you get home? Strong incentives motivated people (and birds) to leave: food, trade, marriage, and plunder. Navigation determined who consistently returned, weeding out bad theories and fraud.

Like many truths, where one is can be determined accurately by many means. With an optical instrument called a sextant, a clock (called a chronometer if it is precise enough for navigation), and the Nautical Almanac (calendars of astronomical data), two celestial observations can be reduced to a point on the globe, thus "fixing" a position. This is called Celestial Navigation.

There is also dead reckoning. Dead reckoning is the strange term for navigation by a whole encyclopedia of techniques, tricks, rhymes, judgments, and guesses. To some purists dead reckoning refers only to the practice of recording the distance and direction traveled from the last known location. Due to uncertainty this yields a circle on the map or chart within which you are. Hopefully when the circle is drawn on the chart there are no reefs or boat swallowing whirlpools within it. Sometimes the circle overlaps a considerable chunk of land, which, if at sea, reduces the amount of uncertainty at the cost of greatly increasing anxiety.

Normally dead reckoning also refers to using one's surroundings such as observable ocean currents, color of the sea, wind, weather, clouds, sky, birds, and other animals to figure out a location. Once I had an epiphany about dead reckoning. Long before Europeans

ventured across oceans there were several ancient cultures that sailed the open seas. The South Pacific islands were colonized by canoe sailors who successfully navigated the open ocean between tiny island archipelagos separated by vast distances. They were expert navigators and used a form of instrumentless celestial as well as dead reckoning and charts. You can see one of their charts at the MFA in Boston. The seashells represent the relative locations of islands, while the rows of little sticks all lashed together represent the typical wave train orientations of the ocean. Unfortunately the MFA exhibit does not present the modern nautical chart of the same area for comparison. It's probably not the first time that an instrument of science from another culture is displayed as folk art. While sailing our canoe along the SW coast of Florida we would anchor well offshore on calm nights to escape the mosquitoes. One night I lay on the deck looking up. As the canoe swung gently on her anchor only the stars above me indicated motion. In a few moments I was oriented. I realized that to early seafarers the night sky was a map as easy to read as the buoys leading into a harbor. The stars always locate you just like satellites locating a GPS. The apparent nightly and seasonal motion of the stars didn't bother the ancient navigator any more than the time of day or season affects my ability to walk home from the trolley stop. When you are a Polynesian canoe sailor, the sky *is* your neighborhood! It is strange that a close relationship to the natural world is referred to as "dead" reckoning. It should be called "alive" reckoning.

Some people think of science as only the strict application of scientific method. That is like thinking of navigation as only the strict application of sextant, chronometer, and nautical almanac to the determination of position. In reality scientists develop an intimacy with their specialty that causes them to make non-deductive conclusions. Science, like dead reckoning, is "alive".

Twice (on land) I have used the following method of reckoning. Everyone present and lost closes their eyes and points in the direction they think home is. Eyes are opened, the one outrageous error in the group is discarded, and the group proceeds in the direction of the average of the remaining fingers. This might be called "reckoning by committee", use it at your own risk. In general, however, if two navigators disagree on the direction of their agreed upon destination, they are likely to agree NOT to compromise and steer the middle course where they both agree the destination isn't. They may be bitterly at odds about who is correct, but would resolve to steer one course or the other rather than compromise on certain peril. In this way science and navigation are undemocratic. Compromise is untenable when two theories contradict eachother.

While standing at the helm of a sailing ship (outside on the quarterdeck) and steering her across the Caribbean Sea from St. Vincent's to Panama I had many lonely and peaceful hours to contemplate the night sky around me and the truth it reveals to the mariner. Of course, the basic premise of celestial navigation is that the earth is a sphere, or at least has no flat surfaces. Otherwise the parallel rays of light from "infinitely" distant stars would appear to be at the same angle from different locations on a plane. But I tried to erase these models from my consciousness and just behold the world around me as early mariners might have. On calm nights the ship seems large compared to the waves, and we "stand still" while the water gurgles past. The familiar pattern of the stars sweeps out an arc around us. Whatever part of a circle the moon is also arcs across the "dome of the heavens" under the center of which peers my eyeball. The horizon is perpetually equidistant, 360 degrees around. Without the physics of spinning and gravity I wonder what these rude fishermen of old thought about this circular realm. I wonder if it occurred to them, as it occurred to me after fifteen days out of sight of land, that a sphere is the only shape that looks the same no matter where you are on it.

What does navigation have to do with authority? As an archetypal science, navigation was, over time, self-correcting. Navigational theories gained authority by repeatedly bringing home the goods, while nature discarded the bad theories along with the adherents. And the theories that were tried and discarded or adopted were as weird and counterintuitive as imaginable. The idea, for example, that a little piece of ore suspended by a thread would point at the pole star even when the pole star is not visible, is not at first obvious. Add to this theory the vastly more complicated observation that at every point on the earth there will be a noticeable error in the direction the ore is pointing (magnetic variation), and furthermore, this error will change slowly over time, and one wonders how this theory persisted long enough to gain acceptance. That a dangling piece of ore can, with a toolbox of caveats, determine direction is no more commonsensical than a wounded dog determining longitude with its periodic moaning. And yet as imperfect a tool the compass originally was, it worked, and the lacerated dogs didn't, and so the compass gained authority and the dogs were left alone.

Imagine developing navigation, dead reckoning, and all of these instruments that assist the navigator without ever putting out to sea, and it is easy to imagine that there would be hundreds, if not thousands, of babbling authorities on navigation, with a thousand different tools and techniques, probably all flawed. Navigation requires a voyage, or several thousand, to give it authority. When I have occasionally used the internet to try and get an answer to a question I find that somewhere on the internet almost any assertion is recorded as true and somewhere else as false. There is no consequence for making a false statement on the internet, and therefore, as the size of the medium is large enough, the statements made in cyberdiscussions take on the character of a random distribution, not necessarily around the truth. We might hope or dream that the progress of science is like the supposedly rigorous practice of celestial navigation, successive observations leading to a succession of unambiguous points on a chart. Really, just as no navigator relies solely on celestial, no scientific progress is made without the "dead reckoning" of a thousand details, assumptions, and guesses.

Today science is specialized, like so many other endeavors in modern society. We are often told by scientists, politicians, and the media to have faith in science, faith in technology, and faith in the "progress" of both. This faith is required because the amount of data is massive, the measurement and analysis of the data is obscure, the calculations required to arrive at a conclusion are impossible for anyone outside of the specific scientific field to understand. So science no longer has a universally accessible feedback loop. Any person *can't* repeat the observations and check the calculations themselves. Having a general *faith* in science is sort of like having a general faith in the Church. Having a scientist explain the truth in lay terms on NPR is no different from having a soothsayer or a priest. (The faithful can at least take solace in the fact that in their own field it is *they* who are the priest, and carry the message to the flock.) Obviously one of the criteria by which any sane NPR listener judges the soothsayer is which transnational corporation is funding their research, and which is sponsoring the program.

If accepting a scientific concept requires faith instead of proof, then science is, for the purposes of that concept, a religion. How many scientific concepts do you accept on faith and how many have you proved? Many people accept the principle of gravity because, in addition to "proving it" by dropping objects out the window in eighth grade science class, they have a common daily experience with it. But take even the most basic concept of physics, like the Law of Universal Gravitation: How many people have made years of astronomical observations of the planets or even checked a few of Brahe's observations, let alone Kepler's lifetime of analysis, to see if these guys were bullshitting? We may have faith in a scientific concept because we have faith in the idea of the universally accessible

feedback mechanism that we assume keeps scientists from making mistakes or playing tricks, or in other words, the idea that someone else would have checked Brahe's observations and found the errors if there were any. In navigation this is akin to following the boats in front of yours under the assumption that they know the waters, and although people do it all the time, it's not considered sound. Some person might argue that the scientific theories of long ago were "proven" by repeatability and peer review in their own era, and it is therefore unnecessary to keep repeating this review. This is a sensible argument, essentially that the channel was long ago sounded and marked by buoys as aids to navigation, and today we can blindly and safely follow the buoys into the harbor. But how often should the location of the buoys be checked? How many generations does it take a "proven fact", like a barnacle encrusted half submerged buoy, to become an article of faith, or a myth, or a quaint story in a venerated book?

While voyaging down the west coast of Florida in the sailing canoe Dugong, we learned to regard the 1979 charts that we had xeroxed at the library with suspicion. Once, we were driven inshore by heavy winds and we made for a cut between two islands. The chart said the cut held six feet of water at low tide, plenty of clearance for our canoe drafting nine inches. We bore down on the cut on a broad reach, surfing erratically down the backside of some pointy swells, our 175 square feet of sail reefed and flapping, spilling wind like a huge, billowing red flag. I scanned the beach nervously with salt stained binoculars, but all I could see was the white-crusted foam of breakers along a shoreline. Beyond the cut I could see the pleasure yachts cruising the calm waters of the intracoastal waterway. We were running out of time to make a decision about trying to run through the cut, and the swells were growing pointier. I noticed a small crowd amassing on the edge of the beach. An instant later I realized they were amassing to gawk at the prospect of our doom! I leapt back to the tiller and threw it to lee, and we tacked about and nosed out to sea through the waves closehauled and beating anxiously off the shore. Later we learned that this and many other cuts along that coast are regularly opened and closed by shifting sand. We never bothered to find out if that cut was water or sand, whether we would have made it into the bay or shipwrecked. Once we were miles downwind of it that was irrelevant.

The faith people must have to believe a scientific theory undermines the unique advantage science has over other religions. The exponential proliferation of scientific theories, data, specialties, and instruments makes it doubtful that through education every person can be part of the contributing scientific community. The authority of science now rests too heavily on faith, and to invigorate its authenticity requires some kind of voyage with consequences that can be attached to individual scientific endeavors.

All religious traditions confer privileges on their priests and soothsayers. Some religions require risk and sacrifice from their mediums. Priests are supposedly celibate. There are rattle snake handling preachers whose authority stems from the fact that God has them not get bit. Sometimes they get bit, sometimes they die. The theory at least is that their authenticity is on trial for everyone to see. One day I read Jacques Cousteau's The Silent World, the account of his discovery of scuba diving. I wondered why I admired him so much since I can't dive and don't like trying. In addition to being very clever and open minded, and including in his research all sorts of details that show his dedication to being a good observer, he had one other outstanding feature. He experimented on himself first, and was unafraid to do so. When his crack German machinist sent down a new breathing gizmo he strapped it right to his own lungs and waded into the Mediterranean. He knew the danger was considerable. There was at the time plenty of evidence that diving is bad for you, as helmet divers had crippling illnesses and grisly death to show for it. But Cousteau risked everything and donned the gear. When the French

Navy wanted to know what a diver experienced when an explosion occurred in the water nearby, Cousteau donned the gear and had them gently bomb him. Today most eminent scientists don't have the balls or the faith in their own research to "don the gear". Like the Nazis, they experiment on poor wretches or prisoners.

Maybe there is some way to require scientists to "don the gear", and force them to accept the consequences of the beliefs they are trying to foist on others. To use the navigation analogy, is there a way to send a proponent of a theory out to sea and see if they come back? The willingness of the scientist to do this would be a necessary precondition to the consideration of their theory. I realize this is a severe proposal. But if to advertise a cure for cancer a huckster actually had to contract cancer and then cure it with their remedy, there might be more cures for cancer and fewer charlatans. With larger issues, like global warming, in which the outcome is off in the future, a market approach (so in vogue these days) might be appropriate. Scientists on opposite sides of the debate are required to completely stake their fortunes on the outcome they believe will occur. Some scientists who are wrong will go broke in their own lifetimes, or their grandchildren might later be unceremoniously evicted from the family home and sent to the shelter. Either way, the scientists and their descendants would become vitally interested in the viability of their theories. As literal stakeholders in the future, they would be more likely to turn away from doubtful theories, like turning the sailing canoe around rather than risking sailing into a non-existant cut. It would be a more dangerous place, as it was for the navigators and people like Cousteau, but at least there would be a correcting force that guides our ongoing attempts to model the world.~

WHAT'S THIS FOR?

I'm not a farmer, don't like the government, and once bought a few large bags of fertilizer. The mere fact that I am not a regular customer aroused plenty of suspicion at the chemical supply plant. The business is an urban agricultural chemical supply place where the giving and taking of life is reduced to 50-pound bags of powder. In a very shrewd mixture of the World Bank and the pentagon, they sell the powder to encourage growth and the powder to kill it back. Right now they are specializing in exotic poisons for pest control contractors to kill special bugs. They have a large display called "pest of the month" that coaches the contractor on selling the product. This month features an obscure spider with a scary name whose picture is magnified a few hundred times. It lurks behind washing machines and can leave a red mark on the skin if it bites. It is responsible for more than a dozen harmful bites a year in the U.S. Concerned households need a monthly application of a fumigant to protect them. The name of the chemical fumigant is longer than the name of the spider. At the counter, there is a lot of nervous shuffling around as my fertilizer order is processed. Then the inevitable "So what's this for?" The deal is almost done, they have my cash, and the printer is sawing out my invoice. I briefly contemplate saying, "I am want to make biggest fertilizer bomb I'm can, but only there is money for three bags." Would they renege on the sale? Would the moral or legal liability of selling me 150 lbs of fertilizer outweigh the bottom line instincts of the average conniving entrepreneur? "Who needs to know?" would be my instinctual response to "What's this for?" but in the case of the fertilizer, I'm not the actual client, rather, where I work is paying, so I shrug and say, "They just told me to come get this stuff." Suspicion follows me around to the service yard where three bags of fertilizer are unceremoniously dumped in the back of the company's pickup and the forklift driver gives me a long, silent look. I mouth the word "McVeigh" to him, and grinning, gun the engine of the old ford.

A lot of the research and actual work I do involves tracking down and acquiring obscure things like fertilizer salts. The reason for this is that the process of inventing new things is now very parasitic. An inventor looks at the kaleidoscopic array of baubles and amulets spewing out of the factories and asks, "How can I recombine this stuff to make it do what I want it to?" Actually developing some one off design from scratch is impossible unless the capital exists to build a giant new factory in Taiwan, and a vast market can be swindled into buying the result. So in underdeveloped markets like the solar energy industry, and in my job in particular, there is the strategy of parasitizing existing industrial schemes for the parts to make some kind of new solar collector or solar cooker. Very successful solar niche products are developed this way, such as super efficient refrigerators, and some solar well pumps.

I am using radiator hose to make a cheap solar hot water heater. The clerk at Napa can't understand why I care about the outside diameter of the different hose sizes. When I take out a vernier caliper and explain that I have to shove the hose through a hole in a plastic drum, he gets slightly anxious and says, "What's this for?" There was a time, when I was younger, when I would have enthusiastically explained the details of the solar hot water heater under construction. I stopped doing this when I discovered that it normally engenders contempt, scorn, and sometimes ridicule. Some clerks have contempt for solar energy. Others scorn the idea of doing anything different, a sort of sarcastic backlash against the concept of Yankee ingenuity. Often a supplier ridicules me for proposing a misapplication of their product. "This valve wasn't designed for that, and I can't guarantee it will hold up." It is very rare to find a supplier who is at all curious about novel uses for their mundane hardware parts. Especially when it comes to tracking down seemingly irrelevant information about the parts. "What's the highest temperature water can pass through this valve? Look, buddy, this is a irrigation supply warehouse. You're not going to put boiling water on your landscaping. What's this for, anyway?" As the popularity of a certain part or pump declines, such as a circulator pump for a closed loop solar hot water heater, the item becomes scarce, and the price increases. Without parasites of my type, the economics of mass production are driving us toward total conformity.

Speaking of conformity, about two years ago a friend calls up and asks me if I want a free truck. "Nothing doing" I say, but several events in my life are conspiring to make me actually want a truck. First, there is the work servicing solar thermal systems. Ironically, being a solar janitor hinges on having a reliable fossil powered work truck to carry around the tools and my lunch from jobsite to distant jobsite. Second, since the collective pickup truck was sold, we need a largish vehicle for moving construction materials, scavenged wood, and manure. Finally, the time Dawn and I spent at sea encouraged me to learn more about engines, since so much of boating is keeping one running. So I say "What kind of engine?" Pretty soon I have a broken truck in my yard. Now I am an ambivalent student of diesel mechanics. I read books on diesel engines, talk to mechanics, and order parts from supply houses and dealerships. And I notice something strange. My relationship with the supply clerks is entirely different. "What kind of engine?" they ask. "Cummins 4BT-3.9," I reply. Clickety-Clack. Brief pause. "Yes, I'm showing those exhaust manifold gasket sets in stock, with the turbo gaskets it is $8.95." I have my usual array of dumb questions. "Does it matter what direction the gaskets face?" "Hold on, I'll get the shop guy." The shop guy steps in from the garage smiling, wiping his hands on a rag, "Sooo, you're fixing up an old Cummins, Huh? That's great! Yeah, it doesn't matter which way those gaskets face. Just make sure the manifold and the head are real clean. See, you want to catch the holes on your bolts there so that the gaskets will stay in place while you're mounting your casting. Oh let me check the book for you, but I think they specify 32 ft-lbs for those bolts. Yes, it's 32 ft-lbs and you want to work them tight from

the middle toward the end in 10 ft-lb increments. Good luck with your Cummins!"

Whether I'm buying a fuel hose, injector washers, or whatever, the suppliers I deal with are competent, helpful, and supportive. Even my neighbors are eager to lend a hand. For about two months the transmission is apart on a bench in the driveway. It takes a long time because, to save money, I do ridiculous things like forge my own bearing pullers for the lay shaft bearings. When I finally get it back together my one neighbor volunteers to help me wrestle it back into the newly replaced clutch and bell housing. After some lifting and shoving we realize I bought the wrong bell housing. We crane the transmission back out of the truck, me swearing in bitter defeat. My neighbor tries to cheer me up, giving the transmission a big slap on the side. It sounds just like it must have sounded a hundred years ago when his great grandfather slapped a donkey's ass in this very spot. "Now you be a good little tranny and work nice for Lu, you hear me? You be a good little tranny!" Just then my other neighbor pulls up in his pickup. From across the driveway he has spotted the problem. "I know what the matter is," he says, " you got a regular Chevy bell housing but your tranny is the heavy duty series, see, so you need the bell housing with the bigger size hole in it". As is his habit, he repeats himself three or four times. Then to my utter surprise he says, "I think I got one of those somewhere in my yard, come on over." For the first time in the eight years we've been neighbors he leads me back into his junkyard of old Chevy parts. There are engines strewn around and piles of camshafts rusting on old palettes, and the ground is a slimy mixture of used motor oil and cottonwood leaves. "Over there!" he exclaims, pointing, "That's the one! Grab it!" Just poking out from the leaf muck among hundreds of things lays the bell housing, and the next day the transmission bolts triumphantly into place.

Other than polluting the atmosphere, causing cancer, and tying up traffic, which are not considered terrorism in our society, I have no plans to do anything antisocial with my truck, and the salespeople and neighbors who assist me universally suppose that my motives for truck ownership are completely innocent. I don't know why it makes such a big difference to be buying a fuel filter for a diesel engine than a pressure relief valve for a glycol loop solar collector. Our urge to conform is primal, and it's easy to be cheerful if you believe you are on the winning team. I didn't know it when I grudgingly accepted the gift of the cursed truck, but in the eyes of society I was being traded to the winning team. Now when I walk into Napa holding the broken clutch fork and the proud clerk hands me a shiny new one in under two minutes, I think about the fertilizer. The only reason we bought 150 lbs of fertilizer is because fifty pounds were the smallest bags we could get in which the salts were not pre-mixed. We needed to mix them ourselves so we could control the melting point of the mixture by varying the ratio. We needed to control the melting point because we were not fertilizing shrubs, but making a thermal storage battery. It turns out that by mixing salts, which have a big heat of fusion, it is possible to make a thermal battery that stores and releases a lot of heat right around a specified temperature. The battery produced with these fertilizer salts weighs about ten pounds and stores enough heat at 400 F to cook a small meal. It can be "charged up" with heat by cooking it in a solar cooker all afternoon, and then brought inside in an insulated container to cook a nice batch of brown rice for supper several hours after dark! In honor of the suspicious fertilizer people I call this battery "A Salt-In Battery".~

DIESELWHISPERER

Erroneously supposing that I know much about diesel engines, I was asked more than once to survey a prospective engine for a friend.

The surveying and troubleshooting of my own engine was done entirely by two expert mechanics, one an employee of Caterpillar, and one a field mechanic with a degree from diesel mechanics school. This is what I learned from them. It mainly applies to engines like mine: old, medium duty truck diesels.

The goal of a quick survey is to attempt to determine the condition of the engine and identify any problems without special diagnostic tools or invasive mechanical procedures. The assumption is that simple tools like a multi-meter and screwdriver are available, but a full shop isn't.

1. There is a way to crank most diesel engines without starting them. In cold weather with a cold engine, cranking the engine is not normally enough to start it, and some combination of glow plugs, a block heater, and a fuel and/or air pre-heater, or barbeque under the block are required to get it going when it is cranked. The reason to crank it without starting it is that something can be learned about the condition of the battery, starter, and engine cylinders by cranking. If the engine is the usual kind of misbehaved diesel, it can be cranked by simply turning the key in the ignition. If it is a peppy one that starts right up, then it can be cranked by denying the engine fuel. The easiest way to do this is to disable the run solenoid temporarily. Some run solenoids need 12 volts to open, and shut down when the voltage is removed. Disconnecting the run solenoid wire leaves the solenoid shut so no fuel goes to the cylinders (I think it just all goes from the injection pump into the fuel return, but I'm not sure). Then the engine is crankable but not startable. Some engines, I am told, have a solenoid that stays open until 12 volts is applied, and then shut down. This seems a little weird to me, but in any case, just running a banana clip lead from power to the solenoid will stop the fuel flow. What is learned by cranking the engine? Wait, before that, one more thing. Diesel starter motors work much harder than their spark engine counterparts, so it is usually recommended that they be rested two minutes for every fifteen seconds they crank, so that they don't fry. A couple of ten second cranks can tell you a lot. If the starter motor doesn't work every time, the starter or starter solenoid might need some work, both costly items. If the starter action works but the starter motor just sort of loses its "oomph", then the battery might be dying. If there is a multi-meter, then the voltage of the battery can be checked while the engine is being cranked. If the cranking voltage of the battery drops below 10 volts or so, then the battery is nearing retirement. Next, listen to the compression beats of the engine. As the flywheel cranks around, there is one compression beat for each cylinder. If the beats are of the same pitch (tone), then that indicates the same compression from cylinder to cylinder. One or two higher or lower pitched beats indicates one or two cylinders with less or more compression than the others, which is a bad sign. Also, a "hard spot", where the starter motor appears to have momentary trouble cranking the engine, is a potential problem. After this test, return the run solenoid wire to its original scheme.
2. This might be a good time to check around the injector pump, fuel lines, and injector glands for fuel leaks, and around the front seal, rear seal, and pan for oil leaks. Fuel leaks at the injector pump can be costly to fix and often must be fixed. Oil leaks are expensive to fix, but don't always need to be fixed right away.
3. While waiting for the battery to recover from its workout, draw a sample of the engine oil and check the level and the quality. How regularly is it changed? Is the level correct? At some point, either now or later when the oil is hot, a sample should be drawn, either via the dipstick or the drain plug, and

checked for emulsion. A white, mayonnaise-like emulsion in the engine oil indicates water (usually coolant) in the engine oil. That's really bad. Coolant in the engine oil can indicate a crack in the engine block, or some other crack, such as a crack in the oil cooler.

4. OK, start the engine. Use the glow plugs, or whatever preheating system normally employed, to get the thing running. If starting it up proves monumentally difficult, especially in warm weather, treat it as a flag. When a cold diesel starts, it usually exhausts a white smoke out the tailpipe. This is "raw" fuel and should clear up when the engine is warmed up and under load. If the engine has an oil pressure gage, check it against the shop manual specifications. Low oil pressure is not good. Oil pressure should increase with engine rpms, and decrease a little as the oil gets hot, but never drop below the minimum specified for the engine.
5. As the engine warms up, keep feeling the exhaust manifold around each cylinder port. Even heating of the exhaust manifold outlets indicates even combustion of fuel in the cylinders. If one outlet lags 20 degrees F behind the others it indicates a problem in that cylinder.
6. Check (with the temperature gage if there is one) that the thermostat opens and coolant circulates. Some claim they can feel the coolant being circulated by the coolant pump by squeezing the radiator hose. If the radiator gets hot, coolant is circulating. The radiator cap can be removed and the coolant circulation observed up until the point when the expanding coolant gushes out.
7. Step on the accelerator and check for a skipping or missing with the engine racing. Skipping or missing could indicate a clogged fuel filter or some other obstruction to fuel flow. A clogged fuel filter is cheap enough to replace (do it right then), but if the engine was operated for a long time with a clogged filter or dirty fuel, then other serious things could be wrong. For example, a plugged fuel filter could eventually perforate and allow contaminants into the injector pump. Or, a plugged fuel filter could starve the injector pump and injectors of the fuel they need to stay lubricated and cool (fuel that is normally returned to the tank).
8. When the engine changes speed, it is sometimes possible to hear the turbo spinning (if there is a turbo). The turbo slows down after the engine slows down because it spins freely. If the turbo emits a loud whine or a racket, or if it leaks oil around it, then it might be bad. This can be further examined by removing the air inlet or exhaust outlet of the turbo and checking the turbo vane assembly for almost free, smooth rotation, and very little play. If the turbo's lubrication system has a leak on the inside, there may also be oil inside the turbo, which indicates a bad turbo. A bad turbo won't keep an engine from running, but will reduce the power it puts out. It is normal for the turbo to get hot. A serious air hose leak between the turbo and the air inlet manifold could mimic a turbo problem. An obstructed air inlet (such as a plugged air filter) can also make the engine appear anemic. If you remove the air filter to check for air inlet suction, be careful. There are stories of things, such as rags, getting sucked right into the air inlet manifold and getting stuck. An air filter is cheap to replace. The air inlet hose between the air filter and the turbo is under considerable negative pressure, and must not leak. A leak indicates dirty air carrying contaminants around the air filter and into the engine. The hose can be inspected for leaks, or starting fluid (ether) can be sprayed gently on a suspicious section of hose with the engine idling. If a little ether gets sucked through a leak, then the engine will race. Finally, a crudded up fuel filter can also make it

feel “like someone is holding on to your bumper while you’re trying to drive down the road”.

9. Listening to the valve noise of an engine can be revealing. A screwdriver and a piece of hose make a crude stethoscope for pinpointing weird noises. With the engine not running, valve covers can be removed and the valves checked for major flaws like large cracks, stuck valves, or badly bent pushrods. If the engine can be “timed” and the valve lash checked, might as well see if it is reasonably in tune. A valve lifter that is seriously loose can indicate a bent pushrod. If a diesel is downshifted too drastically the engine can overspeed and the piston head can whack an open valve. Then hopefully the pushrod is the only thing that goes. (Don’t downshift diesels unless the engine rpm is low enough to do so). Under normal acceleration this doesn’t happen because the injector pump contains a governor that limits the engine rpm.
10. Assuming the engine runs and the rest of whatever machine it is attached to (car, boat, tractor, chipper/shredder, power plant) is working, it should be taken for a ride (run under a variety of loads like normal operation). Under load, exhaust leaks in the exhaust manifold will present themselves like little gunshots. These will also have telltale carbon-soot marks where the leak is. Exhaust leaks upstream of the turbo could lower turbo efficiency, but the main reason to fix them is to avoid asphyxiation. Under normal operation, a diesel makes a little black smoke when shifting up under load, or lugging (engine overloaded), but is clean when running in its “sweet spot” of engine rpm and torque. If it makes black smoke, that indicates a problem with fuel injection, combustion, air supply (plugged air filter), timing of the injector pump. If it makes bluish smoke that indicates engine oil in the exhaust. The engine oil might be entering the combustion/exhaust stream from a crack in the head (very bad), a bad piston seal (bad), or a bad turbo seal (fairly bad). If the engine makes white smoke that smells like raw fuel, that indicates a bad injector or some other reason uncombusted fuel is getting in the exhaust. One way to find out which cylinder is not firing is to loosen each injector gland nut one at a time with the engine idling. Wear gloves and goggles and use a rag to deflect the pulsed jet of fuel that will squirt out from each nut. When the fuel starts squirting out, the rhythm of the engine will change as that cylinder “drops out” (stops firing). If a particular cylinder does not stop firing when the gland nut is squirting that can only be because it wasn’t firing to begin with, and there is a problem cylinder. If the engine makes white smoke that smells sweetish, like hot glycol or coolant, then there is coolant in the exhaust. Coolant can enter the exhaust via a crack in the engine block (very bad).
11. With manual transmission vehicles that are rolling along, pushing in the clutch and switching the ignition “off” stops the engine from turning but leaves everything else turning (wheels, rear axle, drive shaft, transmission). This can help distinguish engine noises from other noises. A lot of caution should be used in vehicles with power steering and power brakes.
12. On vehicles with automatic transmissions, pink emulsion in the transmission fluid indicates a transmission oil cooler leak, which means a transmission rebuild ($$).
13. There are a few things that increase the safety of operating a diesel engine. Being able to disconnect the battery from the engine provides safety from electrical fires. Some diesels have a manual switch or solenoid switch (battery isolator switch) to accomplish this. Accidentally disconnecting the battery while the engine is running could be harmful to the alternator. Some diesels also have a valve or a lever for

manually shutting off the fuel to the engine. This prevents a scenario known as “runaway diesel”, where the engine refuses to turn off. It’s also good to have a fire extinguisher near a diesel engine. A CO2 fire extinguisher has the added feature that it can be discharged into the air intake to stall out a runaway diesel. Nitrile gloves prevent oil from getting on skin, and eye protection is wise when working with high pressure fuel lines.

At this point a reader might reasonably be wondering, “How bad was this guy’s engine when he got it that he has had to learn all of these things?” The answer is yes, most of these things and many more were wrong with my truck when I got it, but, thanks to my indefatigable friends, I learned a lot about diesel engines by rebuilding one. Once someone told me that to pick out an old truck they went to the lot on a cold winter day and tried to start all the engines in all the trucks, and then bought the one that started. I think, that to really learn about an engine that could last a lifetime, a better strategy might be to go to the lot on a warm summer day, try starting all the trucks there, and offer to tow away the one that doesn’t start at all. Set aside as much money as you would have spent on a running truck because you will need it.~

The Injustice of The Passive Solar Hot Water Heater:
Who takes the first shower enjoys the cream of the day’s solar crop, with no incentive to conserve. Those who follow only gain incentive to conserve in proportion to the degree to which the resource was squandered by their antecedents.~

Graveyard Creek, Everglades National Park

One of the neat things about coastal sailing is the unique view we get of the coastline by approaching from the sea side rather than land. Even on the outskirts of large cities we manage to find a marsh or mangrove in the shadow of a smokestack or high rise condominium where we anchor alone with the birds and the "no trespassing" signs all face the other direction. Most of the visitors here at Graveyard Creek are exotic birds: egrets, herons, ibis, tern, plover, all stalking along the tide line. For us there was no official sign at the entrance of the biggest wilderness area in the continental U.S. , just a waning of condominiums and jet skis, and a waxing of birds, fish, and little uninhabited islands. Sailing by, we ignore or are totally unaware of the rules and regulations here in the Park. Some canoeists we meet confirm that in our ignorance we nonetheless comply with the vast majority; inside and outside the Park we are careful not to molest wildlife, feed alligators, leave garbage, and start fires. On the other side of the law we pick coconuts, share the occasional undersize fish with our stowaway cat, and we did not get a camping permit nor file a "floatplan". Had we filed a floatplan we would already be declared "lost at sea", since our plan changes every day with the weather, and half the time we have no idea where we are. Trying to Xerox full size charts on to smaller paper at the library has the effect of distorting or leaving off latitude and longitude lines, and our knot log is a piece of grapefruit peel tossed into the water ahead of us and watched carefully by the querulous navigation committee as it floats by. Anyway, we are not the only surreptitious visitors in the Park. Richard said there are people squatting back in the Glades that the Park Service knows nothing about. Boy, i hope so, and i hope they have mosquito nets. The tide tables these canoeists gifted us call the Park "the backcountry". So we are surprised upon reaching Graveyard Creek to find a National Park Service sign saying "Graveyard Creek", a picnic table, two portapotties, and a long handled spade. After securing Dugong along the creek bank, the

lateral anchor holding us away from the bank won't stick in the channel bottom of the creek. i finally get the anchor to grip way over in the mud on the other side of the channel. Embarrassingly, this means that skinny Dugong, huddled in the mangroves along the creek bank, is actually obstructing motorboat traffic up and down the creek. As morning dawns today i fully expect a motorboat to surprise me and trash our anchor line. At around noon a small fishing skiff motors across the lonely bay and noses into the creek. Instead of going up creek they beach on the bank just downstream from us to use the portapotties. Then, minutes later, i hear a large outboard coming down the creek. It appears around the bend, moving quickly to maintain rudder in the narrow, ebbing creek. It is a large swamp scow with a merc 225 outboard and a big tank and apparatus amidships. I wave to the skipper and jiggle my anchor line and he gives me the thumbs up. i slack the line momentarily while he guns his engine, puts the propeller in neutral, and glides over the rope. Then he suddenly leaps from the helm and shouts, "Your boat is no problem, but I need you to move that other boat down the beach!" The current has a loose grip on his scow and is drifting him in a difficult direction. Then he leans off the side of the scow and much louder and emphatically yells, "I NEED TO GET TO THOSE PORTAPOTTIES!!" Sensing his gastrologic urgency i fly from the bow of Dugong onto the creek bank and sprint to move the skiff. The scow skipper cuts his helm back and runs his prop backwards, then forwards, the scow turns and lurches forward and with a roar runs far up on the beach. A big wooden sign on the plastic tank amidships reads "STINKY". The Honey Wagon has come to Graveyard Creek! With a single nonchalant pull the two stroke engine of his large pump starts up and he begins sucking the contents of the two portapotties right into his stinky tank. For a couple of minutes in the backcountry along Graveyard Creek there are three boats, two outboards, one two stroke pump, and the smell of strong blue chemicals in the air. After the exhaust and the stench clear we chat with the scow skipper. Wearing khakis and knee-high rubber boots (not, presumably, just for wading in the mangroves), he is the archetype of backcountry local knowledge good boathandler, and ties his scow to a tree with two withered painters. He takes a break from his work and walks around the beach. We donate to the National Park Service a beverage cooler we picked up at sea (we sailed over to it hoping it contained cold beer and Reuben sandwiches, but it disappointed us). He thanks us on behalf of the NPS and we chat some more. His interest in our boat and voyage never trespasses on the subjects of permits, floatplans, our cat, or our coconuts. He declines to launch his scow with a push, saying "Let the horses do it, let the horses do it." With another smoky roar and a surge of propwash the now heavier scow floats, clears our anchor line again, and hauls off up creek with its cargo. The other boat takes off as well, and we spend a peaceful afternoon watching the birds work the wrack line, the tide go out, and the wind blow the wrong direction through the backcountry.~